STRATEGIC ASSESSMENT OF THE USAID/NIGERIA CHILD SURVIVAL PROGRAM

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ACRONYMS

ADB	African Development Bank
ANC	Antenatal care
ARCH	Applied Research in Child Health
ARI	Acute Respiratory Infection
BASICS	Basic Support for Institutionalizing Child Survival
BCC	Behavior change communication
BFHI	Baby Friendly Hospital Initiative
CAPA	Catchment area planning and action
CBD	Community-based distribution
CBO	Community-based organizations
CDC	Centers for Disease Control and Prevention
CDTI	Community-directed treatment with Ivermectin program for Onchocerchiais
CEDAW	Convention on the Elimination of Discrimination Against Women
CEDPA	Center for Development and Population Activities
COPE	Client-oriented, provider-efficient
CPH's	Community Partnerships for Health
CS	Child survival
CSD	Committee on Sustainable Development
DG	Democracy and Governance
DFID	Department for International Development (UK)
DHS/NDHS	Demographic and Health Survey/Nigeria DHS
DPT3	Diptheria, Pertussis, Tetanus – 3 Refers to Third Dose
EPI	Expanded program of immunization
FGM	Female Genital Mutilation
FGON	Federal Government of Nigeria
FMOH	Federal Ministry of Health
FP	Family planning
GAIN	Global Alliance for Improved Nutrition
GAVI	Global Alliance for Vaccines and Immunization
HIV/AIDS	Human Immunodeficiency Syndrome/Acquired Immunodeficiency Syndrome
HKI	Helen Keller International
ICC	Inter-agency coordinating committee
IEC	Information, education and communication
IITA	International Institute of Tropical Agriculture
IMCI	Integrated Management of Childhood Illness
IP	International Partners (of USAID)
IPT	Intermittent preventive treatment
ITN	Insecticide treated bednets
INACG	International Nutrition Anemia Consultative Group
IVACG	International Vitamin A Consultative Group
JHU/CCP	Johns Hopkins University, Center for Communication Programs
LGA	Local government area
MCH	Maternal and child health
MTCT	Mother to child transmission
MMR	Maternal mortality rate
MOST	Micronutrient Operational Strategies and Technologies
NACA	National Action Committee on AIDS

NCFN	National Committee on Food and Nutrition
NetMark	USAID-assisted bednet marketing project
NGO	Non-governmental organization
NID	National Immunization Day
NPC	National planning commission
NPHCDA	National Public Healthcare Development Agency
NPI	National program on immunization
NPOA	National Plan of Action (for Survival and Protection of Children)
OAU	Organization of African Unity
ORS	Oral rehydration salts
ORT	Oral rehydration therapy
PEM	Protein energy malnutrition
PHC	Primary healthcare
PHN	Population, Health, and Nutrition
PSRIHH	Promoting Sexual and Reproductive Health and HIV/AIDS Reduction
PTA	Parent Teacher Association
PVO	Private voluntary Oorganization
RBM	Roll Back Malaria
RH	Reproductive Health
SOTA	State-of-the-art
STI	Sexually transmitted infections
TB	Tuberculosis
UNICEF	United Nations Children's Fund
USDA	United States Department of Agriculture
WCFHS	Woman and Child Friendly Health Service
WDC	Ward Development Committee
WHO	World Health Organization
WHS	Ward Health System

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APPENDICES

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EXECUTIVE SUMMARY

As USAID/Nigeria moves toward implementing its new Strategic Plan for 2004–2008, it is working hard to gain a comprehensive understanding of the effects of assistance provided over the past decades by the United States Government and other donors. Nigeria has experienced considerable political, economic, and social upheaval during recent years. To maximize future development assistance, it is critical to understand the interactions of domestic dynamics and the way development assistance has contributed to changes to date. New USAID programs and policies must stem both from Agency policies and priorities, and the specific needs and capacities that exist in Nigeria.

To contribute to an understanding of the current development status of Nigeria, USAID engaged the services of a team of seven public health experts to provide a strategic assessment of the child survival (CS) program. The assessment, conducted from October 24 to November 10, 2002, included a review of official program documents and reports, interviews with key government and private sector leaders in the health field, site visits to Lagos and Kano States, and lengthy discussions with USAID officials in PHN and other sectors.

This report provides a synthesis of what was learned, the results of the assessment, the team's analysis of existing information, and recommendations for proceeding with CS programming over the next five years. The team hopes that this assessment will help facilitate successful efforts by USAID to significantly improve the health status of Nigeria's population.

OVERVIEW

USAID has been involved in CS in Nigeria since the early 1990's. During the years of military rule, USAID maintained a presence in Nigeria by working, at a reduced scale and funding levels, through the private sector. During this period, BASICS (Basic Support for Institutionalizing Child Survival) created local stakeholder groups (community partners for health [CPH]) which evolved into indigenous NGOs to help communities come together to address their own health issues and create partnerships. The CPH's proved that communities could be successfully mobilized to help themselves in times of crisis. Many of these communities also developed partnerships with international partners (IPs) working in reproductive health.

Within months of the transition to a democratic government, the USAID portfolio began to grow dramatically. In October 1999, USAID/Nigeria launched a four-year transition strategy to work in health, education, agriculture, and democracy and governance. The population, health, and nutrition unit has three sub-sectors: CS, family planning, and HIV/AIDS. Currently these sub-sectors are managed separately although considerable effort is being made to foster integration and collaboration.

In the past, in the absence of a bilateral agreement with the Nigerian government, USAID obligated money through US-based international partners. While appropriate at that time, USAID/Nigeria now views this arrangement as too management-intensive and inflexible. Under the new strategy, USAID will obligate funds through fewer, larger bilateral mechanisms. The CS Strategic Assessment is part of the USAID/Nigeria analytic agenda to inform the new five-year strategy. Companion assessments were carried out in HIV/AIDS and reproductive health, and will be carried out in education, agriculture, and food security. There

also will be special assessments on tuberculosis and mother to child transmission (MTCT) of HIV/AIDS.

USAID proposes a strategy that will integrate the family planning, health, and education sectors. HIV/AIDS will receive first priority and the largest portion of funding under the new strategy, and will be managed under its own Strategic Objective (SO), followed by family planning. Activities in education and CS will be subject to resource constraints. It is in this context that the team undertook its analysis. Given the magnitude of the CS issues in Nigeria, every dollar must be used to its maximum potential.

ANALYTIC FRAMEWORK

In order to systematize its assessment, analysis, and recommendations, the team developed a framework to identify key levels and types of action for investment of USAID resources. The framework is compatible with the operational framework developed by the United Nations Children's Fund (UNICEF) and captures several elements of USAID's SO framework.

The framework represents the assessment and recommendations for USAID CS programming. These include:

- Outcomes in three categories – enabling environment, capacity building, and promoting healthy practices;
- Crosscutting support – including the types of investment that affect several CS or PHN program areas;
- Level of action and responsibility – international, national, state, local, and community;
- Activities and interventions – programming approaches and interventions that might be carried out at each level; and
- Synergies and integration – opportunities to integrate programs and interventions.

FINDINGS

Technical Program Areas

Malaria

The Roll Back Malaria (RBM) movement in Africa has defined three key strategic interventions reflected in the three Abuja Summit targets: 1) prompt and effective treatment of malaria in children under five; 2) access to and use of insecticide-treated bednets (ITNs); and 3) intermittent preventive treatment (IPT) in pregnancy. The RBM partnership in Nigeria has drafted a strategic plan that includes these major strategies. The status and strength of progress in implementation of each varies, with implementation of ITNs as the best developed. The RBM strategy of early and effective treatment has moved much more slowly, while the strategy for IPT in pregnancy has not been promulgated.

Current malaria indicators reported by the Mission and its IPs are only partially consistent with RBM and USAID indicators. A Demographic and Health Survey (DHS), planned for

early 2003, will include a malaria module that will provide a standard baseline for future program monitoring and evaluation. However, a review of current plans for data collection and reporting by IPs and communities implementing RBM activities would strengthen the Mission's ability to report results.

Nutrition

While Nigeria has the potential to produce sufficient food to meet the needs of its population (about 130 million) and also for export, food production deficits over the past decade have led to widespread food insecurity and malnutrition, especially among women and young children. Malnutrition is exacerbated by the high rate of infection, lack of safe water and sanitation, inappropriate household dietary and health behaviors, and the effects on women of too frequent child bearing beginning at a very young age. Over 40 percent of Nigerian children are stunted, and rates of anemia among women and children remain high. Over the past decade, Nigeria has achieved almost universal iodization of household salt (98 percent), although some pockets of deficiency remain.

Nigeria's current nutrition policy is comprehensive, however it is only a prelude to a more strategic national plan of action for nutrition under the direction of the National Committee for Food and Nutrition (NCFN). Such a strategy must engage key partners in making strategic decisions about program priorities, phasing, and roles and responsibilities. Such decisions will make the plan feasible for implemention and support from all partners. It must include interventions such as vitamin A supplementation, food fortification, and infant feeding.

Immunization

Nigeria has a long history of implemention of the expanded program of immunization (EPI) beginning with pilot efforts in 1975, and the strategy revision which was completed in 1984, with major inputs from UNICEF. In 1983, the government began increasing their inputs, such as funding, logistics, transport, power generators, information, education and communication (IEC) materials, and training packages, as well as organizing a series of national and state immunization days (NIDs and SIDs). At that time, national immunization coverage was less than 15 percent.

In the last two to three years, immunization activities have focused overwhelmingly on NIDs for polio, based on a global agenda and donor funding, while there is very little routine immunization at fixed primary health care (PHC) facilities. Despite the assertion by the staff of the National Program on Immunization (NPI) that vaccine supplies are adequate (though they do acknowledge a distribution problem), other sources report a widespread scarcity of vaccines. In addition, donors have raised issues regarding transparency in NPI's use of vaccine funds. The Interagency Coordinating Committee (ICC) is positioned to have a greater influence in policy. The surveillance system for life-threatening vaccine preventable diseases and other childhood illnesses has also suffered. Currently, diphtheria, pertussis tetanus (DPT3) coverage is low, and polio NIDs drain resources from routine immunization.

There appears to be a shortage of vaccines throughout the country. Informants complained about lack of transparency in the use of vaccine funds by NPI. One way to insure vaccine quality and availability would be to purchase vaccines through UNICEF. The Interagency Coordinating Committee will be critical to policy change, and USAID has an important role in this area.

Other Child Survival Issues

USAID should identify a limited number of program areas to focus its CS investment. The three areas chosen by USAID (malaria, nutrition, and immunization) account for a significant proportion of under-five morbidity and mortality and will bring earmarked USAID funds. Nigeria is committed to addressing these issues, as well as to taking advangtage of opportunities for leveraging other donor funding and international movements (e.g. Global Alliance for Vaccines and Immunization [GAVI], Global Alliance for Improved Nutrition [GAIN], RBM, etc.) to address them. Other major causes of child morbidity and mortality should be considered. They may be addressed in the context of integrated programs and, in fact, are necessarily addressed at the service delivery level. The major conditions that should be considered are diarrhea and acute respiratory infections (especially pneumonia), estimated to account for over one third of deaths in children under five in Nigeria. Other CS areas worthy of small, well-defined interventions include neonatal mortality, birth spacing, and preventing MTCT.

Crosscutting Areas

Community Approaches

Community approaches are an important means to achieve ownership, sustainability and local buy-in where government resources are scarce. Community approaches need to be backed by observable results, including behavioral and structural changes. The team identified the following key issues to be addressed in order to expand USAID-supported community approaches:

- Simplification, streamlining and consolidation;
- Understanding and applying base population coverage and monitoring;
- Achieving a critical mass of intervention;
- Focusing on and delivering outcomes; and
- Reaching the hard-to-reach.

Child Survival Program Packaging

The primary healthcare system in Nigeria is designed to provide comprehensive, integrated healthcare, with a well-coordinated two-way referral system, and to integrate home/community-based care with clinic-based healthcare. However, in practice, the system does not always meet the goals of its design.

USAID should consider assisting in the formulation of a minimum CS care package. A number of healthcare packages, from the Bamako Initiative to Minimum Healthcare Package, Baby Friendly Hospital Initiative (BFHI), integrated management of childhood illness (IMCI), and more recently the Client-Oriented, Provider-Efficient program (COPE), and Woman and Child Friendly Health Service (WCFHS) strive to provide comprehensive CS/primary healthcare (PHC) services. The two most current additions are the catchment area planning and action (CAPA) and the Ward Health System (WHS) programs. All of these packages were put into operation using well thought out procedural guidelines or operational manuals, and most are internally consistent and logical. However, there was little coordination among the groups in developing different approaches, resulting in a somewhat fragmented effort. Despite the fact that many frontline PHC workers received some form of training on the implementation of these packages, some are confused by changes in the

manner CS/PHC services are provided. PHC packages are usually accompanied by corresponding job aids and BCC materials. There is an enormous amount of experience in these combined efforts, making harmonization a high priority.

Policy

USAID interacts with policy in two ways: directly through USAID officers, and indirectly through its IPs. There is a large number of complex stakeholders and government departments engaged in various policy arenas important to CS.

The team felt that the overall policy environment at the national level is acceptable. Nigeria has many of the right national policies and conventions in place, even if many require updating or more comprehensive plans. Political will is another issue, however; there are outstanding financing and policy issues at the state and local government area (LGA) level that impact CS programs.

As it moves toward an integrated strategy, USAID needs to further focus its policy agenda, especially considering current human resource constraints. Current national activities remain important, but policy activities should gradually devolve to focus on implementation of national policies in focus states and LGAs, where they have a direct impact on service delivery. In addition, coordination should be enhanced between the various levels to avoid the fragmentation of well-intentioned efforts. Some USAID resources might be utilized to address poor institutional capacity for the management of health services.

Private Sector

Nigeria's private sector is large, broad, complex, and dynamic, comprising everything from very small local PVOs to large multinational corporations conducting billions of dollars worth of business. Market forces are particularly vibrant in Nigeria, a fact reflected in the health sector.

The vast majority of poor Nigerians obtain medicines through small patent medicine vendors and local health workers. A significant percentage of healthcare, especially in urban areas, is provided through private sector hospitals and clinics. Quality is an important issue from drug supply (counterfeit drugs) to clinical quality of care, to infection prevention (universal precautions to protect against transmission of HIV). Community (PMVs, midwives, etc.) and mid-level healthcare practitioners (community clinics and hospitals) do not have easy access to the latest technologies and treatment protocols in public health areas. An important advantage of donor-supported commercial or social marketing efforts, such as NetMark and the Society for Family Health, is their commitment to disseminating sound technical information through commercial channels.

The aid sector is made up of many local and international NGOs, private foundations and other charitable organizations. Private health providers and non-governmental organizations (NGOs) contribute significantly to PHC and other CS activities in Nigeria.

Integration

Child survival programs could benefit immensely from integration with other USAID programs, such as agriculture, water and sanitation, and education. Although some effort is

already directed at integration, additional consideration is warranted. In areas where USAID is not active, working with other partners such as UNICEF should be explored.

Behavior Change Communication

Though behavior change communication (BCC) is an integral part of the CS package, in Nigeria it is currently handled by several IPs as an add-on to support the interventions, and not as a systematic and integrated strategy itself. Advantage is not being taken of the professional capacity in health education and communications generated by Nigerian universities. As in all components of CS programming, there should be a strong monitoring and evaluation component to BCC.

USAID Comparative Advantages

Based on the findings noted above and on discussions with a variety of stakeholders, the team identified a number of areas in which USAID/Nigeria holds important comparative advantages. These were further weighed and considered by the team in the formulation of the recommendations in this report. USAID's comparative advantages lie in:

- Technical Assistance – USAID is a recognized leader in state-of-the-art technologies in all health areas;

- Advocacy – This is an area of historical strength of US assistance programs. As a major donor, USAID has significant influence on policy;

- Flexibility – USAID and its partners have demonstrated a remarkable degree of responsiveness to changing needs and conditions;

- Community level approaches – Unlike most donors, USAID has always supported a wide variety of private sector initiatives in Nigeria, and it remains one of the few donors to actually reach the grassroots level effectively;

- Behavior change communication – USAID and its partners have evolved systematic and evidence-based approaches to changing health behavior and community norms related to health issues; and

- Results-based approach – USAID is a pioneer among international donors in implementing strong, data-driven systems to manage for results. Results-based approaches are important to orient programs and define success.

RECOMMENDATIONS

Nigeria is large and complex and its child health problems seem intractable. Although incremental gains have been made in some areas and there are a number of promising programmatic approaches, overall, the survival of Nigerian children depends more on internal geopolitical and social reform than on externally funded programs. When queried, many Nigerian informants spoke movingly of their hope - and prayer - that the way forward for Nigerian children lies in fomenting Nigeria's democracy and curbing corruption. Nigerian informants and other stakeholders provided many sound recommendations, which the team has validated and distilled into broad strategic recommendations. They are discussed in detail in the final section of this report.

General

- **Integrate:** Integration as a principle is a positive force for efficiency and effectiveness. All programs should be integrated at the service delivery level.

- **Tighten policy and research agendas:** Clear mechanisms are needed for USAID to develop and update a highly focused policy and research agenda, with mechanisms to exclude issues or research that is marginal to central issues.

- **Develop an integrated Behavior Change Communication (BCC) Strategy:** USAID and its partners must evolve a behavior change communication strategy that is comprehensive, evidence-based, culturally sensitive, and focused on outcomes across sectors, rather than a knowledge-based, sector specific approach.

- **Expand public-private partnerships:** The private sector offers a crucial link to populations and a safety net in case public sector programs fall short. Whenever possible, CS should be integrated as an essential part of private sector efforts.

- **Design evidence-based and data-driven programs:** Carefully set performance targets, programmatic benchmarks, and monitoring and evaluation protocols are essential to the new USAID strategy. They must pass very strict achieveability criteria, with levels of funding taken into account.

Program Areas

- **Malaria:** Malaria remains the most significant threat to children in Nigeria and should remain a priority for USAID, consistent with the three major RBM areas.

- **Immunization:** USAID should focus on routine immunization to the extent feasible (given the national and international priority given to polio eradication) and on encouraging other programs and donors to strengthen routine immunization. USAID should ensure that private sector vaccination capacity is developed as a back up to the public sector.

- **Nutrition:** There is a need to adopt a more rational and holistic approach around key behaviors with proven impact on child health. To this end, maternal and child nutrition should remain a strong priority of the USAID program.

- **Other CS interventions:** USAID should seek opportunities to reinforce and support ongoing programs in oral rehydration therapy (ORT), acute respiratory infection (ARI), and integrated management of childhood illness (IMCI) with no-cost interventions (e.g. including them in a BCC strategy, reinvigorating ORT corners, include them in curriculum updates).

Recommendations for the Transition Period

- **Strengthen knowledge of healthcare financing:** Additional information gathering and analysis is necessary in this area. The eventual goal is to reinforce the financial sustainability of key health interventions at local, state and national levels. In order to design programs that reinforce self sufficiency in financing, USAID and its partners need a stronger knowledge base of current resource allocation trends and issues.

- **Inventory/annotate policies, norms, "Standing Orders" and curricula:** A team should be organized to conduct a comprehensive inventory and technical review of all guidance materials currently used in public sector health programs.

- **Inventory, integrate and innovate in BCC:** BCC for CS in Nigeria needs an injection of enthusiasm, innovation, and a strong strategic perspective based on sound behavior change theory and well-defined messages. External technical assistance for this should be sought.

- **Harmonize and energize community approaches:** A small working group composed of experienced community mobilization experts and strategic thinkers should be formed to identify common approaches, problems, and to help harmonize models.

- **Cross-train IP staff in CS, reproductive health and HIV/AIDS state-of-the-art-technology:** This will be necessary for integrating programming and technical support, particularly at the community level.

- **Analyze vaccine and essential drug capacity:** USAID needs to determine whether there are points within the supply system where targeted interventions would be helpful.

- **Link research with policy and performance indicators:** USAID should encourage links between policy and research, maximize research links to programs, and reconsider the role of applied and operations research across the health/education sector.

Four Urgent Needs

1. Address the issue of taxes and tariffs on nets, yarn and insecticide for insecticide treated bednets. Be aware of similar issues in upcoming plans for food fortificants.

2. Address, through the ICC and other means, the problem of vaccine stock-outs, initially and urgently in the LGAs where BASICS and other IPs operate. In addition, centralization and the lack of transparency in vaccine procurement and distribution should be addressed. "No Product, No Program!"

3. Follow the launching of the National Nutrition Policy with a Plan of Action. Insure multi-stakeholder involvement and integration of food security and a rational approach to essential nutrition actions".

4. Given the effect of HIV/AIDS on the nutritional status and health of entire households, USAID/Nigeria should actively engage with government and partners to develop comprehensive HIV/AIDS care and support guidelines in order to ensure that programs recognize and provide support to vulnerable households. This would include directing Title II assistance to vulnerable households (potentially identified by food deficits/insecurity rather than by HIV-infected individuals if stigma is an issue).

I. OVERVIEW OF CHILD SURVIVAL IN NIGERIA

> *What we are doing for our children, we are doing for ourselves and our future.*
> Masalaha CD Association Leader
> Kano State CAPA Member

BACKGROUND

Lying on the West Coast of Africa, with a total surface area of 923,708 square kilometers, Nigeria is divided into six geopolitical zones (for administrative and political convenience) comprising 36 states, a federal capital territory, and 774 local government areas (LGAs). The country is a young multi-party democracy – a presidential system of government composed of an elected executive president, the legislature and a judiciary at the national level; and similar officials at the state and LGA levels. Nigeria has an estimated population of 130 million and a population density of 128 persons/square kilometer. The population is pyramidal: 45 percent of Nigeria's children are below the age of five years, which implies a high dependency ratio.

Although the rate of urbanization is rising, more than 60 percent of the population still lives in rural areas. They are dependent on subsistence farming, especially in the northern parts of the country. Although the major industry in Nigeria is agriculture, about 90 percent of foreign exchange earnings is derived from oil. With fluctuating oil prices worldwide, it is little wonder that the structural adjustment program introduced in the 1980's to correct economic imbalances had a serious negative impact on the socioeconomic standards of Nigerians and on the quality and utilization of health services.

> *Lagos is bigger than most African countries in terms of population, complexity and density.*
> Honorable Commissioner for Health
> Lagos State

Nigeria is a multicultural, multiethnic, and multireligious society**,** composed of more than 350 ethnic groups and three large religious groups. This multiplicity of groups not only contributes to enormous competition for access to the nation's resources, it implies a complex mix of cultural practices that impact health. For example, different food preparation practices, such as overcooking vegetables (a practice common among many Nigerian groups), have a serious effect on nutrition. Additionally, in some rural communities, food taboos cause Nigerians to withhold eggs and meat from their children in the belief that this will prevent them from stealing when they become adults. These practices, combined with others such as the practice of discarding colostrum, consequently delaying initial breastfeeding, can have serious effects on nutritional and health status in early childhood.

Other cultural practices that affect child survival (CS) and maternal health include early marriage and female circumcision, both of which could be underlying causes of obstructed labor, abortion, and hemorrhage, leading to high rates of maternal mortality. The following socio-cultural factors contribute immensely to CS status in Nigeria, and require attention and amelioration:

- Female genital mutilation (FGM), practiced in the first year of life and on pregnant women at delivery;

- Gender differentiation in child raising and socialization;

- Increasing involvement of women in the labor force without the corresponding capacity and options for childcare;
- Limited involvement of fathers in raising children;
- Low levels of exclusive breastfeeding;
- Sexual exploitation and trafficking of women for commercial sex work;
- Childhood marriage; and
- Late introduction of poor quality complementary foods.

Nigeria's rapidly growing population is exerting excessive pressures on land resources, and poor infrastructure, leading to limited employment opportunities in rural areas. These forces, individually and collectively, encourage rural-urban migration and lead to rapid urbanization. The sudden influx of large numbers of people into new urban centers increases demand on existing social services, and as a result, basic services are overburdened. The resulting overcrowding and squalor, now characteristic of most Nigerian cities, facilitate the spread of communicable diseases, and a vicious cycle of malnutrition and infection ensues among young children.

More than 80 percent of the population of Nigeria is considered poor, while 25 percent of the nation's wealth is owned by 5 percent of the population. Such a situation leads to further deterioration of the health status of the majority of the people.

In Nigeria, more than half of the adult population is illiterate (59 percent females, 41 percent males). Consequently, not only do women have fewer employment opportunities than men, the high level of illiteracy in women has a negative effect on maternal health and CS. With few exceptions, evidence suggests that individuals who are better educated exhibit better health seeking behaviors than the uneducated, and the latter are less likely to be able to afford treatment for severe illnesses. Similarly, the rate of under-five mortality is higher among children whose mothers are illiterate.

Nigeria's maternal mortality ratio (MMR) is one of the highest in the world at 704/100,000 live births. Zonal variations of the MMR are large, with the highest in the northeast (1549/100,000), and the lowest in the southwest (165/100,000 live births). See Table 1 for other noteworthy health indices for the country. More details on child health indices are found in Annex D.

Table 1.

Crude Death Rate	43 / 1,000
Crude Birth Rate	16 / 1,000
Infant Mortality Rate	114 / 1,000 live births
Under Five Mortality Rate	239 / 100,000 live births
Low Birth Weight	17%
Under Five Stunting	45%
Complete Immunization before 1st birth day	13%

Source: the Status of PHC in Nigeria, NPHCDA, May 2001

The continuous loss of the extended family system, which served as a social safety net, has led to an escalation of social insecurity and poverty. The traditional sense of mutual obligation toward family members' total welfare is fast disappearing, leaving the weak or chronically ill without sure support to face hardships, and an inability to meet their basic needs.

The rapid spread and rising prevalence of HIV/AIDS, and its impact on the economy and the health status of children and their parents, exacerbates social insecurity and poverty. Fifteen years of military rule nurtured large-scale erosion of the social and moral fabric of Nigeria, resulting in the frequent incidence of economic sabotage, nepotism and corruption. Consequently, there is rising unemployment (of youth in particular), great frustration and despair.

Nigerian children are affected by very high levels of mortality and morbidity from diseases that are preventable with simple and affordable measures. Over 90 percent of morbidity and 80 percent of mortality in children under five is attributable to four causes: malaria, vaccine preventable diseases, diarrheal diseases, and acute respiratory infection. These account for 30 percent, 22 percent, 19 percent, and 16 percent, respectively, of under-five deaths. Among the vaccine preventable diseases are pertussis (6 percent), cerebrospinal meningitis (6 percent), neonatal tetanus (5 percent), and measles (5 percent). Nigeria, one of the five remaining global polio reservoirs, reported a total of 57 polio cases in 2001, and 196 cases in 2002. In addition, 42 percent of children under five are stunted and malnutrition underlies more than 50 percent of all child deaths.

Malaria accounts for 30 percent of under-five deaths and 11 percent of maternal deaths. There is a high prevalence of diarrheal disease among children, estimated at 15.5 percent according to the 1999 Nigeria Demographic Health Survey (NDHS). The prevalence of acute respiratory infection in children is 11 percent (NDHS, 1999). This, combined with high levels of malnutrition and micronutrient deficiency, worsens the health status and development potential of Nigerian children. An emerging threat to young children is HIV/AIDS, which can be transmitted from an infected mother to her child in the womb, at the time of delivery or through breast milk.

GOVERNMENT RESPONSE

Nigeria has responded to the poor health situation of its people by creating an enabling environment for the actualization of international conventions and agreements. In this regard, the Nigerian government has signed and ratified a number of charters and conventions with the United Nations and other governments in the region, to respond to the rights and welfare of women and children. These include:

- Convention on the Rights of the Child;
- Organization of African Unity (OAU) Charter on the Rights and Welfare of the Child;
- Declaration and Plan of Action for Children (from the World Summit on Children);
- Convention on the Elimination of Discrimination Against Women (CEDAW);

- Preparation of the National Plan of Action (NPOA) for the Survival Protection and Development of Children (adopted in 1992);

- Formulation of a broad national health policy, with primary healthcare (PHC) as its cornerstone and main focus;

- Formulation and operation of certain CS-specific internal policies such as those on breastfeeding, immunization policy and standard of practice, essential drugs, population and sustainable development, fortification of food with vitamin A, reproductive health, nutrition, maternal and child health, malaria control policy and insecticide treated bednets, water supply, and sanitation policy. An all-embracing child policy was also recently drafted and approved;

- The formulation and implementation of CS programs such as integrated management of childhood illnesses (IMCI), Baby Friendly Hospital Initiative (BFHI), Roll Back Malaria (RBM), nutrition, preventing mother to child transmission (MTCT), and other projects to address the of spread of HIV/AIDS;

- Decentralization of program management and operation through the establishment of semi-autonomous agencies such as: 1) National Program on Immunization Agency, 2) National Public Healthcare Development Agency (NPHCDA), 3) National Action Committee on AIDS (NACA), 4) National Agency for Food, Drug Administration and Control; and

- The reorganization of health departments at the LGA level into maternal and child health (MCH), Immunization and Disease Control, Health Education and Women Activities, and Supplies and Essential Drugs.

Other programs address poverty reduction, provision of basic education, water and sanitation, protection of the environment, enhancement of food production and security, etc. Attempts have been made to coordinate donor support through the National Planning Commission and the formation of the Interagency Coordinating Committee (ICC). A number of state and local governments have declared their resolve to provide free healthcare to vulnerable groups such as women and school children, either for political reasons or as a measure to cushion the burden of poverty afflicting their citizenry. Unfortunately, many excellent and well-intentioned initiatives suffer from fragmentation as a result of a lack of adequate coordination at the national and state level.

> *The previously high gains in immunization coverage were 'donor driven.' The key to sustainability is local and state resource generation and commitment.*
>
> WHO Representative Nigeria

The Federal Ministry of Health, supported by DFID, the World Bank, and the African Development Bank (ADB), is embarking on health sector reforms with a view to improving the financing of healthcare in the country. In addition, the World Bank supports state government reforms with special health systems funds. The NPHCDA is also piloting a community-based model for the implementation of primary healthcare, which could complement or accommodate the USAID/BASICS CAPA model in 200 local government areas.

ANALYTICAL FRAMEWORK

In order to systematize this assessment and analysis, and to make recommendations, the team developed a framework to identify key levels and types of action for investment of USAID resources and efforts. The framework is compatible with the operational framework developed by UNICEF, one of the main USAID CS partners, and captures several elements of the USAID Strategic Objective framework.

The elements of the framework are as follows:

1. Outcomes

Three general categories of outcome are defined:

Enabling Environment: Actions to create conditions for increased availability of resources, coverage, or effectiveness of one or more child health and nutrition interventions. Examples include advocacy, development of improved policies, establishment of conditions for increased availability of commodities, and approaches that increase resources through either public or private channels. While actions at the most central levels (national and even international) are often in this category, important actions to improve the enabling environment can happen at all levels, including the community level.

*Capacity Building: A*ctivities and inputs to strengthen the ability of those charged with providing child health and nutrition services, ranging care for sick children to promotion of behavior change, to do so more effectively. These activities and inputs may include traditional approaches such as building knowledge and skills of providers in the public or private sector. However, other important actions may have equal or greater effects, such as improved availability and use drugs and vaccines, improved use of information for management and decision-making, and operations research to develop more effective approaches for service delivery or to promote behavioral change. Investments in this category can be made at several levels, from the central (national) level, to states and LGAs, to local providers of child health and nutrition services and information. In addition, investments can be made to address capacity to manage health services, at any level. They may also be made in the public sector, the private sector, or both. This category largely corresponds to the supply side of child health and nutrition interventions.

Promoting Healthy Practices: Activities and inputs that increase the appropriate use of child health interventions by communities and families. This may include such activities as organization and mobilization of communities (or of existing organizations within communities), investments in knowledge generation, behavior change and communication, and actions to remove constraints or promote utilization of interventions. Many actions in this category are targeted to the household and/or community level. However, important actions in this category also include media-based strategies to promote behavior change or large-scale planning for social mobilization. This category largely corresponds to the demand side of child health and nutrition interventions.

2. Crosscutting Support

This part of the framework encompasses areas of investment affecting several CS or PHN program areas, such as logistics management, monitoring and evaluation, behavior change

communication, and public-private interaction. USAID has significant technical expertise and frequently has comparative advantage in these crosscutting areas. They hold the potential to become important areas of investment if adequately tied to outcomes.

3. Level of Action and Responsibility

This category must be taken into account when considering the USAID investment strategy. As noted, many of the desired outcomes need to be addressed at more than one level. However, both in terms of strategy and of most effective use of scarce resources, USAID must balance overall impact with other considerations, such as geopolitical commitments, or opportunities to leverage resources in order to determine the most appropriate levels for investment.

Levels in the framework include:

International. This level includes activities such as bringing state-of-the-art (SOTA) technical knowledge to Nigerian policy and programming, working on Nigeria-specific issues with investors such as Global Alliance for Vaccines and Immunization (GAVI), Global Alliance for Improved Nutrition (GAIN) and RBM, and identifying opportunities in Nigeria to carry out applied research that has international importance. USAID/Nigeria may rely on USAID/Washington and its central cooperating agencies to carry out these activities, with defined feedback and coordination mechanisms.

National. Actions at this level include interactions between the Government of Nigeria and the national headquarters of other organizations working in CS (e.g. UNICEF, WHO, World Bank). Examples include active, high level USAID participation in bodies such as the GAVI Interagency Coordinating Committee (ICC), participation in critical policy dialogue on issues (such as tariffs on importation of impregnated bednets), as well as support in development of national norms and standards of practice. This level also includes actions with national or multiple state level organizations, oriented to the private sector, such as distributors of bed nets, large scale food producers capable of undertaking food fortification, or social marketing of child health related commodities or information.

State. USAID is committed to having a focused presence in selected Nigerian states. States play a major role in healthcare, but up to this point, their role has not been clearly defined or agreed upon, particularly for purposes of basic PHC service implementation. Inputs at this level will likely be a critical element of an overall CS strategy. In the public sector, investments may include support for improving management functions (such as planning and logistics), capacity building, and development and implementation of effective program approaches (including operations research). There are potentially important opportunities for enabling environment investment at this level as well, such as revitalization of the state health councils, whose role is meant to be the development and monitoring of approaches to implement national policies in the health sector. In addition, many partners, (WHO, UNICEF, IP's such as BASICS) have established operating units at the state level, opening up opportunities for partnership. Important private sector activities may also be most effectively carried out at this level, including work with producers, suppliers, and marketers, as well as with larger NGOs.

Local. Supply and demand intersect at the local level, where the actual implementation of programs, delivery of services, and health system management comes closest to communities

and individuals. It is the level where the private sector tailors its services to the community. Important actions related to improving the availability, capacity, quality and management of services and information can be supported at this level. This level is likely to be an important focus of some USAID investments in health. Since there are 774 LGAs in Nigeria, USAID must seek ways to impact LGA-level outcomes at a meaningful scale.

Community. Community level action is an essential component of the programs of virtually all current USAID partners. In view of the challenges facing local health services, community organization and action provides critical support in promoting both household level actions such as breastfeeding and bednet use, and the utilization of appropriate services, from immunization to sick child care. Examples of interventions at this level include community organization, use of community channels to provide information, and improved availability of and demand for commodities. Community mobilization is effective in increasing availability and quality of appropriate services through trained community agents (such as community based distribution workers) or private sector providers (such as patent medicine vendors, who are frequently sought for treatment of child illness). It is important for USAID to find ways to invest in community level approaches that can reach a meaningful scale.

4. Activities and Interventions

Activities that might be carried out at each level of the framework, as well as examples of programming approaches are provided in an annex, using malaria as an example.

5. Synergies and Integration

The framework provides for the identification of synergies and opportunities for the integration of different actions and program interventions, relating them to the three major categories of outcome and the different levels of the system. Identification of these areas of synergy and integration allowed the team to envision and recommend options for integrated programming by USAID/Nigeria.

II. THE USAID/NIGERIA RESPONSE

USAID has been involved in CS in Nigeria since the early 1990's. During the years of military rule, USAID maintained a presence in Nigeria by working, at a reduced scale and funding levels, through the private sector. During this period, BASICS (Basic Support for Institutionalizing Child Survival) created local stakeholder groups (community partners for health [CPH]) which evolved into indigenous NGOs to help communities come together to address their own health issues and create partnerships. The CPH's proved that communities could be successfully mobilized to help themselves in times of crisis. Many of these communities also developed partnerships with international partners (IPs) working in reproductive health.

Within months of the transition to a democratic government, the USAID portfolio began to grow dramatically. In October 1999, USAID/Nigeria launched a four-year transition strategy working in health, education, agriculture, and democracy and governance. The Office of Population, Health and Nutrition has three sub-sectors: CS, family planning and HIV/AIDS. These sub-sectors are currently managed separately, although considerable effort is being made to foster collaboration leading to eventual integration.

In the past, in the absence of a bilateral agreement with the Nigerian Government, USAID obligated money through US-based international partners (IPs). While appropriate at that time, USAID/Nigeria now views this arrangement as too management-intensive and inflexible. Under the new strategy, USAID will obligate funds through fewer, larger bilateral mechanisms. The CS Strategic Assessment is part of the USAID/Nigeria analytic agenda to inform the new five-year strategy. Companion assessments were carried out in HIV/AIDS and reproductive health, and will be carried out in education, agriculture, and food security.

Currently, BASICS is the principal IP working in the CS sector. BASICS staff provide input on a broad range of technical issues and will cooperate with the national program on immunization (NPI) on polio NIDs. BASICS works at the community level in three states. Other IPs working in CS include Johns Hopkins University/Center for Communication Programs (JHU/CCP), tasked with behavior change communication for CS, Nigeria Applied Research in Child Health (N-ARCH) with applied research; International Institute of Tropical Agriculture (IITA) on food supplementation including the National Food Consumption and Nutrition Survey; NetMark on commercial marketing of ITNs; and the Policy Project on policy issues. A summary of each IP's area of intervention is Annex D.

In addition to the activities of IP's, the USAID team has considerable hands on involvement in a variety of policy and implementation areas. For example, as active members of the inter-agency coordinating committee (ICC), USAID helped negotiate the launch of the National Nutrition Policy, and they sit on a variety of coordination committees. USAID/Nigeria's small CS Unit in carries a large burden of supervision and direct policy intervention.

In the future, USAID proposes a strategy that will integrate the health and education sectors. HIV/AIDS will receive the largest portion of funding under the new strategy (and be managed under its own Strategic Objective), followed by family planning. Activities in both education and CS will be subject to resource constraints. It is in this context that the team undertook its analysis. Given the magnitude of the CS issues Nigeria faces, every dollar must be used to its maximum potential.

III. ASSESSMENT FINDINGS IN TECHNICAL PROGRAM AREAS

MALARIA

The Roll Back Malaria (RBM) movement in Africa has defined three key strategic interventions reflected in the three Abuja Summit targets: 1) prompt and effective treatment of malaria in children under five, 2) access to and use of insecticide-treated bednets (ITNs), and 3) intermittent preventive treatment (IPT) in pregnancy. The RBM partnership in Nigeria has drafted a strategic plan that includes these major strategies, as well as others. The status and strength of progress in implementation of each varies. The partnership itself in Nigeria is erratic and only somewhat effective in mobilizing sustained high-level commitment, coordinated inputs and strategic technical direction. The major partners in Nigeria have been WHO (with three NGOs assigned to RBM), UNICEF (which has taken a leadership role in ITNs), the World Bank (which remains a somewhat distant but important voice in the partnership), DFID, the Policy Project (the Futures Group), and USAID. There does not appear to be consistent strategic input either from NGOs or from the commercial sector except through the NetMark mechanism. The RBM committee seems to lack skills and direction for advocacy.

Although malaria represents a significant portion of the USAID CS funding and program, the Mission does not seem to have maintained strong attention to the RBM partnership and strategy. Aside from sizeable investment in NetMark, which as yet has no local program officer to facilitate liaison with commercial and other partners, USAID malaria funding and programs are fragmented. USAID is represented in the RBM partnership variably by mission staff, by local IP staff (BASICS, Policy), or even by regional IP staff (NetMark). Some relevant IPs do not seem to be part of the formal RBM partnership (Applied Research in Child Health [ARCH], JHU). This diffuse USAID attention reinforces the weakness in the national RBM partnership.

The implementation of ITNs is probably the best developed of the three RBM interventions, and a broad strategy consistent with regional guidance from RBM has been accepted by partners in Nigeria. President Obasanjo moved quickly to reduce taxes and tariffs on nets and insecticides after the Abuja summit in April 2000, enabling the RBM partnership to fully embrace expansion to the commercial sector in provision of ITNs in Nigeria. Both DFID and USAID (through the NetMark project) have made significant investments in public-private partnerships for ITNs. UNICEF has provided initial inputs at community level to stimulate demand through community based organizations (CBOs), and has also established and maintains a partners' forum for coordination of ITN activities throughout Nigeria. However, recent events have revealed the overall weakness in the RBM partnership. A reimposition of extremely high taxes and tariffs on nets and insecticide, although apparently a bureaucratic oversight rather than willful action, threatens all of the progress to date, particularly the continued viability of NetMark. So far, USAID and the partnership have been unable to effectively mobilize high-level attention from the FMOH or the Ministry of Finance to correct the situation. Time is running out as elections approach.

The federal Ministry of Health (FMOH) has been sluggish in its support for commercial ITN distribution, preferring to rely on donors to support free distribution of ITNs. A weak RBM committee with rotating leadership has been unable to advocate a sustainable multi-channel approach. The IMPAC scheme to offer free nets as a reward for ANC attendance has not

moved forward, as the FMOH has not been able to move the nets (100,000 provided by UNICEF) out of the warehouse.

Nigerian net manufacturers are able to supply perhaps only 1.5 million of the 15 million nets needed annually in the country. NetMark approached these manufacturers but found none producing nets of sufficient quality to be marketed under the NetMark logo. NetMark offered technical assistance to the manufacturers to improve quality, but there is no local manufacture of insecticides for ITN treatment. Activties by NetMark and others to greatly increase demand have produced a response in the local market, and locally produced nets are being packaged with treatment kits and marketed as ITNs.

Similarly, local drug manufacturers have been quick to respond and capitalize on RBM communication about treatment and efficacy by packaging and marketing local products to address concerns about resistance. However, the problem of poor quality and counterfeit drugs, including antimalarials, is acute in Nigeria (and thereby in neighboring countries as well). There is no coherent RBM strategy either locally or in the region to address this issue.

The RBM strategy for implementation of early and effective treatment in Nigeria, an area in which WHO has taken on but has not exerted leadership, has moved much more slowly. There was early commitment to unit dose pre-packs of antimalarial drugs, and some elements of the pharmaceutical industry in Nigeria have responded by producing color-coded blister packs. However, it is unclear how these packs are to be deployed. The design and planned deployment of the pre-packs were not informed by available research (funded by USAID through TDR). Pre-packed doses are expected to make it easier for mothers to identify appropriate drugs in the market, which is swamped by hundreds of brands, formulations, and presentations of antimalarial drugs, both real and counterfeit.

A more fundamental problem, however, is the long-standing question of the therapeutic efficacy of chloroquine. WHO has recently supported Nigeria in the re-establishment of sentinel sites for drug resistance surveillance (sites originally set up with USAID/CDC support in the 1980s). Data have been collected, but policy discussions and decisions about effective first-line treatment policy revision have not yet begun. Until such decisions are made, it is unlikely that any strategy to bring effective treatment closer to families and communities will be successful in reducing malaria morbidity and mortality in young children.

It has been well documented that most treatment of febrile illness in young Nigerian children takes places outside the formal health system. It is equally well documented that a large portion of antimalarial drugs available for community use is of extremely poor quality. The majority of febrile children in Nigeria are not given treatment that can prevent progress to severe illness or reduce the anemia that results from chronic parasitemia. The RBM strategy in Nigeria to pre-package drugs, coupled with a coherent strategy to link demand for effective treatment with supplies of the appropriate drugs in communities could improve this situation. This would be, in effect, a strategy to develop with the private sector.

Policy development and formulation in Nigeria appears to be largely donor-driven, with much external TA and Nigerian academic research input, but with little insight or buy-in from state and LGA levels. Policy documents and decisions do not appear to penetrate in any useful way into implementation. This was clearly shown in the initial RBM situational analysis in Nigeria which found that LGAs were unaware of malaria policies.

The RBM strategy for Nigeria also includes IPT in pregnancy. However, the policy has not been promulgated, does not seem consistent with standards laid out in the Regional Framework for Control of Malaria in Pregnancy, has no clear relationship to policies and programs of reproductive health in the FMOH, and is not implemented anywhere in the country. Nigeria is a focus country for WHO's Making Pregnancy Safer Initiative, which includes IPT. This is an opportunity for coherent IPT implementation and integration of USAID's RH and CS programs.

The capacity for direction and management of malaria control efforts in FMOH suffers from many of the same weaknesses as any other program. Key aspects of what should be a coherent program are scattered throughout the FMOH, and natural programmatic partnerships with IMCI, RH and PHC within FMOH are not fostered. Cross-sectoral partnerships are not sustained. Malaria experts in the FMOH are few, and they are often out of the country attending meetings.

The FMOH malaria program is supported almost exclusively by WHO, where there is a disproportionate emphasis on training, research and materials production. As the mechanism for coordinated action—the RBM partners' forum—is weak, actions are often untimely and unconnected to strategy or plans. Despite commitments made at the Abuja Summit to increase government investment in health and malaria, the program suffers from an acute lack of funds that also affects other health programs in Nigeria.

At the state level there are often requests to build malaria technical teams, which are thought necessary to provide epidemiological, entomological, clinical, and technical guidance and oversight. However, this is not a sound strategic plan for tackling malaria at the state level. The balance of technical competence, management skill, quality assurance and partnership development needed by the States should be carefully considered. The development of broad competence in malaria cadres at this level will not likely be an element of USAID programming. However, targeted inputs to RBM partners' discussions of capacity building, particularly by the World Bank and the Department for International Development (DFID), could build on USAID's comparative advantage and access to CDC, US schools of public health, and technical projects. A needs assessment organized by partners in the wider context of global RBM plans for capacity strengthening for malaria could clarify the appropriate balance of competencies to strengthen state level action in Nigeria.

At LGA and community levels, the competencies and capacity needed for malaria control are much the same as for immunization or nutrition: mobilization of communities and resources, management, supervision and quality, monitoring and communications. However, the importance of the private sector (both NGO and commercial) in ITN and treatment interventions highlights an additional necessary capacity-effective work with retailers and commercial agents. At present, communities are mobilized to link with public sector facilities and supplies. Malaria interventions will require community links to national and state ITN and treatment delivery schemes in the private sector.

One exception is the delivery of IPT as part of an integrated antenatal package. This is a new intervention to be delivered through facility-based antenatal care (ANC). Introduction and strengthening of this intervention will require all of the foundational processes: formulation of policy and clear guidelines and standards; integration into pre-service and in-service training; development of job aids and communication materials; regulatory procurement and logistics

actions to provide supplies; and communication and behavior change to introduce IPT to women and communities. None of this has been initiated. USAID has a distinct advantage in the RBM partnership to move this intervention forward: USAID and its malaria and RH partners (CDC, MNH, RPM+) have been key players in the development of the regional framework with WHO and UNICEF. USAID and its partners also play a major role in the multi-country sharing of experience, tools and strategies for scaling up IPT in both East and West Africa. This experience could be brought to IPT in Nigeria.

The key behaviors for malaria are well-articulated in the region as part of both RBM and IMCI: recognition of febrile illness and rapid administration of an adequate dose of an effective antimalarial drug; recognition of severe illness and rapid referral; regular and proper use of ITNs; early attendance at ANC; and use of IPT. Other related behaviors (continued feeding, etc) are also clearly defined. It is not clear how far community IMCI has moved in Nigeria. BASICS is only now beginning to include malaria in its community activities. Those partners engaged in malaria control at community level in Nigeria (e.g. BASICS, UNICEF) appear to focus on recognition and treatment and ITN use, as those are the only present interventions available. However, behavior change communication for malaria must be supported by the availability of commodities—ITNs and effective, accessible treatment. In the case of ITNs there is currently no direct linkage of community efforts to the top-down marketing and market expansion efforts of NetMark.

NetMark has initially targeted six states, including Lagos, Kano and Abia, where BASICS has been active at the community level. Next year NetMark will expand coverage to another 12 states. Expansion of the retail availability of ITNs through NetMark has moved slowly: retail outlets have grown to over 200 from an initial 20 when the project launched in Spring 2002. There is a need, however, to better link supplies to outlets, especially where intensive marketing has increased demand. For example, clients or wholesalers in all six states must refer to Lagos for bednet purchases. If the supply chain moved closer to the population, solid links to the existing Catchment area planning and action (CAPA) in three states could focus on expanding the market in response to local demand and expand. The scope of the NetMark Project has been expanded to enable such innovative partnerships with UNICEF, communities, and RBM partners. Encouragement of this link at community and LGA levels is critical. A similar link between RH activities at the community level and PSI national demand creation has occurred.

BASICS is developing materials and messages for use at the community level. This is still a fairly new effort in the BASICS program and the messages are not yet focused on key behaviors. The materials and methods are still limited to generic information about ITNs and dosing schedules for chloroquine. There are not yet activated or linked messages to improve access to NetMark nets or retailers, to guide communities to better quality drugs and treatment choices, or to mobilize communities to demand improved services and provision in the private sector. There is no apparent attempt to assist communities in identifying those at risk (biologically and economically) or work toward ITN coverage or treatment. ITN use is a new behavior that needs to be introduced. Treatment comprises a set of behaviors by mothers and providers that needs to be radically improved. Strategies to accomplish these two very different tasks may also be differently conceived.

Although patent medicine vendors (PMVs) are a major source of treatment for fever, they have not yet been formally linked to malaria activities. Patent medicine vendors were part of community partnerships for health (CPHs) in Kano State, where more formal private

practitioners and facilities are rare, unlike Abia and Lagos. It was hoped that PMVs could work in collaboration with CBOs, however, this did not occur as a PMV is not comparable to a health facility. The PMV association eventually became a CBO member; PMVs were elected to CPH boards, were trained, and became established ORT centers. Later, PMVs came to provide family planning commodity access for CEDPA.

There is no apparent implementation of antenatal IPT at the community level. This may result from the lack of a clearly documented national policy as well as limited availability of necessary drugs. Community-level activities in agriculture and education are also carried out by USAID. There appears to be no overlap between these and malaria activities, although there are several potential areas for integration. Malaria has a clear and significant impact on the agricultural sector. Farmers recognize the impact on production and family welfare, not so much from their own illness, but from that of their children for whom they must care, and whose care is a drain on family income and assets. Integration of agricultural and health programs, perhaps most clearly in the realm of micro-financing and household economy, should be explored. Opportunities for the integration of basic education and malaria activities are not as clear. Treatment of malaria in schools sounds good but is a low priority. School children are not at high risk for malaria morbidity and mortality in Nigeria, and it is not proven that health messages in schools lead to improved behaviors in later years, or influence family decisions in the present.

The current malaria-relevant indicators reported by the Mission and its IPs are only partially consistent with RBM and USAID indicators. The DHS planned for early 2003 will include a malaria module, and this will provide a standard baseline for future program monitoring and evaluation. In addition, a review of the current plans for data collection and reporting by IPs and communities would strengthen the Mission's ability to report results for this significant component of its health portfolio.

NUTRITION

While Nigeria has the potential to produce sufficient food to meet the needs of its population (about 130 million) and for export, food production deficits over the past decade have led to widespread food insecurity and malnutrition, especially among women and young children. On average, households spend more than 75 percent of their income for food, and in most households the food fails to meet minimum dietary requirements for energy, protein and micronutrients. Malnutrition is further exacerbated by the high burden of infection, lack of safe water and sanitation, inappropriate household dietary and health behaviors, and the effect on women of too frequent child bearing beginning at a young age.

Over 40 percent of Nigerian children are stunted. This growth retardation begins before birth. The rate of low birth weight is 15-20 percent. The average child's nutritional situation becomes more severe over the first two years of life due to poor breastfeeding and complementary feeding practices, such as delayed initiation and nonexclusive breastfeeding during the first six months, and the poor quality and infrequent feeding of complementary foods. All of this is aggravated by frequent and severe childhood illness. Clearly, nutrition must remain a priority for all USAID health sector interventions in the future.

Rates of anemia among women and young children remain high, largely due to micronutrient deficiencies (iron, vitamin A, folate, B_6, B_{12}), infections (malaria, helminthes, HIV/AIDS) and genetic factors (sickle cell). While reliable vitamin A deficiency prevalence data await the

results of the 2001 National Food Consumption and Nutrition Survey (IITA, USAID, USDA, FGON, UNICEF, Rotary Plus – initial results to be released in January 2003), vitamin A deficiency is expected to be severe among children under five. Over the past decade, Nigeria has achieved virtually universal iodization of household salt (98 percent), although some iodine deficiency remains.

A 15-year (2002 – 2016) national policy on food and nutrition in Nigeria, drafted in 1995 and approved in 1998, was officially launched by the National Planning Commission (NPC) on November 5, 2002.

Seven priority nutrition "actions" in the Nigerian National Policy on Food and Nutrition

1) Protect, promote, and support optimal child feeding practices in the first two years of life;
2) Ensure that the iodine requirements of the population are met;
3) Ensure that the iron and folate requirements of the population are met;
4) Ensure that the vitamin A requirements of the population are met;
5) Ensure adequate nutritional support for adolescent girls, pregnant women, and lactating mothers;
6) Ensure adequate nutritional care and support for people living with HIV/AIDS; and
7) Ensure the prevention and control of nutrition-related non-communicable diseases.

Although the current policy is comprehensive, it is a prelude to the formulation of a more strategic action plan. The National Plan of Action for Nutrition will be drafted under the direction of the National Committee for food and nutrition (NCFN), an interministerial committee for nutrition policy formulation and program coordination within NPC. While the NCFN seems prepared to move forward immediately with drafting the plan of action, there is a need to draw on a full analysis of the data from the National Food Consumption and Nutrition Survey and to engage key partners in making strategic decisions about program priorities, phasing, roles and responsibilities that will make the national plan feasible for support and implementation by all partners (government at all levels, private sector, bilateral donors, multilateral agencies, and foundations and trusts).

Vitamin A Supplementation

While there is a tendency to project potential for similar levels of reduction child mortality (23 percent) by routine Vitamin A supplementation across the board in countries where vitamin A deficiency is prevalent (>20 percent), vitamin A will almost certainly have greater impact in countries where: 1) less than 20 percent of infants are fully immunized; 2) where measles outbreaks continue to be common and fatality rates are high; 3) where less than one-half of the population has access to clean water and sanitation and diarrhea is a major cause of mortality among children under five; and 4) where malaria is endemic and is a major killer of children for lack of preventive measures (i.e., ITNs) and adequate treatment. This describes the public health situation in today's Nigeria. Thus, a high-coverage routine vitamin A supplementation program can provide a significant measure of protection for the most vulnerable children in Nigeria, especially in the short term, while basic public health services are reestablished.

At this time, vitamin A capsules are administered to over 90 percent of children once annually through NIDs (most recently during the October 2002, NID). NIDs are projected to continue through 2005 (ICC Subcommittee: FMOH, NPI, WHO, UNICEF, USAID, BASICS, and R P+). Additional sub-NIDs are conducted throughout the year, especially in the northern region, where vitamin A deficiency is believed to be most prevalent, and could provide a vehicle for delivery of a biannual dose of vitamin A in the short term.

In addition, Helen Keller International (HKI) has successfully piloted delivery of vitamin A capsules in conjunction with the community-directed treatment with ivermectin (CDTI)

program for onchocerchiasis eradication (see HKI description below), which covers 24 states in northern Nigeria. This program may also deliver an annual dose of albendazole for lymphatic filariasis (elephantiasis) eradication. However, the voluntary community-directed distributors for ivermectin have begun to demand payment for services in line with payment of NIDs vaccinators, raising a question about the potential to sustain and expand this model for the delivery of other community health interventions, including vitamin A.

Nigeria appears to be moving toward a health facility-centered primary healthcare delivery system, with active community outreach and health promotion, whether it is the Ward Health System proposed by the NPHCDA; the CAPA model that has had substantial support and ownership in Lagos, Kano, and Abia states; UNICEF's Essential Package of Care (to be expanded to 108 LGAs by 2004); or other variants. At this point, however, facility-based service delivery is weak, due to lack of funds, trained staff and supervision, drugs, and vaccines. In addition, there is a basic distrust in the community toward local health facilities providing quality service and treatment.

While various policies call for routine vitamin A supplementation to be integrated within facility services, including IMCI, there is no evidence that this is happening at a significant level, even within BASICS' target LGAs (BASICS' support of vitamin A supplementation to date appear to be largely constrained to NIDs-based delivery). Further, there are no country examples that can be cited where high routine vitamin A supplementation coverage (greater than 70 percent) has been achieved through routine contacts with children in facilities (e.g. EPI and other well-child and sick-child visits).

This may be the desired goal, but in the forseeable future Nigeria is only likely to achieve high routine vitamin A supplementation coverage through an active community mobilization approach. This has been done with great success in many countries, including Ghana and Zambia, by mobilizing communities to seek vitamin A supplementation for children at local facilities, semi-annually, at a cost of about US 25¢ per child per year. By scheduling the visits at the same times each year, they become routine. Child Health Weeks can provide flexibility for families to bring their children to the facility, spreads out attendance for the facility health workers, and allows facilities to provide multiple services (VACs for children and postpartum mothers, vaccinations, ITNs and dip solutions, water treatment, iron/folate supplementation, anthelmintics, etc.). Also, by building such service delivery around vitamin A supplementation, it can establish a level of trust and confidence in the community that their local health facility can provide highly effective services to protect the health of their families. It should be stressed that routine vitamin A supplementation should not be restricted to Child Health Weeks. There is also an urgent need for facilities to be strengthened in the use of vitamin A supplements in the case management of measles, severe/persistent diarrhea, protein energy malnutrition, and xerophthalmia.

A task force has been formed to consider options for routine vitamin A supplementation, with UNICEF taking a central role. Other likely participants include NPC/NCFN, the FMOH Nutrition Department, and NPHCDA. It should be noted that routine vitamin supplementation is not even mentioned in NPHCDA's current *Plan of Action for the Delivery of the Ward Minimum Healthcare Package in Nigeria.* This omission is likely due to the expectation that this will be covered by full IMCI implementation in the package. USAID/Nigeria and BASICS should actively engage the task force and use USAID's extensive global experience in establishing high-coverage, national routine vitamin A supplementation programs in the development of Nigeria's non-NIDs strategy.

Food Fortification

Nigeria is moving forward quickly in establishing a national food fortification program. A national policy has been established for mandatory vitamin A fortification of wheat flour, sugar, and cooking oils. Already, 85-90 percent of wheat flour millers and 40 percent of oil processors are fortifying their products; and the two major sugar companies, Dangote and ED and FMAN (with about 80 percent of total market share), are committed to launching fortification in January 2003. A logo for vitamin A fortified foods has been designed and launched. While there has been hesitancy to address more than vitamin A, there is obviously a need to move forward with iron, folate, and other B-vitamin fortification of flours, especially given Nigeria's expressed interest in life-cycle approaches to health, human capacity and productivity, and the link between nutrition and chronic illness. On the other hand, current fortification and distribution systems need to be evaluated before proceeding.

UNICEF has taken the lead on fortification with government agencies (NPC/NCFN, FMOH, SON, NAFDAC). The International Institute for Tropical Agriculture (IITA) in Ibadan is also a key institution, especially as the leader in conducting and analyzing the National Food Consumption and Nutrition Survey. While there has been interest in putting a GAIN proposal together to meet the December 15 deadline for the first round of GAIN implementation and strengthening grants, Nigeria is likely to have a much more competitive proposal if they work toward a June 2003 submission. Waiting until the June deadline will allow them to draw on the rich trove of data from the National Food Consumption and Nutrition Survey to develop a specific plan for fortification within the National Plan of Action for Nutrition, to document the establishment and functioning of the National Fortification Alliance, and perhaps to have some key individuals attend the IVACG/INACG meeting in Marrakesh, Morocco in February where the initial GAIN grants will be announced and discussion around GAIN may inform the development of Nigeria's GAIN proposal.

There is a danger that fortification is being oversold, an experience common to many countries establishing national fortification programs. It is being suggested that fortification may eliminate the need to supplement children with vitamin A, and has already led to a policy recommendation that children only receive supplements from 6-24 months of age. There are plans to establish a national nutritional surveillance system (possibly linked to the integrated infectious and non-communicable disease surveillance system) that can monitor nutritional status and program impact across the country as the National Plan of Action for Nutrition is implemented. This should be supported and used to evaluate whether routine supplementation, particularly vitamin A for children 6-59 months and iron/folate for pregnant/lactating women, can be reduced or more narrowly targeted.

UNICEF is developing a proposal to the Micronutrient Initiative for a bridging grant that would support preliminary fortification activities and provide some assistance in the development of a GAIN proposal. UNICEF expressed great appreciation for the technical assistance of Dr. Omar Dary from MOST and indicated their interest in USAID supporting Dr. Dary's technical assistance to the Nigeria program in the future.

Infant Feeding

Nutrition has been one of three technical focus areas (along with immunization and malaria) for BASICS' community-level work in Lagos, Kano, and Abia states. Implementation of nutrition activities, primarily promotion of better breastfeeding and complementary feeding practices, through Catchment Area Planning and Action (CAPA) programs in the target LGAs is at an early stage (even though the BASICS agreement will expire in 2004), and there is little evidence to date that these activities have had measurable impact (e.g. early initiation of breastfeeding, exclusive breastfeeding rates, introduction of complementary feeding at six months, quality and frequency of complementary feeds in well and sick infants, or duration of breastfeeding).

USAID's experience in multiple countries, including Zambia, Madagascar, and Ghana, has shown that while infant feeding behaviors are not easily changed, community level programs can be expanded to significantly improve infant feeding practices. While more than 90 percent of Nigerian mothers breastfeed and predominant breastfeeding is the norm, fewer than 20 percent of mothers exclusively breastfeed for even 3-4 months. In addition, complementary foods are introduced late (later than six months of age), are of poor quality, and babies are fed infrequently. It is estimated that 20 percent of infant mortality in Nigeria (105/1000) is attributable to poor infant feeding practices, so such a program could have a significant impact on infant mortality rates.

However, implementing such a program would require establishing and supporting a trained network of community counselors to work individually with mothers and through breastfeeding support groups, community based growth monitoring and promotion programs, and other channels to effect behavior change and shift community infant feeding norms. It is unlikely that such a program can be supported by USAID/Nigeria unless CS funding is substantially increased, or that the necessary program links are made and budget shared across CS, FP (LAM), and HIV/AIDS (preventive MTCT). It is also unlikely that BASICS' current approach, which is very message/knowledge-based and lacks a focused community level component, will have significant impact on infant feeding practices.

Infant feeding is a key element of CS in Nigeria, and it will become increasingly important in the context of the HIV/AIDS epidemic and preventive MTCT. While USAID/Nigeria should continue to work at the policy level and engage in the development of national strategies for nutrition and primary healthcare to promote appropriate infant feeding practices (as well as the other essential nutrition actions), the lack of funds to support community level action should be reflected in expectations of measurable impact in a bilateral program.

IMMUNIZATION

We don't have vaccines.
CAPA Leaders (Abia, Kano, Lagos)

There is no shortage of BCG in the country.
NPI Director

We are lacking DPT vaccines
Health Worker, Maidan Health Center, Lagos

The awareness us there [for immunization]. We lack the vaccines.
Honorable Commissioner for Health Lagos State

Nigeria has a long history of implemention of the expanded program of immunization (EPI) beginning with pilot efforts in 1975, and the strategy revision which was completed in 1984, with major inputs from UNICEF. In 1983, the government began increasing their inputs, such as funding, logistics, transport, power generators, information, education and communication (IEC) materials, and training packages, as well as organizing a series of national and state immunization days (NIDs and SIDs). National coverage was less than 15 percent in 1983. Nigeria also is one of three remaining polio reservoirs in the world.

The special efforts eventually yielded annual coverage rates of 95 percent for BCG and 65 percent for DPT3 in 1990, but slipped to below 20 percent after the election debacle of 1993. In 1996, NPI was subsumed by the Family Support Programme under the purview of the Office of First Lady, and her son was a major vaccine contractor. This period witnessed the importation of vaccines of doubtful quality through unusual sources.

In 1997, Nigeria became part of the international polio eradication effort and renamed its EPI program the National Program of Immunization (NPI), which is now a parastatal agency related to the federal Ministry of Health. This new agency focused most of its attention on the frequent NIDs, but after five years routine immunization coverage is still low (in the 20-40 percent range) and wild poliovirus is still circulating. During that year over 28,000 cases of measles were officially reported.

Various agencies and partners (including NGOs and research institutions) support immunization services in Nigeria. In addition to the NPI, activities are supposed to be coordinated and organized through an ICC. The ICC is also key to Nigeria's successful GAVI application. In recent months, the ICC has become more proactive, in particular encouraging more emphasis on routine immunization.

NPI sought the support of GAVI to provide global funds for children's vaccines for five years (2001-2005). Nevertheless, the NPI continues to procure vaccines through contracts started under the military regime, and does not avail itself of the cheapest source of quality antigens, namely UNICEF. Responsibility for vaccine distribution remains in federal hands, unlike the essential drug supply that is procured directly by state and local government health authorities. Although strong and efficient central procurement could insure the quality and availability of vaccines, in practice there are many questions about NPI effectiveness. In addition, there is growing tension between states and the federal bureaucracy on this issue. States and LGAs are increasingly frustrated by frequent vaccine stock-outs, despite central level assurances that vaccines are in stock. Transportation problems plague delivery and/or pickup of supplies between national, zonal, state and LGA stores.

NPI acts as a vertical program, controlling all resources from the center. Immunization is not yet effectively integrated into the PHC system. This is a consequence of wider systemic weakness in the health sector. The central control of immunization activities is anathema to the 1988 National Health Policy that states that PHC is the major healthcare delivery strategy for the nation, and that its delivery is constitutionally vested in the LGA. Immunization, as one of the eight essential elements of PHC, clearly should be a major local priority and responsibility.

In the last two to three years, immunization activities, based on a global agenda and donor funding, have focused overwhelmingly on NIDs for polio. There is very little activity in routine immunization at fixed PHC facilities. The surveillance system for life threatening vaccine preventable diseases and other childhood illnesses also has suffered.

> *Sometimes they [the vaccinators] pour vaccine under a tree, take the money and run away.*
> Post-NID Vaccination Briefing

During the field visits, the assessment team interviewed villagers, CAPA committees, health staff, three state commissioners of health, UNICEF, and WHO. All expressed alarm at the shortages of vaccines in their areas of operation, and many expressed concern about the handling of resources by NPI.

During the relaunching of EPI in the late 1980s, several donors, including USAID, contributed to the training of trainers and inservice training to enhance the ability of LGA EPI staff to forecast, plan, manage, mobilize, educate, and evaluate. USAID made a major investment in national and state monitoring and evaluation systems to track and evaluate immunization progress.

UNICEF built cold chain capacity in a comprehensive and reasoned manner from central to zonal, to peripheral levels in each state. This capacity was nearly completely undone in the 1990s. It is a common phenomenon that health staff and supervisors lack skills to perform immunization-related tasks. The vehicles, power generators and cold chain equipment provided by donors were frequently poorly maintained; when they broke down, they were often not repaired or replaced.

The present centralized system relies on a "push" mentality when stocks and transportation are available. Local skills for forecasting and advocacy are either non-existent or irrelevant in such a non-responsive system. One of the reasons for low coverage during NIDs is the selection of vaccinators based on political affiliations. Those selected, from among a particular politial outfit, were known to give false figures for coverage of children. NPI and state ministries of health have taken steps to alleviate this problem.

Between 1994 and 2001, the BASICS I program addressed the issue of immunization through a coalition of community-based organizations and private healthcare providers known as CPHs. CPHs advocated with LGA health departments to ensure that vaccine supplies were provided to their private member clinics, thus ensuring routine immunization at the local level in 16 communities in three states. Later, as NIDs rose in prominence, CPH members began to volunteer as vaccinators and guides, enabling LGA health staff to access skeptical and sometimes resistant communities. Although these small-scale efforts had limited impact on LGA coverage figures, they did build community capacity in advocacy and program planning.

The USAID/Nigeria program has provided funding to BASICS coupled with a mandate requiring them to participate actively in multi-donor/government polio eradication efforts through training at the national, state, and local government levels. The polio program consumes a significant share of BASICS' CS resources and is mainly used for training and communication. Given the national priority for polio eradication, this emphasis is likely to continue.

The Sensitive Surveillance System helps in targeting immunization rounds whenever wild polio virus is detected. The key indicator of the system's quality is a non-polio acute flaccid paralysis rate of greater than 1 per 100,000 population, which signifies that all cases of AFP are being detected. This has not been achieved in Nigeria, where the non-polio AFP rate in 1999 was 0.4.

UNICEF is taking action to provide and ensure maintenance of appropriate cold chain equipment within a national cold chain replacement plan. It is expected that suitable transport facilities (motorcycles/bicycles) will be provided to assure delivery of vaccines and services. WHO has established surveillance units in all states for integrated disease surveillance.

The NPHCDA works very closely with the LGAs through a system of zonal PHC coordinators and zonal technical officers in charge of supervisinh the PHC system. NPHCDA facilitates the formation and functioning of the three tiers of committees: the LGA development committee, ward development committee, and the village development committee. NPHCDA is already monitoring essential drugs through these committees which are also in a good position to manage the vaccines at the level of LGA/ward/health posts.

Current coverage figures support the perception that parents are either not seeking immunization for their children, or they are not successful in their attempts. A 2001 qualitative study, commissioned by JHU/CCP, found that respondents did not spontaneously associate immunization with actions to prevent childhood diseases. On direct questioning, most were aware of immunization programs. Factors inhibiting parents from accessing immunication programs include the poor reputation of immunizations, fear of contracting diseases from immunization, fear of providers' attitudes, a renaissance of certain religious beliefs and practices, lack of confidence in modern medicine, negative associations with family planning, and personal and systematic logistical factors.

The communities visited expressed a lack of confidence in immunization services because sessions for BCG/DPT/Measles/TT are conducted on an ad hoc basis. There is no fixed schedule of immunization at fixed sites on fixed days, and this is a major barrier to behavior change. The Government of Nigeria is planning to pass a law making immunization mandatory for admission to school.

OTHER CHILD SURVIVAL ISSUES

It is logical for USAID to identify a limited number of program areas to focus its CS investment. The three areas chosen by USAID (malaria, nutrition, and immunization) account for a significant proportion of under-five morbidity and mortality and will bring earmarked USAID funds. Nigeria is committed to addressing these issues, as well as to taking advangtage of opportunities for leveraging other donor funding and international movements (e.g. Global Alliance for Vaccines and Immunization [GAVI], Global Alliance for Improved

Nutrition [GAIN], RBM, etc.) to address them. Furthermore, malnutrition, which is a large factor in CS, should be considered in any program.

In addition to USAID CS investment areas, other major causes of child morbidity and mortality were considered in this strategic assessment. Small amounts of resources will almost certainly contribute to implementation in the context of the integrated approach to which the mission is committed. Also, because these conditions are frequent occurrences among the children of Nigeria, the creation of programs that would be responsive to demand is important.

The major conditions that should be considered programmatically are diarrhea and acute respiratory infections (especially pneumonia). According to UNICEF estimates (based on incomplete projections from health service statistics), diarrhea and pneumonia are the second and third major causes of under five mortality (after malaria) and together, they account for over one third of under-five child deaths in Nigeria. Additional CS areas worthy of consideration are neonatal mortality and birth spacing.

Diarrheal Diseases

While not a major focus of donor or national CS program attention at this time, diarrheal diseases of children were the focus of substantial national and donor investment and effort during the 1980s and 1990s (including during the past military dictatorship). One major element of this effort was the widespread promotion of oral rehydration therapy (ORT). As a result, the 1999 DHS shows that, while many other CS indicators suffered serious declines, use of ORT (ORS packets, recommended home solutions, or increased fluids during illness) increased substantially from 1990-1999. In 1999, ORT was used in over 73 percent of episodes of diarrheal illness. A major feature of Nigeria's diarrheal disease policy and program efforts was the national decision to promote use of home-based solution (sugar-salt solution, or SSS), rather than emphasizing dependence on ORS packets, which might not always be accessible. Despite these successes, in recent years, the massive promotion efforts to support the use of ORT have been substantially curtailed. In part, this is the result of shifts in national and donor focus to other health issues, including polio, malaria, and HIV/AIDS. BASICS staff working in population level programming report that knowledge of ORT and SSS may be diminishing, especially among younger mothers, as a result of these decreased promotion efforts.

In the 1990s, the government made a policy decision to discontinue the sale of anti-diarrheal drugs that commonly were used instead of ORT. While that policy is still apparently in place, with decreased attention on childhood diarrhea such drugs have re-entered the market. ORS packets are still imported by UNICEF, but ORS is also reported to be widely available in local markets through private sector production, distribution, and sale.

With international support, Nigeria has also established diarrheal illness treatment as an element of training for health workers at all levels and in all regions. ORT is an element of the "Standing Orders" that provide the standard of care for community health extension workers who make up the majority of primary healthcare personnel in many states and localities. ORT is an element of IMCI, but IMCI has not reached any significant scale in Nigeria as a training approach.

Substantially less effort has been made in support of diarrhea prevention. This fact, coupled with limited access to safe water and sanitation by the poorer segments of Nigeria's

population, has resulted in much less improvement in the prevalence of diarrhea during 1990-1999 than in the use of ORT (and the difference in prevalence may be explained by seasonal factors). Prevalence in 1990 and 1999 was found to be substantially higher in the northern zones than in the south.

The national commitment to diarrheal disease treatment resulted in the establishment of training capacity (including diarrhea treatment units as training sites) in all states. Training in ORT has been provided not only to health workers (doctors, nurses, and community health extension workers), but also teachers, midwives, and others. The assessment team was unable to verify the condition and scale of ongoing training, however, given the limited resources available for states, it is likely that current training investments are fewer and smaller scale than needed. UNICEF provides some support to overall capacity building in a limited area, including diarrheal disease management, through its Mother and Child Friendly Health Services initiative. IMCI training, including diarrheal disease management, is implemented at this time in only six of 774 LGAs.

Public sector communication support for prevention and treatment of diarrheal diseases is limited in current national, state, and local resource allocations. Presently there are no significant private sector or social marketing communication efforts focused on ORS or ORT. USAID, especially through the BASICS II Project, has developed family and community-oriented materials on care of children with diarrheal illness, in response to the demand encountered through community-based programming approaches. However, the population coverage with these materials and approaches is limited. It does not appear that other USAID implementing partners or other organizations working at the community level have systematically accepted the use of these materials or the promotion of diarrhea prevention and ORT treatment.

It should be noted that vitamin A supplementation, both preventative and in case management, is a key intervention of diarrhea, reducing the severity, duration and risk of mortality by more than 40 percent. In addition, healthy and well nourished children are better able to resist periodic diarrhea attacks.

A major share of the demand for diarrhea treatment is channeled to the semi-formal private sector, largely to patent medicine vendors (PMVs). These PMVs appear to be especially prominent in the North, where the relative number of well trained private sector providers is smaller. In general, PMVs have not been included in national efforts aimed at diarrheal diseases; however, a limited BASICS PMV training and follow-up effort in Kano resulted in substantially increased use of ORT and the establishment of “ORT corners” in many PMV shops.

UNICEF and WHO are both promoting the household and community component of IMCI, which is consistent with community-based approaches supported by USAID and its implementing partners. Any investment in this programming approach is likely to include ORT, and also possibly diarrhea prevention through improved hygiene, since these are among the outcomes (key family practices) that are the focus of HH/C-IMCI.

Acute Respiratory Infections

Unlike diarrheal diseases, childhood respiratory infections have not been emphasized by policy, program, or communication efforts, or significant investment in Nigeria. The WHO

ARI program was introduced in the early 1990s, but did not receive substantial donor or government funding. By the late 1990s, the introduction of IMCI was proposed by WHO as a way of strengthening health system response to major child illnesses. However, IMCI has not succeeded as an overall strategy for child health. IMCI is treated separately from ARI program efforts at the national level.

During the introduction of the national ARI program, there was a conflict between the recommended treatment for ARI and pneumonia, and the national Standing Orders that are the guidelines and legal standards of care for community health education workers (CHEWs). It is not clear whether the standard of care for treatment of ARI, and especially pneumonia, has been harmonized with IMCI guidelines. This may be addressed by a review of the Standing Orders carried out by the NPHCDA.

Access to appropriate treatment of pneumonia, especially at the community level, is an important policy issue. The 1999 DHS found that less than half of children with symptoms of pneumonia (cough and rapid breathing) were taken to a healthcare provider. While determinants of low level of care-seeking are not known in Nigeria, in other countries, access to care is a major factor. WHO, UNICEF, USAID, DFID, and other partners recently reviewed all controlled field trials and major program experiences with community-level treatment of pneumonia (including USAID-supported national programs in Nepal and Honduras). This review confirmed that community health workers, with adequate training, supervision, and access to appropriate antibiotics, could safely and effectively detect and treat pneumonia. This led to significant reductions in infant and child mortality. In response, WHO has issued revised policy guidance to recommend that countries consider treatment of pneumonia by trained community healthcare providers. Because of the overlap of pneumonia and malaria symptoms, community approaches to treatment will need to consider both diseases. To date, there has been no policy-level discussion of this issue in Nigeria.

Unlike diarrheal illnesses, pneumonia cannot be managed with home care alone. It requires adequate attention and treatment by a healthcare provider with access to appropriate antibiotics. Thus, ARI and pneumonia care are more susceptible to the weaknesses of the Nigerian health system than is care for diarrhea.

As opposed to diarrheal illness, there has been no major investment in training or training capacity for ARI. As noted, IMCI training has not been widely supported and is not presently a major contributor to capacity development related to child health . The capacity to detect and treat ARI and pneumonia is part of UNICEF's Mother and Child Friendly Health Services initiative, although coverage is limited. It is not clear if the training of CHEWs, the major primary healthcare workers, supports appropriate treatment of ARI and pneumonia. No large scale work has been done with private sector providers to promote effective ARI treatment.

There has also been no significant investment in the promotion of household level treatment of uncomplicated ARI, nor on recognition, care-seeking, and knowledge of appropriate care of pneumonia. These are included among HH/C-IMCI key family practices, and would potentially benefit from investment in this approach. BASICS II has prepared household-level information on management of children with ARI. Unfortunately, this information has not been widely disseminated.

Neonatal Mortality

Despite the fact that, according to 1999 DHS estimates, neonatal mortality makes up almost exactly half of infant mortality in Nigeria (37 of 75 deaths per 1,000 live births), there is no coherent program aimed at newborns. The team does not foresee a substantial USAID effort specifically aimed at newborn mortality. However, several of the elements included in USAID's PHN program approach have the potential to achieve substantial improvements in newborn health. Any reproductive health efforts aimed at improving management of labor and delivery, especially on management of obstructed labor, would be expected to have a substantial impact in improving newborn survival. Efforts to increase intermittent presumptive treatment of malaria and promotion of bednet use for pregnant women are expected to result in reduced numbers of low birth weight babies which will, in turn, contribute to improved newborn survival. Success in the promotion of immediate and exclusive breastfeeding is an important part of USAID's child nutrition and PMTCT efforts. It is expected to result in a significant reduction of risk of newborn infection (and associated morbidity and mortality), and may be augmented by routine vitamin A supplementation of lactating mothers. Finally, immunization efforts aimed at increasing coverage with tetanus toxoid immunization among reproductive age and/or pregnant women will result in reduction of neonatal tetanus, still a significant cause of newborn mortality in Nigeria.

Birth Spacing

Nigeria faces enormous demographic challenges. Continued high birth rates are leading to a rapid expansion of the young dependent population. Based on U.S. Bureau of the Census projections, 71 million of the total 123 million Nigerians are in dependent age groups (19 and below, 65 and above). This means that every Nigerian of productive age needs to support 1.35 dependent persons in the economy. Despite growth of the productive age population, by 2020 the dependent to productive person ratio will still be about 1/20. This projection does not take into consideration the negative effects of AIDS, which primarily attacks persons in their productive years. Thus, Nigeria's demographics seriously impede its efforts to escape from national poverty and ill health. Reduced fertility, facilitated by voluntary family planning, is one key input required to improve this demographic situation.

As USAID examines potential family planning elements of its program strategy, it is important to bear in mind the potential positive impact on CS (and maternal mortality) of a focus on birth spacing. Multi-variate secondary analysis of Nigeria's 1999 DHS data reveals that longer birth interval (both 2-3 years and $\geq$ 4 years) is one of the most highly significant variables associated with lower newborn, infant, and under five mortality. Birth spacing also contributes to lower maternal risk, especially in populations such as Nigeria's, where women's health and nutrition status is often compromised. Birth spacing is also consistent with Koranic views of reproductive health and child care. Lactational Amenorrhea Method should be promoted as a method of delayed fertility and birth spacing as well as an effective program approach to introduction/adoption of modern contraceptive methods. All fertility reduction contributes to reduced lifetime risk of maternal death.

IV. ASSESSMENT RESULTS : CROSSCUTTING AREAS

BEHAVIOR CHANGE COMMUNICATION (BCC) AND HEALTH EDUCATION

Overall, BCC in child survival (CS) and other population, health and nutrition (PHN) programs is disjointed. At present, there is more emphasis on information, education and communication (IEC) products than on developing an integrated health education/BCC process for health and development. For example, AED is one of the BASICS partners, yet, JHU/CCP was mandated to assist BASICS to develop educational materials (including radio PSAs) for breastfeeding promotion. BASICS itself has a BCC staff member, who had developed various materials for local use as seen in the attached table. Both international partners (Ips) admitted that collaboration was not easy and there was no evidence that the CCP-developed materials had been used, much less evaluated. It was unclear to the assessment team whether the intensity or a critical mass of educational inputs on breastfeeding promotion was adequate to bring about behavioral change in this difficult area (i.e. because breastfeeding behavior is tied more closely to community norms than, say immunization seeking behavior).

JHU/CCP plays a major role in national immunization days (NIDs) as chair of the IEC Committee. Although the national program on immunization (NPI) is pleased with this collaboration, NIDs have clearly drained much energy and funds from the various IPs, including JHU/CCP.

JHU/CCP has been under local management for approximately ten years. It no longer appears to exert the leadership role it did in the vibrant reproductive health programming in the 1980s. CCP is sponsoring a HIV/AIDS hotline in Lagos run by a local PVO, but FHI appears to have the lead in HIV/AIDS BCC programming. Recently, CCP was contracted to provide BCC materials for Planned Parenthood Federation of Nigeria, and simply sub-contracted this to a local advertising firm. Thus, its efforts appear mostly to be piecework.

CCP staff explained that during the mid-1990s when their stay in Nigeria (as with all IPs) was tenuous, they were asked to develop local leadership capacity in IEC development in three broad regions. They stated that the choice of a northern NGO, while culturally appropriate, did not succeed as basic functional capacity did not exist. Their efforts in the southwest were more successful, but with an ironic twist. They joined with an Ibadan group called Staywell, run by a physician with no BCC training. The same organization had been dropped by the West African Youth Initiative Project in 1995 due to financial impropriety and incompetence in its management of a peer reproductive health education project. CCP's inability to recognize and involve indigenous health education and mass communications talent being trained at diploma, graduate and post-graduate levels in two faculties at the University of Ibadan is of great concern.

One encouraging case was seen in the VISION Project, a bilateral experiment in reproductive health capacity building sponsored by the Mission. The winning contract team includes INTRAH, PSI/SFH, JHU/CCP, and Engender Health. Each group brought its own expertise to the partnership including training, commodities, communications, and service quality, respectively. This collaborative and integrated effort among IPs bodes well for future arrangements. CCP's role in VISION included not only reviewing and revising existing IEC materials, in a participatory manner with state and local governmental partners, but also

conducting a baseline healthcare seeking behavior survey to aid development of new BCC strategies.

Table 2. Inventory of BCC and Media in CS and GDO

IP/Partner	Child Survival Interventions			Other
	Malaria	Nutrition	Immunization	
JHU-CCP		EBF PSAs for BASICS	Work with NIDs ICC, chair communications committee	HIV Hotline in Lagos; Assist PPFN produce posters, PSAs, etc; VISION: conduct materials review, HSB Baseline and new materials development
UNICEF	IMPAC promotion of nets as reward for ANC, Immunization completion as stimulus for community demand	Baby Friendly Hospitals = 1500 = promoting EBF	Social mobilization consultants for NIDs in 12 high-risk states	Launching of WCFHS by First Lady
NetMark	Private sector ad agencies to stimulate net demand			
BASICS II	Training of community health promoters (CHPs); Home Health Booklets in English and local languages; Counseling Cards in local languages and English; Job aids on essential nutrition package with messages (note most CAPAs started with immunization or nutrition)			
DfID	Private Sector Promotion			
Policy-Futures				HIV reporting and advocacy through Journalists Against Aids (print media)
PSI				Promotion of Gold Circle Condoms and Safe Sex Behaviors
LEAP				Radio for teacher training in basic education skills
FHS/IMPACT				HIV comics, drama, etc.
CEDPA				CPHs outreach, drama on FP promotion
VOA				

COMMUNITY APPROACHES: MODELS OF COMMUNITY APPROACHES IN USAID PARTNER PROGRAMS

Community members are the ultimate consumers of child health services and interventions; the community is where demand is created and behavior changes. In order for services and intended health behaviors to be culturally acceptable and realistic in terms of local norms and

resources, the community needs to be involved in the process of planning, implementing, and evaluating intervention efforts. Concepts of community involvement or participation, therefore, must form the foundation of many community health programs, especially those emanating from the philosophy of primary healthcare as embodied in the Alma Ata Declaration. Community approaches are important as means to achieving ownership, sustainability, and local buy-in where government presence is scarce. These practical and philosophical justifications for community approaches need to be backed by observable results.

> *It is one thing for providers to be talking; it is another for the community to be talking.*
> Lagos CAPA Committee Chair
>
> *The community is the one you want to serve, so you have to involve them. Without the community, you can do nothing.*
> Community Chief and Abia CAPA Leader

Nigeria is emerging from an era during which civil society participation in governance was actively discouraged. Decision-making processes are still highly centralized, and allocation of internally generated revenues reflect this, as local governments receive only 10 percent of the national budget. Local governments, especially rural ones, are dependent on the federal subvention for their revenue, much of which is used to pay staff salaries. State governments have the power to dissolve elected local councils. LGA health workers are employed by a State Civil Service Commission. They can be transferred at will and, therefore, are not accountable to the local government council that pays their salaries. The electorate pays less that $2 annually in local government head taxes. This produces a situation where there is little incentive to hold government accountable. In this environment, efforts to build community involvement into health programs face difficult challenges. Community members need to be convinced that their advocacy efforts will make a difference. In addition, health workers, who receive little training in community organization, lack the skills to approach and involve the community.

The National Primary Health Care Development Agency (NPHCDA) has been a voice for community involvement for ten years. The agency is charged with providing technical assistance at the LGA level to implement the 1988 National Health Policy, which designates PHC as the basis of the nation's health strategy. PHC is constitutionally vested in the local government. Key to the national PHC strategy is community partnership with health staff and other inter-sectoral development agencies through village, district, and local government level development committees. Although these have not functioned well in the past, the NPHCDA is trying to revive the concept on a political ward basis by ensuring that communities are responsible for organizing and overseeing the work of their local health clinics. The ward, as a unit of intervention, offers the benefit of being linked to census and enumeration track information for planning and evaluation.

Table 3. NPHCDA Clinicial Projects as of June 2002

ZONE	Contracted	Complete	Handover	Percent Handed
NC	21	20	18	90.0
SE	17	16	3	18.8
SW	29	29	7	24.1
SS	11	11	7	63.6
NE	17	17	12	70.6
NW	23	23	17	73.9
TOTAL	118	116	64	55.2

Plans have been made to carry out a revised approach in 200 local governments across the country. A ward that had no health facility was chosen in each LGA for facility construction. As of June 2002, 116 facilities had been built and 64 have been handed over to the management of the ward development committees (WDCs). The choice of ward is intended to link health clearly into the political process, and the wards local government councilor is a member of the WDC. The concept of village development committees (VDCs) was retained, and each VDC nominates a representative to the WDC. WDC management responsibilities include a Bamako Initiative type revolving drug fund started with N500,000 seed grants, receiving and monitoring equipment, and planning other supportive and community development activities.

The NPHCDA is not currently planning replication in other wards, but hopes that they have demonstrated a streamlined and cost-effective model that the LGAs themselves could implement in their remaining wards. There are rumors that the federal government might fund the construction of additional ward facilities in the coming year. The close linkages between political WARDs and the NPHCDA may be one factor in dampening donor enthusiasm for the new PHC scheme.

UNICEF has developed a community-based approach to foster healthy household and community behaviors. They identified 100 focal LGAs and chose two focal communities in each. The NPHCDA has only recently learned of this plan and has not been provided with a list of the LGAs. UNICEF plans to inaugurate a “minimal basic package” for Women and Children Friendly Health Services (WCFHS) in the local facilities and to engage in community mobilization to foster utilization of these services and other healthy behaviors.

At present, five USAID-supported programs are using a community-based approach. These are outlined in the attached table and include the following:

- Catchment Area Planning and Action (CAPA) Committees of BASICS II in 20 LGAs in Abia, Kano and Lagos States.

- Community Partners for Health (CPH) –Started by BASICS I as community based organization (CBO) and private provider health and development coalitions in 16 communities, 10 LGAs in Abia, Kano an Lagos States – currently collaborating with CEDPA to include RH/FP services. CPHs have actually demonstrated a process for linking CS, RH, HIV, adult education, occupational training, micro-credit and democaracy and government at the community level.

- ENABLE – a CORE funded project run by CEDPA that experimented with linking DG and reproductive health activities in local chapters of three large membership NGOs in Plateau, Ondo and Enugu States.

- LEAP promoting basic education and involving PTAs in Nassarawa, Kano and Lagos to creating local school environments conducive to promoting literacy and numeracy

- PSRHH - Promoting Sexual and Reproductive Health and HIV/AIDS Reduction – a joint USAID/DfID project that relies on SFH/PSI for commodities but involves ActionAid in community organizing, initially in 13 high risk communities near the 13 SFH/PSI field offices.

Table 4. Summary of Community Programs

Program		Partner	Sector/Technical Area
WHDC	Ward Health Development Committee	NPHCDA	PHC – WHDCs in 200 Wards with no health facility
CAPA	Catchment Area Planning and Action	BASICS II	CS in 20 LGAs, 3 States
CPH	Community Partners for Health	BASICS I CEDPA	CS, RH primarily but also used for HIV, micro-credit, Female Adult Education, Occupational Skills Training, D+G
PTA	Parent Teacher Associations	LEAP	ED – producing enabling school environment for literacy and numeracy
PSRHH	Promoting Sexual and Reproductive Health and HIV/AIDS Reduction	PSI, ActionAid through USAID and DfID	RH, HIV – social marketing through PSI, community mobilization by ActionAid
ENABLE	(through local NGOs like COCIN, COWAN)	CEDPA	RH, D+G, HIV/AIDS
WCFHS	Women and Children Friendly Health Services	UNICEF	CS, Safe Motherhood in 200 communities in 100 LGAs

USAID-supported community level programming efforts in Nigeria have demonstrated the potential success of such approaches to:

- **Increase resources for health** – Programs have obtained financial and human resources from individuals and non-governmental organizations.

- **Increase demand for health services** – Programs have mobilized communities to seek and advocate for services.

- **Use community channels to disseminate of information** – Through local organizations such as women's groups, churches and mosques, trained community health agents, and special events communities augment their ability to disseminate

information. Except for the polio NIDs, to date local information dissemination efforts have rarely been harmonized with mass media campaign.

- **Link government services with communities** – The BASICS II CAPA approach specifically partners local government providers and managers with communities by focusing community organization around government facilities. This is a principle successfully implemented at scale as a fundamental element of the Bamako Initiative, which Nigeria has adopted as part of its national primary health policy.

- **Support distribution of key commodities** – CEDPA has successfully developed contraceptive CBD approaches in Nigeria based on community organization developed under BASICS I.

Community approaches might help provide supervision and quality control of health services. Given the lack of capacity for supervision and quality control by government health services, it is possible that the demonstrated ability of USAID-supported community programs to engage with health services could be systematized to create effective monitoring and supervision of those services.

Catchment area planning and action (CAPA) is the major model of community-based intervention in CS. CAPA builds on the BASICS I CPH model with CBO and private health facility involvement, and focusing on the local government primary healthcare system in 20 LGAs in Kano, Lagos, and Abia States. CAPA creates state-level, multi-sectoral teams of trainers in both the technical areas of immunization, nutrition, and malaria and in the process of establishing community involvement in micro-planning at the LGA primary health center (PHC) level. State trainers train LGA teams that in turn bring together CBOs, private providers and PHC staff who form CAPA committees. The number of CAPA committees in each LGA ranges from 5 to15.

While committees prioritize and focus on one of three technical areas as a starting point for planning and action, they are nevertheless encouraged to think more broadly about future community health needs. CAPA committees examine factors that influence quality of care at the facility and within the catchment area, and they have tackled such problems as adequacy of seats in the clinic, availability of syringes, and improvements in client-consumer interaction. The committees also monitor the facility and the services it provides.

Since the Committees include as members both local CBOs and private providers, they can continue to function even if LGA political officers or health workers change or are transferred. LGA and state level inter-CAPA committees are being formed to advocate for health and development improvements. The committees are expected to be self-financing, a challenge that also applied to the sustainability of the CPHs. This is important as LGAs were usually reported to have inadequate funding.

The CAPA approach most closely resembles what the NPHCDA is trying to achieve through its ward decelopment committees (WDCs). CAPA's focus on the facility resembles the earlier approach of PHC implementation by the federal ministry of health (FMOH) which relied on the concept of a health district as the area served by a health facility. Since a facility may serve more than one ward or a ward may have more than one facility, the CAPA model does not correspond geographically to the political empowerment and participation goals of WDCs. On the other hand, the CAPA model may be more inclusive in that it attempts to involve all

interested CBOs in an area. In the WDC model, CBOs may or may not be included in VDCs, the basic representative unit on the WDCs. Ultimately, each model aims at promoting community ownership and involvement, though the WDC model states clearly that the health facility belongs to the community.

BASICS and the Tulsi Chandrai Foundation (TCF) are the only two potential partners to respond to NPHCDA call for collaboration. TCF is preparing to begin work in one LGA in Kaduna State as an LGA partner in PHC. BASICS has not continued with a specific plan, but the NPHCDA southeast zonal office has contacted the BASICS field office in Aba to see how technical assistance could be provided to the 31 LGAs in the zone identified by NPHCDA. One, Aba South, is a focus of both agencies.

Several issues remain for USAID's investment in community level program approaches to be effective investments for achieving PHN impact at meaningful scale. These include:

- **Simplification, streamlining, and consolidation** – USAID's implementing partners in PHN and other sectors (agriculture, education) have developed a multiplicity of approaches to community-focused programming. This diversity results in fragmentation of USAID's investment in community approaches, as well as potential confusion as these approaches expand and overlap. Some of the approaches involve intensive processes covering relatively small populations, limiting the feasibility of expansion and replication. USAID and its IPs need to identify essential elements of the various approaches and move toward a simplified and shared approach. Partners such as UNICEF and NPHCDA can be included.

- **Achieving scale** – Streamlined approaches will facilitate greater scale-up of programming. Presently, even in the most ambitious USAID community-focused approaches, the population actually reached by intervention is relatively small compared to the overall target population in USAID-assisted areas. The focus needs to shift. Developing consensus and ownership among other partners and government also is necessary to go to scale.

- **Understanding and applying concepts of base population, coverage, and monitoring.** Answering key programmatic questions such as "What number of people in the target age group are we trying to reach?" or "What proportion of those people are practicing the desired practice?" is fundamental to effective programming. The team found that most of the community groups assisted by USAID, either do not know these basic data or do not routinely use them in planning. For example, the smallest CAPA areas include approximately 3,000 children under age five.

- Failure to manage numbers can result in efforts that appear positive, but have little public health impact. For example, in one CAPA with an estimated 2,000 infants under one year of age, the CAPA was pleased with an increase in the number of children attending clinic for vaccination monthly (from under 10 to about 70). Unfortunately, since each infant requires five clinic sessions to be fully vaccinated, the monthly requirement would be over 800.

- Although the community primary healthcare scheme proposed by NPHCDA has several drawbacks, one advantage is that it includes clearly defined target populations, as well as proposed indicators and measurement techniques to ascertain the status of

those indicators. USAID needs to focus on "denominators" and on monitoring coverage.

- **Achieving a critical mass of intervention** – Achieving behavior change often requires a complex set of interventions, repeated often, and reinforced at several levels of communication by multiple interactions. This notion of critical mass or density of intervention presents an important challenge to Nigeria's community efforts.

- **Focusing on and delivering outcomes** – The team observed that community-based approaches seem to focus more on processes than on health outcomes. While processes facilitate outcomes, those outcomes were less clear. Achieving health impact through community efforts requires clearly defined health outcomes, and specific objectives to give a sense of accomplishment. One example of this is the "Champion Community" approach implemented in Madagascar. Under this approach, communities set indicator goals and are awarded "Champion" status when those goals are achieved.

- **Reaching the hard-to-reach** – Communities themselves are in the best position to identify least-served families and children, and they are often able to identify the best tactics for reaching those families and children with interventions.

SYSTEMS AND CAPACITY

Health is placed on the concurrent list of schedules in the Nigerian Constitution, with all levels of government responsible for providing some form of healthcare to the people. The health system in Nigeria is developed around the three-tier form of Government; the federal, state and the local governments that shoulder the responsibility of providing tertiary, secondary and primary healthcare, respectively. There is, however, an overlap in the practical delivery of health service such that state health facilities may be engrossed in providing primary healthcare services. USAID might consider reinforcing current poor capacity in health systems management at all levels.

> *The linkage between the facility and the community is relatively easy to achieve. It is harder to achieve a mentality change in the civil service structure to support the facility.*
> Chief, Health and Nutrition UNICEF

Health policies are formulated jointly by the federal and state governments, mainly through the National Council on Health (NCH) and the State Councils on Health (SCH), but the mode and degree of implementation of policies is dependent on locally operating factors at each technical and/or geopolitical level. All levels of government share the constitutional responsibility of providing CS services. In the past, policy formulation in the health sector had only infrequently involved the private sector.

Although many CS and other PHC interventions were developed and implemented based on national policies and conventions, their practical implementation has had limited success due to obstacles in planning and design, particularly deficiency in the community empowerment component. In addition, the formulation of interventions has largely been top-down and not consultative.

The NPHCDA, the primary instrument by which the federal government channels CS support to the states and LGA's, is divided into six zonal offices, one each for the six geopolitical zones in the country as follows: North East Zonal Office – Bauchi; North West Zonal Office – Kaduna; North Central Zonal Office – Jos; South West Zonal Office – Ibadan; South East Zonal Office – Enugu; South Zonal Office – Benin.

In addition, the NPHCDA stations three to four technical staff at the headquarters of each of the 36 states and Abuja. Called zonal technical officers, these individuals carry out routine supervision of PHC in the LGAs. To support the NPHCDA, the FMOH maintains a Department of PHC and Disease Control, now renamed Department of Public Health, which deals largely with its counterparts in the states.

Other federal government organs that deal with PHC include the National Program on Iimmunization, the Department for Community Development and Population Activities, NAPDAC, and various university teaching hospitals across the country.

The state Ministries of Health provide CS/PHC services through their departments of PHC and disease control. The Hospitals Management Board provides clinical child care through the general hospitals, but the bulk of PHC/CS services are provided by the LGAs in the primary health clinics and centers. The LGAs also maintain a department of PHC which plans, coordinates and monitors the delivery of the CS services.

PHC service is the foundation of the country's health system and, although its provision rests on the LGAs, the NPHCDA is officially assigned to provide all the technical and financial support it requires throughout the country. In addition, the FMOH has established departments to provide CS and broader PHC services to support states and LGAs. The states provide LGAs with much financial and technical support in PHC and CS. The NPHCDA has the additional responsibility of seeking and coordinating donor support to states and LGA's on PHC. This task is, however, generally pursued by the FMOH and the National Planning Commission.

In the area of human resource development, federal and state governments train all levels of health personnel in the universities, schools of nursing, and health technology. These institutions also conduct a variety of in-service training courses for health workers, in addition to their providing expertise through on-the-job, hands-on skills training.

Technical support and coordination of PHC has been provided by numerous donors. External support to PHC and CS constitutes a formidable proportion of resources that are channeled into capacity-building and service provision. Bilaterals and the UN agencies dominate this arena, although a few NGOs provide some support. Donors have also established coordinating offices in the geopolitical zones, and the World Health Organization (WHO) has just completed the establishment of offices in all the states of Nigeria. The WHO has expressed its unreserved willingness to make the facilities in the state offices available to all other donors/partners.

PHC in Nigeria is designed to be comprehensive, providing integrated healthcare throughout the entire system, through a well coordinated two-way referral system. In addition, the package aims to integrate home/community-based care with clinic-based healthcare. It is along this line that all PHC personnel receive training in the various schools of health technology and universities.

Therapeutic guidelines called the national Standing Orders are designed to provide practitioners the necessary technical and legal support, and reference in their interactions with patients. In spite of this, a number of healthcare packages, from the Bamako Initiative to Minimum Health Care Package, baby friendly hospital initiative (BFHI), integrated management of childhood illness (IMCI), and more recently COPE and WCFHS, have attempted to provide comprehensive CS/PHC services. The two most current additions to the array of health care packages are CAPA and the ward health system (WHS). All these packages are well thought out but appear to have been elaborated in isolation. Most PHC workers have received training one or more of these packages. Each PHC package is accompanied by corresponding job aids and BCC materials.

POLICY

> *There is an urgent need for health sector reform. We must put money where it is appropriate and most needed. In a LGA builds a clinic, don't say, 'thank you,' until the PHC services start.*
>
> Honorable Commissioner for Health
> Kano State

The Nigerian Constitution and the National Health Policy provide guarantees for the proper implementation of CS interventions. In addition, the required infrastructural, institutional, and technical capacity needed to implement CS programs is established, but the country has not been able to harness it in a smooth and sustainable manner. Some reasons for this include obstacles in the organizational structures of the health system, as well as its size and complex social dynamics. To quote the Honorable Commissioner for Health, Kano State," Nigeria is a country of 807 independent governments". This multiplicity of relatively independent governments can also be a formidable resource for the delivery of CS interventions as it provides for local decisionmaking and innovation.

Accountability and transparency in the utilization of public funds has been a chronic issue since the military era. This, coupled with a struggling economy, makes the provision of adequate resources for social services increasingly daunting. For this reason, to name one, budgetary allocations for CS are not always released. On the other hand, there is a broad range of performance among states and LGAs on financial and governance issues. Some states and LGAs are well governed; others are victim to widespread corruption. Stakeholder analysis and the tactical engagement of appropriate partners, particularly those operating at LGA and community levels, is critical to the successfull implementation of programs. This does not seem to have been adequately employed in the past.

Agreements can be reached and signed between donors and governments for the provision of counterpart contributions to CS, and can leverage public resources appreciably. This is more possible in the current setting, as all governments claim women and child health developmental issues as their priorities, and never hesitate to use them for political purposes.

USAID interacts on the policy front in two ways: directly through USAID officers and indirectly through its IPs. There are a large number of complex stakeholders and government departments engaged in various policy arenas important to CS. The small USAID CS

technical team has done an admirable job meeting demand, but faces overwhelming challenges.

BASICS has functioned as the lead IP providing CS policy support for USAID/Nigeria. BASICS provides technical and programmatic inputs at the national level, and jointly participates with USAID on committees such as inter-agency coordinating committee (ICC), Global Alliance for Improved Nutrition (GAIN), among others. BASICS also quietly intervenes at the policy level in their priority states (Kano, Lagos, Abia) and in focus LGAs, and provides timely support to other IPs. The need for BASICS' services, however, still outstrips supply, and some key stakeholder meetings are missed because no one is available to attend. Moreover, there is a need to establish a point person in each key technical area. The need for a consistent point person in the Roll Back Malaria working group was specifically noted.

USAID/Nigeria recently awarded funds to the centrally funded Policy Project to support a CS advisor. This promises to provide some relief. In a short period, an excellent "think piece" on CS policy issues has been drafted, and the advisor has taken the lead or backed-up USAID in several areas. The Policy Project also has funding and mandates to address policy issues in reproductive health and HIV/AIDS. Some effort is being made to address policy issues that cross sectors, although surely not enough.

The team felt strongly that the overall policy environment at the national level is acceptable. Nigeria has many of the right national policies and conventions in place, even if many require updating or more comprehensive plans. Political will is another issue; however, there are policy issues at the state and LGA level that impact CS programs. For example, politically-motivated decrees mandating free drugs and services (often translated into shortages, in sharp contrast to Bamako Initiative guidelines) at some LGAs should undoubtedly be addressed.

In the medium and long term, the only truly significant policy issues involve budget and finances (including release of funds), control of corruption, governance, and government commitment to sustainable health programs. Without relief in these areas, no sustainable progress will be made, regardless of the level of donor investments. As a crucial point of intersection with the democracy and governance (DG) portfolio, much more could be done to inform the overall USAID policy agenda in these areas. Some states and LGAs perform better on fiscal and DG criteria than others, and this can be taken into account in selecting target areas. A recent USAID assessment sited Lagos and Kano as being among the states on a positive track in terms of governance.

It was not clear how the USAID health policy agenda is formulated, what role the various IPs play, how they coordinate, and how priorities are identified. The experience of the staff at the Policy Project should be utilized to address truly urgent policy issues, even if these issues are outside of the scope of the annual work plan. For example, both the project Director and the CS Advisor said they were unaware that bednet taxes and tariffs present a program-threatening issue. When informed, they had good suggestions on how to proceed to resolve the issue. Mechanisms to identify emerging priorities need to be put in place. The Policy Project could be a prototype for an integrated approach to policy formulation and dialogue (in RH, HIV/AIDS and CS), if appropriate USAID guidance is provided.

As it moves toward an integrated strategy, USAID should further focus its policy agenda, especially human resource constraints. Current national-level activities remain important, but

policy activities should gradually devolve to focus states and LGAs where they directly impact on service delivery.

PRIVATE SECTOR

Nigeria's private sector is large, broad, complex, and dynamic, comprising everything from very small local PVOs to large multinational corporations conducting billions of dollars worth of business. Market forces are particularly vibrant in Nigeria, a fact reflected in the health sector.

The vast majority of poor Nigerians obtain medicines through small patent medicine vendors and local health workers. A significant percentage of health care, especially in urban areas, is provided through private sector hospitals and clinics. Quality is an important issue from drug supply (counterfeit drugs) to clinical quality of care, to infection prevention (universal precautions to protect against transmission of HIV). Community (PMVs, midwives, etc.) and mid-level healthcare practitioners (community clinics and hospitals) do not have easy access to the latest technologies and treatment protocols in public health areas. As a result, much of their information comes from drug companies motivated to sell their products or from other sources, including the often unreliable public press. An important advantage of donor-supported commercial or social marketing efforts (such as NetMark and the Society for Family Health) is their commitment to passing sound technical information through commercial channels.

The aid sector is made up of many local and international NGOs, private foundations and other charitable organizations. Private health providers and non-governmental organizations (NGOs) contribute significantly to PHC and other CS activities in Nigeria. Two notable non-governmental approaches include the Christian Health Association of Nigeria (CHAN) and Community Partners for Health (CPH).

CHAN, headquartered in Jos, is an association of Catholic and Protestant mission health clinics, outreach programs, and hospitals. CHAN has a PHC department that fosters development of PHC systems among members. CHANPHARM, with a main warehouse in Lagos and zonal offices has provided inexpensive and reliable supplies of essential drugs for nearly 30 years.

The CPH project of BASICS I brought together community based organizations (CBOs) and private healthcare facilities (HCFs) in 16 communities in three states. BASICS provided skills training so that these private facilities could provide prompt treatment at reduced cost, including routine immunization, to CBO member children. They also serve as a rallying point for community mobilization on HIV, environmental sanitation, and other health issues.

Large employers usually make provisions for employee healthcare, either by contracting with local hospitals, or through internally managed health infrastructure. Despite being well financed and able to recruit top doctors and nurses, these organizations also often have difficulty accessing up-to-date information and skills in key health areas. Frequently, they are willing to pay to gain expertise, and opportunities exist to cross subsidize in-service training in certain geographical areas. Evidence also suggests the potential to draw on the private sector to play a policy role and/or for charitable contributions. However, most businesses harbor a well-founded mistrust of the government. The actual impact of work-based health care services on numbers of children services is small; it is not a key at risk target group.

The food industry will be a key partner in expansion of programs to fortify foods and condiments, such as salt (iodine), oils and sugar (vitamin A), wheat and maize flour (vitamin A, iron, B-vitamin and zinc).

During the previous military regime, when immunization and PHC virtually collapsed, the private sector provided a useful safety net for communities. Even now, when some LGAs go on strike for up to two months and services are suspended, people must rely on non-government providers. USAID has historically been the most successful donor working in the private sector, both in Nigeria and internationally.

V. INTEGRATION

USAID PROGRAMMING

Agriculture, Nutrition and Health

The importance of agriculture and food security to nutrition and health are widely recognized; however, nutrition and health should be equally appreciated as key inputs to agricultural productivity. The lack of basic health and nutrition services extended to rural areas severely compromises the productivity of more than two-thirds of the Nigerian population, more than 80 percent of whom are directly involved in agricultural production. For example, malaria and anemia weaken farm family members and divert labor and resources within the household to care for those who are sick. Presumably, nutrition and health, both as inputs and outcomes, will be included in the upcoming USAID/Nigeria assessments of agriculture and food security. One entry point for strengthening health and nutrition among rural farming families may be through the Nigerian agricultural extension system.

Another area of strategic intersectoral investment for USAID/Nigeria is its support to the International Institute for Tropical Agriculture/Ibadan (IITA) in the selection and establishment of biofortified (high iron, zinc, beta-carotene) maize and legumes. These improved varieties may be ready for release and dissemination within five years. [Note: GH and EGAT have requested Administrator funds in FY'03 for a joint initiative in biotechnology, including "biofortification". Nigeria's favorable policy on biotechnology and established technical capacity at IITA and other institutions within country, make it a logical candidate for these funds if they are available.]

Water and Sanitation

It is unfortunate that the team did not have time to focus on water and sanitation, since this is a critical area intersecting with CS. Currently, and for the forseeable future, this important area is not likely to be a focus area for USAID, not because of its importance, but because of resource constraints. The literature (see bibliography) in Nigeria and elsewhere documents the relationship between clean water and sanitary practices, and the incidence of diarrhea, malaria, and other diseases transmitted by oral-fecal routes. Water and sanitation programs intersect with education, since hygiene and de-worming efforts can improve nutrition and school performance, and break the parasite transmission cycle. Water and sanitation also is a natural fit with farmer-to-farmer programs are a likely target to be addressed in food-for-work programs under Title II. The team regrets that they were unable to give this area the emphasis it deserves, and encourages USAID to work with other donors, such as UNICEF, to insure that these important programs move ahead.

Fewer than 50 percent of Nigerians have access to safe water and adequate sanitation. Although USAID/Nigeria may lack funds to support a major water and sanitation initiative, they may want to link with other partners investing in this sector, including the WHO Global Water Quality Initiative, which is focused on improved transport of water, household storage, and (if necessary) point-of-use disinfection. Water disinfection might also be addressed through social marketing of chlorin packets, as has successfully been done in conjunction with Child Health Weeks in Zambia.

Education

Health education should not be an add-on; it needs to be part of the science curriculum. LEAP Director

It is well established that the level of education, especially for mothers, is a key determinant of household nutritional/dietary and health behaviors. However, direct programmatic links between primary education (presently the focus of USAID/Nigeria in this sector) and nutrition in Nigeria are less clear. Multi-micronutrient supplements would likely benefit a great proportion of Nigerian public schoolchildren (limited data available pending the results of the 2001 National Food and Consumption Survey), but would have much greater impact if directed to preschool-age children, especially those 6-24 months of age. At the same time, a successful national fortification program should provide micronutrients to school children, as well as other vulnerable groups. School gardens may contribute to school feeding programs and provide a forum for educating students about diet and nutrition, but Committee on Sustainable Development (CSD) Guidance proscribes the use of CSD funds for such use.

The Honorable Commissioner for Health of Lagos State asked the CS assessment team specifically for support for a school feeding program, but this would be more appropriately directed to the USDA Global Food for Education Initiative (http://ffas.usda.gov/excredits/gffei.html). One other program link between primary school programs and nutrition/health is routine de-worming, but more analysis would be needed on helminth burdens among Nigerian school children and their effects on appetite, nutrient losses, health, and academic performance.

Prevention of Mother-to-Child Transmission (PMTCT) of HIV and Child Survival

PMTCT is fundamentally *a CS issue*. As such, PMTCT programs should be broadened to reduce the risk of MTCT while protecting the health and survival of infants and other young children in households affected by HIV/AIDS. By definition, PMTCT involves an HIV+ mother and often an infected (or deceased) husband whose ability to care for young children may be compromised by deteriorating health status. As productivity and income progressively diminish, limited assets must be diverted for healthcare, and households become increasingly food insecure. Thus, even in the absence of MTCT, parental HIV/AIDS erodes household resources and substantially increases the risk of malnutrition, morbidity and mortality among children and adults.

Programmatically, voluntary counseling and testing (VCT) should be linked to antenatal care (ANC) and baby friendly hospital (BFH) services, so that HIV-infected pregnant women can be counseled on nevirapine treatment for the mother (intrapartum) and infants (postpartum) (*FMOH National Guidelines for the Implementation of Prevention of Mother-to-Child Transmission (PMTCT) of HIV Programme in Nigeria)*, as well as care and support for the mother, her infant and others in the household. VCT/ANC counseling must also assist HIV+ women to be fully informed about infant feeding options (exclusive breastfeeding or exclusive replacement feeding for the first months of life) and fully support their choice programmatically. It should be recognized that the mother's health is critical to reducing the risks to her infant: maternal CD4 counts greater than 500 are associated with approximately a tenfold decrease in MTCT through breast milk, while maintaining breast health (care and treatment for cracked nipples and mastitis) also reduces MTCT through breastfeeding.

It is estimated that approximately two-thirds of pregnant women attend ANC clinics, although a much smaller proportion deliver in health facilities. Presently, between 1000 BFHs and 6000 BFH counselors are in place in Nigeria, although counselors are likely to have had little or no training in counseling on MTCT and infant feeding/child care. While there is a limited set of interventions that can be practically extended to HIV+ women in the present Nigeria context, and the issue of stigmatism needs to be considered, it is not impractical to consider directing food and multi-micronutrient supplements to these women, as well as promoting use of ITNs, preventative/therapeutic treatment of malaria (linked to RBM), and treatment of other maternal infections. If the issue of stigma is an overriding concern, this could be done in the larger context of targeting mothers in households identified as being highly food insecure.

For those infants born to HIV+ mothers who may HIV-infected (but in most cases undiagnosed), and for those who are formula-fed (or mixed-fed in spite of counseling), the greater risks of diarrhea, malaria, ARI, and other infectious diseases, increase the urgency and necessity of providing basic infant/child health interventions. These include routine immunizations, routine vitamin A supplementation, ARI treatment, ITNs/malaria treatment, CDD/ORT/hygiene, water and sanitation (including chlorin water treatment), and community-based growth monitoring and promotion.

In cases where HIV infection is confirmed or where HIV is suspected based on clinical diagnosis, WHO recommends cotrimoxasole prophylactic treatment for pneumocystis cariniae pneumonia. Nigeria is currently developing policies for the distribution of ARVs that will be available under GFATM support and may be directed to HIV positive mothers, infants, and children. Nigeria is also revising Standing Orders, essentially standards of care, for health worker diagnosis and management of HIV-infected children.

INTERACTION AND COORDINATION AMONG DONORS AND ORGANIZATIONS

At one level, there appear to be good working relations among USAID and other organizations involved in RCH policy and activities. In some cases, as with the Polio Eradication Initiative, there is an active inter-agency coordinating committee (ICC) - a requirement under the terms of GAVI support for routine immunization and new vaccines in Nigeria. However, at another level, the broader consensus and coordination needed to achieve greater impact and scale from partners' investments seems to be absent.

In terms of a model for primary healthcare and community involvement, the approaches espoused by several different organizations (NPHCDA, UNICEF [in addition to the Bamako Initiative], MOH, and even USAID) appear to compete, and there does not seem to be a neutral forum or the will to reconcile differences and develop the consensus needed to achieve greater scale. The same appears to be true in the case of impregnated bednets, where USAID, UNICEF, and the federal government have approaches containing fundamental differences (such as the roles of free, subsidized, and commercially marketed nets).

One approach to dealing with these resilient incompatibilities might be establishment of a Health ICC, as suggested by the WHO Representative in Nigeria. Another might be the more effective use of the National Health Council (for policy) or State Health Councils (for implementation approaches).

VI. USAID COMPARATIVE ADVANTAGES

There was a high degree of consensus among non-USAID stakeholders (including government, community representatives, and other donors), USAID-funded IPs and USAID staff on the overall comparative advantages of USAID as a donor. They are, not surprisingly, similar to perceived USAID comparative advantages globally. More, however, can be done to maximize use of CS and other health funds in USAID strategic advantage areas. Some partners, particularly community and state level partners, have exaggerated expectations of what USAID can fund. Given that resources for CS will be modest compared to other sector investments, it is important that CS activities focus carefully. Six areas of USAID comparative advantage are noted:

1. **Technical Assistance** – USAID is clearly recognized as a leader in state-of-the-art technologies (SOTA) in all health areas. Many examples were cited, from inputs into the National Food and Nutrition Survey to assistance in developing national policies, protocols and plans that reflect the latest thinking both programmatically and technically. USAID IPs were praised for their special technical expertise and for the information and technical support they can mobilize as needed. Training (both in terms of content and adult learning methodologies) and improvement of quality of care (COPE, management for results, etc.) are valued by stakeholders. For example, UNICEF is adopting the Engender Health COPE model in their CS program. BASICS is a major resource for all CS partners. Commercial and social marketing—NetMark in the case of CS—is considered an impressive US-led technology, as is the use of modern mass media and communications techniques.

   Notwithstanding severe staffing constraints, USAID and IP staff participate actively in a wide variety of policy and technical areas. The key role played by USAID in launching the National Nutrition Policy is a good example. USAID/IP experts assisted in the development of Nigeria's GAVI and Global Fund proposals, and in Roll Back Malaria discussions. The fact that IPs are currently implemented in communities gives them moral weight and adds practicality to their recommendations. IPs appear to openly share their expertise with other stakeholders. The World Bank is the one major donor that the USAID CS team does not work with on a regular basis, but others had high praise for USAID collegiality.

   On the other hand, major gaps remain in the use of this strategic advantage. Notwithstanding USAID efforts to exhort IPs to collaborate, cross fertilization in technical areas remains a weak point. One family planning partner interviewed had the barest and most general knowledge of CS issues and challenges, and CS partners often scarcely acknowledge reproductive health issues in their community programming. JHU/CCP, which is funded to carry out communications and mass media in all health areas, has so far not played a strategic role in integrating and cross fertilizing the health sector. The staff of the Policy Project was not aware that the key policy issue of taxes and tariffs threatens the entire country's ITN program. The team repeatedly heard the comment, especially by IPs themselves, that "everyone works in their own individual box".

   All currently operating IPs have central headquarters with strong technical staff and a global focus in their technical areas. It is, however, surprising how little technical input is received from their headquarters, and how little SOTA technology and

strategy filters out from the center. The synergistic blend of headquarters and local talent/knowledge that was so palpable in the early days of the USAID/Nigeria Population Program seems to have diminished. This is despite the fact that Nigeria is one of the most important (as well as the largest) USAID-assisted countries in Africa.

2. **Advocacy**—Historically, this is an area of strength in United States (US) assistance programs. The US automatically has considerable influence by virtue of its status as a global leader. Since "money drives policy" in Nigeria (as elsewhere), recent, dramatic, increases in USAID health sector funding also increase its influence in key policy areas. Finally, the high quality of US technical inputs and longstanding on-the-ground programs are important factors in promoting USAID influence. USAID and all IP's routinely conduct advocacy at all levels. Community activities such as CAPA have become powerful advocacy tools at the state, LGA and village levels. The Policy Project was recently funded to create tools and improve advocacy in CS. USAID and its global partners have considerable skill in advocacy; however, to date, efforts in Nigeria have only scratched the surface.

   The most important long term policy issues revolve around the difficult and complex problems os health sector reform, health financing, and control of corruption. Nevertheless, gains in these areas must be made for investments in health to be productive. Previous experience demonstrates that donor-driven programs are not durable; a fact cited by Nigerian organizations and other stakeholders. Partner donors, such as UNICEF and WHO, expressed a strong desire to work closely with USAID and the US Embassy on policy issues. Other points of entry have been international initiatives such as GAVI, the Global Fund and Roll Back Malaria. USAID/Nigeria senior staff are supportive and willing to take the necessary actions to advance a clearly articulated CS policy agenda.

3. **Flexibility**—IPs and international staff express frustration with constraints imposed by central funding mechanisms and a multiplicity of bureaucratic requirements imposed upon the program by each IP headquarters or by USAID/Nigeria. The reality is, however, that despite the current cumbersome contracting mechanisms, USAID and its partners have demonstrated a remarkable degree of responsiveness to changing needs and conditions. Rapid growth of the overall portfolio, especially in HIV/AIDS, provides irrefutable evidence of this. BASICS has provided technical support to the Nigerian Government in a broad range of CS areas, as have other IPs in their technical areas. ARCH is responding to the need to broaden their scope. Programs are finding new ways to respond to the orphan crisis. Funding for priority activities flows with a minimum of delay, compared to other donors with more cumbersome requirements to disburse funds.

   The negative side of flexibility can be a tendency for programs to become fragmented or ad hoc. This is occurring in Nigerian programs, but it can be mitigated by developing a sound long term strategy and a strategic framework which clearly articulates results to be achieved and critical actions required to achieve these results. The next five year strategy and plan will provide this.

   Although historically, USAID is the most adaptable donor, other donors are beginning to follow the lead. In a programmatically bold move, WHO recently posted officers and administrative staff to each of the 36 Nigerian states in order to facilitate technical

work and administration of funds. DFID built its social marketing program on USAID-funded PSI programs. Finally, foundations such as the Hewlett Packard and the Bill and Melinda Gates Foundations offer the possibility to leverage funds in creative and flexible ways.

4. **Community Level Approaches**—With the exception of DFID, most bilateral and multilateral programs are constrained by working mainly in the public sector. In contrast, USAID has always supported a wide variety of private sector initiatives in Nigeria. During the military regime, it was the only type of support USAID provided. In the late 80's and early 90's, USAID also supported a range of activities designed to engage the for-profit, commercial private sector. Private hospitals, clinics, and providers (such as private midwives) were brought into the USAID program, as were work-based service delivery programs, commercial marketing efforts, and social marketing.

   The current range of private sector partners is less broad than in the past and, unfortunately, USAID appears to have lost much of its institutional memory of vibrant past collaborations with private sector. In contrast, some IPs have worked with the same NGO partners for two decades or more. While this creates continuity, it does not always foster maximum creativity. Recently, USAID has begun to reclaim its strategic advantage in public-private partnerships, as HIV/AIDS, malaria, and other well-funded efforts explore every available non-governmental avenue for social mobilization. Integrated programs will allow programs with more limited funding to participate in these types of partnerships.

   Community Partnerships for Health (CPH) and CAPA programs pioneered a new model of public-private partnership by working with entire communities to mobilize supervision, support, and advocacy for local public and private health efforts. Similar community approaches have evolved in other sectors. USAID remains one of the few donors to actually reach the grassroots level effectively.

5. **Behavior Change Communication**—This is an historical strategic advantage of USAID programs in Nigeria and worldwide. Over time, USAID and its partners have evolved systematic and evidence-based approaches to changing health behavior and community norms on health issues. All levels of communication, from village health volunteers through radio-television and mass media, have been mobilized, with demonstrated results, and BCC materials of high quality and entertainment value have been created. Messages have been directed at promoting specific behaviors, such as immunization, use of family planning, etc.

   The polio social mobilization campaign seems comprehensive, and the ITN advertising is promising, though their overall impact has yet to be measured. BCC efforts in CS appear to be disjointed and unfocused. Notwithstanding this, BCC remains a strong area of comparative advantage, and several agencies (JHU/CCP, VOA, PSI, NetMark, CHANGE, BASICS, etc.) have the capacity to make a difference.

6. **Results-based Approaches**—USAID pioneered among international donors in implementing strong, data-driven systems to manage for results. USAID/Nigeria has a rational results framework organized under well-defined Strategic Objectives, with

measurable indicators of success. Recently, USAID has increased its efforts to audit and verify data quality to validate results. Results-based approaches are important to orient programs and define success. On the other hand, the efforts of USAID and its IPs to manage for results is hampered by the fragmentation of the program into many parts and needs to more clearly define catchment areas, baselines and program targets. Results are often small in scale and, while at times dramatic and moving, costly in terms of programmatic inputs.

At the program level, measuring results or even defining desired outcomes becomes daunting and elusive. As described by one IP informant, "This is the weakest area of our NGOs". The same is true for the CPHs and CAPA Committees. Nevertheless, based on field visits made by the team, communities do seem to understand the value of setting objectives and goals, and they relate very positively to USAID's overall results-oriented culture. Communities, it seems, also hunger for results. USAID is in an excellent position to improve management and monitoring at all levels.

What is not in the USAID Strategic Advantage

USAID has the funding and competence to undertake a wide variety of activities designed to leverage other donor funding. It is not, however, in a position to fund nationwide sector reform, large scale capital building or equipment projects, or to subsidize the routine operations of health centers or hospitals. While it can provide technical support in logistics and monitoring and evaluation, it has no strategic advantage in vaccine procurement (a UNICEF strength), purchase of essential drugs, or setting international norms and standards (the role of WHO). USAID does not normally intervene in adult degenerative diseases or at the tertiary care level, except in the case of Safe Motherhood, permanent contraception, and treatment of very ill children under IMCI. USAID has no comparative advantage in sponsoring long-term academic training in Nigeria or overseas, despite superb public health schools. Long-term training is costly and frequently results in the out-migration of the trainee. The USAID comparative advantage in capacity building is linked closely to improvements in on-the-ground services and health indicator results, rather than generalized systems support. USAID has relatively little advantage in areas, which are dominated and funded heavily by other partners. Two important examples are polio eradication efforts and leprosy programs.

VII. PROGRAM PARAMETERS AND CRITERIA

This section lists the program parameters and criteria that informed the assessment team's analysis and recommendations. It is based mainly on guidance from USAID/Nigeria. They are:

1. To the maximum extent possible, **activities will be integrated** in terms of technical content within the health/education sector (CS, RH, HIV/AIDS, education) and across other sectors, such as democracy and governance and agriculture. USAID plans one strategic objective (SO) for HIV/AIDS and a second SO combining health, nutrition, population and education.

2. USAID will retain its **focus on programs that have community level impact,** particularly programs which empower local communities to take action to define and resolve their own problems.

3. USAID strategies will emphasize **potential for leveraging** (other donors, government at central, state and LGA levels and communities), through programs utilizing USAID comparative advantages, and program designs facilitating programs for scale-up. Since virtually all CS projects currently funded by USAID are small, the potential to scale up and leverage resources is the operative criterion in assessing models and modalities.

4. **Management streamlining** (currently underway) of the USAID portfolio will **enhance efficiency, prevent duplication and fragmentation, and multiply results**. A subset of this is using evidence of effectiveness and impact based on sound data. Increasingly, these criteria also are being applied to IPs.

5. USAID programs endeavor to take into account the vast geographic, cultural and religious differences that make up Nigeria. For political reasons, the program needs to have wide **geographic coverage**. Some aspects, such as ITN marketing, will operate nationally. Even so, USAID will plan in such a way that some aspects of the program are based in each of Nigeria's main geographic zones. Given the small size of the CS program, this is a catch-22 in terms of impact and scale. A positive aspect is the role that geographically balanced, functioning programs can play in informing national policy agendas. To the extent possible, the goal of multiculturalism should be applied to staffing, participant training, and other program inputs.

6. USAID/Nigeria is committed to having a program that **incorporates the current state-of-the-art in all its technical areas, as well as the current thinking on program design and monitoring and evaluation**. Overall, USAID/Nigeria has the political influence within USAID and the financial resources to demand a program of excellence. Limited CS funding to address increasingly dire child health and nutrition indicators may be one exception, unless the program can leverage funds or benefit from earmarks. Implementing appropriate mechanisms to access and manage a best practices approach will require creativity and persistence.

7. Implied within all USAID-funded programs is a requirement to implementing **principles of sound governance and fiscal responsibility**. Apart from this, there may be ways to use the records of accomplishment of States, LGAs and NGOs that

already practice sound governance as part of selection **criteria for health or education programs**. This would reward sound governance and allow programs to function, with hope that counterpart funding will eventually materialize.

VIII. CONCLUSIONS AND FIVE YEAR STRATEGY RECOMMENDATIONS FOR CHILD SURVIVAL

Nigeria is large and complex, and its child health problems seem intractable. Although incremental gains are being made in some areas and there are a number of promising programmatic approaches, overall, the survival of Nigerian children depends more on internal geopolitical and social reform than on anything a donor can fund. When queried, many Nigerian informants spoke movingly of their hope--and prayer-- that the "way forward" for Nigerian children lies in growing Nigeria's democracy and curbing corruption.

Nigerian informants and other stakeholders provided many sound recommendations, which the team validated and distilled into broad strategic recommendations.

GENERAL PROGRAM RECOMMENDATIONS

1. Integrate

Integration as a principle is a positive force for efficiency and effectiveness. In implementing its integrated approach, USAID needs to:

- Carefully take into account the wider environment, particularly the myriad of departments, policies, ministries, donor-stakeholders, etc. at the national level that inhibit one unified approach.

- States and LGAs may offer lower cost models of promoting integration across sectors. For example, the State Councils for Health (multi-sectoral advisory groups) could be revitalized in priority states.

- Synergies between technical areas should be incorporated into the program without affecting the quality of SOTA technical inputs. The strategy should be elaborated to incorporate ongoing mechanisms to take advantage USAID central expertise and flexibility to alter programmatic courses to meet new health challenges or solutions as they emerge.

- Community approaches and service delivery should be integrated to the maximum extent possible. This is where integration is both feasible and in demand.

- The private sector should be encouraged to adopt/adapt integrated approaches; emphasis on public-private partnerships should continue.

2. Tighten Policy And Research Agendas

Clear mechanisms are needed for USAID to develop and update a highly focused policy and research agenda, with mechanisms to exclude issues or research that is marginal to central issues, then to carefully monitor progress on key policy issues and the overall policy environment as it evolves. Policy analysis and action should respond rapidly to address barriers such as vaccine supply, taxes and tariffs on ITNs, and the release of funds to LGAs. In the long term, issues around health sector reform, quality of services, equity, budget, taxation, and cash flow should be priorities. USAID should reconsider its objectives in supporting applied and operations research, and maintain closer control of the research

agenda. Operations research is defined as research embedded within programs and driven by program questions. Operations research needs to be carried out quickly and efficiently. The balance in policy and research needs to give priority to essential "must be resolved" issues, and later on the "good to accomplish" ones. Currently, the balance leans more toward the latter.

3. Develop an Integrated Behavior Change Communication (BCC) Approach

USAID and its partners must evolve a behavior change communication (BCC) strategy that is comprehensive, cross-sectoral, evidence-based, culturally sensitive, and focused on outcomes (i.e. household and individual behaviors) rather than knowledge.

Specifically, the long term BCC strategy should:

- Be based on sound research and behavior change theory;
- Incorporate good monitoring and evaluation of impact (linked to services);
- Use message guides to ensure the consistency of technical advice, but use current knowledge of cultural practices, especially in nutrition, to adapt messages regionally to be acceptable and doable by target populations;
- Focus on small, achievable actions, and changing community norms;
- Be integrated across health/education sectors and from mass media to community counseling levels;
- Focus on face-to-face encounters (67 percent of impact is achieved here) and community mobilization;
- Shift approach from predominantly product-oriented (e.g. posters, jingles, TV messages, and a heavy reliance on advertising agencies for creative work) to a broader one of which mass media is an important component;
- Produce higher quality, more appealing materials;
- Share the recognition for any material produced with the broadest possible group of stakeholders, whether they contribute financially or not;
- Produce materials that may be leveraged (i.e. purchased by other donors); and
- Insure adequate coverage in combined BCC efforts (mass media, community mobilization, print materials, individual counseling) in a given community before launching an information, education and communication effort.

4. Expand Public-Private Partnerships

The USAID portfolio is currently well balanced in the use of NGO partners linked to public sector and commercial or social marketing efforts. The private sector offers a crucial link to populations and a safety net when/if public sector programs fall short. It is noted that the

HIV/AIDS program, by virtue of its generous funding and wide mandate, is programming diversely and extensively in the private sector. Whenever possible (that is, nearly always), CS should be integrated as an essential element of these efforts. HIV/AIDS is a CS issue!

The team recommends that USAID/Nigeria continues, and possibly expands public-private partnerships by:

- Seeking non-labor or investment intensive models for supporting NGOs;
- Working with private sector health providers such ashospitals, clinics, private midwives;
- Supporting and expanding commercial and social marketing efforts;
- Revitalizing the USAID work-based services approach;
- Mobilizing the private sector to engage in dialogue on key policy issues;
- Exploring pre-packaged, quality controlled pharmaceutical products (e.g. anti-malarials) with distribution networks to include the Patent Medicine Vendors; and
- Involving the uniformed services in CS approaches, not just in HIV/AIDS.

5. Design Evidence-Based And Data Driven Programs

Careful work in setting performance targets, programmatic benchmarks, and monitoring and evaluation protocols is crucial to the new USAID strategy. Program goals and objectives, like behavior change targets, must pass very strict achieveability criteria, taking levels of funding into account. It is unreasonable for USAID to request significant results while providing very modest input. Currently, the use of evidence and data is not strong either with partners, such as the Ministry of Health, or in USAID/Nigeria-funded health programs. Communities and NGOs are frequently unaware of their service targets-(immunization, family planning, ANC), or set them far too low. At the IP level, data is sometimes unavailable, difficult to access and not standardized. Nevertheless, good progress is being made in attacking these problems. USAID needs to place maximum emphasis and provide sufficient funding in this *critical* area, both to inform the new strategy and throughout the next six years. However, it is important to monitor monitoring and evaluation assistance and advice to insure that it is *practical and achievable*, and not based on theoretical or untested models. To the extent feasible, routine data needs to come from existing HMIS at local levels, supported by DHS, MICS, special studies, and operations research.

PROGRAM AREA RECOMMENDATIONS

6. Immunization

- Modify strategy to focus on routine immunization to the extent possible given the national focus on polio eradication;

- Use polio campaigns to carefully engage remaining polio resources to strengthen routine immunization, and attach any support to polio and NIDs to promotion of routine immunization;

- With GAVI and ICC partners, guarantee the flow of resources and vaccines to 774 LGAs and as a policy force to refocus and strengthen the immunization program;

- Ensure the vaccination capacity of PVO and private health institutions as a back-up to the public sector;

- Advocate for a shift in national policy from ad-hoc immunization sessions to fixed day immunization sessions at Hospital/PHC/Outreach centers;

- Make consistent efforts for reform of vaccine/procurement/procedures with an element of accountability at each level. One way to ensure a sustainable vaccine supply is to ask donors to agree to supply of them instead of putting the funds in the common basket;

- Consider adding measles as a WHO/UNICEF led initiative through routine immunization; and

- Utilize networks of NPHCDA/zonal PCH coordinators/LGAs for vaccine logistics control with appropriate mechanisms for HMIS.

7. Malaria

Malaria remains the most significant threat to young children in Nigeria. The Nigerian government and its partners participate in the Roll Back Malaria program. For USAID/Nigeria, malaria prevention and treatment should remain a priority in the three major RBN areas:

- Continue ITNs through NetMark;
- Reinforce prompt and appropriate community level fever treatment;
- Link IPT (intermittent pregnancy treatment) through reproductive health services; and
- Strengthen community mobilization and efforts targeted at most vulnerable groups.

8. Nutrition

There are many ongoing, potentially important efforts in nutrition. There is a need, however, to focus on key behaviors and interventions with proven impact.

The five-year strategy should:

- Maintain USAID's leadership in supporting the development and implementation of a national routine vitamin A supplementation strategy for children 6-59 months of age (present policy is calling for 6-24 mo), as well as strengthening PHC facilities' capacity to administer vitamin A capsules in the case management of measles, severe diarrhea, PEM, and xerophthalmia.

- Provide technical assistance and support to the National Fortification Program in conjunction with GAIN, focusing on vitamin A, iron, folate, and iodine fortification of commonly consumed foods.

- Support establishment of a national nutrition and food security surveillance system for ongoing program monitoring and needs assessment.

- Explore opportunities and potential to accelerate and expand the release of biofortified lines of key crops, particularly high iron and zinc varieties of maize and legumes developed at the International Institute of Tropical Agriculture/Ibadan (IITA).

- Support an integrated approach to reducing maternal and pediatric anemia, including targeted supplementation and food fortification (VA, iron, folate and other B-vitamins), RBM (ITNs, case treatment, IPT) and de-worming, through antenatal/postnatal care, PHC facilities, and community-level programs.

- Approach PMTCT as a CS issue, linking VCT, ANC, maternal health and nutrition, FP, ARVs, infant feeding counseling and support, and basic child health interventions (EPI, CDD, ARI, vitamin A, malaria), addressing the needs of all children in households where mothers (and frequently fathers) are HIV positive.

- Develop infant feeding strategies cooperatively across CS, FP and PMTCT sectors.

9. Other Child Survival Interventions

Unless additional funding becomes available, it will be impossible to support these interventions on a large scale; however, USAID should seek opportunities to reinforce and support ongoing programs in these areas through no-cost interventions. For example, ORT and ARI should be included in the integrated BCC strategy, and the ubiquitous ORT corners can be revived by community action groups with very little investment. Revisions to curricula or Standing Orders can encompass updating ARI and ORT advice, and USAID can follow policy-level discussions.

IX. RECOMMENDATIONS FOR THE TRANSITION PERIOD

> *We spend too much time talking about coordination and collaboration … [but] we collaborate more than we give ourselves credit for.*
>
> RH NGO Representative

Until its new strategy is fully implemented, USAID will undertake selected activities to further inform its analytic agenda and to ease the transition into a new integrated strategy. The team has made recommendations with this in mind, taking care to recommend activities that may be completed at low cost or within existing funded programs. USAID has identified its structural problems, such as too many IPs, lack of coordination, and an over-dependence on vertical or central projects that impeded efficient implementation. Structural changes will greatly improve things. However, the fragmentation of activities, capacities, and programs by sector and even sub-sector must be addressed at a deeper level than contracting structures. Success in achieving USAID objectives will involve fundamental changes in the attitudes and practices of the local partner staffs, some of whom have been working with USAID programs for years. Thus, the transition recommendations presented here focus on activities designed to yield a gradual evolution of the program toward an integrated outlook and polyvalent technical capabilities in as consensual and non-threatening way as possible.

TRANSITION RECOMMENDATIONS

1. Strengthen Health Financing Knowledge (Analytic Agenda)

Additional analyses or information gathering should be conducted in this important area to assist USAID to design programs that will foster sustainable local, state, and national financing for programs. Specifically, a description and analysis of various health financing issues, including government budget allocations (by central, state, LGA) and experiences in movement of funds. The analysis should examine PHC, community Bamako Initiative type financing, (documenting communities that are still capitalized and those where funding has been drained), financing of vaccines and essential drugs, allocation, and financial management. A few case examples of specific states, LGAs and NGOs, especially those performing well on governance and financial discipline criteria, would be helpful to project the potential sustainability of programmed activities. It is likely that macro level analysis or much of the needed information exists through the World Bank or DFID. To elaborate its strategy, USAID should access a more in-depth review of financial management and planning in health (and education) sectors, and a validation of priority policy agenda.

2. Inventory/Annotate Policies, Norms, Standing Orders and Curricula (Analytic Agenda)

A team should be organized with representatives from USAID, IPs, Government ,and one or two expert consultants to conduct a comprehensive inventory and technical (i.e. content and presentation) review of all guidance materials being used in the public sector (and private sector if time allows). These include:

- Standing Orders in all technical areas;
- Bamako Initiative Procedures Folders;
- Manuals for In-service and community volunteer training;

- Policies/policy documents (FP, RH, Safe Motherhood, Breastfeeding, Nutrition, ITM, Malaria Control, etc.);
- International conventions and charters Nigeria has signed (e.g. ICPD, Rights of the Child, etc.);
- Norms and Standards for licensing PMVs;
- Curricula for training nurse-midwives, doctors and CHEWS; and
- NGO policies, procedures, manuals and training curricula as they relate to the above norms and standards.

For efficiency, this inventory should be conducted across sectors (CS, RH, HIV/AIDS, and education). Audits of selected sites would determine the extent of knowledge and utilization of these policies, standards and job aids. A key result would be to identify critical areas where technical updating or harmonization is required, and to evaluate and make recommendations on dissemination. One area of particular importance is harmonization of guidelines for PHC and IMCI. Treatment algorithms may be dated, and new advice, such as emergency contraception, double protection (FP and HIV), or ITN promotion may not be present.

Judging from a preliminary review of available materials, many manuals and other materials could be made more user friendly and attractive/readable. A future activity would be to harmonize various program-specific materials (e.g. BASICS, UNICEF, Engender Health, etc.) and put logos of all USAID and other donor partners and relevant ministries on the resulting materials. This is an effective way to leverage reproduction/distribution costs and produces better collaboration. Everyone receives recognition for success.

3. Inventory, Integrate, Innovate in BCC (Integration Agenda)

Currently, the bulk of USAID-funded information, education and communication (IEC) support (mass media, print media) is provided by JHU/CCP, although new actors, such as Voice of America are emerging. JHU/CCP is undergoing an internal process of developing an integrated framework for a more comprehensive approach to behavior change communications. This should be shared and validated by stakeholders. The bilateral VISION Project also has begun this process. Regarding the BCC efforts housed within IPs work must be shared, updated and available among partners. Recognition for technical productions needs to be shared. Other groups, such as PSI and NetMark, have BCC approaches that may be shared/enhanced within a wider strategy. Voice of America may add dynamism to the mix.

The current BCC efforts in Nigeria are dominated by a piecemeal mass media production approach, rather than a “bottom up” and comprehensive behavior change model. Visual materials are for the most part not very attractive, and some convey mixed or confused messages. BCC for CS in Nigeria (and possibly other health areas) needs an injection of enthusiasm and innovation and a strong strategic perspective based on sound behavior change theory and well defined messages. All this is unlikely to be achieved during the transition period. However, external technical assistance to initiate this process is recommended.

4. Harmonize And Synergize Community Approaches (Integration Agenda)

The multiple community approaches currently implemented in Nigeria have many common elements. To begin the process of harmonizing models of working at the community level, a small working group composed of experienced community mobilization experts and strategic thinkers should be formed. Those invited should included key thinkers on community from Government (i.e. NPHCDA), foundations (e.g. Tulsi Chandrai, Packard), USAID agriculture (farmer to farmer programs), education (LEAP), former DFID PHC projects, and UNICEF. The objective is not to exchange, but rather to identify common approaches and problems. Cross over site visits should be organized. The focus should be on sharing and evolving a process, rather than coming up with a single mandated approach. On the other hand, evolution of common approaches, not associated closely with one or another IP or stakeholder, would be encouraged. The emphasis would be individuality with commonality, but no proprietary approaches or materials.

Areas to be considered include:

- Potential to scale up/work on a large scale;
- Community decisionmaking;
- Techniques for mobilization of communities and changing community norms on household behaviors (including materials for community mobilization);
- Training community leaders and volunteers (length, content, skills, training aids);
- Cost sharing and cost containment (opportunities to reduce the cost of external financial and technical inputs);
- Integrating activities across sectors (immediate opportunities for synergy between IP programs); and
- Collecting and utilizing data at the community level (community monitoring or health facilities and advocacy).

5. Cross-train IP Staff (Human Resource Development)

In the upcoming strategy, USAID will move into an integrated mode for programming and technical support, particularly at the community level. Currently, IP staff are highly experienced, but often function in specialty areas and have inadequate knowledge of other sectors. To operate its integrated program, USAID will need polyvalent program officers and technical staff. USAID should begin soon, and at the lowest possible cost, the process of cross training IP staff, providing more in-depth knowledge of technical areas outside their current specialty. This should be technical in-service leading to specific clinical and programmatic knowledge that can be evaluated (e.g. post tests, skills assessments, role plays). For example, a two-three day seminar (or two identical seminars planned at different dates/locations to accommodate varying schedules) on malaria would include a comprehensive briefing on SOTA (specifically issues on treatment protocols), RBM initiatives internationally and in Nigeria, ITN promotion strategies (and the role communities can play), and monitoring and

evaluation for malaria control. Each participant would be IP sponsored, and participation should be entirely voluntary. It is likely that IP staff will perceive the advantages of cross training without being coerced. USAID should provide certificates of participation.

6. Analyze Vaccine And Essential Drugs Capacity (Analytic Agenda)

The team received mixed reports on capacity and training needs within the overall three-tiered health system to manage logistics (forecasting needs, stock control, cold chain management, transportation, etc.) for the immunization program and for essential drugs. Clearly, the current, mainly "push" system is not working, but there are many theories as to the root causes. USAID already invests in a strategic approach to contraceptive logistics through the DELIVER Project. It might consider a similar analysis in the area of vaccines and, if feasible, essential drugs. This would enable USAID to determine whether there are points within the supply system where targeted interventions would be helpful. However, UNICEF and WHO should remain the key donors in equipment and vaccines for the NPI.

7. Link Research With Policy And Performance Indicators

Despite an initial exercise to prioritize research topics, some of the applied research being funded by ARCH is relevant to current program issues; some is not. It is not clear that USAID has a sufficiently general CS budget to support applied research in a serious way. Research and analysis undertaken by the Policy Project does not appear to be linked to the interesting position papers generated by ARCH. In the transition period, USAID should encourage links between policy and research, maximize research links to programs and reconsider the role of applied and operations research across the health/education sector. Research should also be linked to monitoring and evaluation of key indicators, with priority given to research that helps explain why some things are or are not working. An example would be sentinel studies to determine the extent that commercially marketed ITNs reach key target groups (poor pregnant women and very young children living in poverty). USAID and the IPs are on track and making good progress in improving the quality of data and indicators. This will pay off in the new strategy. Villages and communities need denominators (i.e. target populations to be served) to monitor their own progress.

Four Urgent Needs

1. Address the issue of Taxes and Tariffs on nets, yarn and insecticide for ITNs. Be on the "look out" for similar issues in upcoming plans for food fortificants.

2. Address the problem of vaccine stock-outs, initially and urgently in LGAs where BASICS and other IP's operate. "No Product, No Program!"

3. Follow on the launching of the National Nutrition Policy with a Plan of Action. Insure multi-stakeholder involvement and integration of Food Security and a rational approach to "Essential Nutrition Actions".

4. Given the effect of HIV/AIDS on the nutritional status and health of entire households, USAID/Nigeria should be actively engaged with government and partners in Nigeria to develop comprehensive HIV/AIDS care and support guidelines to ensure that programs recognize and provide support to these vulnerable households. This would include directing Title II assistance to vulnerable households (potentially identified by food deficits/insecurity rather than by HIV-infected individuals if stigma is an issue).

And on a lighter note…

- **Synergy Awards** could be given to IPs for synergistic activities. Winners can be identified in the course of routine Annual Report and Portfolio Review process.

- **"No Protocol" Training** can add as much as a half day to any workshop or training, producing significant cost savings. Eliminate or restrict time on opening and closing ceremonies. Alternatively, begin training promptly and interrupt it when the guest of honor arrives for his/her opening speech (only one speech).

- **Partner Fairs** provide a lively and interesting alternative to lengthy presentations at IP meetings. IPs and other partners are invited to put together a booth with posters on key studies and findings, materials used, videos produced, etc. The IP meeting becomes a celebration of success. Posters can then be displayed for the general public at USAID or the American Cultural Center.

CLOSING

The assessment team appreciates the opportunity to contribute to the development of the exciting new USAID/Nigeria, health/education strategy. Nigeria is, indeed, one of the most interesting and important countries in Africa, and USAID has a vital role to play.

APPENDICES

APPENDIX A

PERSONS CONTACTED

WORKING DOCUMENT

PERSONS CONTACTED

USAID	DAWN LIBERI	Mission Director
	LYNN GORTON	General Development Officer
	ABDU GARBA	Child Survival Adviser
	KAYODE MORENIKEJI	CS Program Assistant
	SHEILA O'ROURKE	HIV/AIDS Adviser
	ANDREW LEVIN, PH.D.	Agriculture Development Officer
	REGINA R. DENIS	Project Development Officer
	KENNETH P. LUEPHANG	Contracting Officer
	DR SANDY OLEKSY-OJIKUTU	Senior Education Advisor
	LIANE ADAMS	Child Survival Advisor
JHU / CCP Johns Hopkins University Center for Communication Programs	BOLA KUSEMIJU	Country Director
	JKT AJIBOYE	Deputy Country Director in Charge of Child Survival
THE POLICY PROJECT	DR JEROME MAFENI	Country Representative
	DR OCHI IBE	Senior Advisor, Reproductive Health and Child Survival
BASICS	ANDY AGLE	Country Director
	FOLAKE OLAYINKA	Training Consultant
	SAM ORISASONA	Team Leader – Lagos
	DR LEILA MADUEKE	Team Leader – Abia
	FATIMAH ABDULLAI	Acting Team Leader – Kano
	DR AKINPE ASHIRU	Technical Program Manager
	DR OLU AYODELE	Field Support Program Manager
	DR ABEL EIGEGE	Training Consultant
	MR TUNDE HUMPATIN	Chairman of Committee – BASICS Lagos-area CAPA Committee
NETMARK	STEVEN ONYA	CHI Pharmaceutical Ltd
	LISA BADRU	Centerspread Advertising Agency
	DR MOSANYA	

ARCH	STALIN EWOIGBOKHAN ALLAN HILL PROF. LATEEF A. SALAKO	Country Representative Project Director Chairman of the National Steering Committee
NPI	DR DERE AWOSIKA DR CHINYERE CHUKWUANI	National Chairman, Chief Executive Officer Director of Planing
WHO	DR ABDU MOUDI DR FUNKE BOGUNJOKO DR AFOLABI AMOS PETU AUSTINE OGHIDE DR AYOTUMDE ADEGBOYEGA NIYI OGUNDRAN DR OYODELE AWE JONES MPAKATENI DR ABDOULAI JACK DR OLABE	Head of Agency Nutrition Specialist Malaria Specialist Health Economist NPO/IHP NPO/IMCI NPO/HIV/AIDS
UNICEF	DR KOEN VANORMELINGEN SUSAN NJOMO Dr BRANDAO EMMANUAL GEMADE ISIAKA STEVENS ALO NOBLE THALARI PROF. FRANK ONYEZILI	Chief Health and Nutrition PEI Training Specialist EPI Team Leader Malaria Specialist Project Officer, Micronutrient Deficiency Control
THE CARTER CENTER	ABEL EIGEGE	Director Lymphatic Filariasis / Schistosomiasis
NATIONAL PRIMARY HEALTH CARE DEVELOPMENT AGENCY	PROF. RANSOME-KUTI DR SHEHU MAHDI A.O ADENUYA NAUTAMA F. TAIFA KALEOHO-ADELEKOUM P. EHINWEMA PROF. O. AKPAA	Chairman of Board Executive Officer

NATIONAL PLANNING COMMISSION	SA'AD ASAD MOHAMMAD DR AJIBOSE MR OBI	Honorable Commissionner Chairman National Committee on Food and Nutrition
NUTRITION PARTNERS FOOD AND IITA	DR MAZYIA-DIXON DR BEATRICE ELUAKA PROF. AKINYELE	Food Scientist Ministry of Health Department of Human Nutrition, University of Ibaden
LAGOS AREA COMMUNITY PARTNERS FOR HEALTH	DR BOSUN BABAJIDE	Chairman of the Governing Board
LAGOS STATE GOVERNMENT	DR LEKE PITAN DR OMOLEHIM	Honorable Commissioner for Health Director of Primary Health Care
ROLL BACK MALARIA ORGANIZATION	DR MOSANYA	Director
WORLD EDUCATION	MOJI SODEINDE-PARK KIMBERLY DIXON	Community Training Coordinator Technical Consultant
RTI INTERNATIONAL	BARBARA C. KENNEDY	Senior International Health Specialist
PARTNERS FOR DEVELOPMENT	FRANK CONLON LONELA BLOXOM JOEL MONTAGNE	Executive Director – Designate Country Program Director PFD Board Chair

MINISTRY OF HEALTH KAWO STALE	DR JIDE IDRIS DR DAIYABU MUHAMMED ABDULRAHMON YALLUBU DR DAIYABU MOHAMMED BAFFA MAMUDU KADEMI DR HAMTSU WALTER AHMED MOHAMMED	Permanent Secretary Director Primary Health Care and Disease Control
AFRICAN AIDS ALERT	CHRIS OGBALU	Executive Director
LEAP LITERACY ENHANCEMENT ASSISTANCE PROGRAM	IAN SMITH NDIDI UCHE	Chief of Party Assistant Communitu Resource Manager
JOHN HOPKINS UNIVERSITY	J. KAYODE TEJUMOLA AJIBOYE BOLA KUSEMIJU	Deputy Country Director Country Director
NIGERIA NATIONAL POLIO PLUS COMMITTEE	BUSUYI ONABOLU	

APPENDIX B

SCOPE OF WORK

SCOPE OF WORK FOR A STRATEGIC ASSESSMENT OF THE USAID NIGERIA CHILD SURVIVAL PROGRAM

Background

Nigeria's social indicators are among the worst in the world. The Agency's Bureau for Global Health recently assessed the needs in all USAID-supported countries and determined that Nigeria ranked second in terms of magnitude and severity of its health problem related to child survival, HIV/AIDS and population. Under-five mortality rate in Nigeria is 140/1,000 live births, malaria accounts for 30 % of all child deaths ; barely 1% of infants are exclusively Breastfed for the first six month of life; and malnutrition underlies more than 50 % of all childhood death and disability in Nigeria.

During the long years of military rule, USAID maintained a presence in the country, but did not work with the military government. Instead, the mission directed its implementing partners (IPs) to work with and through the private sector, i.e, non-profit, indigenous NGOs, on a reduced scale and with a greatly reduced budget. Prior to the election of a new civilian government, all of USAID's child survival assistance was directed toward the creation and nurturing of entities called "Community Partners for Health"(CPHs).

These CPHs were community-driven and -led as centers for providing health care services to a given community. In all, 16 CPHs were created in Kano, Lagos and Abias Statees over the life of the BASICS I Project, which ended early in 1999. The CPHs comprise "dyads" of community groups (eg, market women, trades, mother's group and so forth) that center around a health facility in the community (usually a private clinic or hospital). Over the course of 4-5 years, these entities learned various skills related to theuir function and gradually grew to full independence on a pre-determined schedule. By the end of the first year of Basics II, all of the CPHs were well on theur way to independence and most were duly registered with the Government of Nigeria as NGOs. They are now on their own and frequently are among the most valued of USAID's partners in the field.

Working closely with Basics in child survival, Johns Hopkins University/Center for Communication Programs (JHU/CCP) has provided the IEC and media arm of their programs in the three states. Because JHU provides the same types of services for all the health sub-sectors (as well as Democracy and Governance), they were instrumental in furthering the collaboration of IPs to integrate some of their programming. For example, reproductive health issues were dealt with routinely in the CPHs, in addition to HIV/AIDS counseling and some highly successful mock parliaments staged to educate women on the usefulness of understanding and participating in the political process for the benefit of their families.

Objective of Strategic Assessment

The overall objective of the strategic assessment is to provide a body of data and analysis that will assist USAID/Nigeria and its stakeholders in the development of the mission's child Survival strategy for the period 2004-2009. As we wind down our four-year transition strategy, the mission has now begun the design process for a new five-year strategy. Data and analysis from this assessment, including the findings, recommendations and distillation of lessons learned will be critical in rounding out the transition period and to defining and formulating new strategies and activities. It is assumed that Nigeria will remain a priority

country for the U.S Government and that funding will remain high at current levels in child survival and population, and increased levels for HIV/AIDS programming.

Scope of work

The purpose of this strategic assessment is to produce a report that will guide the mission's immediate and future decision in terms of child survival programming. In order to create this report, the assessment team need to :

- Assess the nature and scope of child survival indicators
- Analyze response to these indicators by USAID/Nigeria, the Federal Government of Nigeria, other donors and other other relevant stakeholders and actors vis-a-vis the fundings ;
- Distill the lessons learned that would be valuable in formulating a new USAID Child Survival strategy and in rounding out the remaining time in the current transition strategy ;
- Take into account USAID's comparative advantages and potential resources, the involvement of the GON, other USG actors and other donors as they identify the issues and activities the mission should address in its new five-year survival child strategy ;
- Identify key activities, corrective actions, etc..., that should be undertaking during the final months of the transition strategy to current USAID-funded child programs ;
- Review and update the existing bibliography of all epidemiological and sociocultural data on child survival in Nigeria. Based on the results of the literature search for this review and update, identify critical gaps and recommend a priority research agenda to fill those gaps. These recommendations should differentiate between the three components of the child. These recommendations should differentiate between the three components of the Child survival portfolio (i.e., immunization, nutrition, and malaria).

Methodology

In order ot examine the above issues, the following methodology should be considered:

- Review documetnts (lits attached);
- Structured interviews with key actors in the Federal Government of Nigeria involved with child survival activities (e.g., Minister of Health, National Coordinator of the National Program on Immunization (NPI), Hon. Commissioner of the National Planning Commission (NPC), Director of Primary Health Care (PHC) in the Federal Ministry of Health, Executive Director of the National Primary Health Care Development Agency (NPHCDA, etc.), USAID-funded implementing partners involved with child survival activities, local non-governmental organizations involved in carrying out child survival work (e.g., Community Partners for Health (CPHs), and appropriate mission personnel;
- Site visits to projects presently funded by USAID/Nigeria
- A literature search for all child survival epidemiological and sociocultural data for Nigeria and an update of the existing bibliography on these issues. The search for references will include a web search, communication with knowledgeable individuals both within and outside of Nigeria, and interviews with cooperating agencies, including a search of their archives;
- Review and analysis of the project monitoring plans (PMP) for child survival activities

Reports

The contractor will submit a brief assessment report (no more than 20 pages) in accordance with the requirements specified below and in a manner that is conducive to assisting mission decision-makers and stakeholders with the development of the mission's new five-year child survival strategy. The format for the strategic assessment report is as follows :

- Executive summary – consisely state the most salient findings and recommendations (2-3 pages) ;
- Introduction – purpose, audience and synopsis of task (1 page);
- Background – brief overview of child survival in Nigeria, including both the epidemiological and sociocultural profile of the epidemic (1-2 pages);
- Federal Government of Nigeria approach – describe the history of Government interventions and present strategy (1 page);
- USAID's assistance approach – describe the USAID program strategy and activities implemented in response to the problem, target populations, and partners (1 page);
- Other donors – describe the involvement of other significant donors, particularly Unicef, WHO, EU, Japan, DfID and CIDA (1 page);
- Findings/Conclusions/Recommendations – including programming gaps and opportunities (identification ef gaps in programming and, given USAID's comparative advantage, opportunities for future USAID investment), local capacity, i.e., in-country public and private sector capacity for child survival programming (10-12 pages);
- Lessons learned (1 page);
- Issues – provide a list of key technical and/or administrative issues, including critical gaps in available epidemiological and sociocultural data (1 page);
- Suggestions for future directions (2-3 pages); and
- Annexes – including evaluation methods, schedules, interview lists, bibliography of existing epidemiological and sociocultural data.

The team will should provide an interim debriefing for the mission before departure of the AID/W participants to highlight the major finding and recommendations thus far obtained. The remaining team members will incorporate these comments when preparing the final documents.

Relationships and Responsibilities

The Team will work under the direction of the Child Survival unit of the General Development Office. This subgroup compromises Lynn Gorton , Chief of the GDO; Liane Adams, Child Survival Advisor; and Garba Abdu, Child Survival Program Manager. Work Days and Schedule (Illustrative)

Travel days to and from the US for US-based staff and travel within Nigeria for all team members are included. Six-day work weeks are recommended.

First Week – (to begin in September/October and to overlap with the FP/RH Poptech team in early October):

- Background reading (entire team)
- Travel to Abuja of US-based team members

Second Week:

- Team planning with full assessment team and mission staff
- Meet with GON and Abuja-based donors and IPs
- Meet with Lagos-based IPs and donors

Third Week:

- visit project sites
- prepare mission debriefing
- conduct debriefing

Fourth Week:

- Team leader incorporates mission comments and prepare first draft with the Nigeria team members
- Team Leader submits first draft of assessment report
- Departure of Team Leader

Fifth Week:

- Mission prepares and submits comments on draft to Team Leader

Sixth and Seventh Weeks:

- Team Leader incorporates comments and finalizes draft
- Final report submitted to mission and MEDS

Eight Week:

- MEDS reviews and edits report
- MEDS submits final edited report to mission

Team Composition and Qualifications

The Team should have the following composition and skills:

Team Leader: The Team Leader will be responsible for managing a team of full-time and part-time team members in a comprehensive review of USAID/Nigeria's current Child Survival portfolio and in developing a strategy document that clearly shows the technical areas which USAID should support or initiate in the coming years. S/he will be the responsible for the overall organization of the report and the presentations. S/he will be the chief liaison with the Mission's GDO and staff. The TL will provide guidance to other team members, assign appropriate tasks, and ensure timely completion of specific tasks, as well as the entire assessment. S/he should have extensive experience in team leadership and a strong technical grounding in child survival areas. Previous teal leadership is a prerequisite for this position. The TL must be able to provide technical, as well as administrative leadership to the team. S/he should consult with GDO staff regularly throughout this exercise to ensure

progress is sound and key SOW issues are being addressed. The TL should have extensive USAID experience and understanding of USAID systems and procedures, and 10 years of experience in the child survival sector, preferably in developing countries. Although the TL should have a solid technical background; his/her strengths should accentuate the management skills and experience required in the SOW.

Child Survival Program Management Expert: S/he must have robust operational experience with the implementation and program management of child survival issues. The PME should have 5-10 years of international experience and superior understanding of the complexities of USAID program management. This experience and superior understanding of the complexities of USAID program management. This experience and understanding should extensive knowledge of the cooperating agencies and their respective areas of expertise, the disadvantages and advantages of field support, a Strategic Objective Agreement (SOAG), and other bilateral funding mechanisms (e.g., a large consortium of Cas and other NGOs). The PME will contribute heavily to the future directions section of the SOW including the monitoring and evaluation of the program.

Immunization Expert: the Team Immunization Expert should be a senior person with extensive knowledge and experience in the areas of routine and supplemental immunization in developing countries. Knowledge of and experience in Nigeria w will be helpful.

Nutrition Expert: The Team Nutrition Expert should be a senior person with extensive knowledge of and experience with nutrition issues in developing countries. Knowledge of and experience in Nigeria will be helpful.

Social Scientist: The Team social scientist should be a senior person with graduate training in Sociology or Anthropology. S/he must have extensive knowledge of the sociocultural aspects of the child survival situation in Nigeria. Excellent writing skills are required. In addition to supplying background information on Nigeria to other team members, s/he will be responsible for the sociocultural section of the report and the compilation of the sociocutlural bibliography on child survival in Nigeria.

Epidemiologist: The Team Epidemiologist should be a senior person and have extensive knowledge of the immunization and nutrition situation in Nigeria. S/he must also have knowledge of the main stakeholders and actors in the child survival field in Nigeria. Excellent writing skills are required. In addition to supplying background information on Nigeria to expatriate team members, s/he will be responsible for the epidemiological section of the report and the epidemiological bibliography.

APPENDIX C

USAID STRATEGIC OBJECTIVE FRAMEWORK

WORKING DOCUMENT

USAID STRATEGIC OBJECTIVE FRAMEWORK

STRATEGIC OBJECTIVE NO. 3

DEVELOP THE FOUNDATION FOR EDUCATION REFORM

- # education policy reform initiatives presented at national level
- Increased English Literacy and numeracy scores of students in targeted schools
- % English literacy and numeracy agendas implemented in targeted schools
- % of NOIC graduates of Lagos and Delta State programs employed

IR 3.1 Functioning Policy Support System in targeted states

3.1.1 % of data collection forms reliably completed at school level and precisely recorded to State level
3.1.2 # of effective Policy Issue Presentations (PIPs) made at target fora

IR 3.2 Teacher training in English literacy and numeracy improved in targeted states

3.2.1 **#** IR1 (Interactive Radio Instruction) lessons (literacy /numeracy produced and broadcast
3.2.2 % of trained master teachers functioning effectively
3.2.3 # teachers in targeted schools trained in IRI methodology
3.2.4 % of teachers adopting new literacy/numeracy methodology

IR 3.1 Functioning Policy Support System in targeted states

3.1.3 % of data collection forms reliably completed at school level and precisely recorded to State level
3.1.4 # of effective Policy Issue Presentations (PIPs) made at target fora

IR 3.2 Teacher training in English literacy and numeracy improved in targeted states

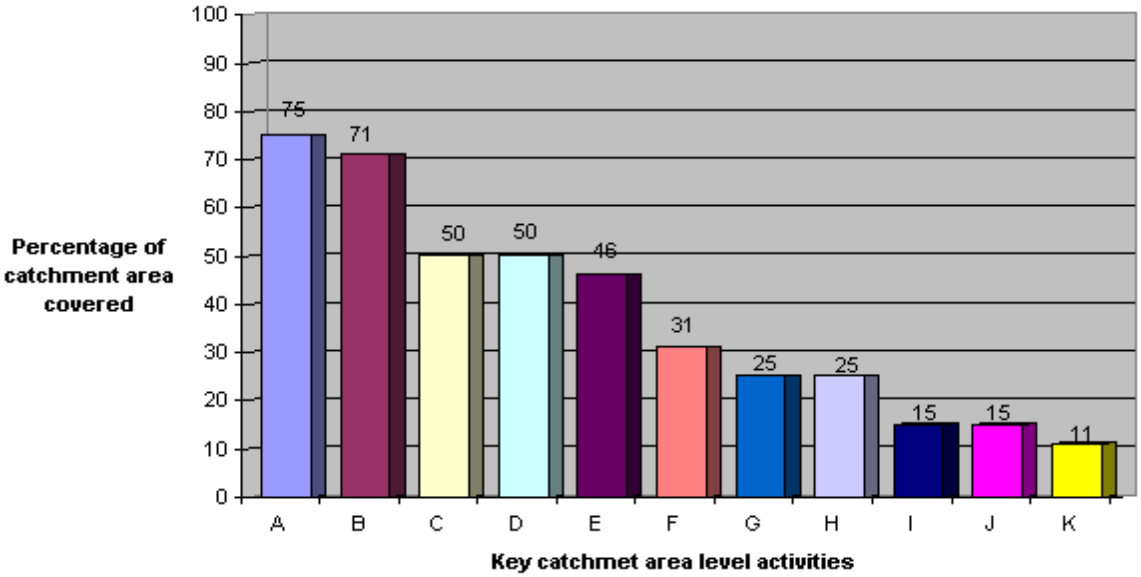
3.2.1 **#** IR1 (Interactive Radio Instruction) lessons (literacy /numeracy produced and broadcast
3.2.2 % of trained master teachers functioning effectively
3.2.3 # teachers in targeted schools trained in IRI methodology
3.2.4 % of teachers adopting new literacy/numeracy methodology

APPENDIX D

SELECTED HEALTH AND DEMOGRAHPIC DATA

SELECTED HEALTH AND DEMOGRPAHIC DATA

STATUS OF SELECTED ACTIVITIES AT CATCHMENT AREA LEVEL (AS AT JUNE 2002)



A	*Listing of CBOs, NGOs, private health services etc*	75
B	*Mapping of Cas in each LGA*	71
C	*Pre-CAPA community meetings*	50
D	*Immunization CAP*	50
E	*Post-CAP meeting to adopt workplan/initiale implementation (Immunization)*	46
F	*Immunization Quality-of-Service self assessment system*	31
G	*Monthly Post CAPA meetings for process monitoring*	25
H	*Group/Community Health Educ.by CAPA members*	25
I	*Immunization coverage monitoring*	15
J	*Nutrition CAP*	15
K	*Post-CAP meeting to adopt workplan and initiative implementation (Nutrition)*	11

Status of PHC in Nigeria: May 2001

Zone	LGAs Sampled	Average Cost Anti-Malarial	% LGAs All Ess. Drugs	% DRF in Place	% with BI	% with Routine Immun.	% Well Baby Clinic	Annual Measles Cases	Annual Polio Cases
NC	33	66.9	15.2	75.8	90.9	87.9	84.8	3,903	278
NE	32	67.09	37.5	87.5	100	96.9	53.1	2,713	168
NW	38	37.1	42.1	81.6	84.2	81.6	71.1	10,960	374
SE	31	75.88	25.8	90.8	83.9	100	80.6	980	611
SS	33	68.84	18.2	78.8	66.7	84.8	78.8	1,527	524
SW	35	113.33	22.9	37.1	57.1	100	91.4	9,320	584
TOTAL	202	64.67	27.2	78.8	80.2	91.6	76.7	28,028	2,539

INDICATORS OF CHILD SURVIVAL INDICATORS

NDHS 1999 Child Health and Related Indicators

Indicator	National	Zonal Range	
Neonatal Mortality Rate	35	23.8 CN	44.5 NE
Infant Mortality Rate	70.8	50.7 CN	82.6 NW
U5 Mortality Rate	133.4	84.4 CN	188.2 NW
% Mothers 2 or more TT	44.3	21 NW	63.9 SW
% Deliver in Health Fac.	37.3	6.4 NW	67.2 SW
% Children with BCG	53.8	21.6 NW	83.7 SW
% DPT3 Vaccine	26.3	9.2 NW	40.8 SW
% Measles Vaccine	40.5	19.7 NE	64.8 SW
% ARI Taken to Provider	49.7	33.4 NE	68.6 SW
% Diarrhea used ORT	73.8	65 NE	85.7 SW
% Breastfed 1st Day	65.6	44.4 NE	75.3 SE
Mean Duration BF Mos.	21.3	15.5 SE	22.2 NW
Mean Duration PBF Mos.	2.4	1.4 SW	4.4 NW
% wt/age < -3 s.d.	10.7	5 SE	24.3 NW
% ht/age < -3 s.d.	25.6	18.3 SE	35.9 NW/NE
% wt/ht < -3 s.d.	4.9	2.9 CN	11.6 NW

APPENDIX E

USAID IMPLEMENTING PARTNERS: CHILD SURVIVAL

USAID IMPLEMENTING PARTNERS: CHILD SURVIVAL

BASICS II

Basic Support for Institutionalizing Child Survival, The BASICS I Project, began working in Nigeria during the military dictatorship, when USAID and its implementing partners worked only with the non-government sector. BASICS' approach was the development of the "Community Partners for Health" (CPH) model, which linked private sector health care providers with community-based organizations. This work continued into BASICS II, which began in mid-1999. The CPHs proved successful in mobilizing communities around health; they were adopted as partners by other USAID IPs and on some occasions by organizations such as UNICEF. However, USAID's analysis in 2000 showed that the actual population reached through this input-intensive process was actually quite small, and significant health impact was not identifiable. Therefore, BASICS phased out the CPH approach, providing inputs that allowed them to become self-sustaining NGOs.

For the past two years, taking advantage of the ability to collaborate with government under the new democratic government, BASICS II has been developing a broader community based approach designated "Catchment Area Planning and Action" (CAPA). This is another community organization approach, carried out in some cases in communities where CPHs exist. The CAPA approach organizes communities around public health facilities, involving state and local government in the process. Communities are engaged in a combination of activities including direct action to support health outcomes, providing resource support to health services, and advocating for essential services. So far, the CAPA approach has been established in selected LGAs in three states (Lagos ; LGAs; and Abia). In terms of technical content of the program, BASICS has focused its efforts around three "technical focus areas," which actually involve multiple interventions: immunization (routine immunization and polio eradication); nutrition (vitamin A supplementation, breastfeeding, promotion and complementary feeding); and malaria (just beginning –promotion of ITN use and appropriate care-seeking for children with fever).

BASICS also provides significant technical assistance and support within Nigeria in these three program areas. BASICS is frequently cited by partners, including state and federal government counterparts, UNICEF, WHO, NPHCDA, and other USAID IPs for its technical assistance to policy, planning, and program. BASICS also has played a major role in USAID's assistance to polio eradication efforts in Nigeria. This role in support of polio eradication has involved substantial effort by professional staff, as well as substantial resources. In this role, BASICS brought its technical expertise and operational perspective to help identify and resolve critical constraints to success of National Immunization Days. Several partners cite this role as an essential contribution to Nigeria's polio initiative.

NetMark

NetMark is USAID's public-private partnership for expanded access to ITNs in Africa. The Academy for Educational Development with the Malaria Consortium has organized a partnership with commercial entities (Bayer, Aventis, SiamDutch, A-Z, Sunflag, Vestergard-Fransen) representing 80% of the world's production of nets and insecticides, and Africa-wide competence in advertising (FCB and Group Africa). USAID resources are used to build generic demand for quality nets and to address specific short-term barriers to importation, distribution and financing as commercial partners enter new markets. All branded advertising, commodities purchase and distribution, and retail costs are borne by the private partners. NetMark maintains a regional office in Johannesberg but has as yet no resident Nigerian representation. Coordination and influence of NetMark within the RBM partnership in Nigeria would be greatly served by a resident representative.

NetMark launched its Nigeria program in April 2002 for Africa Malaria Day, although actual commercial launch started a bit later. Extensive preparatory surveys of ITN recognition and use were carried out in 2000, indicating quite low levels of coverage but solid commercial potential. To date retail outlets for NetMark partner brands have expanded from 20 to 210 since June 2002 in the six initial target States: Lagos, FCT, Kano, Abia, Edo and Rivers. An additional 12 states are targeted in 2003. Some 20,000 ITNs have been sold through retail outlets and over 150,000 to institutional clients. Approximately 400,000 ITNs are in the outlets. NetMark partners are marketing ITNs (packaged as net and treatment kit or long-lasting pre-treated net) ranging in price from 250-600 Naira depending on size, color and form. Re-treatment kits are beginning to be marketed as well. Reimposition of tax and tariffs on ITNs presents an urgent threat to continued importation and distribution. The balance of interest by commercial sector partners in entering the ITN market in Nigeria is tipping rapidly because of the cost implications of the tax at this vulnerable early stage of market/demand creation.

NetMark communications have comprised two types: mass media (radio, TV, print) carried out by FCB, and experiential (road shows, school and women's groups) carried out by Group Africa. Linking this top-down communications approach with the community-based focus of USAID's CS program through BASICS has been lacking.

Malaria Action Coalition

USAID/W organized the Malaria Action Coalition (MAC) in early 2002 in order to provide funding for joint work planning of four of its key technical partners for malaria: WHO/AFRO, CDC, the Maternal and Neonatal Health Project (MNH) and the Rational Pharmaceutical Management Project (RPM+). This coalition has been tasked with providing technical assistance to regional, government and USAID partners for improved malaria treatment and antenatal intervention (IPT). USAID/Nigeria invested $600,000 in field support to MAC in FY02.

The MAC have planned for an RBM partners' meeting in Nigeria early in 2003 to determine the most effective inputs of the MAC, with other partners. Preliminary discussions with WHO and the mission should begin soon. Anticipated inputs include: assistance with evidence and analyses from efficacy tests and other necessary OR, policy review and formulation for both treatment and IPT, development of standards and guidelines for IPT, support to local partners for drug management for treatment and IPT, support to local partners for communications and

training, leveraging resources from GFATM and others for treatment and IPT, linking of Nigeria to SOTA and experience from elsewhere in Africa, and support for implementation of M&E.

The mission is encouraged to view MAC as an interim mechanism (through FY03) for laying the foundation for its future malaria program.

N-ARCH

The Nigerian Applied Research for Child Health project was funded by a bilateral grant to the central ARCH project based at Boston University. N-ARCH started work in 2000 with the formation of a steering committee of senior Nigeria-based researchers. The first activity was a priority setting workshop among stakeholders in September 2000 where six broad areas of potential research were identified. The steering committee refined these into topics that formed the basis of national newspaper advertisements calling for letters on intent. Nearly 200 letters were received and screened by the steering committee members and faculty at Boston University.

A short list of 15 research teams attended a proposal development workshop in May 2001. These proposals focused on the following issues: 1) decision making concerning home management of childhood illness; 2) child nutrition; 3) HIV impact on child health, 4) Role of Patent Medicine Vendors, 5) Neonatal malaria. BU hired a local staff person, and this has facilitated the process. The steps of completing final proposals and budgets, obtaining reviews from BU faculty, making corrections by research teams, obtaining BU IRB approval and ultimately obtaining USAID approval to release funds have been inordinately long, such that only a few of the intended recipients have actually received funds.

At present it is not clear whether any of the projects will have sufficient results to feed into USAID transition strategy planning. In recognition of this problem, N-ARCH is commissioning several monographs that depict the current status of research and practice on child health issues in the country.

JHU/CCP

The Johns Hopkins University's Center for Communication Programs has been active in Nigeria for over two decades. It established its credibility in family planning communications by designing various "enter-education" projects involving local artists. At present CCP is conducting a major review of its Nigeria programs.

Currently CCP has a number of small projects, some of which are intended to support other IP activities. Specifically, CCP was asked to develop radio PSAs and other IEC materials to support the breastfeeding activities of BASICS II. CCP also provided TV and print materials to the Planned Parenthood Federation of Nigeria.

On a more creative level, CCP is supporting a HIV/AIDS hotline in Lagos that is run by local PVOs. CCP is also one of the partners of the Nigerian USAID Mission's bilateral reproductive health project, VISION. As the partner responsible for BCC, CCP conducted a review/inventory of existing IEC materials with participants from the states and LGAs involved in the project. CCP also conducted a Health Seeking Behavior Survey that will inform the development of new materials and strategies.

THE POLICY PROJECT

The Policy Project of the Futures Group is one of the Implementing Partners of USAID functioning since July 1999 in Reproductive Health and HIV/AIDS. The Policy Project played a major role in developing the HEAP for NACA. It has undertaken the RAPID advocacy approach using NDHS Data with national and state level stakeholders and policy makers. Policy played a major role in guiding stakeholders to redraft the 1988 National Population Policy.

From August 2002, it has started working in the area of child survival. A compilation of Child Survival issues in Nigeria has been prepared. Now it has plans to bring together all IPs and donors on a common platform to stimulate development of a list of concrete policy priorities in Child Survival. The Government of Nigeria has launched its Nutrition Policy. It is comprehensive and addresses all nutrition issues involving the various sectors. The Policy Project could play a lead role in bringing together all sectors and formulating the plans and later see through the implementation of the plans.

Helen Keller International (HKI)

HKI has been piloting vitamin A supplementation of children 6-59 months of age and postpartum mothers by community-directed distributors (CDDs) in conjunction with the Community-Directed Treatment with Ivermectin (CDTI) under the Africa Programme for Onchocerciasis Control (APOC) and West Africa Onchocerchiasis Control Programme (OCP). The HKI pilot has been focused in Adamwa and Borno states, providing training at the State, LGA, health facility, CDD levels. Funding for HKI's activities in Nigeria has been largely from CIDA/Micronutrient Initiative, with some core funding from USAID/Washington. The program will be expanded to provide iron/folate supplementation for pregnant women. The target coverage for both vitamin A and iron/folate is 70% of children and postpartum women. UNICEF/Nigeria provides the vitamin A capsules, as it does for NID-based delivery. HKI reports strong commitment and involvement of State and LGA personnel, especially in training of health workers, community education, program monitoring and supervision, drug delivery and program management. More than 600,000 children and 165,000 postpartum mothers (~90% coverage) were supplemented with vitamin A each year of the 2-year pilot program. The marginal cost for vitamin A supplementation was ~$122,000/yr or ~$0.16/capsule delivered – similar to the cost of delivery of Vitamin A capsules within Child Health Days/Weeks in Zambia and Ghana. At full scale in the 26 CDTI program areas with a total population of 22 million (~25% of the Nigerian rural population), more than 5 million children and postpartum mothers would be reached. The CDTI + VA could be expanded further as a vehicle for lymphatic filariasis eradication (albendazole).

THE MOST PROJECT

At the request of UNICEF/Nigeria, MOST recently provided assistance to Nigeria to support the initial development of technical plans for fortification of wheat flour, sugar and cooking oils. Dr. Omar Dary is one of the world's foremost experts on fortification of sugar and other staple foods, as well as being on the Steering Committee of the International Vitamin A Consultative Group (IVACG). MOST (ISTI/AED/HKI/PATH) is the USAID Global Health "flagship" micronutrient project and has been assisting numerous countries, including Zambia, Morocco and the

Philippines, in establishing national fortification programs and preparing proposals for Global Alliance for Improved Nutrition (GAIN) grants. MOST is also the primary cooperating agency for establishment and strengthening of non-NID, routine vitamin A supplementation programs, including Zambia, Ghana, Madagascar and Uganda.

International Institute for Tropical Agriculture (IITA)

IITA is one of the Consultative Group for International Agricultural Research (CGIAR) centers, focused on linking agriculture and nutrition through improved nutritional quality of basic foods and dietary diversification in the humid and sub-humid zones of Sub-Saharan Africa. IITA has been developing improved lines of Quality Protein Maize (QPM) that have enhanced levels of iron, zinc and beta-carotene, which could be released and disseminated within Nigeria within five years. IITA works closely with the Nigerian agricultural extension service through the USAID-supported Agricultural Development Project (ADP), including the promotion of improved food processing methods and dietary diversification at the community level.

IITA is also the lead institution for the Nigeria National Food Consumption and Nutrition Survey (Dr. Bussie Maziwa-Dixon, PI), which was supported by USAID and USDA. The results of this survey should be released in January/February 2003, and will provide critical information for development of both the National Plan of Action for Nutrition and a proposal for GAIN funding for the national fortification program.

Under its new strategy, IITA has a specific objective to strengthen links with the MOH. IITA is also involved in the CGIAR System-wide Initiative on Malaria (SIMA), which may present opportunities for intersectoral programming between agriculture and health/nutrition within USAID/Nigeria.

Nutrition Partners

The Nutrition Partners has been formed to provide external support to the National Planning Commission (NPC) especially through invigorating the National Council on Food and Nutrition (NCFN). Key partners are NPC, NCFN, FMOH, NPHCDA, IITA, University of Ibadan, FMA/RD, Nutrition Society of Nigeria, Food Basket of Nigeria, UNICEF, WHO, USAID, BASICS, JHU/CCP, POLICY, and HKI. Presently, a nutritionist is being sought for secondment to the NPC/NCFN to strengthen internal capacity to coordinate and monitor nutrition policies and programs between government and nutrition partners => Donors are excluded from NCFN membership, so will function through the partners group.

The Global Alliance for Improved Nutrition (GAIN)

GAIN was launched in May, 2002 at the UN Special Session for Children and will focus, at least initially, on support for national food fortification programs. A trust fund has been established at the World Bank, with The Bill & Melinda Gates Foundation, USAID, and CIDA being the largest contributors to date. Other key partners in the early formation of GAIN have been UNICEF, WHO, FAO, and a number of food and pharmaceutical companies. An Request for Proposal (RFP) for National Fortification Program Implementation and Strengthening Grants has just been released (www.gainhealth.org) with a proposal submission deadline of December 15, 2000 and grant announcements scheduled for the IVACG Meeting in Marrakech, Morocco February 3-9, 2003. The second round of grant proposals are expected to be solicited in June, 2003, which is probably a more realistic target for development of a Nigeria proposal. The most competitive proposals in the first

round are likely to come from countries further along in establishment of national fortification programs.(e.g. Morocco, South Africa, Zambia, Indonesia and the Philippines). A June, 2003 submission would also allow more time for establishment of a Nigerian task force for fortification (perhaps linked to the Nutrition Partners), to draw on key data from the National Food Consumption and Nutrition Survey.

APPENDIX F

RECOMMENDATIONS FOR THE TRANSITION PERIOD: NUTRITION

RECOMMENDATIONS FOR THE TRANSITION PERIOD: NUTRITION

- Include a team member on the upcoming USAID/Nigeria Agriculture Sector Assessment who can examine the links between agriculture, food security, nutrition and health.
- Work with key partners (FMOH, NPC/NCFN, UNICEF, WHO, BASICS, HKI) to develop post-NID strategies for routine (semi-annual) VA supplementation at Federal, State, and LGA levels. Explore Child Health Day/Week model, which could build on HKI VA/CDTI model. Activities may be different state by state.
- Support and provide technical assistance to the Nutrition Division/FMOH and other stakeholders to develop a National Plan of Action for Food Fortification and a Global Alliance for Improved Nutrition (GAIN) National Food Fortification Program Implementation & Strengthening Grant proposal for submission in 2003. [Note: Increased interest in Nigeria in nutrition and chronic disease strengthens rationale for fortifying commericial flours (wheat and maize) with folic acid.]
- USAID/Nigeria and UNICEF/Nigeria should jointly support a small delegation of key Nigerians (including Liane Adams) involved in developing the National Nutrition Plan of Action and the National Plan of Action for Food Fortification, particularly the post-NID routine vitamin A supplementation programs and the GAIN proposal, to attend the International Vitamin A Consultative Group (IVACG) and International Nutritional Anemia Consultative Group (INACG) Meetings in Marrakech, Morocco February 3-10, 2003.
- Support IITA and partners in conducting full analyses of data from the National Food Consumption and Nutrition Survey and assure that these analyses inform the development of the National Nutrition Plan of Action and associated policies and programs.
- Include anemia (HemoCue) assessment in 2003 DHS and secondary nutrition analyses of DHS data.
- Develop PMTCT and infant feeding strategy with CDC/Nigeria and other partners with strong links to VCT/ANC and primary CS services.
- Examine evidence that routine deworming would improve health, cognitive development, and educability of children (preschool- and school-age), as well as health and birth outcomes for pregnant women.
- Request support from USAID/Washington (GH and EGAT) for studies on the bioavailability of iron and zinc in "biofortified" lines of maize and legumes developed at IITA.
- The proposed "piloting" of double fortification of salt (iodine + iron) should be approached with caution. Double fortification would require industry investments in the quality of salt, as well as incurring the additional cost of iron. While salt iodization has the potential for unsubsidized commercial production (~5% increase in retail price to cover iodization costs), double fortification would like be unsustainable commercially. Consequently, the public sector would have to indefinitely subsidize the costs and bear the costs of both intensive internal monitoring (the added costs increasing the incentive for producers to cheat) and to restrict the cross-border flow of properly iodized salt from contiguous countries.
- Because of the effects of HIV/AIDS on the nutritional status and health of entire households, USAID/Nigeria should be actively engaged with government and partners in Nigeria to develop comprehensive HIV/AIDS care and support guidelines and ensure that programs recognize and provide support to these vulnerable households. This would include directing Title II assistance to vulnerable households (potentially identified by food deficits/insecurity rather than by HIV-infected individuals if stigma is an issue).

- USAID/Nigeria should be engaged with and assist the GON to revise and implement Standing Orders/guidelines for the clinical diagnosis and treatment of HIV+ infants and children.
- Broaden discussion of tax/tariff relief for ITNs to cover fortificant (and other health commodities).
- Review World Bank Nutrition Program Review (Rae Galloway, 2002).

APPENDIX G

ANALYTICAL FRAMEWORK DIAGRAM

WORKING DOCUMENT

ANALYTICAL FRAMEWORK DIAGRAM

Outcomes			Cross-cutting Support		Level of Action and Responsability	Sample Activities	Interventions (e.g. Malaria)			Opportunities for Synergy, Integration
ENABLING ENVIRONMENT	CAPACITY BUILDING	HEALTHY PRACTICES	*Logistics, *BCC, *M&E-MIS, *Advocacy, *Public-Private Partnerships		**International** Applied Research, Funds, SOTA	Efficacy research, production standards, supplies, technical assistance	NETMARK	PREPACKAGED ANTIMALARIA	INTERMITTENT TREATMENT I	
					National Coordination, Research, Policy, Technical Assistance, SOP, Management of Public-Private Partnership	Applied research, surveillance, distribution mechanisms, packaging, promotion				Nutrition/Anemia addressed through malaria prevention and treatment
					State Training, Supervision, Logistics, PRS including OR and M&E, QA, Wholesaling	TOT, supervision, monitoring, distribution, leveraging LGAs				
					Local Policy implementation, Service Delivery, Fund Allocation, M&E, Training, Community Outreach, Partnerships, Forecasting, Retailing	Training, ITN sale & distribution, IPT within ANC, Rx supplies in public, private				IPT integrating with RH through ANC

			*Policy *Research		**Community** Demand, Monitoring, Organization, Advocacy, Mobilization, Resources, Partnerships, Household Management, Utilization			L S	N P R E G N A N C Y	Net use protecting pregnancy ; PMVs sell contraceptives, have ORT corners

APPENDIX H

BIBLIOGRAPHY

WORKING DOCUMENT

BIBLIOGRAPHY

Issues for Child Survival in Nigeria: an Annotated Bibliography

William R. Brieger
for: a Strategic Assessment of the USAID/Nigeria Child Survival Program
November 2002

PRIORITY AREAS

A. Immunization
- A.1. Epidemiology
- A.2. Programming

B. Nutrition
- B.1. Breastfeeding
- B.2. Diarrheal and Nutritional Diseases
- B.3. Micronutrients and Supplements
- B.4. Nutritional Status & Anthropometry

C. Malaria
- C.1. Epidemiological and Clinical Features
- C.2. Drugs
- C.3. ITNs
- C.4. Pregnancy

D. Home and Community Management

E. Other Child Health Concerns

A. Immunization

A.1. Epidemiology

Adeiga AA, Akinosho RO, Onyewuche J Evaluation of immune response in infants with different nutritional status: vaccinated against tuberculosis, measles and poliomyelitis. J Trop Pediatr 1994 Dec;40(6):345-50. National Institute for Medical Research, Edmond Crescent, Lagos, Nigeria. Immune response of infants vaccinated under Expanded Programme on Immunization (EPI) was evaluated for measles, poliomyelitis, and tuberculosis in Ifo/Otta area of Ogun State and Badagry area of Lagos State, Nigeria. In the prevaccination evaluation of measles antibody, 59 per cent were protected and 41 per cent were at risk in Ifo/Otta area, while 49 per cent were protected and 51 per cent were at risk in the Badagry area. After measles vaccination, 89 per cent of those evaluated seroconverted and 11 per cent did not in Ifo/Otta area, while in Badagry area, 86 per cent of those evaluated seroconverted and 14 per cent did not. For polio neutralizing antibody evaluated at post-immunization, 91 per cent seroconverted, while 9 per cent did not in Ifo/Otta area, while in Badagry area 66 per cent seroconverted and 34 per cent did not. Tuberculin test was used to evaluate the cellular response to BCG vaccination against tuberculosis. 64 per cent were found protected, while 18 per cent were at risk in both areas examined and 18 per cent dropped out. Using Gomez method to evaluate the nutritional status of the infants, 34 per cent were malnourished in Ifo/Otta area and are mostly immigrants. In Badagry area, 53 per cent were normal while 47 per cent were malnourished and most of the malnourished infants were plagued with diarrhoea, severe cough, high fever or malaria infection. Most of the malnourished in the two areas screened were between 9 and 18 months of age, which is the crucial period in the growing stage of the children.

Adu FD, Akinwolere OA, Tomori O, Uche LN. Low seroconversion rates to measles vaccine among children in Nigeria. Bull World Health Organ 1992;70(4):457-60. College of Medicine, University of Ibadan, Nigeria. The Nigerian Expanded Programme on Immunization (EPI) was assessed with particular reference to measles immunization. Of 150 children who received measles vaccine at the Institute of Child Health, University of Ibadan, Nigeria, 82 (54.7%) seroconverted. The immune response was directly related to the titre of the vaccines used. Vaccines whose titres were 10(-1) to 10(1.7) stimulated immune responses in 0-25% of vaccinees, those with titres in the range 10(-2.1) to 10(-2.5) stimulated responses in 12-47.6%, while those with titres of 10(-2.7) to 10(-3.4) stimulated responses in 87.5-100% of vaccinees. Only one of the vaccines used had a titre that met the minimum WHO required standard of log 10(-3) TCID50 at the point of vaccination.

Adu FD, Omotade OO, Oyedele OI, Ikusika O, Odemuyiwa SO, Onoja AL. Field trial of combined yellow fever and measles vaccines among children in Nigeria. East Afr Med J 1996 Sep;73(9):579-82. Department of Virology, University College Hospital, College of Medicine, University of Ibadan, Nigeria. The compared tolerance and immunogenecity of yellow fever and measles vaccines administered separately or combined were evaluated in Nigerian children aged between six to eight and nine to twelve months. The vaccines were well tolerated by both age groups of children, however pyrexia which responded to analgesic was the commonest post vaccination reaction in all the groups of the vaccinated children. Immune response to the vaccines either when given separately or combined was excellent in all the vaccinated groups. Antibody titre and seroconversion rate were always higher in the group that received the combined vaccines together. Our results confirmed that combined yellow fever and measles vaccines are safe for children aged between six to twelve months and we therefore recommend that yellow fever be incorporated into the EPI programme and be given together with measles at the age of nine months.

Adu FD, Odemuyiwa SO, Tomori O. Circulation of poliovirus among risk groups in Ibadan, Nigeria. Trans R Soc Trop Med Hyg 1996 Mar-Apr;90(2):126-7. Department of Virology, University of Ibadan, Nigeria. Faecal samples collected from 114 fully vaccinated pre-school children and 32 unvaccinated infants in Ibadan, Nigeria, were assayed for poliovirus in Hep-2 and RD cell cultures. 8 strains of poliovirus type 1 were isolated from 146 samples--3 from 32 unvaccinated children aged less than 40 d and 5 from 114 fully vaccinated children aged between 9 and 60 months. Studies using Sabin and wild monoclonal antibodies and the polymerase chain reaction confirmed 7 of the 8 isolates to be of the wild type, a possible source of infection among vaccinated children.

Adu FD, Ikusika A, Omotade O. Measles outbreak in Ibadan: clinical, serological and virological identification of affected children in selected hospitals. J Infect 1997 Nov;35(3):241-5. Dept of Virology, College of Medicine, University of Ibadan, Nigeria. An outbreak of measles was investigated in four selected hospitals in Ibadan using clinical, serological and virological methods to identify the affected children. A total of 25 children who were either vaccinated or not vaccinated were involved. Signs and symptoms were, however, more severe among the non-vaccinated children. Measles virus was successfully isolated from three of the children, confirming that the measles virus was involved in the outbreak. Serological tests using both haemagglutination inhibition (HI) and the solid phase immunosorbent test (SPIT) showed evidence of measles antibody in the sera of affected children. The SPIT test was able to detect both IgM and IgA in the sera, indicating that it was a recent infection. Implications of the result obtained in the study for the control of measles in Nigeria is discussed.

Adu FD, Omotade OO, Ikusika O, Oyedele IO. Isolation of Nigerian strains of measles virus. West Afr J Med 1997 May-Jun;16(2):109-11. Department of Virology and Institute of Child Health, College of Medicine, University of Ibadan. We have recently succeeded in isolating two measles viruses, Ibn H13153 and Ibn H13154 from the peripheral lymphocytes of two unvaccinated 9 and 12 month old outpatient children at the Institute of Child Health, University College Hospital Ibadan, Nigeria. The viruses have undergone six serial passages in B95a and Vero cell lines where characteristic measles cytopathic effects (CPE) have been noticed. The viruses have been confirmed to be measles by Haemagglutination Inhibition (HI) test and the Indirect Immunofluorescent antibody Test (IFT). Both isolates agglutinated 0.75% monkey rbc. The HA titres were 1:40 and 1:80 respectively. Antigens from the known positive Edmonston strain and uninoculated Vero cell line gave an HA titre of 1:160 and 1:0 respectively. Further characterisation with respect to the polypeptide and DNA components is under way.

Akang EE, Ekweozor C, Pindiga HU, Onyemenem TN. Childhood infections in Nigeria: an autopsy study J Trop Med Hyg 1993 Aug;96(4):231-6. Department of Pathology, University College Hospital, Ibadan, Nigeria. Infections are the leading cause of childhood morbidity and mortality in developing countries. Bronchopneumonia, meningitis and gastroenteritis are the commonest fatal infections encountered in Ibadan. Tuberculous lymphadenitis, bronchopneumonia and meningitis are other frequent causes of death. The predominant sequela of measles is respiratory tract infection. Another important cause of childhood mortality is cerebral malaria. In half of the cases of tetanus no obvious portal of entry can be found. It is advocated that the implementation of immunization schedules should be vigorously pursued to curtail childhood mortality resulting from infection.

Antia-Obong OE, Young MU, Effiong CE. Neonatal tetanus: prevalence before and subsequent to implementation of the Expanded Programme on Immunization. Ann Trop Paediatr 1993;13(1):7-11. Department of Paediatrics, College of Medical Sciences, University of Calabar, Nigeria. Cases of neonatal tetanus (NNT) admitted into the University of Calabar Teaching Hospital, Calabar, Nigeria during an 8-year period (January 1983-December 1990) were studied in order to evaluate the impact of the Expanded Programme on Immunization (EPI) on this condition. The prevalence rates of NNT were found to be 16% and 24% in the pre-EPI and EPI periods, respectively. In addition, in spite of a high level of awareness among mothers about immunization against NNT in the EPI era, its acceptance was very poor. These disturbing observations indicate the ineffectiveness of strategies employed in the implementation of this immunization programme. It is suggested that intensive health education directed at mothers and traditional birth attendants would eradicate ignorance, superstition and misconceptions which militate against acceptance of tetanus toxoid by mothers. Furthermore, a study of the culture of the Nigerian people may lead to the evolution of acceptable and effective channels of communication which would lead to better understanding of NNT and greater immunization coverage.

Babaniyi OA. A 10-year review of morbidity from childhood preventable diseases in Nigeria: how successful is the Expanded Programme on Immunization (EPI)? An update. J Trop Pediatr 1990 Dec;36(6):306-13. Morbidity and mortality in children from developing countries are primarily due to preventable infectious diseases such as measles, poliomyelitis, tuberculosis, whooping cough, diphtheria, and tetanus. By 1990, WHO hopes to have every child in the world immunized against these 6 diseases, which was why the Expanded Program on Immunization (EPI) was launched. In Nigeria, a nationwide execution of EPI began in 1979. In view of the huge population in Nigeria, an evaluation of the efficiency of the EPI program at reducing morbidity and mortality from the 6 target diseases has national and global importance. 1 such analysis of disease trends showed that apart from tuberculosis and acute poliomyelitis, there was no clear reduction in morbidity from the EPI target diseases between 1979-83. The program was revised and relaunched nationwide in 1984. This paper attempts to update documented program achievements by including information on EPI diseases from 1974-88. An analysis of available data shows that there has been clear reduction in morbidity from measles and whooping cough since 1986, and that the incidence of tuberculosis is on the increase from 1984, despite a national BCG coverage of over 80%. It is suggested that future evaluations should include data on community-based surveys on poliomyelitis and neonatal tetanus, and use the technique of decision analysis to estimate EPI impact on mortality. A similar effort in this paper predicted a 42% morbidity and 37% mortality reductions from EPI target diseases in Nigeria by the end of 1989.

Babaniyi O, Parakoyi B. Cluster survey for poliomyelitis and neonatal tetanus in Ilorin, Nigeria. Int J Epidemiol 1991 Jun;20(2):515-20. Department of Epidemiology and Community Health, University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria. The incidence of poliomyelitis and neonatal tetanus in Ilorin Local Government Area was estimated using a 40-cluster, retrospective survey of neonatal tetanus deaths and lameness from poliomyelitis in March and April 1988. The survey identified 19 neonatal tetanus deaths among 1601 livebirths, giving an incidence rate of 14.9/1000 livebirths. Some 31 residual paralytic polio cases were identified among 4576 children aged five to nine years, giving a prevalence rate of 6.8/1000 children in this age group and an annual incidence rate of 38.3/100,000 general population. Immunization of pregnant women with tetanus toxoid, had a greater impact on mortality from neonatal tetanus than delivery in hospital or birth at home attended by a traditional birth attendant. Antenatal coverage with two doses of tetanus toxoid was 62.6%. Poliomyelitis and neonatal tetanus still constitute important causes of childhood

morbidity and mortality in Ilorin and antenatal tetanus immunization coverage is not yet sufficient to control neonatal tetanus in this population. The target age for immunization with tetanus toxoid should be extended to include all women of childbearing age. Further retrospective surveys from other Nigerian states are needed to determine the magnitude of the neonatal tetanus problem throughout the country.

Babaniyi OA, Yeye-Agba B, Parakoyi DB. Use of physiotherapy records to monitor the efficacy of a poliomyelitis vaccination programme in Ilorin, Nigeria 1981-1988. Trop Doct 1991 Apr;21(2):69-72. Ministry of Health, Kwara State, Nigeria. During the 8 years of a poliomyelitis control programme in Ilorin Local Government Area, Nigeria, a maximum of 85% of children aged 12-23 months were estimated to have received three doses of trivalent oral polio vaccine (TOPV). The estimated incidence of paralytic poliomyelitis decreased by 65%, suggesting a low vaccine efficacy of approximately 76% for the currently used TOPV. A more detailed study of TOPV efficacy (eg case control or cohort study) is required, however, to provide a more accurate estimate. Similar low-cost efforts at documenting the impact of TOPV on the incidence of poliomyelitis, using physiotherapy clinics as independent sentinels, are needed from many other centres. To increase the efficacy of the primary series of TOPV in Nigeria, the number of doses constituting the primary series should be increased to four (including one at birth), as recommended by the World Health Organization.

Babaniyi O. EPI sentinel surveillance for Kwara, 1982-1987. West Afr J Med 1993 Oct-Dec;12(4):218-22. Ministry of Health, Ilorin, Kwara State, Nigeria. A comprehensive review of the EPI sentinel surveillance data for Kwara State, Nigeria was conducted for the years 1982--1987 to evaluate programme impact. Measles vaccination coverage moved up from 26 percent in 1984 to between 54 percent and 58 percent in Ilorin, LGA, Kwara State, Nigeria from 1986 to 1988. During the period of review, the annual number of measles cases and the incidence rate of measles reported by the surveillance system has continued to fall from 1985, the year the revised EPI programme was launched in Ilorin LGA. There was infact a forty-one percent reduction in measles incidence in Ilorin LGA in 1987, but measles is still an important cause of preventable morbidity and mortality in the area. Twenty-two percent of reported measles cases occurred in children under nine months of age, children who are younger than the recommended age of vaccination. Two results expected in a partially vaccinated population, a reduction in measles incidence greater than the level of vaccination coverage and a shift in the age-distribution of measles to older children, have not been observed. Measles control in Ilorin LGA will require a vaccination coverage higher than 58 percent. Also, given the age-specific risk of measles infection there, a measles vaccine that would be effective when given before nine months of age would be an important element in controlling measles transmission. Because the epidemiology of measles in Ilorin is a likely consequence of its urban environment, such a vaccine would represent a significant advance toward the control of measles in urban Africa.

Babaniyi OA, Parakoyi DB, Aiyedun BA, Bello MA. Loss of maternally-acquired measles antibody during infancy in Ilorin, Nigeria. J Trop Pediatr 1995 Apr;41(2):115-7. University of Ilorin Teaching Hospital, Kwara State, Nigeria. In a study of the prevalence of measles antibody in infants aged 1-9 months detectable antibody was present in 32 per cent. Prevalence was highest in the 4-7 week age group and dropped rapidly with increasing age. In infants 28-35 weeks old, only 7 per cent had detectable antibody. Logistic regression analysis showed that by the end of the seventh month of life only 10 per cent would carry antibody against measles.

Babaniyi OA, Parakoyi DB, Aiyedun BA, Bello MA. Loss of maternally-acquired measles antibody during infancy in Ilorin, Nigeria. J Trop Pediatr 1995 Apr;41(2):115-7. University of Ilorin Teaching Hospital, Kwara State, Nigeria. In a study of the prevalence of measles antibody in infants aged 1-9 months detectable antibody was present in 32 per cent. Prevalence was highest in the 4-7 week age group and dropped rapidly with increasing age. In infants 28-35 weeks old, only 7 per cent had detectable antibody. Logistic regression analysis showed that by the end of the seventh month of life only 10 per cent would carry antibody against measles.

Brabin L, Fazio-Tirrozzo G, Shahid S, Agbaje O, Maxwell S, Broadhead R, Briggs N, Brabin B. Tetanus antibody levels among adolescent girls in developing countries. Trans R Soc Trop Med Hyg 2000 Jul-Aug;94(4):455-9. Department of Obstetrics and Gynaecology and Reproductive Health, St Mary's Hospital, Manchester, UK. Neonatal and maternal tetanus infections remain an important cause of death in many countries. Few studies have reported tetanus toxoid antibody levels of adolescent girls. As part of the Expanded Programme on Immunization most girls receive up to 3 injections in early childhood, and many subsequently do not receive booster vaccinations until pregnant. We determined (by ELISA) tetanus antibody seropositivity in adolescent girls from Malawi (in 1996), Nigeria (in 1993) and Pakistan (in 1996), and response to tetanus vaccination in adolescent girls from Pakistan. Geometric mean titres (GMT, IU/mL) were 0.94 in 117 Malawian, 0.32 in 154 Nigerian and 1.08 in 162 Pakistani girls. In Nigeria, 54.7% of adolescents were seronegative, of whom 26.8% had a history of unsafe abortion. In Malawi and Pakistan all girls were seropositive and in Pakistan, following a booster vaccination, titres increased 3-fold, with a lower response in older girls. The results indicated that adequate childhood immunization is likely to provide protective levels through adolescence. Booster vaccination in late childhood/early adolescence should protect the majority of women throughout their reproductive lives. This practice would reduce the risks of girls exposed to infection through unsafe abortions, and may be the best option for countries seeking to improve their vaccination schedule, especially where tetanus vaccine coverage in pregnant women is unacceptably low.

Byass P, Adedeji MD, Mongdem JG, Zwandor AC, Brew-Graves SH, Clements CJ. Assessment and possible control of endemic measles in urban Nigeria. J Public Health Med 1995 Jun;17(2):140-5. Nottingham School of Public Health, Queen's Medical Centre. BACKGROUND: Measles remains as a serious problem of infancy and childhood in the developing world, despite the availability of a vaccine. Increasing urbanization is changing patterns of endemicity. METHODS: A survey of measles in an urban area of Nigeria, using a rapid assessment approach, was carried out to characterize measles in this community. RESULTS: An annual incidence rate of 11.8% among under-fives was found, associated with an acute case fatality rate of 3.3%. This level of endemicity was two orders of magnitude greater than that suggested by official case reports. An endemic, rather than epidemic, pattern was found over the six-month period of the study. Vaccine efficacy was estimated at 26%. Risk factor analyses showed the major risks for measles to be clinic attendance in the month preceding disease, households with more than one mother, and having under-five siblings. Measles itself was the principal risk factor for malnutrition and against survival. CONCLUSIONS: Improved understanding of measles epidemiology and risk factors are prerequisites for effective control. Possible strategies should include vertical vaccination efforts in addition to routine programmes.

CDC. Progress toward poliomyelitis eradication--Nigeria, 1996-1998. MMWR Morb Mortal Wkly Rep 1999 Apr 23;48(15):312-6. In 1988, the World Health Assembly resolved to eradicate poliomyelitis globally by 2000. In the African Region of the World Health Organization (WHO), eradication efforts were accelerated following supporting resolutions

by WHO's Regional Committee for Africa in 1995 and the Organization of African Unity in 1996. Nigeria, the most populous country in Africa and part of a densely populated West African area extending from Nigeria to Cote D'Ivoire, is critically important to the global polio eradication initiative. This report summarizes 1) the success of National Immunization Days (NIDs); 2) the establishment of acute flaccid paralysis (AFP) surveillance; and 3) accelerated efforts to meet the 2000 target, including mopping-up planned for later in 1999.

CDC. Progress toward poliomyelitis eradication--Angola, Democratic Republic of Congo, Ethiopia, and Nigeria, January 2000-July 2001. MMWR Morb Mortal Wkly Rep 2001 Sep 28;50(38):826-9. In 1988, the World Health Assembly, governing body of the World Health Organization (WHO), resolved to eradicate poliomyelitis globally by 2000. In the African Region (AFR), WHO member countries began to implement polio eradication strategies in 1995. Although rapid progress has occurred in much of eastern and southern Africa, wild poliovirus transmission continues to occur in four priority countries: Angola, Democratic Republic of Congo (DR Congo), Ethiopia, and Nigeria. This report summarizes progress toward polio eradication in Angola, DR Congo, Ethiopia, and Nigeria during January 2000-July 2001, and indicates that 11 of 12 cases of wild poliovirus in AFR were identified in these priority countries during January-July 2001.

CDC. Progress toward poliomyelitis eradication--Nigeria, January 2000-March 2002. MMWR Morb Mortal Wkly Rep 2002 Jun 7;51(22):479-81 Since 1988, when the World Health Assembly of the World Health Organization (WHO) resolved to eradicate poliomyelitis globally, the annual estimated incidence of polio has declined 99%. Nigeria is the most populous country in Africa (estimated 2000 population: 127 million) and a major poliovirus reservoir. This report summarizes the progress toward polio eradication in Nigeria during January 2000-March 2002, highlighting achievements in acute flaccid paralysis (AFP) surveillance and evidence indicating reduced poliovirus transmission. The findings underscore the importance of ensuring a rapid flow of surveillance information to guide program activities.

Chikwem JO, Erb J. A review of data on measles cases from sentinel surveillance sites in north-western Nigeria. Public Health 1992 Jan;106(1):53-61. Department of Microbiology, College of Medicine, University of Maiduguri, Borno State, Nigeria. This review was carried out to evaluate the impact of the revised Expanded Programme on Immunisation (EPI) against measles in the six north-western states of Nigeria through the sentinel surveillance system. The revised EPI was launched in all states by 1985, with a strategy of phased acceleration to reach all local government areas by 1987, and to achieve 80% vaccine coverage of children under two years, with 50% reduction in EPI disease morbidity by 1990. Results of the review showed a dramatic decrease in measles cases in each state: 70% overall from 1985 to 1988. Of 918 cases with known measles vaccination status, 90.6% were unvaccinated and 9.4% had documented immunisation. One concern is that 19% of cases occur in unimmunised infants under nine months. Although a suitable vaccine for children under nine months is available, it is not yet in use in Nigeria and these cases are therefore not preventable. At present, our best strategy is to increase coverage through a vigorous EPI campaign, concentrating on underserviced and hard-to-reach areas, and to strengthen surveillance so that measles outbreaks are identified early and action taken.

Davies-Adetugbo AA, Torimiro SE, Ako-Nai KA. Prognostic factors in neonatal tetanus. Trop Med Int Health 1998 Jan;3(1):9-13. Department of Community Health, Obafemi Awolowo University Teaching Hospital Complex, Ile Ife, Nigeria. adetugbo@hotmail.com. OBJECTIVE: Neonatal tetanus (NNT) is the leading cause of neonatal deaths in developing countries. The objective of this study was to determine prognostic indicators in NNT.

METHODS: We reviewed the clinical records of all neonates (n = 174) admitted to Ife State Hospital with the diagnosis of NNT from 1991 through 1995. RESULTS: Delivery had occurred at home in 73.3% of cases. Only 37/164 of the mothers had had adequate immunization with tetanus toxoid. The umbilical cord appeared to be the portal of entry in 58.6% of cases. Mean age of infants at presentation was 7.2 days. Mortality was 57.5%; non-survivors succumbed after mean stay in the hospital of 5.0 days. Mortality was significantly associated with an incubation period of 6 days or less (P = 0.0026), infant's weight of less than 2.5 kg (P = 0.0113), lack of antenatal care in a health facility (P = 0.0279), birth at home (P = 0.0455), but not with lack of adequate maternal immunization (P = 0.2081; not significant). Multivariable analysis showed that a short (< or = 6 d) incubation period was the strongest predictor of mortality (OR = 3.11, P = 0.0030) while low infant weight (< 2.5 kg) was also a significant predictor (OR = 2.46, P = 0.0408). CONCLUSIONS: Hygienic deliveries and adequate cord care are very important for the prevention of neonatal tetanus deaths, and universal prenatal care, including education programmes on appropriate perinatal and cord care, can significantly reduce NNT incidence and mortality in developing countries.

Ekanem EE, Ochigbo SO, Kwagtsule JU. Unprecedented decline in measles morbidity and mortality in Calabar, south-eastern Nigeria. Trop Doct 2000 Oct;30(4):207-9. Department of Paediatrics, University of Calabar, Nigeria. emmanuel@unical.anpa.net.ng. The features of measles presenting at the University of CalabarTeaching Hospital, in south-eastern Nigeria between January 1992 to December 1996, were compared with those of a previous period (January 1984 to December 1987) in the same institution. The aim was to detect any changes in trends, morbidity and mortality from the infection in this environment. There were only 36 cases (7.2 per year) in the current period compared with 436 (109 per year) in the previous period (chi2=48.4, P<0.001).There were also highly significant falls in the incidence of malnutrition and bronchopneumonia (P<0.05) in the current period. Notably, there were no cases of dehydration or keratomalacia in the current period.The case fatality rate was 2.8% compared with 20.0% in the previous period (P<0.02).These unprecedented changes in the incidence, morbidity and mortality from measles are attributed to the continuing Expanded Programme on Immunization, oral rehydration therapy, appropriate nutritional management and vitamin A prophylaxis.With maintenance and strengthening of these strategies, the elimination of measles and measles deaths in the near future is feasible in this environment.

Fajemilehin BR. Neonatal tetanus among rural-born Nigerian infants. Matern Child Nurs J 1995 Apr-Jun;23(2):39-43. Department of Nursing, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. PROBLEM. Identify factors that influence the high rate of tetanus among infants born in rural areas. SUBJECTS. Home-born infants (n = 39) admitted to a medical center with fever. Males (n = 24) and females (n = 15); age range 3-15 days. METHOD. Retrospective, descriptive design. The author used a 10-item interview schedule and a 9-item clinical checklist, including observation of infants' umbilical cords and physical state. FINDINGS. Of the 39 infants, 27 contracted neonatal tetanus; 11 died. All infants with tetanus were delivered at home by traditional, nonprofessional attendants. Factors contributing to high tetanus incidence included: lack of sepsis control, cord care, mothers' lack of immunization, delivery in settings. CONCLUSIONS & IMPLICATIONS FOR NURSING. Traditional nonprofessional attendants need training by professional nurses and midwives, and integration into the national health services. Immunization programs and health education are necessary, and can be delivered by nurses and midwives.

Gini PC, Okafor GO. The response to varied timing and spacing of tetanus toxoid administration in pregnancy. East Afr Med J 1992 Mar;69(3):157-61. Dept. of Obstetrics and Gynaecology, University of Nigeria Teaching Hospital, Enugu. One hundred and sixty-eight pregnant women at the University of Nigeria Teaching Hospital, Enugu, Nigeria, were studied

for their response to varied timing and spacing of tetanus toxoid administration. In patients who started immunization before the third trimester of pregnancy, the longer the interval between the two doses, the better the response. In contrast, when immunization was started in the third trimester, the longer the interval between the two injections, the poorer the response. In all cases, the presence of antitetanus antibodies at booking conferred better response. In addition, the titres of antibodies in all patients who responded continued to rise till delivery. The significance of these findings is discussed and recommendations made.

Hartter HK, Oyedele OI, Dietz K, Kreis S, Hoffman JP, Muller CP. Placental transfer and decay of maternally acquired antimeasles antibodies in Nigerian children. Pediatr Infect Dis J 2000 Jul;19(7):635-41. Department of Immunology, Laboratoire National de Sante, Luxembourg. BACKGROUND: In developing countries vaccination against measles virus (MV) is generally administered at 9 months of age, although it is well-documented that protection of most infants by passively acquired maternal MV antibodies is waning before immunization is given. The purpose of this study was to investigate the decay of maternally derived MV antibodies in Nigerian infants as well as to compare a German and Nigerian cohort of paired mothers and newborns regarding the placental transfer efficiency of MV-specific IgG and total IgG antibodies. METHODS: MV-specific IgG antibodies were measured with a commercially available MV-enzyme-linked immunosorbent assay, a recombinant hemagglutinin enzyme-linked immunosorbent assay as well as a neutralization assay. Total IgG values were determined with a standard immunoturbidimetric test. RESULTS: Anti-MV IgG titers were twice as high in German newborns as in Nigerian newborns. An increased concentration of immunoglobulins transferred via the placenta was found only in the German cohort. High concentrations of total maternal IgG reduced the concentration of MV-specific as well as total IgG that crossed the placenta. Furthermore only 17% of the 4-month-old Nigerian infants were still protected against measles. Antibodies had a biologic half-life of 33 days and a biochemical half-life of 48 days. CONCLUSIONS: Our findings demonstrate that the decay of passively acquired MV antibodies occurred even more rapidly than expected resulting in susceptibility to MV in most of the 4-month-old infants in Nigeria. Furthermore transfer of maternal anti-MV IgG and total IgG antibodies to the newborn was more efficient in the German cohort compared with the Nigerian group. These findings suggest the use of alternative vaccination strategies in developing countries to possibly reduce the window of susceptibility against measles.

Hood N, Chan MC, Maxwell SM, Familusi JB, Hart CA. Placental transfer of tetanus toxoid antibodies in Nigerian mothers. Ann Trop Paediatr 1994;14(3):179-82. Department of Medical Microbiology, University of Liverpool, UK. The aim of this study was to assess the efficacy of the tetanus toxoid immunization programme in Nigeria, specifically the placental transfer of antibody to newborn Nigerian babies. Tetanus toxoid antibody levels were measured in 39 mother-baby pairs in Ibadan, Nigeria and compared with 78 British mother-baby pairs. Geometric means of the ratios of cord/mother (sequestration index SI) were 0.776 for Nigerian pairs and 1.306 for British pairs, indicating a limitation in the placental transfer of tetanus toxoid in the Nigerian population. These findings confirm that there is a block in the placental transfer of anti-tetanus toxoid antibodies in African populations which will affect current immunization programmes and requires further investigation.

Hoppe JE, Rockenstiehl A, Hagedorn HJ, Kraminer-Hagedorn A, Hofler W. Bacteriological and serological study of pertussis in Abeokuta, Nigeria.Trop Geogr Med 1992 Jul;44(3):219-24. Section of Bacteriology, University Children's Hospital, Herford, Germany. Charcoal horse blood agar is the medium of choice for isolation of Bordetella pertussis from patients with early whooping cough. Since sterile animal blood often is not available in developing countries, a field study in Nigeria was undertaken to evaluate donated human blood as

supplement to charcoal agar. Out of 209 children with suspected early pertussis, 33 were culture-positive (isolation rate 16%). Out of 188 children studied serologically by enzyme immunoassay, 36 (19%) were seropositive. The satisfactory isolation rate of 16% shows that culturing for B. pertussis on charcoal human blood agar can be tried in countries, where there is no regular supply of bacteriological media with animal blood.

Ibadin MO, Oviawe O. Trend in childhood tuberculosis in Benin City, Nigeria. Ann Trop Paediatr 2001 Jun;21(2):141-5. Department of Child Health, University of Benin Teaching Hospital, Benin City, Nigeria. In order to determine the trend in childhood tuberculosis, case records of children diagnosed and treated for tuberculosis between January 1981 and December 1995 at the paediatric tuberculosis clinic of the University of Benin Teaching Hospital were reviewed. Of 8,829 paediatric medical cases, 1,026 (11.6%) were managed as tuberculosis. The proportion of tuberculosis cases increased steadily over the study period from 6.9% in 1981 to 22.1% in 1995. An apparent decrease in the number of cases in 1985 (6.6%) was attributable to a strike by medical personnel. The clinical pattern of tuberculosis during the study period shifted toward the adult type with disseminated and cavitating lesions predominating in later years. Additionally, the severity of the disease increased with the incidence of both haemoptysis and finger clubbing increasing from 1.6% in 1981 to 14.2% and 18.2%, respectively, in 1995. Possible reasons for these findings include increased prevalence of malnutrition in childhood, increasing tuberculosis in the adult population and the effects of HIV/AIDS.

Monath TP, Nasidi A. Should yellow fever vaccine be included in the expanded program of immunization in Africa? A cost-effectiveness analysis for Nigeria. Am J Trop Med Hyg 1993 Feb;48(2):274-99. OraVax Inc., Cambridge, Massachusetts. The cost-effectiveness of preventive yellow fever vaccination versus emergency mass vaccination campaigns for epidemic control remains a matter of controversy. Until recently, Nigeria and other anglophone countries in West Africa most severely afflicted by yellow fever epidemics have followed a policy of emergency control. The effects of including yellow fever 17D vaccine in the Expanded Program of Immunization (EPI) on the immune status of the Nigerian population was studied under conservative assumptions of vaccine coverage and efficacy. The model defined the age-specific prevalence of immunity resulting from vaccination of infants and from natural endemic infection beginning in 1991 and extending over a time horizon of 35 years. The data were used to predict the number of cases and deaths during hypothetical epidemics in 2006 and 2026, representing the historic periodicity of epidemics. A second model was used to demonstrate that a > or = 60% prevalence of immunity would preclude epidemic yellow fever transmission; under base case assumptions, this prevalence would be reached after 18 years of initiating routine yellow fever vaccination in the Guinea savannah zone, the region most often affected by epidemics. Using assumptions based on data from other African countries, the cost of adding yellow fever vaccine to the existing EPI was estimated as +0.65 per fully immunized child, whereas the cost of emergency vaccination in the face of an epidemic was estimated as +7.84/person. Vaccine coverage rates achievable by the EPI were modeled on recent successes with measles vaccine, and began in 1991 at 60%. The effective vaccine coverage rate in an emergency campaign was taken as 10%, based on recent experience. For an epidemic of moderate size in 2006 (morbidity similar to the documented outbreak in 1987), the cost-effectiveness of emergency mass immunization for control of hypothetical yellow fever epidemics was two-fold higher ($381/case and $1,904/death prevented) than that of the EPI ($763/case and $3,817/death prevented). However, despite its higher cost, the efficiency of the EPI was seven-fold greater in terms of cases and deaths prevented. In large epidemics, such as that occurring over successive years (1986-1991) in Nigeria, cost-effectiveness of the EPI exceeded that of emergency control. The EPI may also play an important role in the prevention of endemic yellow fever.

Assuming annual rates of endemic yellow fever predicted by serologic surveys, routine vaccination would significantly reduce morbidity and mortality at cost-effectiveness ratios within the range for other diseases prevented by the EPI, including polio, tetanus, and diphtheria.

Nte AR, Ekanem EE, Gbaraba PV, Ouamabo RS. Social-environment influences on the occurrence of neonatal tetanus in some riverine communities in Nigeria. Tropical Doctor 1997; 27: 234-235. A survey was based in communities with previously established high occurrence rate of NNT and was conducted using WHO defined criteria for NNT. An incidence rate of NNT was calculated at 15/1000 or 28 of the 1867 children studied. A significantly higher proportion of control mothers had education beyond the primary level, attended ANC and delivered at a medical facility. In this environment homes are ess likely to be clean and the attending personnel less likely to have any training in the issues of asepsis and antiseptics.

Odujinrin OM, Ogunmekan DA. Assessment of post-vaccination tuberculin sensitivity in Lagos-Nigeria. Eur J Epidemiol 1992 Jan;8(1):128-31. Department of Community Health College of Medicine, University of Lagos, Nigeria. An increase in the number of cases of tuberculosis, especially in children, has been observed recently. Post-vaccination conversion rate in babies immunised with BCG was assessed. Sensitization was detected as early as 4 weeks after BCG inoculation. Although 84.2% had physical evidence of BCG inoculation only 69.8% had developed detectable sensitization to the tubercle bacilli as shown by the Mantoux test.

Okafor GO, Gini PC. Tetanus antibodies at booking in a Nigerian obstetric population. Afr J Med Med Sci 1994 Mar;23(1):19-22 Department of Haematology & Immunology, University of Nigeria Teaching Hospital, Enugu. Eighty-four consenting ante-natal patients at the University of Nigeria Teaching Hospital, Enugu, were examined for tetanus antibodies at booking. Only 28.6% had detectable serum antibodies. Although 73.8% were immunized within three years prior to investigation, only 37.1% had measurable antibodies. It was found that the longer the interval from previous immunization, the fewer the number with detectable antibodies and the lower the titres. Possible explanations for these findings are discussed and recommendations made.

Oladiran I, Meier DE, Ojelade AA, OlaOlorun DA, Adeniran A, Tarpley JL. Tetanus: Continuing Problem in the Developing World. World J Surg 2002 Sep 6;26(10). Department of Surgery, Baptist Medical Centre, PO Box 15, Ogbomoso, Nigeria. Despite diligent efforts by the World Health Organization and the governments of developing world countries, tetanus persists as a global health problem. This retrospective study was undertaken to assess the outcome for victims of tetanus presenting to the Baptist Medical Centre in Ogbomoso, Nigeria and to develop better management techniques for future patients. Sixty patients (46 males, 14 females) with nonneonatal tetanus were seen over a 5-year period (1995-1999). The mean age was 26 years, and 74% were 30 years or younger. All patients were treated with antitetanus serum, antibiotics, wound debridement (when a wound was identified), and antispasmodics. No patients underwent tracheostomy or gastrostomy. The mortality rate was 44%. Factors significant for predicting mortality were age greater than 14 years, occupation as a farmer, short incubation period, short symptom duration, high degree of severity on presentation, and high temperature during hospital care. The best hope for improvement in the treatment of tetanus in our institution is more conscientious titration of antispasmodics to control spasms without causing significant respiratory depression. The only real hope for reducing the global mortality for tetanus, however, lies in renewed immunization efforts by all health care providers in developing world countries, not just community health workers.

Omilabu SA, Oyefolu AO, Ojo OO, Audu RA. Potency status and efficacy of measles vaccine administered in Nigeria: a case study of three EPI centres in Lagos, Nigeria. Afr J Med Med Sci 1999 Sep-Dec;28(3-4):209-12. Department of Medical Microbiology and Parasitology, College of Medicine, University of Lagos, Idi-Araba, PMB 12003, Lagos. The potency status and efficacy of measles vaccines were studied in three immunization (EPI) centres in the suburban area of Lagos, Nigeria. A total of 14 vials of measles vaccine were collected and subjected to potency testing while, 203 measles-vaccinated children were recruited for this study. Only 85 (41.87%) of the vaccinees reported back for the post-vaccination follow-up screening. The seroconversion pattern showed that 51(60%) had potent antibody titres ranging from 1:40 to 1:1280, while the remaining 34 (40%) had a low antibody titres between < 1:20 and 1:20. The vaccine potency test showed that only 1 (7.14%) of the 14 vaccine vials collected at these centres had virus titre of 3.5 Log while the remaining 13 (92.86%) had virus titres lower than 3.0 Log: the recommended human dose by the World Health Organisation (WHO) for measles vaccine. The administration of these subpotent and/or impotent vaccines vis-a-vis the status of immune response elicited in the vaccinees may be one of the reasons for the occurrence of measles infection in vaccinated children in the recent time in Nigeria. We herein suggested the subjection of all vaccines to a thorough standard laboratory screening before use in Nigeria.

Onoja AL, Adu FD, Tomori O. Evaluation of measles vaccination programme conducted in two separate health centres. Vaccine 1992;10(1):49-52. Department of Virology, College of Medicine, University of Ibadan, Nigeria. Measles vaccination programmes at two vaccination centres in Ibadan, Nigeria were evaluated using the following factors as indicators: type of vaccination centre, age at vaccination, titre of vaccine, economic, health and social status of vaccinee. There was a significant association between type of vaccination centre, vaccine titre and rate of conversion. Seroconversion rates of 64 and 26% were obtained in the two vaccination centres. This was associated with the difference in the method of vaccine handling during vaccination in the centres. Higher prevalence of maternal antibody was found among children with longer breast feeding period. Results obtained suggest that the Expanded Programme on Immunization (EPI) against measles is not effective, especially in rural health centres, because of improper vaccine handling. Recommendations on how to improve measles vaccination in the EPI are highlighted.

Oruamabo RS, Igbagiri FP. Neonatal tetanus in Port Harcourt. Afr J Med Med Sci 1996 Sep;25(3):265-8. Department of Paediatrics, University of Port Harcourt Teaching Hospital, P.M.B., Nigeria. In a previous study on neonatal tetanus (NNT), we provided information on clinico-epidemiological data and reported a case-fatality rate of 60.3%. The present report covers a 7-year period, January 1984 to December 1990, and amongst others, focuses on tetanus toxoid vaccine (TT) coverage of pregnant women. The subjects were those with a diagnosis of NNT and other neonatal admissions. Total neonatal admissions, NNT admissions, neonatal deaths, and NNT deaths were: 4,315, 471, 727, and 221 respectively. The overall NNT case-fatality rate was 46.9%. The highest NNT admission rate was in the third quarter of 1984, with a significant decline subsequently except for the increase in 1989. The neonatal tetanus rate began dropping appreciably from 1988 although less than 10% of the mothers in 1990 received two doses of TT. The improper immunization of the mothers during pregnancy with TT is worrying particularly several years into the Expanded Programme on Immunization (EPI), more so as the experience is not unique to Port Harcourt. We suggest intervention at the community level, operational research, and ethnographic studies to determine possible underlying factors to be carried out in all health zones of the country.

Oyelami OA, Aladekomo TA, Ononye FO. A 10 year retrospective evaluation of cases of post neonatal tetanus seen in a paediatric unit of a university teaching hospital in south western Nigeria (1985 to 1994). Cent Afr J Med 1996 Mar;42(3):73-5. Department of Paediatrics and Child Health, Faculty of Clinical Sciences College of Health Sciences Obafemi Awolowo University, Ile-Ife, Nigeria. A review of 56 children with post neonatal tetanus admitted over a 10 year period (January 1985 t December 1994) was undertaken at the Wesley Guild Hospital, IIesa, South Western Nigeria. The male: female ratio was 1.8:1. About 64.3 pc of the cases were above six years of age (mean 7.6 years). Wounds on the lower limb were identified as portal of entry in 39.2 pc of cases and discharging Otitis media in 21.4 pc. Otitis media was the usual portal of entry among the pre-school children (six years) in 55 pc of the cases. The patients were managed with antibiotics, alternating does of diazepam, phenobarbitone and chlorpremazine and nasogastric tube feeding. It was noticed (in 1992) that the patients showed varying degrees of talkativeness and disinhibition during therapy, which tended to subside one to two weeks after discontinuation of chlorpremazine and phenobarbitone. One case had a relapse which occurred one week after complete cessation of the initial symptoms which had taken four weeks to nurse. Resolution of symptoms followed the removal of a foreign body from the left foot on the 58th day of admission. Mortality was recorded in 39.3 pc of cases. Only 12.5 pc of the survivors completed the scheduled immunization doses after discharge.

Oyefolu AO, Omilabu SA. Measles HI-antibody levels in Lagos children, Nigeria: a follow-up study to resurgence of measles in Lagos metropolis. West Afr J Med 2001 Jul-Sep;20(3):238-42. Department of Microbiology, Faculty of Science, Lagos State University, Nigeria. A total of 138 children aged between 0-36 months were bled and screened for measles haemagglutination inhibiting (HI)-antibody. Twenty seven children were from age group (0-4) months with 16 (59.3%) seropositive while, 67 and 44 were bled in the group (5-9) and > or = 12 months with 29 (43.3%) and 31 (70.5%) sero positive sera respectively. The distribution of the antibody titre pattern among various age groups suggest vaccination against measles should be at age 9 month. The antibody titres pattern of seroconverted vaccinees also showed that the vaccine administered at our study centre were potent enough to elicit good and protective immune response in vaccinees when given at age 9 month. Our study agrees with the current policy of vaccinating children against measles at age 9 months in Nigeria and should therefore be continued. Based on observations in this study, we suggest; continued administration of the Edmonston-Zagreb strain of measle vaccine currently-in-use in Nigeria, mother's breast-feeding of children for a longer period before the apporpriate age for vaccination, and the possible administration of Vitamin A-a potent immune enhancer, as a supplement during immunization programmes in Nigeria. The introduction of a booster dose of measles vaccine at elementary school age in order to care for the residual unvaccinated children may be a good strategy for measles eradication necessary to be considered in Nigeria and might probably forestall instances of measles outbreaks in children during their second year in school.

Owa JA, Makinde OO. Maternal tetanus toxoid coverage during pregnancy in Ile-Ife, Nigeria. Int J Gynaecol Obstet 1992 Oct;39(2):123-30. Department of Paediatrics and Child Health, Faculty of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. A cluster survey on maternal tetanus toxoid (TT) coverage was carried out in the Ile-Ife Central Local Government Area. Out of the 896 mothers of babies 0-12 months old who were interviewed, 668 (74.6%) claimed they received TT during pregnancy, this was confirmed in 37 (4.1%) and in only 25 (2.8%) of these cases could the babies be said to have been protected from neonatal tetanus (NNT) at birth. About 35% of the babies were delivered at home/churches where most babies with NNT are usually born.

A.2. Programming

Abuwa PN, Alikor EA, Gbaraba PV, Mung KS, Oruamabo RS. Determinants of tetanus toxoid immunization of parturient women: a community-based study in Rivers State of Nigeria. West Afr J Med 1997 Jul-Sep;16(3):174-8. Department of Community Medicine, Paediatrics University of Port Harcourt Teaching Hospital, Nigeria. A community-based study carried out in the Rivers State of Nigeria on tetanus toxoid immunization status of parturient women showed a complete, partial and no coverage status of 41.2, 17.0 and 41.8 per cent respectively of women surveyed. Formal education to the secondary school level was very strongly associated with complete coverage status ($p < 0.001$). Also of importance was the peculiar geographical terrain of the state since the place of obstacles as a negative factor was significantly more pronounced among the riverine community ($p < 0.001$). Generally, communities in the state will require more logistics support than elsewhere in the country for any intervention measure to have an appreciable impact and on the long term the institution of measures aimed at raising the literacy level of the population as a whole will bring about overall improvement in the vaccine coverage in the state.

Akpala CO. An evaluation of the knowledge and practices of trained traditional birth attendants in Bodinga, Sokoto State, Nigeria. J Trop Med Hyg 1994 Feb;97(1):46-50. Department of Community Medicine, College of Medicine, University of Sokoto, Nigeria. To improve Maternal and Child Health services especially in the rural areas, a programme to train traditional birth attendants (Ungo Zoma) was established by the Sokoto State government of Nigeria in 1975. The impact of the training programme on the knowledge and practices of traditional birth attendants (TBAs) in a rural community in the state was studied. Seventy-four TBAs, consisting of 43 trained and 31 untrained attendants, were interviewed. Statistically significant differences were observed in the proportion of both groups of TBAs able to recognize high risk pregnancies and deliveries for referral to health institutions. In contrast to the trained attendants, none of the untrained TBAs offered any of the following Maternal and Child Health services: antenatal care, advice on immunization of children or their mothers during pregnancy, and family planning. Suggestions for improving the knowledge and practices of the TBAs in Sokoto as well as in other communities wishing to embark on similar programmes are offered.

Ambe JP, Omotara BA, Mandu Baba M. Perceptions, beliefs and practices of mothers in sub-urban and rural areas towards measles and measles vaccination in Northern Nigeria. Trop Doct 2001 Apr;31(2):89-90. Department of Paediatrics, College of Medical Sciences, University of Maiduguri, Nigeria. Measles is of particular concern in Nigeria because of the high fatality rate, and high morbidity rate, particularly in young children. Measles and its complications are a common reason for hospitalization, indicating very low immunization coverage. This study was carried out to elucidate the contributing factors from attitudes, beliefs and practices of mothers towards measles and its vaccination. A cross-sectional survey was conducted in Konduga Local Government Area. One per cent of the 500 mothers interviewed believed that measles is prevented by immunization, 16% that it is contagious or due to an infectious agent, 26% that it is caused by evil spirits, witchcraft and heat, and 25% had never heard of measles immunization. Twenty-seven per cent said they did not believe immunization was effective and 4% were not allowed to go for immunization by their husbands. Of those mothers whose children had developed measles, only 31% had been treated in formal health facilities. These results indicate an unfavourable attitude and practice by mothers in relation to measles and measles vaccination. There is the need for an intensive health education campaign to improve this state of affairs and to reduce the morbidity and mortality from measles.

Dao MY, Brieger WR. Immunization for the migrant Fulani: identifying an under-served population in southwestern Nigeria.Int Q Community Health Educ 1995;15(1):21-32. Rural populations are often at a disadvantage for receiving health services. Although Nigeria launched its Expanded Programme of Immunization in 1978, and has revised it twice since then, rural immunization coverage is still low. These problems may be compounded when the population is nomadic; thus a study was designed to learn about immunization coverage among a minority group of nomadic Fulani cattle herders living in southwestern Nigeria. It was necessary to conduct a census of the target population first because local government maps and records did not reflect their presence in study area, Ifeloju Local Government Area (LGA) of Oyo State. Sixty Fulani settlements were located and contained 2197 residents, 22.1 percent of whom were below five years of age and 21.5 percent of whom were women of child bearing age. Only 2.6 percent of children below twenty-four months of age (the EPI target group in Nigeria) had received full immunization, compared to an estimated coverage of 48 percent among all target age children in the LGA. Only 2.1 percent of the women had at least two tetanus toxoid immunization contacts. Immunization coverage was associated with proximity to a town, length of residence in the LGA and awareness of the settlement's leader about EPI. The latter factor gave rise to suggestions that greater outreach efforts should be targeted at Fulani leaders, using staff of the local nomadic education center to help design culturally appropriate health education programs.

Market Research Consultancy. Dip-Stick Stud on Immunization Inhibitions. Johns Hopkins University Center for Communications Prograams, Ikoyi, Lagos, September 2001. Qualiative study was carried out in 4 states where polio cases had occurred, Lagos, Zamfara, Benue and Yobe. During FGDs it was found that respondents did not link immunization spontaneously with things people do to prevent childhood diseases. On direct questioning, most were aware of immunization programs. Factors that inhibit the program included poor reputation of immunizations, fear of contracting diseases from immunization, fear of providers' attitudes, renaissance of certain Islamic beliefs and practices, lack of confidence in modern medicine, links with family planning and personal and system logistical factors. Respondents did not perceive that polio was rampant in their communities. They were aware of the polio vaccination effort, but doubted its efficacy to permanently prevent the disease. This was due in part to beliefs that polio is caused by mysterious powers such as evil or ancestral spirits for which immunization is not effective. People also were concerned about side effects. Other beliefs about causation included bad or wrong treatment of other childhood diseases and exposure to cold.

Ebong RD. An evaluation of immunization coverage of Nigerian Army Depot: a case study of Zaria, northern Nigeria.J R Soc Health 1992 Feb;112(1):3-6. Department of Physical and Health Education, University of Cross River State, Uyo Akwa Ibom State, Nigeria.

Edet EE, Ikpeme BM, Ndifon WO, Oyo-Ita AE. Factors associated with missed opportunities to immunise with tetanus toxoid at a tertiary health institution in Nigeria. Cent Afr J Med 1998 Aug;44(8):199-202. Department of Community Health, University of Calabar, Cross River State, Nigeria. OBJECTIVE: To determine the magnitude of and the reasons for missed opportunities to immunise with tetanus toxoid at a tertiary health institution in Nigeria. The information obtained would be used in developing an intervention strategy for eliminating missed opportunities in the future. DESIGN: Missed opportunity was assessed by using the Revised WHO/EPI protocol (WHO/EPI/MLM/91.7). Exit interviews were carried out on pregnant women visiting the antenatal (prenatal) clinic to register the present pregnancy. SETTING: A tertiary health institution in Nigeria. SUBJECTS: Pregnant women who attended the antenatal clinic for the purpose of registering the present pregnancy during the last two booking days in February, 1997 and the first booking day in March, 1997. MAIN

OUTCOME MEASURES: Missed opportunities and contributory factors. RESULTS: The prevalence of missed opportunity was 66%. The factors responsible for missed opportunity were poor history taking, lack of knowledge of the current schedule of immunisation, dependence on physician referral for immunisation and inefficient immunisation record keeping system. CONCLUSION: The findings establish the need for providing physicians in antenatal settings with an update on current immunisation policy and practice and for improved documentation of immunisation histories.

Egwu IN. The use of selected interventions in monitoring primary health care implementation in rural Nigeria. Scand J Prim Health Care 1992 Mar;10(1):30-5. Department of Community Health, College of Medical Sciences, University of Calabar, Nigeria. Nigeria's Primary Health Care (PHC)-based health system development aims to strengthen PHC in the local government areas (LGA) through technical planning and implementation that emphasize maternal and child health services. Convenient variables, including expanded programme on immunization (EPI), antenatal care (ANC) utilization and attended births, were selected as interventions to monitor the progress of implementation of PHC activities during 1985-90 in Odukpani LGA. Analysis of available data at the LGA showed that immunization coverage for most EPI antigens increased; ANC services showed increased utilization; health worker-attended births increased as traditional birth deliveries declined during the period. Some of the increases were modest but are considered important. The study offers a pilot approach to monitoring implementation of PHC activities in Odukpani LGA. The implications of the findings for similar studies are discussed.

Ekerete PP. Motivating consumers for National Programme on Immunization (NPI) and Oral Rehydration Therapy (ORT) in Nigeria. J Hosp Mark 1997;12(1):33-60. Rivers State University of Science and Technology, Port Harcourt, Nigeria. The Expanded Programme on Immunization (EPI) (changed to National Programme on Immunization (NPI) in 1996) and Oral Rehydration Therapy (ORT) were launched in Nigeria in 1979. The goal of EPI was Universal Childhood Immunization (UCI) 1990, that is, to vaccinate 80% of all children age 0-2 years by 1990, and 80% of all pregnant women were also expected to be vaccinated with Tetanus Toxoid Vaccine. The Oral Rehydration Therapy was designed to teach parents with children age 0-5 years how to prepare and use a salt-sugar solution to rehydrate children dehydrated by diarrhoea. Nigeria set up Partners-in-Health to mobilize and motivate mothers to accept the programme. In 1990 a National coverage survey was conducted to assess the level of attainment. The results show that some states were able to reach the target and some were not. It therefore became necessary to evaluate the contribution of those promotional elements adopted by Partners-in-Health to motivate mothers to accept the programme. The respondents were therefore asked to state the degree to which these elements motivated them to accept the programme. The data were collected and processed through a Likert rating scale and t-test procedure for test of significance between two sample means. The study revealed that some elements motivated mothers very strongly, others strongly, and most moderately or low, with health workers as major sources of motivation. The study also revealed that health workers alone can not sufficiently motivate mothers without the help of religious leaders, traditional leaders and mass media, etc. It was therefore recommended that health workers should be intensively used along with other promotional elements to promote the NPI/ORT programme in Nigeria.

Ekerete PP. Promotional model: a new direction for the National Programme on Immunization (NPI) and Oral Rehydration Therapy (ORT) in Nigeria. Health Mark Q 2000;18(1-2):115-33. Department of Business Administration, Faculty of Management Sciences, Rivers State University of Science and Technology, Port Harcourt, Nigeria. The National Programme on Immunization (NPI), which was formerly known as the Expanded

Program on Immunization (EPI), and Oral Rehydration Therapy (ORT) were relaunched in 1984 after the problems of vaccine supply had been corrected. The aim of the NPI was to protect children against six childhood killer diseases and ORT to rehydrate the dehydrated child caused by diarrhoea. In order to achieve these objectives, a Partner-in-Health strategy was set up to educate, convince and motivate mothers, pregnant women and the community to accept the programme. To assess the effect of the promotional strategy, the government decided to conduct a National Immunization Coverage survey. The results showed that some states were able to reach the target while some were not. The survey also reported that 32% of the reason for immunization failure was due to lack of information and that 9% was lack of motivation. It therefore became necessary to design a promotional model for effective and rapid implementation of the programme. After an evaluation of the promotional strategy set up by the government, a pilot survey was conducted from which nine promotional elements were selected. These promotional elements were regarded as sources of information and motivation. Based on these, a promotional model was set up which stated that promotion depends on consumer information which in turn depends on the extent of interaction between the consumer and the promotional elements. The implication of the model is the need for the formation of a Public Health Organisation with a Public Health Committee at all levels of government.

Gage AJ, Sommerfelt AE, Piani AL. Household structure and childhood immunization in Niger and Nigeria. Demography 1997 May;34(2):295-309. Department of Sociology and Population Research Institute, Pennsylvania State University, University Park 16802, USA. gage@pop.psu.edu In this study, we use data from the Demographic and Health Surveys to examine the relationship between household structure and childhood immunization in Niger and Nigeria. We show that household structure is an important determinant of childhood immunization in Nigeria: Children from nuclear, elementary polygynous, and three-generational households are worse-off than those from laterally extended households. However, the lower odds of full immunization among children from three-generational and elementary polygynous households are attributable to low economic status and low maternal education levels, respectively. In Niger, household structure does not have a significant effect on children's likelihood of being fully immunized.

Okoro JI, Egwu IN. Essential factors in the implementation of an Expanded Program on Immunization in an urban-periurban community in Nigeria. Asia Pac J Public Health 1994;7(2):105-10. Department of Community Health, College of Medical Sciences, University of Calabar, Nigeria. The aim of this study was to identify some of the factors that affected the implementation of the Expanded Program on Immunization (EPI) in the Local Government Area (LGA). The study covered the three communities in Calabar LGA. Data on vaccine-eligible children and pregnant women were sought with questionnaires; other information on technical and community aspects of the EPI was gathered with specially designed checklists. EPI coverage for most antigens increased between 70-100% in response to highly-organized immunization campaigns initiated in 1985. In subsequent years, up to 1989, similar campaign-induced responses to national, state and local campaign efforts were observed. In contrast, coverage levels attributable to routine immunization remained unsatisfactory. When tested with the Z-statistic using 1985 as the base year ($p < 0.05$), there was a significant difference between the proportion of eligible children and pregnant women who did not receive their full dose of immunization. Socio-logistic variables found to be important in EPI implementations included scheduling, health staff attitude, intersectoral collaboration, and health education. Lack of community participation was also found to be a crucial constraining factor. As community participation/involvement is critical in sustaining health programs, social marketing techniques are suggested for future use.

B. Nutrition

B.1. Breastfeeding

Adejuyigbe EA, Fasubaa OB, Ajose OA, Onayade AA. Plasma glucose levels in exclusively breastfed newborns in the first 48 hours of life in Ile-Ife, Nigeria. Nutr Health 2001;15(2):121-6. Department of Pediatrics and Child Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. This study aims to determine the effectiveness of exclusive breastfeeding of newborns in maintaining a normal blood glucose level in the first 48 hours of life. One hundred and twelve consecutive newborns were initially recruited and 91 completed the study. All neonates of mothers with complicated pregnancy such as diabetes, hypertension and infections were excluded from the study. Maternal and cord glucose estimation were carried out within 30 minutes of delivery. All mothers were assisted in positioning and attaching their babies to the breast. All newborn were weighed and glucose levels were measured at 24 and 48 hours of life before breastfeeding. All mothers were euglycaemic while seven neonates had plasma glucose level less than 1.7 mmol/l at birth. Only one neonate had persistent hypoglycemia from birth to 12 hours of age and required treatment. All other neonates had blood glucose level above 1.7 mmol/l at 24 and 48 hours of life. The weight loss was 0.176 +/- 0.134 kg and 0.211+/-0.157 kg at 24 and 48 hours respectively. We therefore conclude that the exclusively breastfed newborns have adequate glucose supply and are not at risk of having hypoglycemia in the first 48 hours of life.

Aghaji MN. Exclusive breast-feeding practice and associated factors in Enugu, Nigeria. West Afr J Med 2002 Jan-Mar;21(1):66-9. Department of Community Medicine, University of Nigeria Teaching Hospital, Enugu. A cross-sectional questionnaire survey was conducted among 235 infant-mother pairs in five Baby Friendly pairs in five Baby Friendly Hospitals in Enugu-Nigeria in 1998. The aims were to study their breast-feeding practices and associated factors. The exclusive breast-feeding rate was 33.3% while the predominant breast-feeding rate was 50.2%. Factors associated with exclusive breast-feeding included infants' birth order (P = 0.015), fathers' education (P =0.0244), mothers' education (P = 0.000001), occupation (P = 0.0069) and parity (P = 0.004). However, the infants' age (P = 0.054) and sex (P = 0.403), mothers' age (P = 0.2005), number of breast-feeding counseling attendances (P = 0.0883) and the breast-feeding initiator (P = 0.473) were comparable irrespective of breast-feeding practice. In the mothers' perspectives, the commonest reasons for not breastfeeding exclusively included; insufficient breast milk (58,37.0%) and the sociocultural practice of giving water to babies because of the hot climate (52,33.1%). For an improvement in the exclusive breast-feeding rate of this population, health workers should highlight to mothers the dangers of water supplementation and the dynamics of breastmilk supply through health education, home visits and the formation of community based lactation support groups.

Ahiadeke C. Breast-feeding, diarrhoea and sanitation as components of infant and child health: a study of large scale survey data from Ghana and Nigeria. J Biosoc Sci 2000 Jan;32(1):47-61. Population Dynamics Unit, ISSER, University of Ghana, Legon, Ghana. Using Demographic and Health Survey datasets from Ghana and Nigeria, this study examined whether the protective effects of breast-feeding are greatest where the poorest sanitation conditions prevail. It was found that mixed-fed infants aged between 0 and 11 months tend to have a higher risk of diarrhoea than fully breast-fed children, while the risk of diarrhoea among weaned infants is twice that of mixed-fed infants. The probit regression models employed in the analysis were used to predict the probability of diarrhoea associated with each breast-feeding pattern for both 'poor' and 'good' sanitation areas. It was found that the risk of diarrhoea among mixed-fed infants in the poor sanitation areas tends to be high while the same risk among fully breast-fed infants tends to be minimal. In essence, the health risks

of mixed feeding are real, particularly for infants aged less than 7 months, and are even worse for those weaned before 6 months of age.

Ahiadeke C, Gurak DT, Schwager SJ. Breastfeeding behavior and infant survival with emphasis on reverse causation bias: some evidence from Nigeria. Soc Biol 2000 Spring-Summer; 47(1-2): 94-113. Population Dynamics Unit, ISSER, University of Ghana, P.O. Box 74, Legon, Ghana. The possibility of selection bias in the estimation of the effects of breastfeeding on subsequent survival is implied by the clinical evidence that children who are healthier at birth are more likely to be breastfed than their less healthy counterparts who may be prone to difficulties in sustaining breastfeeding. This paper addresses an important problem in understanding the association of breastfeeding and child survival with regard to reverse causation. It utilizes data on the reported reason for weaning to assess the degree to which reverse causality may be responsible for observed associations. The analysis indicates that children who are weaned in the neonatal period because of illness or weakness to suckle, experience a much higher risk of dying than others. This is not mainly because of the cessation of breastfeeding, but because of the original factor, being their illness. Any biases imparted by an initial selection mechanism appear, therefore, to have influence on the effectiveness of breastfeeding behavior.

Davies-Adetugbo AA, Ojofeitimi EO. Maternal education, breastfeeding behaviours and lactational amenorrhoea: studies among two ethnic communities in Ile Ife, Nigeria. Nutr Health 1996;11(2):115-26. Obafemi Awolowo University, Ile Ife, Nigeria. Kadetugb@oau.net. Breastfeeding is an important child survival strategy. This report aims to describe the unique contributions of education, ethnicity, and other variables to breastfeeding outcomes. The study was conducted among two groups of lactating mothers in Ile Ife, southwestern Nigeria, using structured questionnaires focusing on their breastfeeding history and current practice. Breastfeeding initiation was delayed in both groups, and primary education is the most significant predictor of initiation of breastfeeding within 6 hours of delivery (OR = 3.92, p = 0.0117). Breastfeeding duration (SD) was 13.7 (4.3) months for the Yorubas and 17.5 (3.4) for the Hausas. Its only significant predictors are education ($p <= 0.0001$), with an average decrease in breastfeeding duration of 3.2 and 6.6 months with mother's education to the primary and post-primary levels respectively, compared with mothers with no education. In turn, breastfeeding duration is the most significant predictor of the duration of lactational amenorrhoea ($p = 0.0000$). Mothers with some formal education are also more likely to start feeding human milk substitutes at 2 weeks (OR = 3.83, p = 0.024). The most important variable determining breastfeeding in this study is education. The educated mother is more likely to be involved in economic activity away from the home. To protect breastfeeding in these communities, there is a need for programmes to support the breastfeeding mother who works.

Davies-Adetugbo AA. Promotion of breast feeding in the community: impact of health education programme in rural communities in Nigeria.J Diarrhoeal Dis Res 1996 Mar;14(1):5-11. Department of Community Health, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria. Breast feeding has been recognized as a child survival strategy, while breast feeding programmes have been increasingly implemented in many communities. This study assesses the effectiveness of a breast feeding education programme launched through the primary health care programme in the rural communities of Nigeria. Late trimester pregnant women were enrolled into the study and given a questionnaire on knowledge, attitudes, and practices (KAP) about breast feeding. Women in the study group (n = 126) received breast feeding counselling before and after delivery, while those in control group (n = 130) did not receive any counselling. Both groups were monitored after delivery and followed with the KAP questionnaire. The results of the study showed marked

improvements in the intervention group for colostrum feeding (p = 0.0000). Moreover, 31.6% of the mothers in the intervention group practised timely initiation of breast feeding compared to 5.6% of the controls, and the prevalence of exclusive breast feeding at 4 months was 39.8% in the intervention group compared to 13.9% for the controls. Multivariate analysis showed that the intervention was a powerful and the only significant predictor of the increase in breast feeding behaviours (p = 0.0000), and that an early initiation of breast feeding is a strong predictor of exclusive breast feeding at 4 months of age. It is concluded that breast feeding promotion in rural communities is feasible and can lead to behavioural changes.

Davies-Adetugbo AA. Sociocultural factors and the promotion of exclusive breastfeeding in rural Yoruba communities of Osun State, Nigeria. Soc Sci Med 1997 Jul;45(1):113-25. Department of Community Health, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria. Child survival strategies include prolonged and intensive breastfeeding, together with its early initiation, and breastmilk only for the first six months of life. This paper reports on local knowledge and attitudes of breastfeeding and the sociocultural factors that shape its practice in poor rural Yoruba communities of Southwestern Nigeria. The study has conducted 10 focus group discussions among homogeneous groups of grandmothers, pregnant women, lactating mothers, husbands, and community health workers, and a questionnaire survey of 256 third trimester pregnant women. All women in these communities breastfeed their infants on demand, and for up to two years, because breastmilk is universally accepted as the best food for babies, and breastfeeding spaces births. Prelacteal feedings of water herbal infusions and ritual fluids are the norm, and breastmilk is supplemented, from birth, with water and teas. Exclusive breastfeeding is considered dangerous to the infant: the baby has an obligatory requirement for supplementary water to quench its thirst and promote its normal development, and for herbal teas which serve as food and medicine. Colostrum is discarded because it is dirty, "like pus", and therefore potentially harmful to the infant, although 24% of the survey sample would give it to their babies. Expressed breastmilk is suspect as it can get contaminated, poisoned or bewitched. Complementary foods are introduced as early as two months because of perceived lactation insufficiency. The commonest supplement is a watery maize porridge of low nutrient density. Breastfeeding can also be dangerous, as toxins and contaminants can be passed to the infant through breastmilk. The most serious conflict with the WHO/UNICEF recommendations is the lack of local credibility of exclusive breastfeeding. According to local knowledge, the early introduction of water, herbal teas, and of complementary foods is designed to enhance child survival, while these are supposed to do the exact opposite by the WHO/UNICEF rationale, by exposing the infant to contaminants early, thereby increasing diarrheal morbidity and mortality. Child survival interventions need to address this conflict.

Davies-Adetugbo AA, Adebawa HA. The Ife South Breastfeeding Project: training community health extension workers to promote and manage breastfeeding in rural communities. Bull World Health Organ 1997;75(4):323-32. Department of Community Health, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria. Reported are the results of a project to promote exclusive breastfeeding in rural communities through the training of community health extension workers in rural Nigeria. A workshop for the trainers was organized for health workers in the study area; subsequently, these trainers ran district-level training workshops. In the study area perinatal facilities, early initiation of breastfeeding has increased compared with those in the control area ($P < 0.001$). Also, the trained health workers had significantly better knowledge about breastfeeding than their untrained colleagues in both the study ($P < 0.001$) and control areas ($P < 0.001$), and more often recommended timely initiation and exclusive breastfeeding than the controls ($P < 0.001$). A multivariate analysis showed that the training programme and the study area were the only significant variables that were predictors of breastfeeding knowledge ($P < 0.001$).

Appropriate education of health extension workers can therefore contribute significantly to the promotion of breastfeeding in rural communities.

Davies-Adetugbo AA, Adetugbo K, Orewole Y, Fabiyi AK. Breast-feeding promotion in a diarrhoea programme in rural communities. J Diarrhoeal Dis Res 1997 Sep;15(3):161-6. College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria. adetugbo@hotmail.com Breast-feeding promotion is an important intervention for the control of infant diarrhoea. This study assesses the impact of a breast-feeding counselling programme on the prevalence of exclusive breast feeding in rural communities in Nigeria. Mothers attending primary care facilities because their infants had acute diarrhoea were randomised into two groups. The study group (n = 82) received individual, focused breast-feeding counselling, while the controls (n = 79) had routine advice for diarrhoea. Both groups were monitored and followed with home visits to determine infant-feeding practices. The results showed marked increases in exclusive breast-feeding prevalence for the intervention group at day 7 (49% vs. 6% control; $p < 0.0001$) and day 21 (46% vs. 8%; $p < 0.0001$). Moreover, diarrhoea re-occurrence at day 21 was less in the intervention group (12%) than controls (18%). It is concluded that focused breast-feeding counselling can increase exclusive breast feeding and reduce the prevalence of diarrhoea in rural communities.

Eregie CO. Studies on exclusive breastfeeding: a report on associated factors in an African population. J Trop Pediatr 1998 Jun;44(3):172-3. Institute of Child Health, University of Benin, Nigeria. This study was conducted at the Infant Welfare Clinic of the University Teaching Hospital, Benin City, Nigeria, in April 1996, to investigate factors associated with exclusive breastfeeding in this African population. Birth weight showed significant association with exclusive breastfeeding. Maternal age and maternal educational level did not. It is suggested that the association between maternal educational level and exclusive breastfeeding needs further investigation in different cultures.

Eregie CO. Observations on urinary frequency in exclusively breastfed neonates. East Afr Med J 1998 Oct;75(10):576-8. Institute of Child Health, University of Benin, Nigeria. This study was conducted at the University Teaching Hospital, Benin City, Nigeria to investigate urinary frequency in exclusively breastfed neonates. Amongst exclusively breastfed neonates, 59.0% passed urine eight times or more per day while 14.5% passed urine less than five times a day. The comparative figures in partially breastfed neonates were 55.8% and 12.8% respectively. There was no significant association between the type of breastfeeding and urinary frequency. Sex was also not significantly associated with urinary frequency amongst exclusively breastfed infants. However, birthweight showed significant association with urinary frequency in the analysed sample. It is suggested that birthweight, which correlates with gestational maturity may influence urinary frequency because of its effect on renal functional maturation and possibly differential threshold for intravesical pressures required for initiating the micturition reflex. The observed association is, however, not an indication for supplementary water in low-birthweight infants since all the infants had normal hydration status. It is, therefore, recommended that all neonates should not receive supplementary water irrespective of their birthweights.

Eregie CO. Exclusive breastfeeding and infant growth studies: reference standards for head circumference, length and mid-arm circumference/head circumference ratio for the first 6 months of life. J Trop Pediatr 2001 Dec;47(6):329-34. Institute of Child Health, University of Benin, Nigeria. coregie@benin.nipost.com.ng. This paper presents the development of reference standards for head circumference (HC), length and mid-arm circumference/head circumference (MAC/HC) ratio for the evaluation of exclusively breastfed infants. A total of 219 exclusively breastfed term appropriate-for-gestational age (AGA) infants were studied

and analysed from 1 June 1995 to 31 May 1997 at the Neonatal Follow-up Clinic, University Teaching Hospital, Benin City, Nigeria. Head circumference and length measurements were recorded for the infants at each postnatal completed month. MAC/HC ratios were also computed for each infant at each completed postnatal month. There was a progressive increase in the mean measurements at the completed months with increasing postnatal age and the differences between the mean measurements of length and head circumference at the 4th and 6th completed months were significant ($p < 0.001$). The head circumference, length and MAC/HC ratio had significant correlations with postnatal age. The standards represent the regression lines of the anthropometric measurements and MAC/HC ratio on postnatal age with the corresponding 95 per cent confidence limits. The standards identified 95 per cent (for head circumference), 93 per cent (for length) and 94 per cent (for MAC/HC ratio) of exclusively breastfed healthy infants as having normal infant growth for age.

Eregie CO. Observations on water supplementation in breastfed infants. West Afr J Med 2001 Oct-Dec;20(4):210-2. Institute of Child Health, University of Benin, Benin City, Nigeria. A total of 378 infants, under six completed months, were evaluated at the University of Benin Teaching Hospital, Benin City, Nigeria, to investigate some aspects of water supplementation in breastfed infants. Data were recorded concerning water supplementation and age at introduction of supplementary water among others. Water supplementation accounted for 91.7% of partial breastfeeding up to one completed month compared with 70-76% from up to 2 completed months to up to 5 completed months or earlier. The postnatal period of up to one month completed month may possibly be considered as the critical period for water supplementation since after this period, water was introduced only in a small proportion of infants during the first six months. It is suggested that strategies which prevent water supplementation at this critical period may ultimately reduce the prevalence of water supplementation during the first six months and, therefore, increase the rates and duration of exclusive breastfeeding in the studied population.

Igbedioh SO, Ogbeni AO, Adole GM. Infant weaning practices of some Tiv women resident in Makurdi, Nigeria. Nutr Health 1996;11(1):13-28. College of Food Technology, University of Agriculture, Makurdi, Nigeria. The weaning practices in infants aged 4 to 9 months of two hundred Tiv mothers in Makurdi, Nigeria were examined. The data was collected using a questionnaire from these randomly selected women from a known population and who regularly visited the public post-natal clinic in Makurdi. The study showed that all the mothers breast-fed their infants and most introduced supplementary feed at 3 to 4 months. Most also fed the traditional pap or "akamu' usually prepared by adding boiling water to fermented maize-sorghum paste. However, only a few of these (34%) enriched such paps. Price was a major determinant influencing the choice of feed fed to the infants. Only a few of the mothers (19%) used commercial milk formula, about a quarter fed legumes (24.5%) and fruits and vegetables (30%). The study showed that the mother's educational level and occupation influenced both time and duration of breast feeding and introduction of milk formula. Three-quarter of the mothers used bottle feeding while a quarter used spoon and cup and the feeds were improperly stored. The significance of these findings is discussed.

Lawoyin TO, Olawuyi JF, Onadeko MO. Factors associated with exclusive breastfeeding in Ibadan, Nigeria. J Hum Lact 2001 Nov;17(4):321-5. Family and Reproductive Health Unit, Department of Community Medicine, College of Medicine, University College Hospital, Ibadan, Nigeria. Although nationwide efforts to promote exclusive breastfeeding began in Nigeria in 1992, data on this type of infant feeding are still generally scarce. Current status breastfeeding data were obtained from 2794 mothers, enrolled from randomly selected infant welfare clinics in Ibadan, Nigeria, to evaluate factors that are associated with exclusive breastfeeding. The exclusive breastfeeding rate dropped from 57.4% at 1 month to 23.4% at 6

months. Using multiple regression analysis, younger age of infant (P < .0001), higher maternal occupation (P < .05), and delivery in tertiary (P < .0001) or secondary (P < .0001) health facility were predictive of exclusive breastfeeding. Mothers 24 years or younger and primiparous mothers were less likely to breastfeed their babies exclusively (P < .01 and P < .05, respectively). Additional programs are needed to meet the needs of at-risk mothers, who should be identified and counseled.

Nwankwo BO, Brieger WR. Exclusive breastfeeding is undermined by use of other liquids in rural southwestern Nigeria. J Trop Pediatr 2002 Apr;48(2):109-12. Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria. Exclusive breastfeeding (EBF) requires that the child be started on breastmilk on the first day of life and to continue with breastmilk alone for the next 4-6 months. EBF is compromised even when water is given to a child. This study surveyed the breastfeeding practices and opinions of 411 mothers of children aged 4-28 months in the rural community of Igbo-Ora in southwestern Nigeria. While all children were given breastmilk throughout that period, all received plain water during the first week of life. Herbal tea was given to nearly half (47 per cent) during their first week, and by the fourth month 97 per cent had taken herbs. Glucose water was commonly given during the first week (72 per cent). In-depth interviews with health workers confirmed that they gave advice to use glucose water for newborns. Only 45 (11 per cent) of women practised what could be termed predominantly breastfeeding (PBF), i.e. giving only plain water and/or herbal tea in the first 4 months. These were primarily women with some education and in skilled occupations. Mothers believed that breastmilk alone would not satisfy their children and would be physically draining on themselves because the current economic hard times did not allow them to eat as they wished. The results imply a need for health education that starts with the health workers themselves and addresses the cultural context of the mothers' fears about EBF.

Ojofeitimi EO, Olaogun AA, Osokoya AA, Owolabi SP. Infant feeding practices in a deprived environment: a concern for early introduction of water and glucose D water to neonates. Nutr Health 1999;13(1):11-21. Institute of Public Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. The main objective of this study was to inquire from lactating mothers whether they were fully or partially practising exclusive breastfeeding in the first six months postnatally. Time of initiation of breast and complementary feedings, types of feeds and reasons for giving other feeds to infants apart from breast milk were also examined. The data were collected by structured pretested questionnaire. Of the 200 nursing mothers interviewed, 103 (51.5%) and 77 (38.5%) reported to have given water and glucose D water to neonates respectively within the first week of life. Sieved cornpap was the popular weaning diet. Time of introducing complementary feeding to infants, and nursing mothers' educational levels, were highly significantly related (P = 0.005). Surprisingly, none of the nursing mothers listed infant formula as one of the complementary feeds. It is concluded that there is a strong need to correct this unnecessary practice of giving water and glucose D water to neonates to prevent thirst and Jaundice respectively. The correction should commence with health workers and then the nursing mothers.

Ojofeitimi EO, Owolabi OO, Eni-Olorunda JT, Adesina OF, Esimai OA. Promotion of exclusive breastfeeding (EBF): the need to focus on the adolescents. Nutr Health 2001;15(1):55-62. Institute of Public Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. This study was designed to assess the knowledge and attitude towards exclusive breast feeding among 377 female students of School of Health Technology, Ilesha and to compare their responses with 60 primigravidae attending antenatal clinic in Ile-Ife, Nigeria. The ages of the subjects ranged from 15 to 34 years. Data were collected using pretested structured questionnaire. Approximately 47% of the total population were grouped under low level of knowledge of exclusive breastfeeding. There was no

significant relationship in terms of knowledge between the two groups. There was, however, a significant relationship between the age of subjects and increased level of knowledge about EBF. Seventy percent of the primigravidae were graded as having poor attitudes as compared with 18% of the female students. About 42% of the total population would give water and glucose D water to neonates within 72 hours after delivery. These findings further suggest that planners of the Baby Friendly Initiative need to focus more on adolescents and the primigravidae in the promotion of breastfeeding.

Ojofeitimi EO, Esimai OA, Owolabi OO, Oluwabusi, Olaobaju OF, Olanuga TO. Breast feeding practices in urban and rural health centers: impact of baby friendly hospital initiative in Ile-Ife, Nigeria. Nutrition and Health 2000; 14: 119-125. The present study was carried out to assess the impact of the Baby Friendly Hospital Initiative (BFHI) on breast feeding practices. The variables used to evaluate the BFHI center included time of initiation of breastfeeding (BF) after delivery, intended duration of BF, adoption of exclusive breastfeeding (EBF) in relation to educational status, location of health center, and knowledge and practice of positioning the child at the breast. Observation, questionnaire and interview techniques were employed to collect data among 217 and 214 nursing mothers (NMs) from, Urban and Rural Health Centers. Of the 228 NMs who initiated BF within 30 minutes after delivery, 140 (61%) were from a designated BFHI center and 88 (39%) were from an undesignated BFHI rural health center. There was a significant relationship between the practice of EBF and designation of BFHI center (p=0.0001). The present study has also confirmed that EBF which was once considered to be less than 3%, has increased significantly to 61%. The success was not unconnected with the inauguration of BFHI. The BFHI is recording huge success in the urban area but the impact is still to be felt in the rural areas.

Okolo SN, Adewunmi YB, Okonji MC. Current breastfeeding knowledge, attitude, and practices of mothers in five rural communities in the Savannah region of Nigeria. J Trop Pediatr 1999 Dec;45(6):323-6. Department of Paediatrics, Jos University Teaching Hospital, Nigeria. The knowledge, attitude, and practices regarding breastfeeding of 310 mothers in five rural communities in Toto Local Government in Nassarawa State, Nigeria were investigated using a questionnaire. One hundred and sixty-two (52.3 per cent) mothers were illiterate while 148 (47.7 per cent) had either primary or secondary school education. Apart from giving babies colostrum, which was seen more amongst mothers with higher levels of education ($p < 0.001$), other practices investigated such as exclusive breastfeeding, demand feeding, 'rooming-in', and time of first breastfeed were not influenced by the mother's level of education. Fifty-four per cent of mothers did not give their babies colostrum. All mothers attended the antenatal clinic but only 103 (33.3 per cent) received instructions from the health worker on breastfeeding and 46.8 per cent delivered at home. Only 28.6 per cent of babies were breastfed within 24 hours of birth. The mean time after birth for the first breastfeed was 47.7 hours. Although breastfeeding is widely practiced, none of the babies was exclusively breastfed, and prelacteal feeds ranging from water, formula, or herbal tea were given by all the mothers. The practice of discarding colostrum and replacing it with a wide range of prelacteal feeds and late initiation of breastfeeding has implications for health education programmes and neonatal feeding strategies.

Okolo SN, VanderJagt TJ, Vu T, VanderJagt TA, VanderJagt DJ, Okonji M, Huang YS, Chuang LT, Onwuanaku C, Glew RH. The fatty acid composition of human milk in northern Nigeria. J Hum Lact 2000 Feb;16(1):28-35. Department of Paediatrics, Jos University Teaching Hospital. The authors previously reported that the milk of Yoruba women in southwestern Nigeria was deficient in alpha-linolenic acid and contained a high percentage (42%) of medium chain-length fatty acids (MCFA, C10-C14). In the present study, the

authors used capillary gas-liquid chromatography to analyze the milk of Hausa women in the northern region of Nigeria. The milk of the Hausa women contained 27% MCFA, 10.6% linoleic acid, 0.41% alpha-linolenic acid, 0.52% arachidonic acid, and 0.32% docosahexaenoic acid. The proportion of alpha-linolenic acid in the serum phospholipids of a subset of exclusively breastfed infants (n = 15; mean age, 6.2 +/- 0.3 months) was below the limit of detection (< 0.03%). While the milk of women in northern Nigeria is adequate with regard to n-3 and n-6 fatty acids, to satisfy the requirements for alpha-linolenic acid, it may be necessary to supplement the infants of these women after the first 6 months of life.

Okolo NS, Okonji M, Ogbonna C, Ezeogu AF, Onwuanaku C. Levels of calcium, aluminium and chromium in serum of exclusively breastfed infants at six months of age in Savannah region of Nigeria. West Afr J Med 2001 Jan-Mar;20(1):13-6. Department of Paediatrics, Jos University Teaching Hospital, Jos, Nigeria. This study was undertaken to determine the levels of calcium, aluminium and chromium in the serum of apparently healthy exclusively breastfed infants at the sixth month of lactation. Forty-five infants (with a male:female ratio 2:1) were studied. They were of an average age six months and one week, weighed 6.8-10.0 kg. The mean calcium levels of 83.92 ug/ml (2.1 mmol/L) obtained is within the reference range (2.1-2.5 mmol/L) in this area. The mean level of chromium was 0.11 u/ml while that of aluminium is significantly (P < 0.001) higher than the toxic level reported by some workers, yet none of the subject was manifesting any obvious signs of toxicity. We can then infer from our data that the exclusively breastfed infants are able to extract enough calcium, aluminium and chromium from the maternal breastmilk.

Okolo SN, Ogbonna C. Knowledge, attitude and practice of health workers in Keffi local government hospitals regarding Baby-Friendly Hospital Initiative (BFHI) practices. Eur J Clin Nutr 2002 May;56(5):438-41. Department of Paediatrics, Jos University Teaching Hospital, Jos, Nigeria. okolom@unijos.edu.ng. OBJECTIVE: To assess the knowledge, attitude and practice of health workers towards Baby Friendly Hospital Initiative (BFHI) practices and thereafter plan an advocacy on BFHI training of the workers. DESIGN: A randomised cross-sectional study. SETING: Ten out of 16 health facilities reflecting all the levels of healthcare provision in Keffi Local Government Area in Nassarawa State, Nigeria, were selected. Staff of these health facilities had not received BFHI training, although breastfeeding is the norm in this population, exclusive breastfeeding is almost zero. SUBJECTS: A total of 250 health workers (six doctors, 160 nurses and 84 auxiliary staff) met in the health facilities at the time of interview. INTERVENTION: A structured questionnaire based on 10 steps to successful breastfeeding was administered by one of the authors and a Lactad nurse between July and October 1995. RESULTS: Fifty-two (20.8%) were aware of the need for initiating breastfeeding within 30 min of birth and 92 (36.8%) were aware of breastfeeding support groups. However, there were significant differences in the level of awareness among the doctors compared to the other categories of health staff (P<0.05). Also, 48 (19.2%) of the health workers believed that babies less than 6 months of age should not be given water (statistical difference (P<0.05) between doctors' attitude and that of the other health workers). Thirteen (5.22%) health workers could demonstrate correct positioning and attachment. CONCLUSION: There was general lack of awareness of some major recommended practices in the hospitals that will promote and sustain breastfeeding. There is therefore the need for policy changes and BFHI training for the staff of these health facilities to respond to the concern and growing need for proper infant/young child feeding.

Schmeits BL, Okolo SN, VanderJagt DJ, Huang YS, Chuang LT, Mata JR, Tsin AA, Glew RH. Content of lipid nutrients in the milk of Fulani women. J Hum Lact 1999 Jun;15(2):113-20. University of New Mexico, USA. Little is known about the nutrition of the infants of the Fulani, migratory nomads of the western Sahel of Africa. Milk was collected from 18 Fulani

women 10 to 30 days postpartum and the fatty acid compositions of the triacylglycerol and phospholipid fractions were determined by capillary gas-liquid chromatography. De novo fatty acids (10:0-14:0) comprised 36.3 +/- 12.7% of fatty acids of the triacylglycerols. Compared to the milk of various populations worldwide, the milk of the Fulani women contained adequate proportions of alpha-linolenic acid (0.50 +/- 0.16%) and arachidonic acid (0.42 +/- 0.22%), but relatively low amounts of linoleic acid (9.95 +/- 2.13%) and docosahexaenoic acid (DHA) (0.15 +/- 0.08%). In addition, the milk of the Fulani women contained adequate concentrations of beta-carotene (1.58 +/- 0.69 micrograms/dl) and vitamin A (42.7 +/- 40.3 micrograms/dl), but very low levels of vitamin E (0.11 +/- 0.10 mg/dl). These data indicate that exclusively breasted infants of Fulani women were receiving relatively low amounts of critical fatty acids and vitamin E.

Ukwuani FA, Suchindran CM, Cornwell GT. Influences of mother's work, childhood place of residence, and exposure to media on breast-feeding patterns: experience of Nigeria and Uganda. Soc Biol 2001 Spring-Summer;48(1-2):1-20. Carolina Population Center, University of North Carolina at Chapel Hill, 123 West Franklin Street, Chapel Hill, NC 27516, USA. Ukwuani@unc.edu. This study uses data from the Nigerian Demographic and Health Survey collected in 1990 and the Ugandan Demographic and Health Survey collected in 1995 to examine the implications of mother's work, childhood place of residence, and exposure to the media for breast-feeding patterns (exclusivity and intensity) in Nigeria and Uganda. Nigeria and Uganda present an interesting contrast because Nigeria is more modernized and economically developed than Uganda, thus providing a good indication of the influence of modernization on breast-feeding patterns. Mother's work status is defined by considering whether mothers earned cash from work and took their children to work, hence emphasizing the compatibility of work with child care. Work least compatible with child care had a negative effect on breast-feeding intensity in Nigeria. The negative effect of mother's work on exclusive breast-feeding (that is, if the mothers used formula or milk instead) observed for some working mothers in Nigeria and Uganda was partly confounded by urban residence, exposure to media, and other socioeconomic factors. Mother's work did not have a negative effect on breast-feeding intensity in Uganda. The relationship between mother's work, urban residence, media exposure, and breast-feeding practice seems to be stronger in Nigeria than Uganda.

VanderJagt DJ, Arndt CD, Okolo SN, Huang YS, Chuang LT, Glew RH. Fatty acid composition of the milk lipids of Fulani women and the serum phospholipids of their exclusively breast-fed infants. Early Hum Dev 2000 Dec;60(2):73-87. Department of Biochemistry and Molecular Biology, School of Medicine, University of New Mexico Health Sciences Center, Room 249, BMSB, Albuquerque, NM 87131-5221, USA. We previously reported that, relative to milk of women elsewhere in the world, the lipid fraction of milk of Fulani women in northern Nigeria contained relatively low proportions of alpha-linolenic acid and docosahexaenoic acid (DHA). This led us to question the essential fatty acid status of Fulani infants and the relation between the proportion of critical n-3 and n-6 fatty acids in the serum phospholipids of the mothers, their milk, and the serum phospholipids of their exclusively breast-fed infants. We were also interested in the effect de novo intermediate chain length-fatty acids (C10-C14) had on the proportions of critical and non-essential fatty acids in milk. Capillary gas-liquid chromatography was used to analyze the fatty acid content of the total milk lipids of 34 Fulani women, as well as the fatty acid content of serum phospholipids of the women and their breast-fed infants during the first 6 months of life. The proportions of critical n-3 and n-6 fatty acids in the milk of the Fulani women were adequate, but the proportions of these same fatty acids were low in their exclusively breast-fed infants. The serum phospholipids of the infants contained 18.8% linoleic acid, 0.13% alpha-linolenic acid, 12.8% arachidonic acid, and 3.40% DHA, whereas, the mean percentages of linoleic,

alpha-linolenic, arachidonic and DHA in the serum phospholipids of the Fulani mothers' were 21.4, 0.20, 9.79, and 1.97, respectively. There was a strong positive correlation between fatty acid content of serum phospholipids of Fulani women and the fatty acid content of their milk lipids. As the proportion of C10-C14 fatty acids in the milk lipids increased, the proportions of critical n-3 and n-6 fatty acids in milk remained relatively constant; however, proportions of three non-essential fatty acids decreased dramatically. C10-C14 fatty acids do not appear to displace critical n-3 and n-6 fatty acids in milk.

World Health Organization. The World Health Organization Multinational Study of Breast-feeding and Lactational Amenorrhea. I. Description of infant feeding patterns and of the return of menses. World Health Organization Task Force on Methods for the Natural Regulation of Fertility. Fertil Steril 1998 Sep;70(3):448-60. OBJECTIVE: To detect differences between populations in both infant feeding practices and the duration of lactational amenorrhea, if they exist. DESIGN: Prospective, nonexperimental, longitudinal follow-up study. SETTING: Five developing and two developed countries. PATIENT(S): Four thousand one hundred eighteen breast-feeding mothers and their infants. INTERVENTION(S): Breast-feeding women collected ongoing information about infant feeding and family planning practices, plus the return of menses. Fortnightly follow-up occurred in the women's homes. MAIN OUTCOME MEASURE(S): Breast-feeding frequency by day (and by night); 24-hour breast-feeding duration, percent of all infant feedings that were milk/milk-based (and solid/semisolid foods); time until the end of full breast-feeding; time until regular supplementation; and time until the end of lactational amenorrhea. RESULT(S): Differences between the centers in the duration of amenorrhea were substantial, ranging from a median of 4 months in New Delhi (India) to 9 months in Chengdu (China). Women in developed countries (but also women in Chengdu) were more likely to delay supplementation (for up to 5 months), whereas women in Santiago (Chile), Guatemala City (Guatemala), and Sagamu (Nigeria) started supplements much earlier, sometimes as early as 1 week after birth. CONCLUSION(S): Both breast-feeding behavior and the duration of lactational amenorrhea vary markedly across settings, indicating that breast-feeding promotion and family planning advice should be site- and culture-specific.

B.2. <u>Diarrheal and Nutritional Diseases</u>

Akaninwor JO, Abbey BW, Ayalogu ED. Profile of protein energy malnutrition amongst children under four years in urban areas of Rivers State. West Afr J Med 1996 Jan-Mar;15(1):50-5. Department of Biochemistry, University of Port Harcourt. The incidence of protein-energy malnutrition (PEM) in Rivers State children aged 0-4 years has been studied. The incidence rate for a period of 30 months investigated gave a range of 3.97 to 4.81% of the total number of patients examined while the point prevalence gave a range of 0.13 to 0.99% of the total urban population of children aged 0-4 years. PEM was found to occur at a very low rate in Rivers State and persisted throughout the period investigated. PEM occurred in both males and females. The mean difference between the two sexes was not significant ($p > 0.05$) suggesting a non-sex dependent PEM within this age range.

Akpede GO, Omotara BA, Ambe JP. Rickets and deprivation: a Nigerian study. J R Soc Health 1999 Dec;119(4):216-22. Department of Paediatrics, College of Medical Sciences, University of Maiduguri, Nigeria. Under-fives in 461 households were assessed clinically to determine the prevalence of rickets in sub-urban and rural\ communities in the Sahel savanna. Overt rickets was found in 11 (2.4%) of households and abnormalities suggestive of rickets in 69 (14.9%). There were significant variations ($p < 0.05$) in the prevalence of rickets in association with ethnic grouping (higher in southerners and non-Kanuri, non-Hausa-Fulani northerners), religion (more prevalent among Christians), and mother's occupation and

educational status (higher with working class mothers and mothers with at least a primary education). A significantly higher prevalence was also associated with late introduction (at more than seven months of age) of cereals to the infant's diet, more than one under-five in a household and presence of under-fives aged 13-43 months. In contrast, no significant variations in prevalence were observed in association with duration of breast feeding, use of multivitamins or cod liver oil, history of convulsions in under-fives, sex, nutritional status, or history of diarrhoea within a recall period of six months. Thus, rickets is common in under-fives in rural and sub-urban communities in the Sahel savanna and may be related more to environmental and dietary factors than to culture and religion. Further studies are required to determine the relative roles of vitamin D or calcium deficiency to facilitate the planning and execution of a community-based intervention programme in the area.

Bakare S, Smith SI, Olukoya DK, Akpan E. Comparison of survival of diarrhoeagenic agents in two local weaning foods (ogi and koko). J Trop Pediatr 1998 Dec;44(6):332-4. Department of Botany and Microbiology, Lagos State University, Nigeria. The pH values of both cooked and uncooked ogi and koko samples were determined and the survival rate of four diarrhoeagenic agents, enteroinvasive Escherichia coli, Salmonella typhi, Shigella flexneri, and Vibrio cholerae were studied after they were seeded into cooked ogi and koko. Analysis of the pH of the cooked inoculated samples showed that there was a slight increase in pH (decrease in acidity) during storage for 48 h and 37 degrees C (from 3.5 to 3.7 for ogi and from 3.7 to 4.1 for koko). The study also showed that ogi had a slightly lower pH value than koko both before and after cooking. In both cases, the cooked samples had a slightly lower pH value than the uncooked samples. The pH value of ogi ranged from 3.0 to 3.6 and that of koko from 3.5 to 3.9. The survival experiment showed that the inoculated enteric pathogens were inhibited in cooked ogi and koko during storage for 24-48 h. The antibacterial effect of cooked koko was more pronounced, on the four enteric pathogens studied, than that of cooked ogi. Except for Shigella flexneri and E. coli in ogi, non of the other bacteria studied was recovered after 24 h.

Ene-Obong HN, Uwaegbute AC, Iroegbu CU, Amazigo UV. The effect of two child-care practices of market women on diarrhoea prevalence, feeding patterns and nutritional status of children aged 0-24 months. J Diarrhoeal Dis Res 1998 Sep;16(3):173-9. Department of Home Science, University of Nigeria, Nsukka, Enugu State, Nigeria. A cross-sectional comparative study was conducted in seven markets in Enugu and Nsukka, Nigeria, to evaluate the child-care practices, occurrence of diarrhoea, feeding patterns and nutritional status among 506 and 157 children aged 0-24 months taken to the market (CTTM) by their mothers and those left at home (CLAH) respectively. A lack of a caretaker at home was the most common reason for taking children to the market. The majority (92%) of the caretakers at home were young (< 20 years). There was no difference in the occurrence of diarrhoea in the last month between the CTTM (39%) and the CLAH (41%) groups ($p > 0.05$). However, there were differences in reported diarrhoea episodes between children aged 0-6 months and higher age classes (chi 2 = 20.0; $p = 0.003$). Very few children (0.8%) were exclusively breastfed. More CTTM (58%) were still being breastfed than the 42% of CLAH (OR = 1.87; 95% C.I. = 1.27-2.37; $p < 0.001$). Children cared for at home had a slightly better but nonsignificant ($p > 0.05$) anthropometric status as characterised by weight-for-age and height-for-age. There was no relationship between feeding patterns and diarrhoea.

Ighogboja IS, Ikeh EI. Parasitic agents in childhood diarrhoea and malnutrition. West Afr J Med 1997 Jan-Mar;16(1):36-9. Department of Paediatrics and Medical Microbiology, Faculty of Medical Sciences, University of Jos, Nigeria. In a prospective survey, 1130 children were studied for parasitic infections associated with acute diarrhoea and/or protein energy malnutrition at the Jos University Teaching Hospital, Jos, Nigeria. Intestinal parasites

were isolated in 29.2% of the children with E. histolytica, S. mansoni, Hookworm and A. lumbricoides predominating. Children with diarrhoea marginally harbour parasites more frequently than those without diarrhoea, particularly the diarrhoeagenic parasites. The prevalence and pattern of parasitic infections was similar between the malnourished children and their controls reflecting similar environmental influence. We therefore conclude that significant number of children are infected with intestinal parasites and these contribute to morbidity and mortality by precipitating or aggravating diarrhoeal disease or malnutrition. The need for improving sanitation, community awareness, and periodical mass treatment of pre-school and school age children with antiprotozoal and anti-helminthic drugs is advocated.

Iroegbu CU, Ene-Obong HN, Uwaegbute AC, Amazigo UV. Bacteriological quality of weaning food and drinking water given to children of market women in Nigeria: implications for control of diarrhoea. J Health Popul Nutr 2000 Dec;18(3):157-62. Department of Microbiology, University of Nigeria, Nsukka, Enugu State, Nigeria. MISUNN@aol.com. Bacteriological quality of weaning food and drinking water given to 2 groups of children aged < or = years was evaluated by estimating bacterial cell count. One group consisted of those taken to market and the other of those left at home in the care of older siblings or house-helps. Bacterial counts (geometric mean) ranged from 5.02 +/- 1.82 to 8.70 +/- 1.0 log10 cfu per g or mL of food, and from 1.15 +/- 1.67 to 6.53 +/- 0.81 log10 cfu per g or 100 mL of water. Analysis of variance showed no significant difference in counts between types of food and between meals (breakfast and lunch). Bacterial contamination increased significantly with storage time, and was, in all circumstances except the water samples, significantly higher in foods given to children left at home. Reheated leftover foods also had significantly higher bacterial load than the freshly-cooked food. Coliform count varied significantly with source of drinking water. Poor hygiene standard (inferred from bacterial contamination) was generally observed among mothers weaning < or = 2-year-old children, while they were engaged in trading activities in the market, thus exposing their children to high risk of diarrhoea. Hygiene was significantly poorer in weaning of children left at home in the care of older siblings or house-helps. This implies that, in spite of their trading activities in the market, mothers still take better care of their babies than the older siblings or house-helps who may be inexperienced. These mothers may need education on childcare and food hygiene to suit to their trading activities, for example, during their monthly meetings. There is also a need to establish ORT (oral rehydration therapy) corners in the markets as part of the municipal services. This can be used not only for efficient and quick management of diarrhoea in the market but also for reinforcing hygiene education.

Jinadu MK, Odebiyi O, Fayewonyom BA. Feeding practices of mothers during childhood diarrhoea in a rural area of Nigeria.: Trop Med Int Health 1996 Oct;1(5):684-9. Department of Community Health, Obafemi Awolowo University, Ile-Ife, Nigeria. Our main objective was the identification of different types of foods given or withheld for various kinds of childhood diarrhoea. The study was conducted in rural Yoruba communities of Osun State, Nigeria. Questionnaires and focus group discussions were used and a total of 335 randomly selected mothers with children under 5 years of age were interviewed. The diets chosen by the mothers reflect cultural perceptions of the aetiology of illness and of the therapeutic properties of local foodstuffs. Raw corn starch is believed to be an anti-diarrhoeal agent and therefore given for all types of diarrhoea, while rice is avoided. Sugar, sweet foods and groundnut preparations, which are perceived as causes of bloody diarrhoea and related illnesses, are proscribed. Sixty per cent of mothers would reduce the intake of fluids for the most common types of diarrhoea. Their level of education does not make any significant difference. To ensure adequate home management of childhood diarrhoea, educational interventions must take into account prevailing beliefs in the community.

Madusolumuo MA, Akogun OB. Sociocultural factors of malnutrition among under-fives in Adamawa state, Nigeria. Nutr Health 1998;12(4):257-62. Department of Biological Sciences, Federal University of Technology, Yola, Nigeria. Sociocultural factors affecting malnutrition in over one thousand under fives living in villages and towns located in northeastern Nigeria were examined. Data was collected using a structured questionnaire and through examination of the children. The study showed that about a third of the children were malnourished. The observed malnutrition was higher among females. The age group most affected was 25-36 months. Poor weaning and food supplementation exerted the strongest influence on the nutritional status of the children whose diet consisted mainly of cereals. It is suggested that local but largely ignored protein sources should be given more attention. Adequate health education to mothers is essential especially in providing information on appropriate nutrition for the child that has just been weaned.

Meremikwu MM, Asindi AA, Antia-Obong OE. The influence of breast feeding on the occurrence of dysentery, persistent diarrhoea and malnutrition among Nigerian children with diarrhoea. West Afr J Med 1997 Jan-Mar;16(1):20-3. Department of Paediatrics, College of Medical Sciences, University of Calabar, Nigeria. A case-control study of children attending a diarrhoea treatment unit (DTU) in Calabar, Nigeria was undertaken to evaluate the association between failure to breastfeed on one hand, and dysentery, persistent diarrhoea and malnutrition on the other. The prevalence of dysentery, persistent diarrhoea and underweight were 6.3%, 1.2% and 36.4% respectively among a total of 1133 children with diarrhoea. The proportion of the children with persistent diarrhoea or underweight was significantly lower among currently breastfeeding children than the age-matched, non-breastfeeding counterparts ($p < 0.05$). Dysentery was also less frequent among breastfeeding children (5.8%) than the non-breastfeeding ones (7.4%), but this did not reach statistical significance. The findings lend support to the enormous benefit of breastfeeding as a child survival strategy. Global efforts geared towards the support of breastfeeding should be intensified especially the less developed countries where diarrhoea-related morbidity and mortality constitute a major public health problem.

Olumese PE, Sodeinde O, Ademowo OG, Walker O. Protein energy malnutrition and cerebral malaria in Nigerian children. J Trop Pediatr 1997 Aug;43(4):217-9. Department of Pharmacology & Therapeutics, College of Medicine, University of Ibadan, Nigeria. Eight (14 per cent) out of 57 consecutive cerebral malaria patients (all < 5 years old) were malnourished, including one with marasmus and another recovering from kwashiorkor. This was significantly lower than among other paediatric patients in the same children's emergency ward (112/319, i.e. 35 per cent, $P < 0.01$). Poor outcomes (death or recovery with neurological deficits) were commoner in the malnourished group (4/8) than the well nourished group (7/49) ($P = 0.037$, Fisher's exact test). Malnourished children should receive malaria chemoprophylaxis during nutritional rehabilitation.

Oni GA. Infant feeding practices, socio-economic conditions and diarrhoeal disease in a traditional area of urban Ilorin, Nigeria. East African Medical Journal 1996; 73(5): 283-288. A cross-sectional study involving 771 children under the age of one year, was carried out in a traditional area of urban Ilorin, Nigeria, to determine how socio-economic conditions and feeding practices relate to diarrheal disease among infants. After adjustment had been made (through lgisic regression) for covariates, five factors had significant association with diarrhoeal diseases. These are the age of the child, parity, mother’s education, availability of household kitchen and the feeding of semi-solid foods to the infants. The lowest diarrhoeal rate occurred in infants aged 0-3 months, while the highest rate occurred among infants 7-9 months old (Odds Ratio = 4.2). Children who were of the fifth or higher birth order had significantly higher risk of diarrhoea when compared to those who were of the first or second

birth order (OR=1.62; p<0.05). Children of mothers with secondary education had significantly higher risk of diarrhoea compared to children of illiterates (OR=1.9; p<0.05). Households that had no kitchen had significantly higher risk of infantile diarrhoea than households with kitchen facilities (p<0.01). Finally, infants receiving semi-solid food (p<0.05). Diarrhoeal disease awareness campaign to educate mothers on the dangers of childhood diarrhoea and how to prevent it, through proper hygiene, especially, food hygiene, is advocated.

Oyelami OA, Maxwell SM, Adeoba E. Aflatoxins and ochratoxin A in the weaning food of Nigerian children. Ann Trop Paediatr 1996 Jun;16(2):137-40. Department of Paediatrics and Child Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. A total of 48 samples of maize-based gruels, used as weaning food for children, were taken daily from hospital meals and from patients' mothers while their children were on admission at the Wesley Guild Hospital, Ilesha, Nigeria. These samples were analysed for aflatoxins and ochratoxin A. Twelve samples (25%) were positive for aflatoxins (concentration range 2-19,716 pg/g) but only four (8%) were positive for ochratoxin (concentration range 142-6516 pg/g). In the majority, the concentrations were relatively low, only two having aflatoxin and one ochratoxin A levels greater than 1000 pg/g. It is concluded that, unlike aflatoxin, ochratoxin A contamination is unlikely to present a major health hazard to the newly weaned child in this area of Nigeria.

Pfitzner MA, Thacher TD, Pettifor JM, Zoakah AI, Lawson JO, Isichei CO, Fischer PR. Absence of vitamin D deficiency in young Nigerian children. J Pediatr 1998 Dec;133(6):740-4. Department of Pediatrics, University of Utah, Salt Lake City, Utah, USA. OBJECTIVE: To determine the prevalence of vitamin D deficiency in young Nigerian children residing in an area where nutritional rickets is common.Study design: A randomized cluster sample of children aged 6 to 35 months in Jos, Nigeria. RESULTS: Of 218 children evaluated, no child in the study had a 25-hydroxyvitamin D (25-OHD) concentration <10 ng/mL (the generally held definition of vitamin D deficiency). Children spent an average of 8.3 hours per day outside of the home. Twenty children (9.2%) had clinical findings of rickets. Children with clinical signs of rickets were more likely to be not currently breast fed and have significantly lower serum calcium concentrations than those without signs of rickets (9.1 vs 9.4 mg/dL, respectively, P =.01). Yet, 25-OHD levels were not significantly different between those children with clinical signs of rickets and those without such clinical signs. CONCLUSION: Vitamin D deficiency was not found in this population of young children in whom clinical rickets is common. This is consistent with the hypothesis that dietary calcium insufficiency, without preexisting vitamin D deficiency, accounts for the development of clinical rickets in Nigerian children.

Thacher T, Glew RH, Isichei C, Lawson JO, Scariano JK, Hollis BW, VanderJagt DJ. Rickets in Nigerian children: response to calcium supplementation. J Trop Pediatr 1999 Aug;45(4):202-7. Department of General Medical Practice, Jos University Teaching Hospital, Nigeria. In a previous study of rachitic children in Jos, Nigeria we concluded that inadequate dietary intake of calcium was the primary contributing factor to the development of their rickets. The objective of the present study was to determine the effect of calcium supplementation in 10 children with radiographically and biochemically proven rickets from the same geographical area. Rachitic children were provided with calcium supplements of 1000 mg/day for a period of 3 months. Serum and urine samples were obtained at baseline and at 24 hours, 1 week, 4 weeks, and 12 weeks after initiation of supplementation. Serum calcium, phosphorus, alkaline phosphatase, intact parathyroid hormone, 25-hydroxyvitamin D, and 1,25-dihydroxyvitamin D were measured at each time point. Dietary recalls obtained at two separate times were used to estimate usual daily intakes of calcium and phosphorus.

Ten non-rachitic age-matched controls from the same geographical area were recruited for comparison. Nine of 10 rachitic subjects had radiographic evidence of healing after 3 months of calcium therapy. Although serum calcium concentrations returned to control levels, other biochemical data indicated that the rickets of these subjects may have been multifactorial in aetiology, pointing to a possible defect in the synthesis of 25-hydroxyvitamin D.

B.3. Micronutrients and Supplements

Adelekan DA, Fatusi AO, Fakunle JB, Olotu CT, Olukoga IA, Jinadu MK, Ojofeitimi EO. Prevalence of malnutrition and vitamin A deficiency in Nigerian preschool children subsisting on high intakes of carotenes. Nutr Health 1997;12(1):17-24. Department of Community Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. The prevalence of malnutrition and vitamin A deficiency was determined in 204 preschool children of both sexes aged 3-57 months. The children were recruited from 2 rural communities of Atakumosa Local Government Area of Osun State in South West Nigeria. Dietary vitamin A intake was estimated from frequency of consumption of locally available vitamin A containing food items. Vitamin A status of the children was assessed from concentration of retinol in plasma. Nutritional status was assessed from height and weight compared with international reference standards. The results indicate widespread malnutrition among the children. The prevalence of stunting (low height for age) was 60.8% while prevalence of wasting (low weight for height) was 7.4% and of underweight (low weight for age) 27.5%. Dietary vitamin A intake appeared to be adequate in the children. Intake of vitamin A is predominantly from plant sources. At least 43% of the children consumed the carotene rich red palm oil 6 or more times per week in contrast to less than 1% who consumed eggs or milk for 6 or more times per week. Vitamin A deficiency was low in the children. Only 11.3% of the children had plasma retinol concentration < 0.70 mumol/L. The results indicate that childhood malnutrition of public health magnitude can coexist with adequate dietary vitamin A intakes or vitamin A status.

Adelekan DA, Adeodu OO, Thurnham DI. Comparative effects of malaria and malnutrition on plasma concentrations of antioxidant micronutrients in children. Ann Trop Paediatr 1997 Sep;17(3):223-7. Department of Community Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. dadeleka@oauife.edu.ng. The comparative effects of malaria and malnutrition on plasma antioxidant vitamins were studied in 65 children aged 8-96 months. Forty-six (71%) of them had malaria; nineteen (29%) served as controls. Patients and controls were further subdivided into two groups depending on whether they were malnourished or well nourished, as defined by weight-for-age Z score (WAZ) +/- -2. Plasma levels of alpha-tocopherol, beta-carotene and retinol were measured. Results indicate that malaria was associated with levels of antioxidants lower than in the controls. Two-way analysis of variance shows that for all three plasma micronutrients concentrations were lower in those children infected with malaria but were not influenced by malnutrition. There were an equal number of malnourished children in both malaria and non-malaria groups; nevertheless, WAZ tended to be lower in those with malaria ($p = 0.056$), although this did not quite reach significance. It is concluded that in areas where malaria and malnutrition co-exist, malaria alone exerts a greater influence on plasma antioxidants than does malnutrition.

Adelekan DA, Adeodu OO. Anaemia in Nigerian mothers and their children: relative importance of infections and iron deficiency. Afr J Med Med Sci 1998 Sep-Dec;27(3-4):185-7. Department of Community Health, Faculty of Clinical Sciences, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. The study assessed the relative contribution of infections and iron deficiency to anaemia in Nigerian mothers and their children. Sixty-one mother-child pairs were recruited. The mean ages of mothers and children

were 31.05 +/- 9.35 years and 30.85 +/- 16.70 months, respectively. Dietary iron intake was used as proxy for iron status while anaemia was diagnosed by whole blood haemoglobin concentration < 120 g/L in mothers and < 110 g/l in the children. A structured questionnaire was used to collect information on the exposure of the mothers and their children to infections. Approximately 53% of mothers and 56% of children had abnormal haemoglobin concentrations indicative of anaemia. Also, 41% of the mothers and 37% of the children had dietary iron intakes below the recommended dietary allowance. In the preceding 6 months of the study, about 50% of the mothers, and 65% of the children in the preceding month, were ill. Febrile illness accounted for 70% and 30% of the illness in mothers and children, respectively. There was significant correlation between mothers' and children's dietary iron intake and blood haemoglobin concentration. In conclusion, iron deficiency and infections were equally important aetiological factors in the anaemia recorded in the subjects of this study.

Adelekan DA, Adeodu OO. Interrelationship in nutrient intake of Nigerian mothers and their children: nutritional and health implications. Afr J Med Med Sci 1997 Mar-Jun;26(1-2):63-5. Department of Community Health, Faculty of Clinical Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria. This study examined the interrelationships in the nutrient intake of mothers and their children. One hundred and eight mother-child pairs participated in the study. The children were aged 36-59 months (mean age 44 months) while the mean age of the mother was 31.0 years. The subjects were drawn from rural locations, were largely illiterate, and farming and petty trading were main occupations. Intakes of energy, protein, total fat, and iron were assessed from 3 consecutive 24 hour recalls given by the mothers. There were significant positive correlations between energy, total fat, and iron intakes of mothers and their children. There was no significant correlation in protein intakes of mothers and children. The results also indicate that total fat and protein make little contribution to the total energy intake of the subjects. Mother's age was significantly correlated with child's protein intake ($r = 0.21$, $P < 0.01$) but not with child's energy, total fat, or iron intakes. Although mother's energy intake was significantly correlated with child's energy intake ($r = 0.39$, $P < 0.001$) this was not the case with the intakes of the other three nutrients. The results indicate aggregation of nutrient intakes in mothers and their children which has important nutritional and health implications.

Airede AI.Zinc levels in the Nigerian full-term newborn from birth to six months. East Afr Med J 1997 Apr;74(4):221-3. Department of Paediatrics, University of Maiduguri Teaching Hospital, Borao State, Nigeria. Zinc(Zn) remains an important micronutrient needed by the growing foetus and newborn. We are unaware of a previous study delineating the longitudinal evolution in the African fullterm (FT) infant. Hence we prospectively studied thirty randomly selected stable FT infants (M:F; 17:13) born between July 1991 and April, 1992. Serum Zn was determined by atomic absorption spectrophotometry on unhaemolysed sera. Eighty per cent of the babies were exclusively breastfed up to the age of six months. The mean birthweight was 3490 g(range, 2950-3950) with a mean gestational age 39.7 weeks(range, 38-42). The cohort included two sets of twins. Mean (SD) serum zinc was 2.4 (0.2) mumol/ml at birth and declined significantly ($p < 0.01$) over the subsequent eight weeks to a nadir of 1.2 (0.2)mumol/ml. Levels later rose to 1.6(0.3)mumol/ml at 12 weeks whilst peaking 2.2(0.3)mumol/ml in 16 weeks. It remained fairly constant at 2.0(0.2) and 2.1(0.2)mumol/ml between 20 and 24 weeks, respectively. The zinc evolution had a triphasic pattern. Our trend compare favourably with previous literature from affluent societies, but our levels were one and a half to two fold higher. The findings may serve as normative reference against which serum zinc concentration in the African infant could be compared. Our findings(number albeit small) could be taken as a preliminary report.

Akanji AO, Mainasara AS, Akinlade KS. Urinary iodine excretion in mothers and their breast-fed children in relation to other childhood nutritional parameters. Eur J Clin Nutr 1996 Mar;50(3):187-91. Department of Chemical Pathology, College of Medicine, University College Hospital, Ibadan, Nigeria. OBJECTIVE: There is currently no coordinated policy on the epidemiology and control of iodine deficiency disorders (IDD) in many parts of Africa even where these disorders are endemic. Assessment of the urinary iodine excretion is believed to give the best index of the prevalence of IDD in the community. This study aimed to establish whether: (i) the breast-fed child of an iodine replete mother was protected from IDD and, (ii) infants at risk of IDD and in need of immediate iodine supplementation could easily be identified through simple screening methods. DESIGN: Randomized, cross-sectional study. SETTING: A tertiary care infant welfare clinic in Ibadan, South-western Nigeria, a geographical area recognised to be outside Nigeria's endemic goitre belt (goitre prevalence < 5.0%). SUBJECTS: 68 healthy mother-child pairs. The children were all aged 9-18 months and breast-fed almost exclusively. INTERVENTIONS: Nil. METHODS: The relationships of anthropometric, iodine status (casual urinary iodine (I) and iodine/creatinine ratio (I/Cr)) and nutritional indices (weights, haematocrits) of the mothers with those of their breast-fed children were assessed, as well as how these parameters differed between the children classified on the basis of their mid-upper arm circumference, MUAC, as: (A) borderline malnourished, MUAC < 13.5 cm and, (B) well nourished, MUAC > 13.5 cm. RESULTS: The maternal values for I and I/Cr were significantly ($p < 0.001$) greater than those of their breast-fed infants, although the respective mother-child pair values correlated positively (I, r 0.47; I/Cr, 0.21; both $p < 0.05$). There was thus a gradient in iodine status between the mother and her breast-fed infant that is unfavourable to the growing child; the latter may thus require iodine supplementation in spite of the fact that the mother is iodine replete. Among the children, those considered well nourished (Group B) had similar iodine status parameters as those considered poorly nourished (Group A) suggesting that malnutrition alone should not be the determinant of the prioritization (or otherwise) of iodine supplementation in a population with coexistent iodine deficiency and malnutrition. Mean values for (I) in all the children (9.9 micrograms/dl) fell in the iodine deficiency range (< 10 micrograms/dL), although all the mothers were iodine replete (mean urinary (I) 14.5 micrograms/dL), despite the fact that all resided in a non iodine deficient area. CONCLUSION: The study suggests that: (i) the breast-fed child of an iodine replete mother resident in a non-iodine deficient area may be iodine deficient and in need of iodine supplementation; (ii) malnutrition, as defined by the simple community screening method of measuring the MUAC, will not accurately identify those infants in immediate need of iodine supplementation. These observations have important implications for planning IDD control programmes in Africa.

Akinyinka OO, Usen SO, Akanni A, Falade AG, Osinusi K, Ajaiyeoba IA, Akang EE. Vitamin A status of pre-school children in Ibadan (South West Nigeria), risk factors and comparison of methods of diagnosis.West Afr J Med 2001 Jul-Sep;20(3):243-8. Department of Paediatrics, College of Medicine, University College Hospital, Ibadan, Nigeria. Vitamin A deficiency (VAD) and protein energy malnutrition (PEM), sharing common aetiological factors, are important public health problems in many developing, countries. A cross-sectional survey of the vitamin A status of 128 well nourished and 230 malnourished pre-school children was carried out in order to define factors associated with increased risks of VAD and also to determine the predictive values of CIC-T in identifying serum retinol of < 10 microg/dl in these children. The proportional morbidity rates of VAD defined by serum retinol concentrations (7.3%) and CIC-T (6.2%) was similar ($p>0.05$), and children aged < 3 years accounted for 70% of VAD cases. VAD occurred in 6.3% and 7.8% of well-nourished and malnourished children respectively. The risk of VAD was increased following measles, history of persistent diarrhoea and wasting. The predictive value of CIC-T is highly dependent

on CIC-T such that abnormal and normal smears classification appears to be very robust and predictive of serum retinol of < 10 microg/dl, with sensitivity of 83.3% (95%CI: 61.8-94.5), and specificity of 73.3% (95%CI: 68.3-78.5). Judging by the proportional morbidity rate in this study, VAD appears to be a significant public health problem in both malnourished and well-nourished Nigerian children, especially in children < 3 years of age. The history of measles and persistent diarrhoea appear to increase the risk of VAD. The simplicity, sensitivity and specificity of CIC-T suggest that this procedure is a good screening tool for epidemiological survey of vitamin A status.

Akosa UM, Ketiku AO, Omotade OO. The nutrient content and effectiveness of rice flour and maize flour based oral rehydration solutions. Afr J Med Med Sci 2000 Jun;29(2):145-9. Department of Human Nutrition, College of Medicine, University of Ibadan, Ibadan, Nigeria. The effectiveness of rice flour and maize flour based oral rehydration solution (ORS) in treating mild and moderate dehydration was studied among 88 children aged to 6 to 42 months at the Oni Memorial Children Hospital, Ibadan. In this randomized clinical trial, fifty children were treated with rice-based ORS while fifty-three received the maize-based ORS, over a four hour period. There was clinical improvement in the signs of dehydration with a significant increase in body weights and a significant fall in the packed cell volume following the administration of the two preparations. The maize-ORS contains 4.3 g protein, 179.3 Kilocalories and rice-ORS contains 3.6 g protein and 152.1 Kilocalories per litre of the preparation, respectively. It is concluded that rice and maize based ORS were acceptable and effective in oral rehydration of diarrhoea patients. They may also contribute to the nutrient intake of patients with (mild to moderate) 'some' dehydration. However other sources of energy, protein and mineral intake should be continued in these patients.

Cooper KA, Adelekan DA, Esimai AO, Northrop-Clewes CA, Thurnham DI. Lack of influence of red palm oil on severity of malaria infection in pre-school Nigerian children. Trans R Soc Trop Med Hyg 2002 Mar-Apr;96(2):216-23. Northern Ireland Centre for Diet & Health, University of Ulster, Coleraine BT52 1SA, UK. ka.cooper@ulst.ac.uk. Vitamin A supplements are reported to reduce febrile episodes of malaria and parasite counts, especially in children aged 12-36 months. Red palm oil (RPO) is a good source of vitamin A, is rich in alpha- and beta-carotene and is as effective as high-dose retinyl palmitate supplements in improving vitamin A status. In western Nigeria, where malaria is endemic, RPO is widely used and consumption can be measured using plasma alpha-carotene as a proxy biomarker since there are few other prominent sources of this carotene in the diet. The influence of RPO consumption on malaria was investigated in 207 children (aged 0-60 months) who presented with fever in August-October 1999 at several hospital clinics around Ile-Ife. Medical and anthropometric data, body temperature, parasitaemia and plasma C-reactive protein (CRP), retinol, carotenoids and tocopherols were measured in the children. Mothers were interviewed on usage of cooking oil and mosquito nets in the home, education and occupation. Most families used RPO and median plasma concentrations of both alpha-carotene (0.518 mumol/L) and beta-carotene (0.698 mumol/L) in the children were high. Using body temperature, parasite density and plasma CRP as markers of disease severity, multiple linear regression analysis was carried out on those for whom complete data were available (n = 138), separated into 3 age-groups of < 12 months (n = 37), 12-36 months (n = 68) and > 36 months (n = 33). In the absence of plasma retinol, plasma alpha-carotene explained 13.9% of the variance in parasite density (P = 0.013) but only in children aged > 36 months. The relationship with disease severity was negative, i.e., there was some evidence that RPO usage protected against malaria, and other dietary indices generally indicated that better nutritional status was associated with a lower severity of malaria.

Nnam NM. Chemical evaluation of multimixes formulated from some local staples for use as

complementary foods in Nigeria. Plant Foods for Human Nutrition 2000; 55: 255-263. The nutrient compositions of eight multimixes formulated for use as complementary foods from processed soyabeans, cowpeas, maize, sorghum, yams, cocoyams, plantains and sweet potatoes were examined. The foods were processed by sprouting, cooking and fermentation. The samples were separately dried and milled into fine flours. A ratio of 65% cereal, 30% legume and 5% starchy staple (65:30:5) calculated on a protein basis was used to formulate the multimixes. The blends were chemically analyzed using standard procedures. The mixtures containing soyabeans had higher protein, lipid, energy and crude fiber and calcium levels but lower carbohydrate content than those mixtures without soyabean. The protein and energy levels of the multimixes were higher than those in some commercial infant foods (Cerelac, Farex and Nestrum) in Nigeria but were comparable to that or 'soy-ogi'. The multimixes contained fair quantities of calsium and phosphorus and an adequate amount of some of the essential amino acids. Methionine was the most limiting amino acid in all the mixtures. Blending the maize produced a higher protein score than blending cowpeas or soyabeans with sorghum. The cowpea/maize/sweet potato mixture had the highest protein score.

Oguntona CR, Akinyele IO. Food and nutrient intakes by pregnant Nigerian adolescents during the third trimester. Nutrition 2002 Jul-Aug;18(7-8):673-9. Department of Human Nutrition, University of Ibadan, Ibadan, Oyo, Nigeria. CBTO@infoweb.abs.net. We assessed the food and nutrient intakes of pregnant adolescent Nigerians during the third trimester of pregnancy. The study was hospital based and the subjects consisted of 101 adolescents (47 urban and 54 rural) and 20 controls (primigravidae, 20 to 25 y old) who attended antenatal clinics. The 3-d weighed-intake technique was used to obtain information on food intake. For all cohorts, the results showed that the bulk of the foods derived from three main food groups, namely roots or tubers, cereals, and legumes. Older adolescents (17.5 to 19 y) in urban areas had the highest energy intake (5.9 MJ/d), and the younger urban adolescents (15 to 17 y) had the lowest (5.2 MJ/d) energy intake. Mean protein intake levels for urban adolescents (37.7 g/d) did not differ significantly ($P > 0.05$) from mean intake levels (35.3 g/d) for rural subjects. Dietary iron intake was similar in all cohorts including controls, and only 32.3% to 39.3% of the recommended daily allowance for iron was met by the subjects. Approximately 30% of subjects individually achieved 100% of the recommended levels of zinc. Mean intakes as percentages of the recommended daily allowance by adolescent subjects were 50.7% for calcium, 29.2% for copper, and 28.5% for folate. There is urgent need to monitor the nutrition status of pregnant women in the area.

Ojofeitimi EO, Abiose S. Prevention of nutrient loss during preparation of the most popular weaning diet in Nigeria--practical considerations. Nutr Health 1996;11(2):127-32. Obafemi Awolowo University, Ile-Ife, Nigeria. A pilot study is presented as an attempt to modify the traditional method of preparing maize gruel 'ogi', the most popular weaning diet in Nigeria. The modification consists of completely grinding the food to a fine paste without sieving. Cooked samples of the unsieved maize gruel were taken for proximate chemical analysis and organoleptical evaluation. Analysis revealed that protein, fat and mineral losses in the unsieved maize gruel were much less. The majority (58%) of mothers of malnourished children rated the cooked modified maize gruel favourably and the overall acceptability was positively rated by 61%. The inference to be drawn is that through food demonstrations and nutritional health information at the nursing mothers' level, the traditional method of preparing the most popular weaning diet in Nigeria can be modified to advantage.

Ojofeitimi EO, Abiose S, Ijadunola KT, Pedro T, Jinadu MK. Modification and improvement of nutritive quality of cornpap "Ogi" with cowpea and groundnut milk. Nutr Health 2001;15(1):47-53. Institute of Public Health, College of Health Sciences, Obafemi Awolowo

University, Ile-Ife, Osun State, Nigeria. The study aimed at improving the nutritive quality of cornpap, "Ogi", the most popular infant feed in Nigeria. Milk samples of cowpea, groundnut and soyabean and their complementations with cornpap were assessed chemically, organoleptically and anthropometrically. The protein contents of milk from cowpea, groundnut and soyabean were 1.18, 1.6, and 1.23% respectively. On separate complementation of the milk sources with cornpap, the low protein content of "ogi" was increased from 0.3% to 2.79% with cowpea; 3.0% with groundnut and 3.64% with soyabean. The fat content of the complementary feeds also increased remarkably. The anthropometric study revealed that there were significant differences P = 0.001 between the mean weight of children aged 13 to 18 (92 +/- 1.2) and 19 to 24 months (9.9 +/- 1.3) who were fed the three sources of milk with cornpap, and the control group of the same age groups (8.5 + 1.5; 9.3 + 1.11) who received nutrition education and no complementary feeds. Of the three sources of milk, groundnut milk was ranked as the most likeable, the easiest to prepare and the least costly by the nursing mothers. This study has shown that some of the deep rooted cultural food taboos that prohibit locally available and nutritious feeds to infants could be changed through practical food demonstrations.

Ojule AC, Osotimehin BO. The influence of iodine deficiency on the cognitive performance of school children in Saki, south-west Nigeria. Afr J Med Med Sci 1998 Mar-Jun;27(1-2):95-9. Department of Chemical Pathology, University College Hospital, Ibadan, Nigeria. The influence of inadequate iodine intake on the thyroid status and cognitive performance of school children in Saki, a town within the goitre belt of South-western Nigeria with known environmental iodine deficiency, was assessed. One hundred and ninety-seven (197) study subjects from Saki and seventy (70) appropriately matched control subjects from Moniya, near Ibadan, the Oyo State capital were recruited into the study. The subjects were apparently healthy primary school pupils between the ages of 10 and 14 years and had been resident in the respective locality for at least two (2) years. After establishing the presence of goitre, blood was collected for thyroid function tests by venepuncture from each pupil. The cognitive function tests, Draw-A-Person (DAP) test and the Standard Progressive Matrices (SPM) were administered simultaneously to all the pupils in the class. Urine samples were collected for urinary iodine estimation. The mean urinary iodine concentration was significantly lower in Saki than in Moniya (134.81 +/- 69.86 vs 220.00 +/- 69.00 ug/L, P < 0.01). The total goitre rates (TGR) and the visible goitre rates (VGR) were 15.2% and 1.5% for Saki, and 8.6% and 4.3% for Moniya, respectively. The mean plasma total T4 was significantly lower in Saki pupils (97.55 +/- 26.64 nmol/L vs 122.52 +/- 26.51 nmol/L P < 0.05). The TSH level was higher in Saki pupils than in Moniya pupils (4.72 +/- 1.38 mU/L vs 4.26 +/- 1.28 mU/L), but the difference was not statistically significant. Scores on intelligence function tests (DAP and SPM) were lower for Saki pupils when compared with Moniya pupils, though the differences were not statistically significant. These results show that there is a mild but significant iodine deficiency disorder problem in Saki. However, the children in Saki still maintained euthyroidism and the mild degree of iodine deficiency did not seem to have adversely affected their cognitive performance.

Okolo SN, Onwuanaku C, Okonji M, VanderJagt DJ, Millson M, Churchwell C, Glew RH. Concentration of eight trace minerals in milk and sera of mother-infant pairs in northern Nigeria. J Trop Pediatr 2000 Jun;46(3):160-2. Department of Paediatrics, Jos University Teaching Hospital, Nigeria. Okolom@unijos.edu.ng. Breastmilk from 15 healthy lactating women (21-31 years of age) from the hot, semi-arid sahel of Africa were analysed for copper, iron, zinc, magnesium, manganese, sodium, potassium, and phosphorus. Relative to published data from other populations worldwide, the milk of the Jos women appeared to contain adequate levels of magnesium, manganese, sodium, potassium, phosphorus and iron, but relatively low concentrations of zinc (1.07 micrograms/ml) and copper (170 micrograms/l).

The sera of the exclusively breastfed infants nursed by these mothers contained levels of all these minerals that are within the international reference range of values. No statistically significant correlation was observed between the level of a particular mineral in the mothers' milk and the sera of their nursing infants.

Onofiok N, Nnanyelugo DO, Ukwondi BE. Usage patterns and contribution of fermented foods to the nutrient intakes of low income households in Emene, Nigeria. Plant Foods Hum Nutr 1996 Apr;49(3):199-211. Department of Home Science and Nutrition, University of Nigeria, Nsukka, Nigeria. This study investigated the usage consumption pattern and chemical composition of fermented foods consumed in 191 rural households (1030 individuals) in Emene. The result showed that fermented foods were widely used and consumed by most age groups (under 2 years to adults) because of poor socioeconomic status. Fermentation period varied with type of food and was mostly carried out as a means of detoxifying certain foods. Generally, fermented foods contributed substantially to the daily caloric (46.3 to 79.9% for males and 57.5 to 78% for females); calcium (33.8 to 63.5% for males and 48.3 to 55.4% for females); iron (34.4 to 58.6% for males and 47.4 to 74.6% for females); and thiamin (23 to 58.5% for males and 37.5 to 60% for females) intakes. The contributions of fermented foods to protein (10 to 40.7%) and ascorbic acid (1.9 to 18.7%) intakes were however, low. When compared with the FAO recommendations, the daily intakes of protein, calcium, riboflavin, niacin and ascorbic acid by the subjects were low due to large consumption of starchy root crops. Poor financial status was the most limiting factor to adequate nutrient intake. Such results point out the need for nutrition education related to improved methods of preparation and food selection.

Usen SO, Akinyinka OO, Akanni OA, Ajaiyeoba IA, Falade AG, Osinusi K, Akang EE. Conjunctival impression cytology with transfer in the assessment of vitamin A status in Nigerian children. Acta Cytol 1999 May-Jun;43(3):416-21. Department of Pediatrics, College of Medicine, University College Hospital, Ibadan, Nigeria. OBJECTIVE: To determine vitamin A status by conjunctival impression cytology with transfer (CIC-T) and assess its ability to predict low and deficient serum retinol concentrations. STUDY DESIGN: CIC-T was performed on 128 healthy, well-nourished and 230 malnourished children aged under 6 years by a 3-5-second application of cellulose acetate paper to each bulbar conjunctiva followed by transfer of the adhered cells onto glass slides. The slides were stained with Alcian green 2GX, and smears were classified as normal, borderline normal, borderline abnormal and deficient. Corresponding serum retinol levels were determined in each subject. RESULTS: The results showed that CIC-T is a simple procedure with a failure rate of 7.3% caused by tearing and agitation. The power of CIC-T to predict vitamin A status varied with both the CIC-T smear classification used and serum retinol concentration threshold. CIC-T smear classification as abnormal and normal appears to be the most robust and predictive of serum retinol, < 10 and > 10 < 20 micrograms/dL, respectively. CONCLUSION: The simplicity, sensitivity and specificity of CIC-T suggest that this procedure is a good screening tool for epidemiologic survey of vitamin A status.

Walter EA, Scariano JK, Easington CR, Polaco AM, Hollis BW, Dasgupta A, Pam S, Glew RH. Rickets and protein malnutrition in northern Nigeria. J Trop Pediatr 1997 Apr;43(2):98-102. Department of Biochemistry, School of Medicine, University of New Mexico, Albuquerque 8713, USA. The aim of the study was to explore the relationship between protein nutritional status and the development of rickets in children living in northern Nigeria. The diagnosis of rickets in 16 children between the ages of 10 months and 7 years was confirmed using established, and recently developed clinical and biochemical parameters. Twenty-seven children devoid of skeletal stigmata were age- and sex-matched to the rachitic patients. A battery of clinical laboratory and anthropometric measurements designed to assess

calcium homeostasis, skeletal growth, the extent of bone remodeling or resorption, and protein nutritional status were performed on all subjects. Our central finding was that although the rachitic children were moderately malnourished, their protein nutritional status was significantly better as measured by the serum prealbumin concentration (15.4 v. 12.5 mg/dl, P = 0.0012) when compared with the severely malnourished children who were devoid of any indication of rickets. This may be due, in part, to the fact that actively growing children are more likely to develop rickets than are children whose linear growth is impeded. Unexpectedly, we found that the mean concentrations of serum 1,25-dihydroxyvitamin D in both the rachitic and control group were higher than any values for the active vitamin D metabolite previously reported in the literature.

B.4. Nutritional Status & Anthropometry

Abidoye RO, Soroh KW. A study on the effects of urbanization on the nutritional status of primary school children in Lagos, Nigeria. Nutr Health 1999;13(3):141-51. Department of Community Health, College of Medicine, University of Lagos, Nigeria. A study on the effects of urbanization on the nutritional status of primary school children aged 5-10 years was carried out in Lagos. A total of 328 children and their parents were studied with the aid of a questionnaire, anthropometric measurements of weights and heights and stool microscopy. The study revealed a prevalence of protein energy malnutrition (PEM) among the children to be 37.9%. 125 (38.2%) of them were found to have weight-for-height below -2SD (standard deviation) signifying wasting, while another 133 (40.5%) had a height-for-age below -2SD, indicating the level of stunting among the children. Most of the malnourished children 125 (60.7%) were found to belong to mothers with a maximum of primary school education and 73 (52.5%) were from mothers who were skilled workers. There was a preponderance of malnourished children from single parents. All the children (100%) from single parents were found to be clinically malnourished. And 280 (84.9%) of all children examined had ova and cyst of intestinal parasites (Ascaris, Tricuris, Amoeba, etc.) in their stools. And finally, most children 223 (67.7%) spent less than 6 hours contact time with their parents per day.

Abidoye RO, Pearce AP. Nutritional status of nursery school children: a comparison between Lagos State (Southern Nigeria) and Jos, Plateau State (Northern Nigeria). Nutr Health 2000;14(4):241-56. Department of Community Health, College of Medicine, University of Lagos, Nigeria. This comparative study was carried out to assess the nutritional status of preschool children in the Southern part of Nigeria (Lagos) and Jos, Plateau State in the Northern part of Nigeria. A total of 393 nursery school children aged 24-77 months in 5 schools (3 in Jos, 2 in Lagos) were randomly selected by multistage sampling. Anthropometric data (height, weight and age) were taken from the subjects and dietary information, weaning and breastfeeding history and general socio economic data were obtained from the parents by administering questionnaires. Weight/Height Z-score (WHZ) differed significantly between Jos (3.0%) and Lagos (11.6%), while weight/age (WAZ) was found to have the same prevalence rate in both locations (2.5%) each. This WAZ score is the normal expected prevalence in a standard population of children. Height/Age Z-scores (HAZ) were not statistically different in both South and North, 2.5% HAZ < -2.0 SD in Jos and 0.0% HAZ < -2.0 SD in Lagos. The intestinal parasitosis rates in this study were as follows: in Jos, a 13.5% infection rate was found, and in Lagos, the infection rate was 8.8%.

Abidoye RO, Akande PA. Nutritional status of public primary school children: a comparison between an upland and riverine area of Ojo LGA, Lagos State Nigeria. Nutr Health 2000;14(4):225-40. Department of Community Health, College of Medicine, University of Lagos, Nigeria. This cross sectional study was carried out to compare the nutritional status of public primary school children in an upland and a riverine area of Ojo Local Government

Area of Lagos State, Nigeria. A multistage sampling method was used to select a total of 240 children, 120 from each of the two areas. The study population for each area had an equal sex distribution (60 boys and 60 girls). Dietary, anthropometric, clinical and laboratory methods were employed. Using the National Centre for Health Statistics (NCHS/WHO) Reference values, a malnutrition prevalence of 20.8 and 30.81 for the upland and riverine populations respectively was found. There was a stunting in 15.8% of upland and 30.0% of riverine children; 3.3% and 1.7% of them were wasted, and 14.2% in the upland and 18.3% in the rural area were underweight. The mean weights and heights for boys and girls of different ages were lower for the riverine group, although no statistically significant differences were found. Anaemia occurred among 25.0% and 29.2% of the upland and riverine groups respectively. Intestinal helminth infection was found to be significantly associated with malnutrition. Ascaris had a prevalence of 46.7% in the upland and 63.3% in the riverine area. Trichuris had a prevalence of 15.0% and 19.2% in the upland and riverine area respectively. To address the malnutrition problem in these populations, efforts should be aimed at increasing food availability and quality, personal and environmental hygiene, supply of basic amenities, prevention and treatment of infection, and general living conditions of these populations.

Abidoye RO, Ihebuzor NN. Assessment of nutritional status using anthropometric methods on 1-4 year old children in an urban ghetto in Lagos, Nigeria. Nutr Health 2001;15(1):29-39. Department of Community Health, College of Medicine, University of Lagos, Nigeria. This study assessed the nutritional status using anthropometry of 1-4 year old children in an urban slum in the Mushin Local Government Area of Lagos State, with a view to determining the impact of urbanization on child health. A total of 365 children were enrolled using multistage random sampling techniques. Anthropometric measurements used were weight and height. Height-for-age, weight-for-height, and weight-for-age Z-scores below -2.00 SD of the reference NCHS standard were used to define stunting, wasting and underweight, respectively. The study revealed a prevalence of underweight of 39.2%, stunting of 34.5% and wasting of 21.9%. The mean of weight-for-age, height-for-age, weight-for-height and mid-upper-arm-circumference were less than the mean of the NCHS reference population. This difference might be due to the socio economic backgrounds of the two populations. Using the modified Wellcome Classification of malnutrition, 37.8% of the children were malnourished. Most subjects came from homes with inadequate water supply and poor refuse disposal methods.

Abidoye RO, Nwachie CA. Comparative anthropometrics of 3 to 24-month-old children breastfed in both high and low socio-economic strata in Lagos, Nigeria. Public Health 2001 Mar; 115(2): 157-62. Department of Community Health, College of Medicine, University of Lagos, Nigeria. This is a cross-sectional study of infants seen in the Nitel Health Centres in Lagos metropolis and Mushin Primary Health Care Centres in the Mushin Local Government Area of Lagos State. A total of 297 infants aged 3-24 months were studied. Anthropometric and breast feeding patterns of the children were studied. The mean weights of the mothers were 67.2 kg for Nitel mothers and 62.11 kg for the mothers in Mushin Primary Health Care Centres. The mean heights for the mothers were 71.47 cm and 66.1 cm, respectively. About 98.8% of the mothers in the Primary Health Care Centres of Mushin breastfed. About 7.4% of the total population studied had WAZ scores of less than -2s.d. while 12.8% had HAZ scores of less than -2s.d. and 7.43% had WHZ scores of less than -2s.d. Malnutrition was considered to be very high. There was a positive correlation between the anthropometric measurement and education.

Aina F, Morakinyo O. Anthropometric assessments in Nigerian children. East Afr Med J 2001 Jun;78(6):312-6. Department of Psychiatry, College of Medicine, University of Lagos,

Nigeria. OBJECTIVE: To determine the relationship between psychomotor development and the anthropometric indices in a sample of Nigerian children. DESIGN: A cross-sectional study. SETTING: Anthropometric and developmental assessments were carried out on the subjects in research rooms or semi-opened spaces that were generally conducive for the display of developmental skills by children in the various study centres as follows: well baby/ immunisation clinic, nursery schools and religious centres. SUBJECTS: Ninety six apparently healthy children aged 7.5, 10, 12, 18, 24 and 30 months (sixteen subjects in each age group) were assessed in the various study centres. MAIN OUTCOME MEASURES: The anthropometric indices of weight, height and mid upper arm circumference (MUAC) were measured on each subject; who was in turn subsequently assessed with the Bayley Scales of Infant Development (BSID): a performance developmental inventory. RESULTS: The anthropometric indices of the subjects were found to steadily rise with age but below normal standard values for each corresponding age group. However, all the subjects scored above the normal minimal developmental index of 50 when assessed with the BSID. CONCLUSION: The finding in this study is in line with the submission of earlier authors that malnutrition (as indicated by the anthropometric indices) on its own alone may not necessarily cause poor psychomotor development but perhaps in synergy with some other environmental factors linked with retarded development. Based on the anthropometric findings in this study, it is suggested by the authors that concerted efforts should be made to improve the nutritional states of the Nigerian children so as to, among other things, enhance their maximal developmental potential.

Ansa VO, Odigwe CO, Anah MU. Profile of body mass index and obesity in Nigerian children and adolescents. Niger J Med 2001 Apr-Jun;10(2):78-80. Department of Medicine, University of Calabar Teaching Hospital, Calabar. This cross-sectional anthropometric study involved one thousand and five randomly selected children and adolescents aged 6 to 18 years resident in Calabar, Nigeria. It was aimed at determining the profile of Body Mass Index (BMI) as well as the prevalence of obesity in the group. Subjects had their heights and weights measured using standard methods and Body Mass Index calculated. Those with BMI of 95th percentile for their ages and sexes were considered obese. Body Mass Index as well as other anthropometric parameters were found to increase progressively with age with females having higher values. The prevalence of obesity in 6-12 years old children was 2.3%. Adolescents 13-15 years had a prevalence of 4.0% while those 16-18 years had 3.0%. Though females had a higher prevalence in both groups, the difference was not statistically significant (l2 = 4.90 df = 2, P > 0.5) We conclude that obesity hitherto seen predominantly in developed countries is a potential health problem in developing countries despite the prevailing poor socioeconomic situation. The significant role played by factors other than the environment in the development of obesity has since been recognised. Since treatment of adult obesity is largely difficult, the need for intervention during childhood and adolescence which includes early detection and prevention cannot be overemphasized.

Davies-Adetugbo AA, Adetugbo K. Effect of early complementary feeding on nutritional status in term infants in rural Nigeria. Nutr Health 1997;12(1):25-31. Obafemi Awolowo University, Ile-Ife, Nigeria. Breastfeeding is common in developing countries, but exclusive breastfeeding is rare, and complementary foods are introduced at an early age. The objective of the present study is to determine the effect of early complementary feeding on the nutritional status of infants. Weight-for-age (WA) indices have been determined for 82 infants 3 to 4 months old participating in a breastfeeding study. They included 42 that started complementary feeding early (before 2 months) and 40 that started later. Weight-for-age indices were significantly lower for the early group than for the later group (t = 3.00, p = 0.004). The prevalence of underweight (WA SD scores below -2.0) was 7.5% in the later complementary feeding group and 28.6% in the early group (chi(2) = 4.76, p = 0.0292).

Severe underweight (WA SD scores below -3.0) prevalences were 0% and 14.3% respectively (p = 0.0259). Thus, poorer nutritional status was significantly associated with earlier complementary feeding. The results suggest that exclusive breastfeeding, (together with promotion of weaning education and growth monitoring) should be vigorously promoted in these rural communities.

Eregie CO. Neonatal nutritional assessment by a method independent of precise maturity determination. J Trop Pediatr 1998 Feb;44(1):25-7. Institute of Child Health, University of Benin, Benin City, Nigeria. Data from a previous study were analysed to develop a new model for neonatal nutritional evaluation which is independent of precise maturity determination. Birth weights and arm/head ratios were recorded for each infant recruited for the study. Both indices were correlated by simple regression analysis with gestational age as the independent variable. Birth weight showed highly significant correlation with gestational age ($r = 0.77$; $P < 0.001$). Arm/head ratio was also correlated with birth weight with highly significant correlation coefficient ($r = 0.81$; $P < 0.001$). The regression line of arm/head ratio on birth weight, with the demarcated 95 per cent confidence spread, formed the new model for neonatal nutritional assessment. The model had a sensitivity of 80.54 per cent and specificity of 90.22 per cent using nutritional status determined by clinical features as reference. Since the model is independent of precise maturity determination, which limits the potential usefulness of several methods of neonatal nutritional assessment, it is recommended as a rapid, simple, and reliable appropriate health technology for developing communities.

Esimai OA, Ojofeitimi EO, Oyebowale OM. Sociocultural practices influencing under five nutritional status in an urban community in Osun State, Nigeria. Nutr Health 2001;15(1):41-6. Department of Community Health, Obafemi Awolowo University, Ile-Ife, Nigeria. Three hundred and forty four preschool children from Ilare district of Ife Central Local Government Area of Osun State, Nigeria were assessed for nutritional status using selected and sensitive anthropometric techniques. The sociocultural practices of the parents were also examined. Approximately 53.8% and 54.7% of the children were identified to be malnourished and stunted respectively. The socioeconomic situation of the family was identified to have a significant influence on the child's nutritional status. Female children were observed not to be as adequately nourished as their male counterparts. However parity and food taboo had no significant influence on the child's nutritional status. The need for improvement in the socioeconomic status of the family and education of the community on the importance of female nutrition are discussed.

Igbedioh SO. Caring capacity in the management of the nutrition crisis in infants, young children and women in Nigeria. Nutr Health 1996;10(4):359-70. College of Food Technology, University of Agriculture, Makurdi, Nigeria. Nigeria's nutrition crisis has been shown to have a considerable negative impact on infants, young children and women. Available evidence suggests that 'caring capacity' when properly planned and targeted at the most-at-risk can help. Strategies that can achieve this care are increasing women's income and control over income, increasing investment in women's education and improving access to credit facilities. Others are the aggressive promotion of gender-biased labour saving technology, increasing women's access to basic health and family planning services and implementing reforms in land ownership while instituting social security for women.

Obatolu VA, Ashaye OA. Assessing the contribution of soybean utilisation on the nutritional status of children from low-income families: Lagos State, Nigeria as a case study. Int J Food Sci Nutr 1999 Nov;50(6):375-81. Institute of Agricultural Research and Training Obafemi Awolowo University, Ibadan, Nigeria. Questionnaires were administered to mothers from 120 randomly selected households. Anthropometric measurement of 258 children from these

households were taken, to assess the contribution of soybean in the diet of the infants from low-income families in Lagos State (Imota, Idimu and Badagry), Nigeria. The result showed that majority of the mothers either have no formal education or were primary-school leavers. Most mothers were categorised into low-income earners because they earn about N500 (US$6) per month. The frequency of soybean consumption in Idimu and Imota is significantly higher ($P < 0.05$) than that of Badagry. Although the frequency of animal protein consumption in Badagry households is significantly higher ($P < 0.05$), it is found to be inadequate to meet their daily requirements. The protein intakes were between 92-110, 97-100 and 75-103% of FAO requirements for the children in Idimu, Imota and Badagry respectively. The weight and height of children from Idimu and Imota are higher than the children from Badagry. About 26, 32 and 71% of the children studied in Idimu, Imota and Badagry respectively fell below the WHO 5th centile bracket of weight for age. These differences are attributed to the introduction and contribution of soybean (a cheaper source of protein) to Imota and Idimu.

Ojo O, Deane R, Amuna P. The use of anthropometric and clinical parameters for early identification and categorisation of nutritional risk in pre-school children in Benin City, Nigeria. J R Soc Health 2000 Dec;120(4):230-5. Exercise Physiology and Public Health Nutrition Research Group, School of Chemical and Life Sciences, University of Greenwich, Wellington Street, London SE18 6PF, England. This study was conducted in Benin City, Nigeria between June and August 1996 to assess nutritional status and health risks of three to five-year-old children, with the view to suggesting practical approaches to their early detection and intervention. A total of 165 children comprising 90 males and 75 females was studied. Mid-upper arm circumference (MUAC), weight-for-age (WFA), weight-for-height (WFH) and height-for-age (HFA) z-scores were determined and used to calculate percentage prevalence of malnutrition. Clinical features of macro- and micro-nutrient deficiency were used to develop a clinical scoring system which was subsequently matched with anthropometric z-scores. The results showed that MUAC z-scores (-1.91 SD +/- 0.74) gave the highest percentage prevalence of malnutrition of 45.2% in this population, followed by the WFA (-1.22 SD +/- 1.07) and HFA (-0.84 SD +/- 1.42) z-scores with a percentage prevalence of 23.3% and 20.6% respectively. The WFH z-score (-0.89 SD +/- 1.06) was the least sensitive in detecting malnutrition (14.7% prevalence). The percentage prevalence calculated from MUAC z-scores matched FAO figures (43%) for the sub-Saharan African region in 1996. MUAC z-scores also correlated more closely with the clinical features of malnutrition ($R2 = 0.7087$). Progressively worsening clinical features were also seen with decreasing z-scores for all variables. Even though moderate differences in clinical and anthropometric variables were detected between the sexes with females fairing better than male subjects, these differences were not statistically significant. Comparisons between anthropometric variables showed only weak correlation, except for WFA vs. HFA z-scores ($R2 = 0.5233$) and WFH vs. WFA z-scores ($R2 = 0.4559$) which showed moderately positive correlation. We conclude that whereas MUAC z-scores were most sensitive in detecting the extent of malnutrition in this population, merely using anthropometric variables alone may lead to significant under-reporting of the prevalence of malnutrition in a community. A combination of various anthropometric z-scores with clinical features will however help in the early identification and categorisation of subjects in terms of degree of nutritional risk. The training of field health and nutrition workers should therefore emphasise the routine use and combination of anthropometric and clinical variables in the determination of prevalence of malnutrition and in the formulation of intervention strategies for nutrition rehabilitation.

Oyedeji GA, Olamijulo SK, Osinaike AI, Esimai VC, Odunusi EO, Aladekomo TA. Head circumference of rural Nigerian children--the effect of malnutrition on brain growth. Cent Afr J Med 1997 Sep;43(9):264-8. Department of Paediatrics, College of Health Sciences,

Obafemi Awolowo University, Ile-Ife, Nigeria. OBJECTIVE: To compare head circumference measurements of the well nourished with those of the malnourished children for each sex. DESIGN: Cross sectional. SETTING: Imesi, Ile-Ife village, Nigeria. SUBJECTS: 644 children in the first six years of life. MAIN OUTCOME MEASURES: Head circumference. RESULTS: The mean head circumference values of malnourished children of both sexes fell mostly below the values for their well nourished age mates. The curve for well nourished girls fell by a little below, and for malnourished girls by over two standard deviations below Tanner's 50th percentile curve. For the boys, the curve for the malnourished children fell by over one standard deviation below the curve for their well nourished age mates. CONCLUSION: The significant reductions in head circumferences found in malnourished children may have serious implications for their future performance and achievement. Therefore, sufficient community concern and appropriate world action aimed at eradicating protein energy malnutrition is solicited.

Tompsett J, Yousafzai AK, Filteau SM. The nutritional status of disabled children in Nigeria: a cross-sectional survey. Eur J Clin Nutr 1999 Dec;53(12):915-9. Centre for International Child Health, Institute of Child Health, London, UK. OBJECTIVE: To compare the nutritional status of disabled children in Nigeria with their non-disabled siblings and neighbours. A second aim was to investigate anthropometric techniques appropriate for disabled children in this situation. DESIGN: A cross-sectional survey. SETTING: Nasarawa and Plateau States and the Federal Capital Territory in Central Nigeria. SUBJECTS: 311 children under 10 years of age were studied: 112 with various disabilities, 87 siblings and 112 neighbours. Methods: Selected anthropometric measurements, (height, weight, mid-upper arm circumference (MUAC), demispan and halfspan), and blood haemoglobin levels were assessed by trained personnel. All measurements of disabled subjects were compared to the non-disabled controls. RESULTS: The disabled subjects had mean height for age (ht/age) and weight for age (wt/age) significantly lower than the control group ($P<0.05$). These differences were due largely to the very low Z scores in children with neurological impairments, (ht/age= 3.07 (s.d.=1.6); wt/age= 2.0 (s.d.=1.2)). Measurement difficulties contributed to low height values in disabled children and halfspan was found to be a useful proxy for height in these children. MUAC results were higher for the children with disabilities due to polio than for controls. The mean haemoglobin levels were slightly but significantly higher ($P<0.05$) in the disabled and sibling groups compared to the neighbourhood group. CONCLUSION: Disabled children with neurological impairments and consequent feeding difficulties are nutritionally at risk, but others are no worse off than their non-disabled peers in this area. Halfspans may serve as a useful proxy indicator for estimating height in some children with physical impairments.

Walker MB, Omotade OO, Walker O. Height and weight measurements of Ibadan school children.Afr J Med Med Sci 1996 Sep;25(3):273-6. Institute of Child Health, College of Medicine, University of Ibadan, Nigeria. Height and weight measurements were carried out on three groups of Nigerian primary school children aged 6-12 years, in and around Ibadan. A total of 1,192 children was examined from three social classes as follows: (1) the educated elite group (n = 444); (2) the urban low socio-economic group (n = 366), and (3) the rural village group (n = 382). The school children from the educated elite group had the highest mean height and weight values while the school children from the rural group had the lowest values and the urban low socio-economic came in between the two. In the children of the educated elite class, mean heights and weights were higher than those of the international reference population (though not significantly so) only at ages 6-9 years. Malnutrition as indicated by wasting and stunting was prevalent among both rural and urban low socio-economic school children. The prevalence of wasting was 75.9% among the rural school children, while it was 62.5% among the urban low socio-economic children. The prevalence

of stunting was 79.1% among the rural school children, while it was 62.9% among the urban low socio-economic school children. Neither stunting nor wasting was observed among the children of the elite educated group. This study has demonstrated that there has been no change with time in the pattern of differences of height and weight with respect to school children of various social classes.

C. Malaria

C.1. Epidemiological and Clinical Features

Achidi EA, Salimonu LS. Malaria parasitaemia and immunoglobulin levels in paired maternal-cord sera from south western Nigeria.Afr J Med Med Sci 1997 Sep-Dec;26(3-4):167-70. Department of Chemical Pathology, Sub-department of Immunology, University College Hospital, Ibadan, Nigeria. Blood samples were collected from one hundred and sixteen parturient women and one hundred and seventeen umbilical cords at delivery for the detection of malaria parasitaemia and determination of total serum immunoglobulins (IgG, IgM and IgA). Immunoglobulin levels were measured by the single radial immunodiffusion method and the enzyme-linked immunosorbent assay for cord blood IgM. Malaria parasites were found in 2.6% (3/117) of cord blood and 22.4% (26/116) of maternal samples. Primiparae had the highest incidence and density of parasites compared with multiparae. A negative correlation was obtained between parasite density and parity of the parturient women ($r = -0.54$, $P < 0.005$). Mean cord blood IgG ($P < 0.001$) and IgM ($P < 0.0001$) were significantly lower than the mean maternal IgG and IgM. Maternal IgG ($r = 0.65$, $P < 0.001$) but not IgM ($r = 0.09$, $P < 0.50$) correlated with those of cord blood. Mean IgM ($P < 0.001$) but not IgG ($P > 0.50$) and IgA ($P < 0.40$) was significantly higher in malaria positive parturient women compared with malaria negative women. These data confirms the transplacental transfer of IgG across the placenta and the higher incidence of malaria parasitaemia in primiparae. The presence of IgM in cord blood samples suggest intrauterine sensitization of the foetus to common infections.

Achidi EA, Salimonu LS, Perlmann H, Perlmann P, Berzins K, Williams AI. Lack of association between levels of transplacentally acquired Plasmodium falciparum-specific antibodies and age of onset of clinical malaria in infants in a malaria endemic area of Nigeria. Acta Trop 1996 Aug;61(4):315-26. Department of Chemical Pathology, University College Hospital, Ibadan, Nigeria. A cohort of 117 newborns was followed longitudinally for 12 months to determine the age of onset of clinical malaria and the subsequent episodes of malaria, and to investigate the possible existence of a correlation between level of transplacentally acquired Plasmodium falciparum-specific antibodies and age of onset of malaria in the infant. The mean age of onset of malaria in 49 infants was 4.48 +/- 1.54 months. Mean (+/- S.D.) age of onset of clinical malaria in haemoglobin AA infants (4.38 +/- 1.14) was significantly ($P < 0.05$) lower compared with haemoglobin AS (5.58 +/- 2.43) infants. No correlation was obtained between the age of onset of malaria and the level of cord serum total IgG, IgM and antibodies to P. falciparum antigens. Cord blood seropositivity for antibodies to the blood stage antigen Pf155/RESA and its C-terminal repeat sequence (EENV)6 or to the (NANP)6 peptide representing repeats of the circumsporozoite protein (CSP) did not influence the age of onset of clinical malaria. However, infants with haemoglobin AS whose cord blood was seropositive for antibodies to the (EENV)6 or (NANP)6 peptide showed delayed onset ($P < 0.001$) of malaria compared with AA seropositive infants. Although our results indicate that transplacentally acquired antibodies to the studied antigens alone offer no significant protection against malaria during the first few months of life, antibodies in concert with other factors such as haemoglobin genotype may contribute to the protection of the newborn.

Afolabi BM, Salako LA, Mafe AG, Ovwigho UB, Rabiu KA, Sanyaolu NO, Ibrahim MM. Malaria in the first 6 months of life in urban African infants with anemia.Am J Trop Med Hyg 2001 Dec;65(6):822-7. Nigerian Institute of Medical Research, Yaba, Lagos. bmafolabi@hotmail.com. A total of 446 infants in the first 6 months of life who presented at an urban children's hospital with complaints of any illness whatsoever were recruited into a

study with the aim of determining the contribution of malaria to infant morbidity in a malaria-endemic urban area in Nigeria. Sixty-eight of the infants were in their first month of life and 79, 77, 61, 97, and 64 were in their second, third, fourth, fifth and sixth month of life, respectively. Overall, 107 (24.0%) infants were clinically diagnosed as having malaria. This included 3 who were in the first month of life, 12 in the second, 15 in the third, 17 in the fourth, 33 in the fifth, and 27 in the sixth months of life (4.4, 15.2, 19.5, 27.9, 34.0, and 42.1%, respectively). Laboratory investigations confirmed 35 (32.7%) of those clinically diagnosed and 86 (25.4%) of those not clinically diagnosed (n = 339) as having malaria parasitemia, giving an overall malaria parasite rate of 27.1% among the infants. Acute respiratory infection was the major diagnosis (41.3%) among those that were not initially diagnosed as malaria but turned out to have malaria parasitemia followed by gastroenteritis (11.8%) and failure to growth (1.5%). Overall geometric mean parasite density was 202.5 parasites/microL of blood (range, 12-65,317 parasites/microL of blood). The mean hematocrit of infants with parasites (33.0%) was significantly lower (P < 0.005) than that of infants without parasites (35.1%). The mean hematocrit of infants with malaria parasites in each age group was lower than that of infants without malaria parasites in the corresponding age group. Among the infants with malaria parasites, those aged 2 to 2.9 months recorded the lowest mean hematocrit (30.1%), and those aged < 1 month recorded the highest mean hematocrit (42.7%). Axillary temperature increased and hematocrit decreased with increase in parasite density. The percentage of infants with anemia likewise increased as the parasite density increased. Plasmodium falciparum was present in all infected infants, but mixed infection with P. malariae was present in only 2.5% of infections. Analysis of our data suggests an urgent need for health education of caretakers and for training of clinicians for increased awareness of malaria as an important cause of illness and anemia in infants aged < 6 months so as to reduce children's wasting due to an easily preventable and treatable disease.

Ambe JP, Fatunde JO, Sodeinde OO. Associated morbidities in children with sickle-cell anaemia presenting with severe anaemia in a malarious area.Trop Doct 2001 Jan;31(1):26-7. Department of Paediatrics, College of Medical Sciences, University of Maiduguri, Borno State, Nigeria. A prospective study of 104 consecutive cases of patients with sickle-cell anaemia (SCA) presenting with severe anaemia (packed cell volume < or = 15%) was carried out in the Children's Emergency Ward of the University College Hospital, Ibadan, in 1991. The patients were classified according to the type of anaemic crisis, by physical findings, serum bilirubin and reticulocyte counts. Other investigations included a blood film for malaria parasites, blood culture, radiological investigation and lumbar puncture when necessary. The most common problems associated with SCA patients in anaemic crisis were malaria and bacterial infections--68 (66%) and 18 (17.3%) of cases, respectively. Acute chest syndrome was significantly more frequent in patients with hyperhaemolytic and acute splenic sequestration crisis compared with aplastic crisis (P < 0.05). Conjugated hyperbilirubinaemia was also significantly more frequent among patients with hyperhaemolytic crisis compared with all other anaemic crises (chi2 = 13.18, P = 0.001). The overall case fatality was 86.5/1,000 SCAs, with no fatalities in those with aplastic crisis.There were complications in six of the nine mortalities. Co-existing bacterial infections and conjugated hyperbilirubinaemia were associated with increased morbidity and mortality in patients with anaemic crisis. Patients with SCA crisis should have early evaluation and prompt treatment for associated infections.

Amodu OK, Adeyemo AA, Olumese PE, Gbadegesin RA. Intraleucocytic malaria pigment and clinical severity of malaria in children. Trans R Soc Trop Med Hyg 1998 Jan-Feb;92(1):54-6. Department of Clinical Pharmacology, University College Hospital, Ibadan, Nigeria. sysop@nga.healthnet.org. Intraleucocytic malaria pigment has been suggested as a measure of disease severity in malaria. We have tested this hypothesis by studying 146

children aged 6 months to 14 years in 4 categories--cerebral malaria, mild malaria, asymptomatic malaria and 'no malaria'--in Ibadan, Nigeria, an area of intense malaria transmission in Africa. Children with cerebral malaria were studied at the university hospital, those with mild malaria at 2 primary health centres and the other 2 groups were studied in a primary school. The proportion of pigment-containing neutrophils showed a clear rise across the spectrum no malaria--asymptomatic malaria--mild malaria--cerebral malaria (median values 2.0%, 6.5%, 9.0% and 27.0%, respectively; $P < 0.0001$). The proportion of pigment-containing monocytes did not differ significantly between the mild malaria, asymptomatic malaria and no malaria groups but the cerebral malaria group had a higher median value than the other 3 groups. The ratio of pigment-containing neutrophils to pigment-containing monocytes showed the same trend across the groups of subjects as was observed with the number of pigment-containing neutrophils. It is concluded that the pigment-containing neutrophil count is a simple marker of disease severity in childhood malaria in addition to the parasite count.

Angyo IA, Pam SD, Szlachetka R. Clinical pattern and outcome in children with acute severe falciparum malaria at Jos University Teaching Hospital, Nigeria. East Afr Med J 1996 Dec;73(12):823-6. Infectious Disease Unit, Jos University Teaching Hospital, Nigeria. A prospective study was undertaken to determine the clinical pattern and outcome among children admitted with acute severe malaria into the emergency paediatric unit (EPU) at the Jos University Teaching Hospital (JUTH) over a 15-month period (between August 1991-October 1992). Five hundred and one (25%) children were admitted with acute severe malaria, out of a total of 2008 admissions into the EPU during the study period. Blood smears for malaria parasites were positive in 287 (57.7%) of the children and P. falciparum was the only species identified in the study. Seventy one percent of the children admitted were aged 5 years and below. Febrile convulsions was the commonest manifestation of acute severe malaria, accounting for 49.7% of the cases. Majority (97.8%) of the children responded satisfactorily to chloroquine therapy with clearance of parasitaemia. Associated bacteraemia was documented in 35 (7%) of the 501 children. Sixteen out of the 501 children died, giving a mortality of 3.2%. Cerebral malaria, which accounted for only 17.6% of the admissions, was responsible for 56.3% of all the deaths. Mortality was also associated with hypoglycaemia, severe anaemia, shock and repeated, prolonged seizures.

Egwunyenga OA, Ajayi JA, Duhlinska-Popova DD. Transplacental passage of Plasmodium falciparum and seroevaluation of newborns in northern Nigeria. Southeast Asian J Trop Med Public Health 1997 Dec;28(4):741-5.Department of Zoology, Faculty of Science, University of Jos, Nigeria. The findings of a prospective study of 656 near-term pregnant; women, and of the cord and peripheral blood of newborns of positive mothers are reported. 292 (44.51%) of the pregnant women were infected with Plasmodium falciparum. Further microscopic screening of the cord blood of newborns of the 292 positive cases at delivery showed a parasite rate of 10.95%. Transplacental passage of P. falciparum was confirmed by detection of parasitemia in the peripheral blood of 2.82% of newborns within 7 days of birth. Serological investigation of sera of 284 newborns by indirect fluorescent technic (IFA) with P. falciparum IgM specific conjugate indicated that 72 (24.66%) had IgM antibodies of P. falciparum in their blood. The average birthweight of seropositive newborns was 400 g less than seronegative ones. There was no significant difference in the rate of neonatal infection regardless of whether or not the mothers had taken chloroquine prophylaxis.

Egwunyenga OA, Ajayi JA, Popova-Duhlinska DD, Nmorsi OP. Malaria infection of the cord and birthweights in Nigerians. Cent Afr J Med 1996 Sep;42(9):265-8. Department of Zoology, University of Jos, Nigeria. OBJECTIVES: To establish the prevalence of cord malaria parasitaemia in Nigerians and to elucidate its effect on birthweight. DESIGN: Case

series. SUBJECTS: 1,905 women resident in three parts of Nigeria. SETTING: University of Jos Teaching Hospital, Jos, Plateau State, Bauchi Specialist Hospital and Eku Baptist Hospital, Eku Delta State. RESULTS: 21.6 pc (405) were infected with Plasmodium falciparum. The prevalences by residence were 21.8 pc in Bauchi, 23.2 pc in Jos and 17.5 pc in Eku. The cord malaria prevalence was significantly higher among newborns of first pregnancies than those of two or more pregnancies. Although no significant seasonal fluctuation in mean birthweights was found, the mean for the August to October quarter were the lowest in the three study sites. The mean birthweights of newborns with parasitized cords were generally lower than those that were not parasitized. Birthweights of infected cords also decreased with increasing parasite densities. Of the newborns 215 (11.2 pc) weighed < or = 500 g, of which 202 (10.5 pc) had cord malaria. CONCLUSION: There is a need for more efficient malaria chemoprophylaxis regime during antenatal care in public hospitals to effectively manage malaria in pregnancy and reduce the incidence of low birthweight.

Emuchay CI, Usanga EA. Increased platelet factor 3 activity in Plasmodium falciparum malaria. East Afr Med J 1997 Aug;74(8):527-9. Department of Haematology College of Medicine, Abia State University, Aba, Nigeria. Platelet count and platelet factor 3 (pf 3) availability were determined in twenty five febrile subjects with no parasitologic Plasmodium falciparum malaria and in thirty eight febrile subjects with parasitologic malaria. Eighteen age and sex matched afebrile subjects without parasitologic malaria served as controls. Platelet counts were significantly lower in the malaria patients ($p < 0.01$) and in the non-parasitologic but febrile subjects ($p < 0.01$) than the control group. Platelet factor 3 activity was significantly higher in the febrile group ($p < 0.01$) than in the control subjects. Parasite density did not correlate either with platelet count or with platelet factor 3 clotting time.

Gbadegesin RA, Sodeinde O, Adeyemo AA, Ademowo OG. Body temperature is a poor predictor of malaria parasitaemia in children with acute diarrhoea. Ann Trop Paediatr 1997 Mar;17(1):89-94. Department of Paediatrics, University College Hospital, Ibadan, Nigeria. In order to ascertain the usefulness of a temperature > or = 38 degrees C or a history of fever in detecting malaria parasitaemia in children with diarrhoea as recommended by the World Health Organization (WHO), 522 children aged from 6 to 60 months presenting with acute diarrhoea were studied in Ibadan, Nigeria. The overall prevalence of malaria parasitaemia was 13%. There was no significant difference in the prevalence of parasitaemia between patients with a temperature > or = 38 degrees C and those < 38 degrees C. Neither was any difference found in the prevalence of parasitaemia between those with and those without a history of fever. Temperature > or = 38 degrees C had a low sensitivity (53%) and specificity (57%) and a low positive predictive value (16%) in detecting malaria parasitaemia. A history of fever had a higher sensitivity (79%) than temperature > or = 38 degrees C in detecting malaria parasitaemia but a low specificity (27%) and low positive predictive value (14%). Similar results were obtained in a simultaneously studied non-diarrhoea control group of 313 children. The implications of using the current WHO guidelines is that many diarrhoea patients with malaria would not be identified, while many patients without malaria would be treated unnecessarily. The latter situation may be associated with the development of drug-resistant malaria parasites while the children are unnecessarily exposed to the risk of drug-related complications. It is recommended that while the search for better guidelines continues children should be screened for malaria parasitaemia before treatment, where facilities are available.

Ibadin OM, Airauhi L, Omoigberale AI, Abiodun PO. Association of malarial parasitaemia with dehydrating diarrhoea in Nigerian children. J Health Popul Nutr 2000 Sep;18(2):115-8. Department of Child Health, University of Benin, Nigeria. yeleabi@uniben.edu.ng. Records of 402 children--216 (53.7%) males and 186 (46.3%) females--aged 1-36 month(s), admitted to the Diarrhoea Treatment and Training Unit of the University of Benin Teaching Hospital,

Benin city, Nigeria, during July 1993-June 1996, were reviewed to document the relationship between dehydration and malaria parasitaemia. There was a significant association between severity of dehydration and malaria parasitaemia ($p < 0.0001$). Association of parasitaemia ($p < 0.006$) with dehydration ($p < 0.0001$) was significantly more marked in patients with acute watery diarrhoea than in those with persistent and bloody diarrhoea. Parasitaemia was demonstrated in 50.5% of those not initially suspected to have malaria. Parasitaemia was also significantly associated with fever ($p < 0.001$) and fever coexisting with vomiting ($p < 0.01$). The prevalence of malaria-associated diarrhoea was 61.7%. More infants (75.6%) than older children had diarrhoea. It was concluded that the prevalence of malaria-associated diarrhoea was high and that children with dehydration are more likely to manifest malaria parasitaemia.

Ibekwe AO. Febrile illness a major cause of profound childhood deafness in Nigeria. West Afr J Med 1998 Jan-Mar;17(1):15-8. E.N.T. Department North West Armed Forces Hospital, Tabuk, Saudi Arabia. A prospective study of 63 children with profound deafness seen personally at the E.N.T. Clinic, University of Nigeria Teaching Hospital, Enugu between January, 1984 and October, 1987 is the subject of this paper. There were 35 males and 28 females. Thirty-six (57.1%) were in the age group, 0-3 years, 17 (27%) in the age group 4-6 years, 7 (11.1%) in the age group 7-10, and 3 (4.8%) over 11 years. Febrile illness 41.3% was the most common cause followed by unknown with about 20.6%. The various causes were compared with causes from other parts of the world. The possible causes of the febrile illness with special emphasis on the role of viral infections and malaria are highlighted. Mention is made of possible preventive measures.

May J, Falusi AG, Mockenhaupt FP, Ademowo OG, Olumese PE, Bienzle U, Meyer CG. Impact of subpatent multi-species and multi-clonal plasmodial infections on anaemia in children from Nigeria. Trans R Soc Trop Med Hyg 2000 Jul-Aug;94(4):399-403. Institut fur Tropenmedizin und Medizinische Fakultat Charite, Humboldt-Universitat zu Berlin, Berlin, Germany. juergen.may@gmx.de. Childhood anaemia in sub-Saharan Africa is often caused by Plasmodium falciparum malaria. The influence of subpatent, multi-species and polyclonal infections with malaria parasites on haematological parameters was assessed in 1996/97 in clinically healthy children in Nigeria. Of the 228 children studied, 64% were anaemic by the WHO age-dependent criteria. A univariate analysis of risk factors indicated that the prevalence of anaemia was dependent on the number of Plasmodium species detected by species-specific PCR ($P < 0.0001$). Furthermore, the prevalence of anaemia increased gradually with the complexity ($P < 0.003$) as well as with the extent of P. falciparum parasitaemia ($P < 0.0001$). A logistic regression analysis revealed that individuals with an enlarged spleen tended to be anaemic. The number of Plasmodium species by which an individual was infected was independently associated with anaemia ($P < 0.03$). ANOVA revealed that the age-corrected values for haemoglobin (Hb) and red blood cells (RBCs) were mainly influenced by the occurrence of mixed infections. Haematological parameters were also influenced by the number of different P. falciparum clones by which an individual was infected. Hb levels and RBC counts were further diminished by additional infections with P. malariae and/or P. ovale. However, the effect of multi-species infections on haematological parameters exceeded that of multi-clonal infections.

May J, Mockenhaupt FP, Ademowo OG, Falusi AG, Olumese PE, Bienzle U, Meyer CG. High rate of mixed and subpatent malarial infections in southwest Nigeria. Am J Trop Med Hyg 1999 Aug;61(2):339-43. Institut fur Tropenmedizin, Medizinische Fakultat Charite der Humboldt-Universitat zu Berlin, Germany. The rate of malarial parasitemia in children and adults was assessed by microscopy and the polymerase chain reaction in a holoendemic area in Nigeria. A high rate of subpatent Plasmodium falciparum parasitemia (19.6%) was found. Plasmodium malariae and P. ovale infections were common in a rural area (26.1% and

14.8%) but were observed sporadically in individuals from an urban area. Simultaneous infections with P. falciparum, P. malariae, and P. ovale were frequent in the rural area (11.7% triple infections). The rate of triple infections was higher than expected from the prevalences of each species ($P < 0.00001$). Spleen enlargement was associated with mixed infections of P. falciparum and P. malariae (odds ratio [OR] = 5.9, 95% confidence interval [CI] 3.0-11.7) and less frequently observed in individuals without detectable parasitemia (OR = 0.06, 95% CI = 0.01-0.3). Spleen enlargement and titers of antibodies to schizonts were positively correlated with parasite densities. The results also suggest that in some individuals a long-lasting subpatent parasitemia might occur.

Meremikwu MM, Asindi AA, Ezedinachi E. The pattern of neurological sequelae of childhood cerebral malaria among survivors in Calabar, Nigeria. Cent Afr J Med 1997 Aug;43(8):231-4. Dpartment of Paediatrics, College of Medical Sciences, University of Calabar, Nigeria. OBJECTIVE: To determine the pattern and long term outcome of neurological complications following cerebral malaria (CM) in a group of Nigerian children treated in Calabar. DESIGN: Prospective, follow up study. SETTING: Children's emergency room (CHER) of the University of Calabar Teaching Hospital (UCTH) located in a malaria-holoendemic rainforest belt of south eastern Nigeria. SUBJECTS: Survivors among 45 children with CM treated between February and December, 1991. All received intravenous quinine infusion and supportive care. Survivors (39) were followed up until detected neurological sequelae had resolved. RESULTS: Case fatality rate was 13.3%, 95% CI. Eleven (28.2%) of the survivors developed neurological sequelae. Prolonged coma, focal seizures and abnormal posturing (decorticate/decerebrate) were associated with increased risk of sequelae. Commonest neurological sequelae were cortical blindness (3/11), speech disorders (3/11: aphasia or echolalia) and motor abnormalities (5/11: dyskinesia/hemiplegia). Eight cases recovered completely from the neurological deficits within a mean period of three (1.3) weeks. One persisted with hyperactivity and attention deficit, had a remarkable improvement at the sixth month of follow up but developed secondary dyslexia and other learning disabilities by the third year of follow up. CONCLUSION: Although short lived, neurological sequelae of CM appear common among these Nigerian children. This problem could significantly add to the burden of childhood disability in Nigeria. Early diagnosis, use of appropriate drugs and large scale malaria control programmes can prevent malady.

Mockenhaupt FP, May J, Stark K, Falusi AG, Meyer CG, Bienzle U. Serum transferrin receptor levels are increased in asymptomatic and mild Plasmodium falciparum-infection. Haematologica 1999 Oct;84(10):869-73. Institut fur Tropenmedizin, Spandauer Damm 130, 14050 Berlin, Germany. frank.mockenhaupt@charite.de. BACKGROUND AND OBJECTIVE: The serum transferrin receptor (sTfR) concentration in an individual reflects the extent of erythropoietic activity and is considered a useful marker of iron deficiency independent of concurrent inflammation or infection. However, data on the impact of malaria on this parameter are ambiguous. We have examined potential associations of asymptomatic and mild Plasmodium falciparum-infections and of several erythrocyte variants with sTfR values in South West Nigeria. DESIGN AND METHODS: In a cross-sectional study among 161 non-hospitalized children, sTfR concentrations and P. falciparum parasitemia were assessed. In addition, hemoglobin (Hb) and serum ferritin values, Hb-types, glucose-6-phosphate dehydrogenase (G6PD)deficiency and a-globin genotypes were determined and the effects of these factors on sTfR levels were analyzed by univariate and multivariate statistical methods. RESULTS: P. falciparum-infection was present in 77% of the children. Mean sTfR levels were higher in infected than in non-infected children (geometric mean, 3.68, 95% confidence interval [3.5-3.9] vs. 2.99 [2.7-3.3] mg/L; $p = 0.0009$). There was a significant trend for higher sTfR values with increasing parasite density. sTfR values decreased continuously with age. Hb-types, G6PD-, and a-globin genotypes did not correlate with sTfR

levels. In the multivariate analysis, age, Hb and log ferritin values, and parasite density of P. falciparum were independently associated with log sTfR values. INTERPRETATION AND CONCLUSIONS: sTfR concentrations are increased in asymptomatic and mild P. falciparum-infections suggesting adequate bone marrow response in this condition. The diagnostic value of sTfR levels for iron deficiency may be impaired in areas where stable malaria occurs.

Mockenhaupt FP, Bienzle U, May J, Falusi AG, Ademowo OG, Olumese PE, Meyer CG. Plasmodium falciparum infection: influence on hemoglobin levels in alpha-thalassemia and microcytosis. J Infect Dis 1999 Sep;180(3):925-8. Institute for Tropical Medicine and Medical Faculty Charite, Humboldt University, 14050 Berlin, Germany. frank.mockenhaupt@charite.de. Plasmodium falciparum malaria, alpha-thalassemia, and anemia are frequent in African children. In 494 nonhospitalized Nigerian children, P. falciparum infection rates, alpha-globin genotypes, and hematologic parameters were determined. P. falciparum infection was observed in 78% of the children. The gene frequency of alpha-thalassemia was 0.28. Infection rates and parasitemia were similar for the 3 alpha-globin genotypes. In contrast to nonthalassemic and heterozygous persons, infection in children with homozygous alpha-thalassemia did not influence hemoglobin values. Because microcytosis and anemia are common features of alpha-thalassemia, their significance in P. falciparum infection was examined. Microcytosis was significantly associated with protection from hemoglobin decrease due to P. falciparum. Moreover, the rate of infection was lower in microcytic than in normocytic anemia.

Mockenhaupt FP, Falusi AG, May J, Ademowo OG, Olumese PE, Meyer CG, Bienzle U. The contribution of alpha+-thalassaemia to anaemia in a Nigerian population exposed to intense malaria transmission.Trop Med Int Health 1999 Apr;4(4):302-7. Institute for Tropical Medicine and Medical Faculty Charite, Humboldt-University, Berlin, Germany. frank.mockenhaupt@charite.de. The proportion to which alpha-thalassaemia contributes to anaemia in Africa is not well recognized. In an area of intense malaria transmission in South-West Nigeria, haematological parameters of alpha-thalassaemia were examined in 494 children and 119 adults. The -alpha3.7 type of alpha+-thalassaemia was observed at a gene frequency of 0.27. Nine and 36.5% of individuals were homozygous and heterozygous, respectively. P.falciparum-infection was present in 78% of children and in 39% of adults. The alpha-globin genotypes did not correlate with the prevalence of P. falciparum-infection. alpha+-thalassaemic individuals had significantly lower mean values of haemoglobin, mean corpuscular volume, and mean corpuscular haemoglobin than non-thalassaemic subjects. Anaemia was seen in 54. 7% of children with a normal alpha-globin genotype, in 69.9% of heterozygous (odds ratio: 1.99, 95% confidence interval: 1.32-3.00, P = 0.001), and in 88.4% of homozygous alpha+-thalassaemic children (odds ratio: 7.72, 95% confidence interval: 2.85-20.90, P = 0.0001). The findings show that alpha+-thalassaemia contributes essentially to mild anaemia, microcytosis, and hypochromia in Nigeria.

Odunukwe NN, Salako LA, Okanny C, Ahmed OA, Mafe AG, Efinemokwu C, Raheem TY. Serum ferritin and other haematological measurements in apparently healthy children with malaria parasitaemia in Lagos, Nigeria. West Afr J Med 2001 Jan-Mar;20(1):42-5. Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria. One hundred apparently normal nursery and primary school children aged between 2 to 12 years from private schools, in Lagos Nigeria were studied. From this study the mean ferritin levels for children aged 2-5 years, and 6-12 years were 112 +/- 48 micrograms/l, and 119 +/- 38 micrograms/l respectively. Mean haematocrit values were 37.6 +/- 2.2%, and 37.5 +/- 2.6%, while mean haemoglobin levels were 126 +/- 9 g/l 127 +/- 7.9 g/l (2-5 years and 6-12 years respectively). The mean values for MCV, MCH, MCHC were 92 +/- 8.6 fl, 27.6 +/- 3.0 pg, 338.0 +/- 15.0 g/l and 93.5 +/- 9.0 fl, 28.7 +/- 2.5 pg, 332.0 +/- 17.0 g/l (2-5 years and 6-12 years respectively). All haematological

parameters measured were similar in both malaria parasitaemia positive and negative subjects, except ferritin level which was significantly higher in subjects with malaria parasitaemia ($p < 0.05$). There was positive correlation between ferritin concentration and malaria density ($r = 0.85$, $p < 0.05$). From the above findings, it would be concluded that, ferritin estimation without examination for malaria parasitaemia in a malarious region like Nigeria is not reliable. It is also concluded that with the high mean ferritin level obtained in this study for normal children on balanced diet, routine iron supplementation may not be necessary for this group of children in Nigeria.

Ogun SA, Adelowo OO, Familoni OB, Jaiyesimi AE, Fakoya EA. Pattern and outcome of medical admissions at the Ogun State University Teaching Hospital, Sagamu--a three year review. West Afr J Med 2000 Oct-Dec;19(4):304-8. Department of Medicine, Ogun State University Teaching Hospital, Sagamu, Ogun State, Nigeria. This is a three-year retrospective study of the pattern and outcome of acute medical admissions at the Ogun State University Teaching Hospital, Sagamu. Our findings showed that there were 1,938 admissions over the study period of which 1,044 (54%) were females and 894 (46%) were males. The ages of the patients ranged between 12 to 86 years with a mean of 49 +/- 1.7 years. The age range was 14 to 80 years for males with a mean of 47 +/- 6.1 years and 12 to 86 years for females with a mean of 49 +/- 4.5 years. The length of stay was between 5 to 25 days with a mean of 15 +/- 0.5 days. There were 16 patients per bed per year with a turn around of 8 days and bed occupancy of 65% 194 (10%) patients discharged themselves against medical advice and there were 488 (25%) deaths. The interval between admission and death ranged between 4 to 7 days with a mean of 5.5 +/- 0.07 days. Indications for admissions were infectious diseases (38%), neurological disorders (19.6%) gastro-intestinal disorders (11%), genito-urinary tract disorders (10.2%) endocrine disorder (10%), cardiovascular disorders (9.9%), respiratory disorders (6.4%) and haematological disorders (4.9%). Tuberculosis accounted for 10% of total medical admissions and was the commonest disease entity responsible for medical admissions. Acquired immuno deficiency syndrome (AIDS) constituted 1.8% of medical admissions. Mortality was highest for infections accounting for 32% of deaths while malaria accounted for the lowest. The reasons for the relative frequency and mortality are adduced. The study recommends improvement of preventive strategies towards communicable diseases in the community and encourages better admission policy, provision of appropriate facilities and manpower to improve the hospital services.

Okafor HU, Nwaiwu O. Anemia of persistent malarial parasitemia in Nigerian children. J Trop Pediatr 2001 Oct;47(5):271-5. Department of Paediatrics, College of Medicine, University of Nigeria Teaching Hospital, Enugu. One hundred children aged 0-60 months, 63 males and 47 females, were studied prospectively over a period of 9 months to determine the effect of persistent malaria parasitemia on their packed cell volume (PCV) levels. Thick and thin blood films for parasite identification and counts were done. Patients were randomly assigned to two treatment groups: 62 patients received chloroquine, while 38 patients received fansidar. Mean parasite count (2789.2+/-1809.6) and mean temperature (36.83 (0.66 degrees C) in the fansidar group at day 7 were found to be significantly lower than at enrollment ($p < 0.05$). This also corresponded with significantly higher mean PCV values of 33.85+/-4.72 ($p < 0.05$). In the chloroquine group it was only by day 21 that a significant reduction in parasite count and associated increase in PCV levels were noted. A negative correlation between mean parasite counts and PCV levels was observed ($r = -0.9512$). The hematological recovery time for chloroquine was longer at 21 days compared to fansidar which was 7 days. RII level of parasite resistance was found in 81 patients, 32 in the fansidar group, and 49 in the chloroquine group. The level of resistance to the used first-line antimalarials was found to be rather high in Enugu, south-east Nigeria. This calls for more extensive community-based studies and probable changes in drug policies.

Okoro BA, Okafor HU, Nnoli LU. Childhood nephrotic syndrome in Enugu, Nigeria.West Afr J Med 2000 Apr-Jun;19(2):137-41. Department of Paediatrics, University of Nigeria Teaching Hospital, Enugu, Nigeria. In a prospective study spanning 12 1/2 years (July 1983 to December 1995), 272 children with nephrotic syndrome seen at the University of Nigeria Teaching Hospital Enugu, Nigeria, were followed up and reviewed at the end of the study period. The demographic, clinical and laboratory features, response to treatment and prognosis were documented. Nephrotic syndrome made up 1.34% of all paediatric admissions. There were 164 males and 108 females giving a male to female ratio of 1.5:1. The ages ranged from 2 to 16 years, with a mean of 7.9 +/- 3.4 years and peak age of 5-7 years. The major clinical features were generalized oedema (100%), hypertension (23%), fever (20%), oliguria (10%) and cough (7%). Haematuria was present in 26%, mean serum albumin was 16 +/- 5, 1 gm/L, serum cholesterol 9.53 +/- 1.6 mmol/L Malaria parasitaemia was present in 38.7% and 9 patients (3.3%) had sickle cell disease (SS). Treatment with diuretics, pooled plasma, prednisolone or cyclophosphamide in various combination achieved 63.9% remission. Mortality was 5.5% being mainly due to chronic renal failure, hypertension and infections. The study calls for more trials in the use of steroids and cyclophosphamide in the treatment of childhood nephrotic syndrome in the tropics.

Olanrewaju WI, Johnson AW. Malaria in children in Ilorin, Nigeria. East Afr Med J 2001 Mar;78(3):131-4. Malaria Resource Centre/Olanrewaju Hospital, Nigeria. OBJECTIVES: To determine the prevalence of paediatric malaria admissions in an area of stable malaria transmission and to ascertain the relative contributions of different forms of severe malaria to morbidity and mortality. DESIGN: A descriptive restrospective study. SETTING: Olanrewaju hospital, a general practice health facility in a malaria holoendemic city in Nigeria. SUBJECTS AND METHODS: Case files of paediatric (age < 15years) admissions between 1/1/98 and 31/12/98with a diagnosis of acute malaria were retrieved and relevant information including demographic data, clinical signs, laboratory records, treatments received and diagnosis on discharge were extracted. Grouped age-associated prevalence rates were calculated; characteristics of different groups were compared using standard statistical methods. RESULTS: Children with Falciparum malaria accounted for 95 (18%) of the 526 medical admissions. The proportion of children admitted with severe malaria was significantly higher among the under-fives compared to those over five years ($p < 0.001$; RR = 5.36, 95% CI of 2.58 to 11.2). Thirty two (33.7%) children had severe malaria. Fifteen (15.8%) had convulsions without coma, 13 (13.68%) had malaria-associated anaemia and four (4.2%) were diagnosed as having had cerebral malaria. Seizures were significantly more frequent in the under-fives ($p=0.001$, RR=6.0; 95% CI of 1.8 to 19.6). There was a significant negative correlation between age and severe anaemia/blood transfusions ($p = 0.002$). Cerebral malaria carried the greatest risk of fatality (CFR=25%; RR=7, 95% CI of 1.5 to 91). CONCLUSION: High prevalence of paediatric malaria admissions in this study underscores the morbidity burden in Nigerian children, especially in under-fives in whom the severe forms are more common. A high incidence of anaemia requiring blood transfusions further increases the risk of paediatric HIV infection in Nigeria where organised control programmes are rudimentary.

Olanrewaju WI. Malaria in the neonate: report of 2 cases. West Afr J Med 1999 Apr-Jun;18(2):139-40. Olanrewaju Hospital, Ilorin, Nigeria. Two cases of neonatal malaria are reported, both presenting with signs similar to neonatal sepsis. The first baby responded to oral Chloroquine (CQ) with fever and parasite clearance times of 48 h and 60 h respectively. The CQ treatment failed in the second baby and was subsequently treated successfully with oral Halofantrine hydrochloride. These cases indicate a need for routine blood film for malaria parasite as part of initial screening for neonatal sepsis.

Olumese PE, Gbadegesin RA, Adeyemo AA, Brown B, Walker A. Neurological features of cerebral malaria in Nigerian children. Ann Trop Paediatr 1999 Dec;19(4):321-5. Department of Clinical Pharmacology, University College Hospital, Ibadan, Nigeria. p.olumese@skannet.com. Cerebral malaria is one of the commonest causes of an acute neurological syndrome in malaria-endemic areas. However, there are few detailed reports of findings on clinical neurological examination of the condition. The neurological features of cerebral malaria in 103 children aged 5 years or less were studied in Ibadan, Nigeria, an area of high malaria transmission. The correlation of these features with prognosis was also studied. Convulsions occurred in 87% of subjects and were in most cases of a generalized tonic-clinic nature. Abnormalities of posture were observed in 41%, abnormal tone in 70% and abnormal deep tendon reflexes in 74%. Absent corneal reflexes were found in about 14%. The time interval between the last seizure episode and presentation in hospital, abnormal posture (decerebrate or decorticate), absence of corneal reflex and depth and duration of coma were indicators of poor prognosis. In this study, cerebral malaria presented with non-specific features of diffuse, symmetrical, upper motor neurone dysfunction, and some specific neurological features were associated with poor prognosis. It is important that cerebral malaria be considered in any child with features of acute encephalopathy in a malaria-endemic area. Careful clinical examination of such children is essential as neurological features of the condition may provide a clue to prognosis.

Olumese PE, Adeyemo AA, Ademowo OG, Gbadegesin RA, Sodeinde O, Walker O. The clinical manifestations of cerebral malaria among Nigerian children with the sickle cell trait. Ann Trop Paediatr 1997 Jun;17(2):141-5. Department of Clinical Pharmacology, College of Medicine, University College Hospital, Ibadan, Nigeria. Olumese.errands@skannet.com. In order to describe the interaction between haemoglobin type and the clinical manifestations of cerebral malaria, we studied 60 children aged between 6 and 60 months at University College Hospital, Ibadan, Nigeria. Haemoglobin AS individuals with cerebral malaria did not exhibit major differences in clinical and laboratory characteristics when compared with their haemoglobin AA counterparts. There were no deaths among the Hb AS children compared with an 18% mortality in the Hb AA group. Blood transfusion rates were higher in the AS than in the AA children (86% vs 44%). The higher transfusion rates in the AS group is consistent with in-vitro observations of sickling of parasitized red cells containing Hb S which in vivo would be cleared by the reticuloendothelial system. It is concluded that the clinical manifestations of cerebral malaria are essentially similar in children with haemoglobins AS and AA but the former have higher transfusion needs and are less likely to die.

Sodeinde O, Gbadegesin RA, Ademowo OG, Adeyemo AA. Lack of association between falciparum malaria parasitemia and acute diarrhea in Nigerian children. Am J Trop Med Hyg 1997 Dec;57(6):702-5.Department of Paediatrics, University College Hospital, Ibadan, Nigeria. It is widely believed that malaria causes diarrhea. Yet, national and international diarrheal diseases control programs are silent about the overlap between these two major public health problems that coexist in most tropical countries. To test the hypothesis that malaria is associated with diarrhea and to define the role of malaria in morbidity due to diarrhea, 522 children 6-60 months of age presenting with acute diarrhea to the Children's Emergency Ward of the University College Hospital in Ibadan, Nigeria were routinely screened by means of thin and thick blood films for malaria parasitemia. Controls, without diarrhea, were studied in parallel. Detailed clinical features were recorded for every patient. Sixty-eight (13%) of the 522 diarrhea patients screened had malaria parasitemia. Among the controls (who had similar distributions of admission temperature, hemoglobin types, glucose-6-phosphate dehydrogenase deficiency, and prior treatment with antimalarial drugs),

parasitemia was not significantly different, occurring in 56 (17.9%) of 313. In the dry season, however, a significantly higher prevalence of parasitemia was observed among the control group (15.5%) than in the diarrhea group (7.0%) (P = 0.004). Parasitemia was significantly more common in the dehydrated diarrhea patients than their well-hydrated counterparts (25% of 56 versus 11% of 466; P < 0.005). There were no significant differences in admission temperature, the presence of vomiting, or the home use of oral rehydration fluids between the dehydrated and the well-hydrated subsets of diarrhea patients. Consideration of parasite densities did not alter any of the foregoing relationships. These data contradict the widely held view that diarrhea is a symptom of malaria or that malaria causes diarrhea. They do, however, provide support for examining blood smears at least in dehydrated children with diarrhea in malaria-endemic areas and giving immediate antimalarial therapy to those who have malaria parasitemia.

Sodeinde O, Adeyemo AA, Gbadegesin RA, Olaleye BO, Ajayi-Obe KE, Ademowo OG. Interaction between acute diarrhoea and falciparum malaria in Nigerian children. J Diarrhoeal Dis Res 1996 Dec;14(4):269-73. Department of Paediatrics, University College Hospital, P.M.B., Ibadan, Nigeria. Although both malaria and diarrhoea are major public health problems in developing countries, and separately each has been the subject of intense research, few studies have investigated the interaction between these two conditions. The interaction between diarrhoea and malaria among children aged 4 months to 12 years in two tertiary health-care facilities, University College Hospital, Ibadan, and Lagos University Teaching Hospital, Lagos, Nigeria was studied. In Ibadan, the prevalence of diarrhoea among the cerebral malaria patients on admission as 11.7% (7/60) compared to 9.3% (215/2312) among other admissions in 1990 (chi square = 0.16; p = 0.6913). Similarly, no significant difference in the prevalence of diarrhoea was found between the cerebral malaria patients (14.3%) and other patients (16.1%) seen in Lagos in 1992 (chi square = 0.06, p = 0.81). Thus, cerebral malaria does not seem to be associated with an increased or decreased prevalence of diarrhoea when compared with other conditions. The prevalence of malarial parasitaemia among the 554 diarrhoea patients studied in Ibadan during 1993-1994 was 13.6% compared with 17.9% among the 347 controls (chi square = 3.75, p = 0.053). However, of the children with diarrhoea, malarial parasitaemia was more common among the dehydrated patients (25.4%) than among the well-hydrated patients (11.6%) (chi square = 8.11, p = 0.004). These data suggest that diarrhoea is merely coincidental in severe malaria and conversely, malarial parasitaemia is similarly coincidental in children with acute diarrhoea, although it may be more frequent among dehydrated diarrhoea patients than well-hydrated ones.

Sodipo JO, Padgett D, Warrie E, Olopoenia L. Parasitic infections in sickle cell crisis: Nigerian experience. J Natl Med Assoc 1997 Apr;89(4):285-8. Centre for Holistic Medicine, Lagos, Nigeria. Data collected on 150 sickle cell patients in Nigeria were analyzed to determine the frequency of parasitic infections in clinical and hematologic crisis. Fifty-three adult and 97 pediatric patients (mean age: 27.6 years and 9.7 years, respectively) were studied. Of these patients, 82 were males and 68 females. One hundred thirty-nine had the SS and 11 the SC genotype. Blood samples collected from patients on admission for sickle cell-related illnesses were examined microscopically for evidence of Plasmodium sp, and stool samples were analyzed for presence of any helminth. A total of 102 parasitic infections associated with clinical cases of sickle cell crisis were recorded (malaria, 36[35.3%]; helminths, 49 ([48%]; and malaria and helminths together, 17 [16.7%]). Of the 49 helminthic infections, 26 (53.1%) were due to Ascaris lumbricoides, 15 (30.6%) were due to hookworms, 7 (14.3%) were due to Trichuris trichiura, and 1 (2%) was due to Strongyloides stercoralis. The mean hemoglobin levels during clinical crisis were 7.1 g/dL for helminths, 6.4 g/dL for malaria, and 6.1 g/dL for malaria and helminths together. Reticulocyte counts were 1.4% for helminths, 1.5% for malaria, and 1.2% for both malaria and helminths together. Severity and

duration of the clinical crisis were longer for events associated with a single parasitic organism infection than for those with multiple organisms. Routine blood smear examination for malaria and stool analysis should be included in the laboratory evaluation of individuals with sickle cell anemia in developing countries as these infestations could play an important role in precipitating a crisis.

Sowunmi A, Adedeji AA, Sowunmi CO, Falade CO, Falade AG, Ohaeri B, Happi TC, Oduola AM. Clinical characteristics and disposition kinetics of the hepatomegaly associated with acute, uncomplicated, Plasmodium falciparum malaria in children. Ann Trop Med Parasitol 2001 Jan;95(1):7-18. Department of Pharmacology and Therapeutics and Postgraduate Institute for Medical Research & Training, University of Ibadan, Nigeria. malaria.iba@alpha.linkserve.com. The clinical characteristics and the kinetics of the disposition of the hepatomegaly associated with acute, uncomplicated Plasmodium falciparum malaria were investigated in 162 children in an endemic area of Nigeria. Hepatomegaly was significantly more common in the younger than in the older children. Complete resolution occurred in 48% following antimalarial chemotherapy. In the children in whom hepatomegaly did not resolve, a reduction in liver size of < 17% by the time parasitaemia was cleared (usually on day 3) was associated with non-resolution of hepatomegaly by days 7 or 14 of follow-up. An increase in liver size to at least 125% of the baseline value by day 4 or 5 was associated with a lack of therapeutic response, providing the child involved was aged < 5 years. In the children who had complete clearance of parasitaemia and resolution of hepatomegaly, there was no significant relationship between the parasitaemia-derived conventional indices of therapeutic response [i.e. time to clearance of 50% (PC50) or 90% (PC90) of the parasitaemia, and the parasite-clearance time (PCT)] and the corresponding parameters derived from measurement of liver size [i.e. time for resolution of 50% (HR50) or 90% (HR90) of the hepatomegaly and the hepatomegaly-resolution time (HRT)] in the same patients. However, as the HR50:PC50, HR90:PC90 and HRT:PCT ratios were similar (range = 1.6-2.1), the liver parameters may have therapeutic application. In the children with drug-sensitive P. falciparum infections and in whom hepatomegaly completely resolved, the area produced by plotting liver size against time (i.e. the area under the curve of hepatomegaly v. time, or AUChp) increased in proportion to the liver size below the costal margin (P = 0.02, from analysis of variance), but there was no significant difference in the half-lives of hepatomegaly (t1/2hp) or in the ratios of liver size to AUChp, indicating that the kinetics of the resolution of hepatomegaly were linear in the range examined. Comparison of the kinetic indices of hepatomegaly and parasitaemia showed that, although the half-lives of parasitaemia and hepatomegaly and the corresponding clearance values were similar, there was no correlation between these parameters among those in whom hepatomegaly completely resolved and parasitaemia completely cleared. These results indicate that routine clinical measurement of the liver size in children with hepatomegaly during acute, uncomplicated, P. falciparum malaria may have some use in evaluating and monitoring the therapeutic responses of infections. The resolution of hepatomegaly, a reflection of pathological changes, lags behind clearance of parasitaemia in children with P. falciparum malaria, and supports the use of the liver 'rate' as a malariometric index for assessing the intensity of transmission in endemic areas.

Sowunmi A, Oduola AM. Comparative efficacy of chloroquine/chlorpheniramine combination and mefloquine for the treatment of chloroquine-resistant Plasmodium falciparum malaria in Nigerian children. Trans R Soc Trop Med Hyg 1997 Nov-Dec;91(6):689-93.Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. The efficacy of chloroquine for treating uncomplicated Plasmodium falciparum malaria was evaluated in 98 children in Nigeria. Forty-three children failed chloroquine treatment (21 RI, 20 RII, 2 RIII) and were allocated at random to receive multiple doses of a

combination of chloroquine and chlorpheniramine or a single dose of mefloquine orally. The parasite and fever clearance times were 2.7 +/- 1.0 d and 1.6 +/- 0.6 d, respectively, in children treated with the combination and 1.6 +/- 0.5 d and 1.1 +/- 0.3 d, respectively, for mefloquine treatment. The cure rate on day 14 was 81% among children receiving chloroquine/chlorpheniramine and 100% on days 14 and 28 with mefloquine. Three children who failed treatment with the combination responded promptly to mefloquine, with clearance of parasitaemia and fever within 48 h. Adverse effects following therapy were minimal, comprising drowsiness and pruritus in the combination group and abdominal discomfort in the mefloquine group. Isolates obtained from children who failed initial treatment with chloroquine were resistant to chloroquine but sensitive to mefloquine in vitro. The efficacy of this combination of chloroquine and chlorpheniramine confirmed previous reports of enhanced activity and it was effective in the management of mild to moderate chloroquine-resistant malaria. Although mefloquine is more effective in this respect, the combination, when developed, will be a valuable addition to the list of drugs for the management of chloroquine-resistant malaria.

C.2. Drugs

Adagu IS, Warhurst DC. Plasmodium falciparum: linkage disequilibrium between loci in chromosomes 7 and 5 and chloroquine selective pressure in Northern Nigeria. Parasitology 2001 Sep;123(Pt 3):219-24. Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, UK. Ipemida.Adagu@lshtm.ac.uk. In view of the recent discovery (Molecular Cell 6, 861-871) of a (Lys76Thr) codon change in gene pfcrt on chromosome 7 which determines in vitro chloroquine resistance in Plasmodium falciparum, we have re-examined samples taken before treatment in our study in Zaria, Northern Nigeria (Parasitology, 119, 343-348). Drug resistance was present in 5/5 cases where the pfcrt 76Thr codon change was seen (100% positive predictive value). Drug sensitivity was found in 26/28 cases where the change was absent (93% negative predictive value). Allele pfcrt 76Thr showed strong linkage disequilibrium with pfmdr1 Tyr86 on chromosome 5, more complete than that between pfcrt and cg2 alleles situated between recombination cross-over points on chromosome 7. Physical linkage of cg2 with pfcrt may account for linkage disequilibrium between their alleles but in the case of genes pfmdr1 and pfcrt, on different chromosomes, it is likely that this is maintained epistatically through the selective pressure of chloroquine.

Adagu IS, Warhurst DC. Association of cg2 and pfmdr1 genotype with chloroquine resistance in field samples of Plasmodium falciparum from Nigeria. Parasitology 1999 Oct;119 (Pt 4):343-8. Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, UK. I.Adagu@lshtm.ac.uk This study examines polymorphisms in 2 genes (pfmdr1 and cg2), which have been associated with resistance to chloroquine in Plasmodium falciparum, to determine their value as predictors of resistance status. Among field samples from children in Zaria, northern Nigeria, the Tyr-86 polymorphism in pfmdr1 and Ala-281 and the Dd2 kappa repeat of cg2, were significantly associated. In 8 samples classified resistant by the micro-in vitro test, or, where this failed, by in vivo trial, 7 showed the cg2 Dd2 type kappa repeat, and 6 of these had both the Ala-281 allele and the pfmdr1 Tyr-86 allele. In 26 chloroquine-sensitive samples, none had this combination of 3 polymorphisms (P = 0.00002). This indicates 75% sensitivity and 100% specificity in detection of resistance and shows a positive predictive value for resistant infections of 100%. The negative predictive value, because of sensitivity less than 100%, would depend on the prevalence of resistance. Where prevalence of resistance is approx. 21% as in Zaria, the negative predictive value would be 94%, while in Gabon, with a prevalence of ca 73% it would be 60%. The use of (cg2: Ala-281, Dd2 kappa. pfmdr1: Tyr-86) genotype detection as a predictive epidemiological tool to examine the distribution of chloroquine-resistance in

parts of Africa is therefore possible. The sensitivity of detection of resistant strains still requires improvement.

Adetunji JA. Response of parents to five killer diseases among children in a Yoruba community, Nigeria. *Soc Sci Med* 1991; 32(12): 1379-87. This paper examines the various ways through which adults' health beliefs and attitudes affect their responses to five major killer diseases during childhood. The data for the study were derived from in-depth interviews conducted between December 1988 and January 1989 in a Yoruba community, Nigeria. The diseases covered in the study include diarrhoea, measles, tetanus, pertussis and fever. It was observed that teething and food related causes were believed to be responsible for diarrhoea; the cause of measles and pertussis was generally unknown; tetanus was usually associated with convulsions; and fever was believed to be caused by roaming in the sun and by constipation. Herbal tea, modern drugs and prayers were the most commonly prescribed treatments for these diseases. It was observed that most mothers used alternative sources of health care, rather than hospitals, clinics and maternity centres, in their treatment of diseases among children. Prominent among the alternative sources were patent medicine stores where there were personalistic social interaction between clients and operators, free consultancy and flexible pricing. Parents' location at the time of a child's sickness, access to good advisers, the perceived seriousness of the sickness and religious beliefs of mothers were important determinants of their response. Avoidance of blame was noted to be a major motivating force in parents' search for potential sources of health care. The paper concludes that although some of the practices might have negative health implications, they could be usefully adapted to the goal of self-reliance in medical care as a strategy for attaining health for all by the year 2000.

Antia-Obong OE, Alaribe AA, Young MU, Bassy A, Etim BV. Chloroquine-resistant Plasmodium falciparum among children in Calabar, south eastern Nigeria.Trop Doct 1997 Jul;27(3):146-9. Erratum in: Trop Doct 1998 Jan;28(1):61. Department of Paediatrics, University of Calabar Teaching Hospital, Nigeria. Sixty-nine children aged between 6 and 60 months with parasitologically proven Plasmodium falciparum malaria were treated with chloroquine (2.5 mg/kg) in the Children's Emergency Room of the University of Calabar Teaching Hospital (UCTH) in 1993. Thirty subjects (mean age 27.8 months) and 39 (mean age 29.5 months) received chloroquine phosphate suppository (Pharma Deko) and chloroquine sulphate syrup (May & Baker), respectively. The World Health Organization (WHO) 14-day in vivo field test was used in evaluating the response to treatment. In both treatment groups the responses were similar. Overall, parasitological cure occurred in 24 subjects (34.8%) and in the remaining 45 subjects (65.2%) treatment failed (chloroquine resistance). This level of chloroquine resistant Plasmodium falciparum (CRPF) is higher than 53.6% reported in this centre in 1989. Furthermore, in the present study the proportion of RII (46.4%) is significantly higher than 21.4% ($P < 0.02$) obtained in 1989. Our findings show a worsening of CRPF in Calabar with RII being the main contributor. This observation indicates the need for continued surveillance of the response of P. falciparum to chloroquine and alternative antimalarials as a means of evolving an effective treatment policy for malaria.

Babalola CP, Bolaji OO, Ogunbona FA, Sowunmi A, Walker O. Pharmacokinetics of quinine in African patients with acute falciparum malaria. Pharm World Sci 1998 Jun;20(3):118-22. epartment of Pharmaceutical Chemistry, Faculty of Pharmacy, Obafemi Awolowo University, Ile-Ife, Nigeria. The pharmacokinetics of quinine were studied in six Nigerian patients during acute uncomplicated falciparum malaria and convalescent periods. An oral dose of 10 mg/kg quinine dihydrochloride administered 8-hourly for 7 days gave parasite and fever clearance times of 36.0 +/- 16.6 h and 18.0 +/- 6.4 h, respectively. From the individual quinine plasma profiles the mean plasma concentration of quinine at the time of parasite clearance was estimated as 4.5 +/- 1.1 micrograms/ml. Plasma quinine levels during malaria rose rapidly

reaching a peak around the second and third days and declining thereafter as patients improved clinically. In acute malaria plasma quinine levels were more than two-fold higher than in convalescence; the mean AUC(0-12) in malaria was 37.9 +/- 14.7 micrograms.h/ml compared to 17.9 +/- 8.5 micrograms.h/ml in convalescence. The apparent oral clearance (CL/F) and volume of distribution (Vd/F) during the acute phase of the malaria (1.9 +/- 0.7 ml/min/kg and 1.8 +/- 0.9 l/kg, respectively) were significantly lower than in convalescence (4.5 +/- 2.1 ml/min/kg and 4.2 +/- 3.2 l/kg). The present data suggest that malaria parasites in African patients are still very sensitive to quinine and that the current dosage of quinine is effective for the treatment of acute falciparum malaria in African patients without augmenting therapy with any other drug such as tetracycline or sulphadoxine-pyrimethamine. It also confirms that malaria significantly alters the pharmacokinetics of quinine in humans.

Ezedinachi EN, Ekanem OJ, Chukwuani CM, Meremikwu MM, Ojar EA, Alaribe AA, Umotong AB, Haller L. Efficacy and tolerability of a low-dose mefloquine-sulfadoxine-pyrimethamine combination compared with chloroquine in the treatment of acute malaria infection in a population with multiple drug-resistant Plasmodium falciparum. Am J Trop Med Hyg 1999 Jul;61(1):114-9. Department of Medicine, University of Calabar, Nigeria. The efficacy and tolerability of single, low-dose mefloquine, sulfadoxine-pyrimethamine (MSP) combination was compared with chloroquine (CQ) for malaria treatment in a malaria-endemic area of Nigeria with multiple drug-resistant Plasmodium falciparum. The two drug regimens (MSP and CQ) were tested in a 12-month prospective population study. The patients were divided into two groups. Group 1 patients were treated presumptively, based on malaria symptoms. Group 2 patients were treated based on a parasitologic diagnosis using the World Health Organization seven-day in vivo test and extended to a 28-day follow-up period. Tolerability was assessed by the incidence and intensity of adverse events. One thousand nine hundred thirty-five patients visiting 10 health facilities, including the University of Calabar Teaching Hospital, were enrolled. The study showed that the low-dose MSP was efficacious, with day 7 response rates of 95% and 91% for (presumptive) Group 1 and (in vivo) Group 2, respectively, while CQ had day 7 response rates of 82% and 66% in Groups 1 and 2, respectively. The low-dose MSP was significantly ($P < 0.0001$) more efficacious, with faster fever and parasite clearance times than CQ in this area of CQ-resistant P. falciparum malaria. Eight patients treated with CQ, including seven severe cases (RII-RIII) were successfully re-treated with MSP. Adverse events were generally more common among those treated with MSP (29%) than those treated with CQ (17%). However, the adverse events caused by both drugs were mild to moderate and self-limited. The MSP combination appears to be a good substitute for CQ, in view of multiple drug resistance, especially in areas with severe (RII-RIII) malaria.

Falade CO, Salako LA, Sowunmi A, Oduola AM, Larcier P. Comparative efficacy of halofantrine, chloroquine and sulfadoxine-pyrimethamine for treatment of acute uncomplicated falciparum malaria in Nigerian children. Trans R Soc Trop Med Hyg 1997 Jan-Feb;91(1):58-62. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. One hundred and ten children aged 6 months to 11 years were randomly treated with halofantrine (HF), sulfadoxine-pyrimethamine (S-P) or chloroquine (CQ) for acute uncomplicated Plasmodium falciparum malaria in an endemic area of south-western Nigeria. The response of infection to treatment in each child was monitored for 14 d. The mean fever clearance times were 1.9 d (n = 36), 1.6 d (n = 27), and 1-7 d (n = 28) for children treated with HF, S-P and CQ, respectively. The parasite clearance times were 3.4 d (n = 39), 4.4 d (n = 24) and 4.1 d (n = 15) in the 3 groups of children. The cure rate at day 7 was 92.3% (36/39) in children treated with HF, 72.7% (24/33) in those treated with S-P, and 39.5% (15/38) in those treated with CQ. By day 14, 4 of 36 (11.1%) parasitologically cured patients treated with HF

had experienced recrudescences. The corresponding figures among children treated with S-P or CQ were 8.3% and 13.3%, respectively. The 3 drugs were well tolerated. The results of the study showed a further decline in the sensitivity of P. falciparum infections to CQ, while HF and S-P remained relatively effective in the treatment of malaria in south-west Nigeria.

Gellert S, Hassan BY, Meleh S, Hiesgen G. Malaria prevalence and outcome in the in-patients of the Paediatric Department of the State Specialists Hospital (SSH), Maiduguri, Nigeria. J Trop Pediatr 1998 Apr;44(2):109-13. Paediatrics Department of State Specialists Hospital Maiduguri, Borno State, Nigeria. Of 4651 admissions between February 1995 and February 1996, 1043 had a presumed diagnosis of malaria. Six hundred and twenty-seven cases were confirmed by thick blood film examinations. The highest prevalence was in October (124/480 admissions) and the lowest in March (12/303). Sixty-five children died while 562 survived, 12 with defects. The first treatment in 422 children was chloroquine, in 143 quinine, in 59 halofantrin, and in three pyrimethamine with sulfadoxine (Fansidar). 23/422 patients started on chloroquine were switched to halofantrine, two to quinine. A higher mortality was associated with coma, convulsions, hepatosplenomegaly, pulmonary congestion, jaundice, haemoglobinuria, bladder paralysis, anuria. Anaemia and fever were more severe and hypoglycaemia more frequent in children who died than in children who survived (packed cell volume 18.5 +/- 7.1 per cent vs. 25.6 +/- 7.6 per cent, $p < 0.001$; temperature 39 +/- 1.1 degrees C vs. 38.7 +/- 0.9 degrees C, $p < 0.05$; random blood sugar < 40 mg/100 ml; 76 vs. 22 per cent, $p < 0.01$). There was no difference in the median age, pretreatment duration, and prevalence of diarrhoea and sickle cell disease. The male to female ratio was 1.5:1 in the surviving children vs. 1:1.03 in the dead.

Mockenhaupt FP, May J, Bergqvist Y, Meyer CG, Falusi AG, Bienzle U. Evidence for a reduced effect of chloroquine against Plasmodium falciparum in alpha-thalassaemic children. Trop Med Int Health 2001 Feb;6(2):102-7. Institute of Tropical Medicine and Medical Faculty Charite, Humboldt-University Berlin, Germany. frank.mockenhaupt@charite.de. Alpha-thalassaemia is common in malaria-endemic regions and is considered to confer protection from clinical disease due to infection with Plasmodium falciparum. In vitro, sensitivity to chloroquine (CQ) of P. falciparum infecting alpha-thalassaemic erythrocytes is reduced. We examined, in a cross-sectional study of 405 Nigerian children, associations between alpha-globin genotypes, blood concentrations of CQ, and P. falciparum parasitaemia. Of the children, 44% were alpha+-thalassaemic (36.8% heterozygous, 7.6% homozygous). CQ in blood and P. falciparum-infection were observed in 52 and 80%, respectively. CQ was more frequently found in homozygous alpha+-thalassaemic (71%) than in non-thalassaemic children (50%; odds ratio, 2.42; 95% confidence interval, 1.01-5.8). Among children with CQ in blood and despite similar drug concentrations, alpha+-thalassaemic individuals had fewer infections below the threshold of microscopy which were detectable by PCR only, and they had a higher prevalence of elevated parasitaemia than non-thalassaemic children. No such differences were discernible among drug-free children. CQ displays a lowered efficacy in the suppression of P. falciparum parasitaemia in alpha+-thalassaemic children; hence protection against malaria due to alpha+-thalassaemia may be obscured in areas of intense CQ usage. Moreover, alpha+-thalassaemia may contribute to the expansion of CQ resistance.

Mockenhaupt FP, May J, Bergqvist Y, Ademowo OG, Olumese PE, Falusi AG, Grossterlinden L, Meyer CG, Bienzle U. Concentrations of chloroquine and malaria parasites in blood in Nigerian children. Antimicrob Agents Chemother 2000 Apr;44(4):835-9. Institute of Tropical Medicine and Medical Faculty Charite, Humboldt-University, Berlin, Germany. frank.mockenhaupt@charite.de. Consumption of chloroquine (CQ) and subtherapeutic drug levels in blood are considered to be widespread in areas where malaria is endemic. A cross-sectional study was performed with 405 Nigerian children to assess factors associated with

the presence of CQ in blood and to examine correlations of drug levels with malaria parasite species and densities. Infections with Plasmodium species and parasite densities were determined by microscopy and PCR assays. Whole-blood CQ concentrations were measured by high-performance liquid chromatography. Plasmodium falciparum, P. malariae, and P. ovale were observed in 80, 16, and 9% of the children, respectively, and CQ was detected in 52% of the children. CQ concentrations were >17 and <100 nmol/liter in 25% of the children, 100 to 499 nmol/liter in 14% of the children, and > or =500 nmol/liter in 13% of the children. Young age, attendance at health posts, and absence of parasitemia were factors independently associated with CQ in blood. With increasing concentrations of CQ, the prevalence of P. falciparum infection and parasite densities decreased. However, at concentrations corresponding to those usually attained during regular prophylaxis (> or =500 nmol/liter), 62% of children were still harboring P. falciparum parasites. In contrast, no infection with P. malariae and only one infection with P. ovale were observed in children with CQ concentrations of > or =100 nmol/liter. These data show the high prevalence of subcurative CQ concentrations in Nigerian children and confirm the considerable degree of CQ resistance in that country. Subtherapeutic drug levels are likely to further promote CQ resistance and may impair the development and maintenance of premunition in areas where malaria is endemic.

Mockenhaupt FP, May J, Eggelte TA, Thies FL, Ademowo OG, Bienzle U, Meyer CG. Short report: high prevalence and imbalanced age distribution of the Plasmodium falciparum dihydrofolate reductase gene Asn108 mutation in an area of low pyrimethamine usage in Nigeria. Am J Trop Med Hyg 1999 Sep;61(3):375-7. Institute for Tropical Medicine, Medical Faculty Charite, Humboldt-University Berlin, Germany. Resistance of Plasmodium falciparum to pyrimethamine is associated with a non-silent point mutation of the parasite dihydrofolate reductase (DHFR) gene (Ser108 --> Asn108). Wide-scale use of antimalarials is thought to contribute to the emergence of drug resistance. In 131 P. falciparum-infected children in rural Nigeria, the frequency of the resistant Asn108 genotype was assessed by enzymatic restriction digestion of polymerase chain reaction-amplified DHFR sequences and compared with residual pyrimethamine blood levels. The prevalence of the Asn108 variant was 41.2%. In 18.3% of the isolates, both the Asn108 and the wild-type alleles were present. In contrast to the high prevalence of resistant genotypes, residual pyrimethamine blood levels were detected in only 4%. Furthermore, age was found to be a determinant of the parasite genotype since the proportion of Asn108 variants decreased with age ($P < 0.05$). These findings indicate that additional, unidentified factors, rather than selection by residual drug levels alone, might be responsible for the emergence of pyrimethamine-resistant parasite genotypes.

Odunukwe NN, Salako LA, Okanny C, Ahmed OA, Mafe AG, Efinemokwu C, Raheem TY. Serum ferritin and other haematological measurements in apparently healthy children with malaria parasitaemia in Lagos, Nigeria. West Afr J Med 2001 Jan-Mar;20(1):42-5. Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria. One hundred apparently normal nursery and primary school children aged between 2 to 12 years from private schools, in Lagos Nigeria were studied. From this study the mean ferritin levels for children aged 2-5 years, and 6-12 years were 112 +/- 48 micrograms/l, and 119 +/- 38 micrograms/l respectively. Mean haematocrit values were 37.6 +/- 2.2%, and 37.5 +/- 2.6%, while mean haemoglobin levels were 126 +/- 9 g/l 127 +/- 7.9 g/l (2-5 years and 6-12 years respectively). The mean values for MCV, MCH, MCHC were 92 +/- 8.6 fl, 27.6 +/- 3.0 pg, 338.0 +/- 15.0 g/l and 93.5 +/- 9.0 fl, 28.7 +/- 2.5 pg, 332.0 +/- 17.0 g/l (2-5 years and 6-12 years respectively). All haematological parameters measured were similar in both malaria parasitaemia positive and negative subjects, except ferritin level which was significantly higher in subjects with malaria parasitaemia ($p < 0.05$). There was positive correlation between ferritin concentration and malaria density (r =

0.85, p < 0.05). From the above findings, it would be concluded that, ferritin estimation without examination for malaria parasitaemia in a malarious region like Nigeria is not reliable. It is also concluded that with the high mean ferritin level obtained in this study for normal children on balanced diet, routine iron supplementation may not be necessary for this group of children in Nigeria.

Oduola AM, Omitowoju GO, Sowunmi A, Makler MT, Falade CO, Kyle DE, Fehintola FA, Ogundahunsi OA, Piper RC, Schuster BG, Milhous WK. Plasmodium falciparum: evaluation of lactate dehydrogenase in monitoring therapeutic responses to standard antimalarial drugs in Nigeria. Exp Parasitol 1997 Nov;87(3):283-9. Department of Pharmacology and Therapeutics, College of Medicine, University of Ibadan, Nigeria. The correlation of P. falciparum lactate dehydrogenase (pLDH) activities and patent infections was evaluated for monitoring therapeutic responses and drug resistance in 70 patients with microscopically confirmed P. falciparum malaria in Nigeria. Each patient was treated with standard dosages of artemether (53 patients), chloroquine (7 patients), sulfadoxine-pyrimethamine (6 patients), or halofantrine (4 patients). Response of infection to treatment was monitored by microscopic examination of thick and thin blood smears, clinical symptoms, and levels of pLDH activities in blood products. pLDH activity was determined using an antibody capture technique and 3-acetyl pyridine adenine dinucleotide developed to enhance sensitivity of the enzyme detection. All patients treated with artemether were cured while 5 patients treated with chloroquine, 1 treated with sulfadoxine-pyrimethamine, and 2 treated with halofantrine suffered recrudescent infections after treatment. pLDH activity was detected in blood products obtained from patients with patent or recrudescent infections determined by microscopy and clinical symptoms. Levels of pLDH activities in whole blood and packed cells from the patients correlated with qualitative detection of parasites in blood smears and in patients with high gametocyte counts. Gametocyte counts in the patients after treatment ranged from 40 gametocytes/microliter of blood to 4923 gametocytes/microliter of blood. There is a consistent relationship between patent infection and pLDH activities that could easily be determined in whole blood and packed cells from the patients. Further development of the procedure will enhance its valuable application in clinical management of drug-resistant malaria in the endemic areas.

Okonkwo PO, Akpala CO, Okafor HU, Mbah AU, Nwaiwu O. Compliance to correct dose of chloroquine in uncomplicated malaria correlates with improvement in the condition of rural Nigerian children.Trans R Soc Trop Med Hyg 2001 May-Jun;95(3):320-4. Department of Pharmacology and Therapeutics, University of Nigeria Teaching Hospital, PMB 01129, Enugu, Nigeria. pokonkwo@infoweb.abs.net. Non-compliance to correct dosing is thought to be one of the main causes of treatment failure of chloroquine in the home management of childhood malaria. There are few studies of compliance to drugs used for tropical diseases. In order to study compliance in the rural setting, chloroquine syrup was packaged with a novel pictorial insert for compliance to correct dosing. Compliance was assessed in a field trial in September 1996-December 1997, involving 632 children with uncomplicated malaria in Udi local government area in Nigeria. Written informed consent was obtained from mothers/guardians before children were enrolled in the study. There were 3 arms to the trial: control villages (group I) received chloroquine syrup without further intervention, group II received a pictorial insert with chloroquine syrup, and group III received chloroquine syrup, the pictorial insert and verbal instructions. Each group was made up of 3 health centres. Compliance was assessed by volumetric measurement of the chloroquine syrup left in 30-mL bottles and by questionnaires administered to mothers/helpers of the children. Control villages recorded full compliance for 36.5 +/- 4.4% of the children, group II for 51.9 +/- 7.9% and group III for 73.3 +/- 4.2%. There was a significant correlation (P < 0.0001) between full compliance, improvement and time for improvement of the condition. This study is deemed

important because it focuses on children, who bear the greatest burden of malaria. It is unique for introducing a pictorial insert that illiterate villagers, who may not understand the use of age or weight in drug dispensing, may utilize as a substitute.

Okonkwo CA, Coker HA, Agomo PU, Ogunbanwo JA, Mafe AG, Agomo CO, Afolabi BM. Effect of chlorpheniramine on the pharmacokinetics of and response to chloroquine of Nigerian children with falciparum malaria. Trans R Soc Trop Med Hyg 1999 May-Jun;93(3):306-11. Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria. Chlorpheniramine (CP), a histamine H1-receptor antagonist, enhances the efficacy of chloroquine (CQ) in acute uncomplicated falciparum malaria. The effects of this combination therapy on the pharmacokinetic disposition of CQ is, however, unpredictable. A standard treatment with 25 mg CQ base per kg bodyweight was orally administered over 3 days, alone or in combination with CP, to 17 semi-immune Nigerian children with Plasmodium falciparum parasitaemia attending hospital in Lagos, Nigeria, and observed for 28 days. Whole-blood CQ concentrations were monitored 14 times during the follow-up by high-performance liquid chromatography analysis of blood dried on filter paper. Parasitaemia was determined on thick blood films stained with Giemsa, and treatment failures were established following the WHO classification for CQ resistance. Our pharmacokinetic data showed that the peak whole-blood CQ concentration was significantly increased ($P < 0.05$) by CP administration, and the time to achieve the peak was reduced in the presence of CP. The area under the first-moment drug-concentration-time curve was also significantly increased ($P < 0.05$) by CP administration. Treatment with CQ-CP combination resulted in a shorter parasite clearance time (2.0 +/- 0.5 days) and a higher cure rate (87.5%) compared to treatment with CQ alone (3.5 +/- 0.5 days; 66.7%). Our data suggest that CP enhanced the efficacy of CQ against resistant P. falciparum in acute uncomplicated malaria by increasing the uptake/concentration of CQ in resistant parasites.

Okoyeh JN, Lege-Oguntoye L, Ugbode RO, Ogunrinde GO. Responses of multidrug-resistant Plasmodium falciparum parasites to mefloquine in Nigerian children. Trop Med Int Health 1997 Apr;2(4):319-24. Department of Pharmacology and Clinical Pharmacy, Ahmadu Bello University, Zaria, Nigeria. Thirty-three children aged 6 months to 7 years from an area with multidrug-resistant Plasmodium falciparum strains were treated with 25 mg/kg body weight of mefloquine base as a single oral dose. They were followed-up using the modified 28-day WHO extended field test. The parasite isolates from these patients were cultured in vitro with different concentrations of mefloquine. All children were parasite-negative by day 4, and 31 remained so throughout the period of observation. Two patients who were parasitaemic on days 16 and 28 were successfully treated with a sulphadoxine/pyrimethamine combination. Parasitological and clinical responses were well correlated. The mean parasite clearance time was 65 +/- 10.2 hours. A mefloquine concentration of 64 pmol/well inhibited schizont growth and the EC50 and EC99 were 5.5 and 5.4 pmol/well (1.1 and 10.8 mumol/l blood) respectively. This indicates reduced parasite susceptibility to the drug in vitro.

Olumese PE, Bjorkman A, Gbadegesin RA, Adeyemo AA, Walker O. Comparative efficacy of intramuscular artemether and intravenous quinine in Nigerian children with cerebral malaria. Acta Trop 1999 Oct 15;73(3):231-6. Department of Clinical Pharmacology, University College Hospital, Ibadan, Nigeria. p.olumese@skannet.com. The efficacy of a 5-day treatment with intramuscular artemether (3.2-mg/kg loading dose followed by 1.6 mg/kg daily) was compared to that of the standard 7-day treatment with quinine (20-mg/kg loading dose followed by 10 mg/kg every 8 h) in a randomised clinical trial including 103 children aged 12-60 months with cerebral malaria between 1994 and 1996. No statistical difference of immediate efficacy was found between the two treatments. There were 11 (20%) deaths in the artemether group and 14 (28%) in the children who received quinine. The respective

artemether versus quinine median fever clearance times (h) were 39 (interquartile ranges [IQ] 30-54) vs. 48 (IQ 30-60), and parasite clearance 42 (IQ 24-60) vs. 36 (IQ 30-48). However, one patient who received artemether had a recrudescence on day 14, which was successfully treated with sulphadoxine-pyrimethamine. Times to recovery from coma were 24 h (IQ 18-45) and 33 h (IQ 19-57), respectively. The occurrence of transient neurological sequelae including motor disabilities, cortical blindness, and afebrile seizures was also similar in the two groups. No adverse reactions to the two drugs were recorded during the study period. Artemether represents an important option in the management of cerebral malaria in Nigeria especially in rural areas where facilities for intravenous administration may not yet be optimal.

Sowunmi A, Ayede AI, Falade AG, Ndikum VN, Sowunmi CO, Adedeji AA, Falade CO, Happi TC, Oduola AM. Randomized comparison of chloroquine and amodiaquine in the treatment of acute, uncomplicated, Plasmodium falciparum malaria in children. Ann Trop Med Parasitol 2001 Sep;95(6):549-58. Department of Pharmacology and Therapuetics and Postgraduate Institute for Medical Research and Training, University College Hospital, Ibadan, Nigeria. malaria.iba@alpha.linkserve.com. The increasing resistance of Plasmodium falciparum to chloroquine (CQ) has created an urgent need for the evaluation of alternative, effective, safe, cheap, readily available and affordable antimalarial treatments. In the present study, the efficacy of amodiaquine (AQ) in the treatment of acute, symptomatic, uncomplicated, P. falciparum malaria was compared with that of CQ, each drug being given at 10 mg/kg per day for 3 days (days 0, 1 and 2). The 210 subjects (104 given AQ and 106 CQ) were Nigerian children aged 5 months-12 years. Fever-clearance times (FCT), parasite densities on days 1-4 and parasite-clearance times (PCT) were all significantly lower with AQ than with CQ. Mean (S.D.) PCT, for example, were 2.6 (0.8) days with AQ and 3.0 (1.0) days with CQ (P = 0.001). The cure rates obtained on days 14, 21 and 28 - 98.1% v. 79.3% (P =0.000), 97.1% v. 64.2% (P = 0.00001) and 95.2% v. 58.5% (P = 0.0000000) with AQ and CQ, respectively - were all also significantly higher with AQ. All but two of the 20 subjects who were considered CQ-treatment failures by day 14 (i.e. two RIII, two RII and 16 RI) responded to subsequent treatment with AQ, with PCT (but not FCT) significantly shorter than during their initial treatment with CQ. In siblings in whom there was clustering of infections, the cure rates were 100% with AQ (N =12) and 63.6% with CQ (N = 11; P = 0.03). Adverse reactions to CQ and AQ were similar and tolerable: pruritus in 10 and 11 children in the AQ and CQ groups, respectively, and gastro-intestinal disturbances which occurred in three children from each group. Haematological parameters were not adversely affected by either drug. At least in the setting of the present study, AQ appears more effective than CQ, effective against CQ-resistant infections, and well tolerated by children with acute, uncomplicated, P. falciparum malaria. It may therefore be useful as an alternative to CQ in areas of CQ resistance.

Sowunmi A, Adedeji AA, Sowunmi CO, Falade AG, Sijuade AO, Oduola AM. Comparative clinical characteristics and response to oral antimalarial therapy of children with and without Plasmodium falciparum hyperparasitaemia in an endemic area. Ann Trop Med Parasitol 2000 Sep;94(6):549-58. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. malaria.iba@alpha.linkserve.com. The clinical characteristics and the responses to oral antimalarial therapy of 104 children presenting consecutively with or without Plasmodium falciparum hyperparasitaemia (HP) were investigated in an endemic area. At presentation, although the 52 children with HP were significantly younger and had significantly higher heart rates than the 52 without, there were no significant differences between the two groups in their symptoms or in any other clinical feature of their malaria. Responses to oral antimalarial drugs were similar in both groups. Analysis of the disposition kinetics of parasitaemia, using a non-compartmental model similar to that used in

characterizing drug disposition, showed that the two groups had similar half-lives of parasitaemia (t1/2pd), volumes of blood completely cleared of parasites per unit time (CLBpd), and parasite-clearance-time:t1/2pd ratios. Three children in the HP group, all aged < 3 years, progressed to cerebral malaria within 8 h of presentation, and another HP child presented with isolated trunkal ataxia, indicative of cerebellar involvement. No child in the non-HP group had any of the features of severe malaria. Although the clinical characteristics and responses to oral therapy of children with and without HP are therefore very similar, young children with HP appear to have an increased risk of developing other features of severe malaria.

Sowunmi A, Falade CO, Oduola AM, Ogundahunsi OA, Fehintola FA, Gbotosho GO, Larcier P, Salako LA. Cardiac effects of halofantrine in children suffering from acute uncomplicated falciparum malaria. Trans R Soc Trop Med Hyg 1998 Jul-Aug;92(4):446-8. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. sysop@nga.healthnet.org. The cardiac effects of halofantrine were assessed in 42 children with acute symptomatic uncomplicated Plasmodium falciparum malaria by electrocardiographic (ECG) and clinical monitoring over a period of 14 d. The children were treated with oral halofantrine 8 mg/kg body weight every 6 h for 3 doses. There was significant prolongation of the P-R interval (compared with the pre-treatment value) only at 8 h after drug administration. However, first degree auriculoventricular (AV) block occurred in 2 children at 8 h or 8 and 48 h, and second degree AV block in another child at 48 h. There was significant prolongation of the Q-Tc interval at 8, 16, 24, 48 and 72 h after treatment; the proportions of children with Q-Tc interval > 0.44 s were also significantly higher at all these times except 72 h. Rhythm disturbance was rare. There was no significant ECG change at 168 or 336 h. Despite the ECG abnormalities, there was no clinical symptom. These findings indicate that, in children, the currently recommended dose of halofantrine for the treatment of falciparum malaria may produce serious cardiac side effects.

Sowunmi A, Fehintola FA, Ogundahunsi OA, Oduola AM. Comparative efficacy of chloroquine plus chlorpheniramine and halofantrine in acute uncomplicated falciparum malaria in Nigerian children. Trans R Soc Trop Med Hyg 1998 Jul-Aug;92(4):441-5. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. sysop@nga.healthnet.org. In the face of growing chloroquine resistance of Plasmodium falciparum, efforts to prolong the clinical usefulness of the drug have partly concentrated on its combination with potential resistance-reversing compounds. However, clinical studies on such combinations have been limited. We have compared the efficacy of halofantrine, an arylaminoalcohol effective in chloroquine resistant malaria, and a combination of chloroquine plus chlorpheniramine, a histamine H1 receptor antagonist which reverses chloroquine resistance of P. falciparum in vitro and in vivo, in 100 children with acute symptomatic uncomplicated falciparum malaria in an area in Nigeria where the rate of chloroquine resistance is 35-45%. Both chloroquine plus chlorpheniramine and halofantrine produced similar parasite and fever clearance times and cure rates (96%). Both treatment regimens were relatively well tolerated. Pruritus was commoner in patients treated with chloroquine plus chlorpheniramine than in those treated with halofantrine. Intravascular haemolysis occurred in one patient, and abdominal pain with or without diarrhoea occurred in 4 patients, treated with halofantrine. In vitro, the chloroquine resistance of P. falciparum isolates obtained from the patients was reversed by verapamil. All patients with isolates which were chloroquine-resistant in vitro were cured by either therapy. These results indicate that chloroquine plus chlorpheniramine is as effective as halofantrine and is without overt deleterious effect in treating acute uncomplicated chloroquine-resistant falciparum malaria in children, and may be a clinically useful alternative for this purpose in Nigeria.

Sowunmi A, Oduola AM, Ogundahunsi OA, Salako LA. Comparative efficacy of chloroquine plus chlorpheniramine and pyrimethamine/sulfadoxine in acute uncomplicated falciparum malaria in Nigerian children. Trans R Soc Trop Med Hyg 1998 Jan-Feb;92(1):77-81.Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. The efficacy of pyrimethamine/sulfadoxine (PS) and chloroquine plus chlorpheniramine, a histamine H1 receptor blocker which reverses chloroquine insensitivity in Plasmodium falciparum in vitro, was evaluated in 100 consecutive children with acute symptomatic uncomplicated falciparum malaria. Parasitaemia on day 3 following initiation of treatment, fever and symptom clearance times were significantly lower in the chloroquine/chlorpheniramine (CQ/CP) combination group than in the PS group. The cure rate was also significantly higher in the combination group. The combination cured all children who had failed PS treatment. Gametocytaemia and the gametocyte carrier rate following therapy were significantly lower in the combination group than in those receiving PS. Both treatments were well tolerated but adverse drug reactions were commoner in the children given PS. CQ/CP is effective in PS treatment failure in Nigerian children and may be useful for this condition in African children in general.

Sowunmi A, Odulola AM. Artemether treatment of recrudescent Plasmodium falciparum malaria in children. Trop Med Int Health 1997 Jul;2(7):631-4. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. Intramuscular artemether given for five days was evaluated prospectively in 32 patients with acute recrudescent Plasmodium falciparum malaria. All patients had experienced one or more treatment failures with one or more courses of the following drugs: chloroquine, amodiaquine, sulphadoxine-pyrimethamine and erythromycin given alone or in combination. There was a prompt response to treatment with fever and parasite clearance times of 10.7 (3.6) h (range 6-24) and 32.3 (8.3) h (range 24-48) respectively. Parasite reduction at 24 h was 93.2 (7.8)% (range 75-100). The cure rate on day 14 was 100%. The drug was well tolerated. These results suggest that artemether is rapidly effective in acute recrudescent Plasmodium falciparum malaria and is without deleterious side effects.

Sowunmi A, Oduola AM, Ogundahunsi OA, Falade CO, Gbotosho GO, Salako LA. Enhanced efficacy of chloroquine-chlorpheniramine combination in acute uncomplicated falciparum malaria in children. Trans R Soc Trop Med Hyg 1997 Jan-Feb;91(1):63-7. Department of Pharmacology and Therapeutics, University of Ibadan, Nigeria. Chlorpheniramine, a histamine H1 receptor antagonist, reverse chloroquine resistance in Plasmodium falciparum in vitro. However, the clinical significance of this remains unclear. We have evaluated the efficacy of chloroquine and a chloroquine-chlorpheniramine combination in 112 consecutive children with acute symptomatic uncomplicated falciparum malaria. There was no significant difference in the parasite and fever clearance times in the 2 treatment groups. However, the proportion of patients in whom parasitaemia increased 24 h after commencement of treatment was significantly higher in the chloroquine group than in the chloroquine-chlorpheniramine group (28.5% vs. 8.3%, chi 2 = 6.61, $P < 0.01$). There was also a higher proportion of children with RII and RIII responses to treatment in the chloroquine than in the chloroquine-chlorpheniramine group but the difference was not statistically significant. The cure rate on day 14 was higher in the chloroquine-chlorpheniramine group than in the chloroquine group. Chloroquine and its combination with chlorpheniramine were well tolerated, the only prominent adverse effect being pruritus, with equal incidence in both groups. Chlorpheniramine reversed chloroquine resistance in vitro in a similar manner to verapamil in isolates of P. falciparum obtained from the patients. Failure of a response in vivo to

chloroquine correlated with resistance in vitro in patients treated with this drug. In contrast, all but one patient with isolates which were chloroquine resistant in vitro were successfully treated with chloroquine-chlorpheniramine combination. These data suggest the enhanced efficacy of chloroquine-chlorpheniramine combination in treating acute uncomplicated P. falciparum infection in children from an endemic area of Nigeria.

C.3. ITNs

Brieger, W. R., E. Nwankwo, V. I. Ezike, J. D. Sexton, J. G. Breman. K. A. Parker, O. J. Ekanem, and T. Robinson. Social and Behavioural Baseline for Guiding Implementation of an Efficacy Trial of Insecticide Impregnated Bed Nets for Malaria Control at Nsukka, Nigeria. *International Quarterly of Community Health Education* 1996-97 Volume: 16 Issue: 1. Insecticide impregnated bed nets are being tested in many tropical areas as a major tool to control malaria. In a few African countries, there is a history of local bed net production and use, while in most others, ownership of commercially-produced nets is rare due to high costs relative to local income. Such variations in pre-existing bed net use behavior must be studied prior, to designing new intervention trials. A "baseline" diagnostic study in Nsukka Local Government of Enugu State, Nigeria, found that local beliefs about malaria causation, which include heat from the sun and hard work, may reduce the perceived efficacy of bed nets as an appropriate malaria control action. While the belief that mosquitos can cause malaria increased with level of formal education, the study also documented that educated people simultaneously hold both indigenous and scientific perceptions about malaria. Although the project provided bed nets, curtains and residual house spray for free, long-term sustainability may be influenced by the main constraint to current ownership of a bed net, i.e., cost. Issues, such as concern about feeling hot under the nets, a tendency to sleep outside during the hot dry season, and variations in people's ideas about what constitutes a malaria episode, point to the need to monitor the bed net intervention. This is recommended as a means of learning how people perceive the efficacy of the nets, whether they use them correctly and whether the intervention can be sustained and integrated into local primary health care programs.

Brieger WR, Onyido AE, Sexton JD, Ezike VI, Breman JG, Ekanem OJ. Monitoring community response to malaria control using insecticide-impregnated bed nets, curtains and residual spray at Nsukka, Nigeria. Health Educ Res 1996 Jun;11(2):133-45. African Regional Health Education Centre, College of Medicine, University of Ibadan, Nigeria. A project testing the efficacy of insecticide (permethrin)-impregnated bed nets, compared with impregnated door and window curtains, residual house spraying, and a control group was implemented in 12 village clusters in the Nsukka Local Government Area of Enugu State, Nigeria, using epidemiologic and entomologic indicators. The appropriate materials and services were given free to all families. During the first year of study, three monitoring exercises were carried out in a random selection of homes where children under 5 years of age resided. Information was collected on perceived effectiveness of the interventions, condition of nets and curtains, reasons for not sleeping under nets, and recall of steps required in caring for nets and curtains. Bed nets were perceived as more effective in reducing mosquito bites compared with the two other interventions. At the last monitoring period, which occurred a few weeks before a re-impregnation exercise, respondents also perceived bed nets to be most effective in preventing malaria. These findings coincided with epidemiologic evidence. Curtains, especially those at doors, were more likely to be torn and dirty than bed nets. Although holes would not reduce the effectiveness of the insecticide, they could reduce the 'beauty' of the curtains, a perceived benefit that initially attracted villagers to both curtains and nets. Bed net owners reported significantly less frequent use of other mosquito control measures in their homes than did members of the other groups. Finally, bed net users demonstrated increased knowledge of use and care steps than did those with curtains. These

findings suggested a high level of social acceptability of bed nets, and point to the need to test their acceptability further under conditions where people would pay for nets and communities would manage distribution and re-impregnation systems.

Onwujekwe O, Chima R, She E, Nwagbo D, Okonkwo P. Hypothetical willingness to pay for insecticide-treated nets in five Nigerian communities. Tropical Medicine and International Health 2001; 6(7): 545-553. Objectives: To determine the hypothetical and actual willingness of households to pay (WTP) for insecticide-treated nets (ITNs), and compare these in areas with and without previous exposure to free ITNs. Methodology: The contingent valuation method was used to determine the willingness of head of 1908 randomly selected households from five communities in south-eastern Nigeria to pay for two sizes of ITNs. Two communities previously had access to ITNs. Validity was assessed using multiple regression analyses, and by offering ITNs for sale to 200 randomly selected people drawn from the original sample. The data was collected between March and September 1998. Findings: Most respondents were willing to pay for ITNs; Mbano (93.26%), Ugwogo (97.69%), Orba (83.24%), Alor-uno (95.37%), and Ibagwa-ani (87.34%). In multivariate analyses, WTP was significantly associated with the number of people living in a household, sex of the respondent, average yearly expenditure on gifts and the type of savings scheme ($p<0.05$). Some of the residences were also statistically significant in the two models used, and those with prior exposure to free ITNs were negatively related to WTP. Seventy-six percent of those who were hypothetically willing to pay actually purchased them, and the WTP technique correctly predicted the choices of 80% of the respondents. Conclusion: There was good evidence that stated WTP could be translated into actual WTP. However, peoples' perception of affordability of the nets and its link to their WTP needs further exploration. The WTP technique is a potentially valid tool for market research in healthcare, as it was able to predict the direction of actual WTP for the ITNs. The hypothetical WTP amounts could be used as a guide to know either the optimal price top charge for the ITNs or the level of subsidy to introduce.

Onwujekwe O, Chima R, She E, Nwagbo D, Akpala C, Okonkwo P. Altruistic willingness to pay in community-based sales of insecticide-treated nets exists in Nigeria. Social Science and Medicine 2002: 54: 519-527. College of medicine, University of Nigeria, Enugu Campus. The objective of this study was to determine whether households who are willing to pay for insecticide-treated nets (ITNs) for themselves are prepared to contribute for the ITNs to be purchased for the indigent community members who cannot afford the nets. This was in the framework of community-based and directed sales for ITNs. The study was conducted in four malaria holoendemic communities in south-eastern Nigeria. Contingent valuation method was used to determine altruistic willingness to pay (WTP) from randomly selected household heads or their representatives, which was elicited using an open-ended question. Theoretical validity was assessed using the Tobit model. Median altruistic WTP ranged from $0.11 to $0.21 across the four communities (95 Naira = $1). However, using a pooled data from the four communities, the mean was $0.34. In Tobit estimation, altruistic WTP varied significantly with two of the communities; the respondents were resident in sex, marital status and the amount of savings of the respondent. It also varied significantly with the respondents' WTP for their own ITNs and the average monthly household expenditures to treat malaria ($p<0.05$). Altruistic WTP will exist in community-based and directed sales of ITNs. Thus there can be intra-community subsidization by the rich for the poor who may not be able to pay for the nets. Community mobilization and sensitization should be used to encourage able households to actually pay at least the amounts they have stated.

C.4. <u>Pregnancy</u>

Gharoro EP, Igbafe AA. Pattern of drug use amongst antenatal patients in Benin City, Nigeria. Med Sci Monit 2000 Jan-Feb;6(1):84-7. Departement of Obstetrics and Gynecology, University of Benin Teaching Hospital, Benin City, Nigeria. gharoro@uniben.nigol.net.ng. BACKGROUND: Drugs taken by pregnant women could have profound effect on pregnancy outcome for both the mother and fetus. In most developing country regulation of drug is poor, access is unrestricted and abuse of drugs especially antibiotics is rampant. The study was undertaken to determine the pattern and extent of drug consumption amongst pregnant women in Benin City. METHODS: A cross-sectional study of 1200 pregnant patients at various gestational ages was undertaken, using a structured questionnaire to obtain details of the extent and character of drug use before or during pregnancy. FINDINGS: Folic acid was taken by 76.08% of all the pregnant patients, while anti-malarial drugs were taken by 19.75%; 15.83% used the drugs on doctors' prescription and 3.92% without a doctor's prescription. The proportion of the mothers that consumed native herbs was 12.08%. The use of native medication was more prevalent amongst nulliparous mothers (41.82%). Native herb consumption decreased with increase in parity. Both educated and illiterate mothers consumed herbal medications. Less than 1% of the mothers smoke cigarettes. INTERPRETATION: In Benin City drug use in pregnancy is characterized by a pattern of low consumption except folic acid and native herbs. This could be a major setback for any program of drug intervention, as in chemoprophylaxis for malaria in pregnancy. Much resource will be needed for patients' education for successful implementation of any planned program in the community.

Obed JY, Zarma A, Mamman L. Antenatal complications in adolescent mothers aged below 14 years. Afr J Med Med Sci 1997 Sep-Dec;26(3-4):179-82. Department of Obstetrics and Gynaecology, University of Maiduguri Teaching Hospital, Nigeria. Antenatal complications in 340 booked and 710 unbooked adolescent mothers aged 12-14 years were evaluated over a 2-year period at the Specialist Hospital, Yola, Adamawa State, Nigeria. Emesis gravidarum was observed in 290 (85.3%) and 612 (86.2%) booked and unbooked mothers, respectively. While 112 (32.9%) booked mothers had malaria, this ailment was observed in 508 (71.5%) of unbooked mothers. Forty-six (13.5%) booked mothers suffered from anaemia as against 483 (68.0%) unbooked patients. It was observed that preeclampsia manifested in 62 (18.2%) booked and 158 (22.2%) unbooked mothers, while eclampsia occurred in 18 (5.3%) and 66 (9.3%) booked and unbooked mothers, respectively. The rates of premature deliveries were 16.20% in booked mothers and 22.82% in the unbooked group. Other notable complications observed in both groups include premature rupture of fetal membranes (PROM), preterm contractions, antepartum haemorrhage, and urinary tract infections. There were slightly higher frequencies of the above complications in 12-year-olds, and these decreased slightly towards the age of 14 years. Nine of the 10 above observed complications occurred more in the lower socioeconomic classes [3-4] than in the upper social economic classes [1-2] in significant proportions.

Odum CU, Anorlu RI, Dim SI, Oyekan TO. Pregnancy outcome in HbSS-sickle cell disease in Lagos, Nigeria. West Afr J Med 2002 Jan-Mar;21(1):19-23. Department of Obstetrics and Gynaecology, College of Medicine, University of Lagos, Nigeria. A retrospective study of pregnancy outcome in 60 HbSS sickle cell disease patients, exclusively managed in accordance with standard management modality, as obtained in the obstetric Unit of the Lagos University Teaching Hospital (LUTH), was carried out over a 3-year period (1995-1997). The study shows an increase in the number HbSS patients seeking antenatal care in the LUTH. Although the patients maintained a stable haematological profile, all through pregnancy and delivery, as reflected by the booking, pre-delivery and post-delivery PCV of 23.2 +/- SD 4.6% and 23.6 +/- SD 4.5% respectively; pregnancy was complicated in 96.6% of cases (n = 58). Sickle cell crises of bone pain (41.4%), acute haemolysis with anaemia

(34.4%); malaria (22.4%) and other systemic infections (22.4%) were the major causes of pregnancy complications. Antenatal and postpartum blood transfusion rates were 45.0% and 81.6% respectively. The perinatal and maternal mortality rates were 121 and 67/1000 respectively, while caesarean section rate was 43.2%. It is observed that while more patients with HbSS sickle cell disease are seeking antenatal care in the LUTH, with improved prognosis, pregnancy complications from sickle cell crisis, remain a major problem in the care of these patients.

Walker MB. High risk behaviours related to maternal and child health. West Afr J Med 2001 Oct-Dec;20(4):203-9. Institute of Child Health, College of Medicine, University of Ibadan, Nigeria. BACKGROUND: The excessive high maternal and perinatal mortality and morbidity figures characteristic of our community could be linked with maternal high-risk behaviours during pregnancy, delivery and postnatal periods. This cross-sectional questionnaire study assessed the prevalence of these behaviours among mothers in Ibadan. METHODS: Consecutive mothers attending infant welfare clinics of selected formal health facilities in Ibadan within 6 weeks of delivery were interviewed with a questionnaire. RESULTS: Of the 500 women interviewed, only 2.4% did not receive any antenatal care, 87.7% commenced care after first semester (57.2% and 30.5% in the second and third trimesters respectively). Twenty-five percent, 7.5% and 4.8% received no malaria prophylaxis, no tetanus immunisation, and iron preparations during pregnancy respectively. Seventeen percent (16.9%) received incomplete tetanus immunisation. Thirty percent (30%) of the women delivered out of formal health facilities, in church-based maternity and at home. While 91.4% received group breastfeeding counselling, 72% received group counselling specifically on exclusive breastfeeding. Eighty-four percent of the babies were not exclusively breast-fed, with 62.9%, 26.8% and 4.6% receiving supplementation with water, herbal preparations and artificial milk respectively. Sixty-seven percent of the babies received first immunisation after the first week of delivery. Prevalence of high risk behaviours related to maternal and child health care were not significantly different among the women utilising formal health facilities irrespective of the level, but were significantly higher among women who did not. CONCLUSION: A high prevalence of high-risk behaviours during pregnancy, delivery and postnatal periods, despite the availability of services, has been highlighted. There is a need to promote optimal utilization of existing services. There may be a need for quality assurance of these services.

D. <u>Home and Community Management</u>

Adikwu MU. Sales practices of patent medicine sellers in Nigeria. Health Policy Plan 1996; 11(2): 202-5. A survey was carried out among patent medicine dealers to evaluate their practices that militate against laws governing prescriptions-only medicines in Nigeria. Questionnaires were distributed to 46 patent medicine dealers and later collected from them on appointment. Analysis of the results showed that all the patent medicine dealers were aware of the law governing the sale of prescription drugs in Nigeria. Seventy-five per cent of them stock such drugs. Patent medicine dealers obtain their drugs largely from sales representative of pharmaceutical companies as well as from industries. Inappropriate use of sales boys and girls in patent medicine stores and defective government policies were all investigated.

Akpede GO, Igene JO, Omotara BA. Perceptions of and management practices for diarrhoeal diseases by traditional healers in northeastern Nigeria. J Health Popul Nutr. 2001; 19(2): 91-99. In Nigeria, there is a paucity of data on the beliefs and practices of traditional healers 5oAhundertapercdisstrvia97202.56Patenpauct pdealers were

and others that are accessible to scattered, outlying communities that are poorly served by orthodox medicine.

Brieger WR, Ogunlade PB. Lessons Learned and Impacts of the CPH Experience in Nigeria. Basic Support for Institutionalizing Child Survival (BASICS) Project/U.S. Agency for International Development. BASICS, Arlington, Virginia, 2001. Since 1994 BASICS has experimented with community and private health care provider partnerships in poor urban communities of three Nigerian cities in an attempt not only to fill service gaps for children, but also to empower communities to take responsibility for their own health. What resulted were 16 Community Partnerships for Health (CPHs) that involved dyads of private health care facilities (HCFs) and community based organizations (CBOs). This model worked well in the southern cities Lagos and Aba where western orthodox HCFS abounded, but in the northern city of Kano, effort was made to involve PMVs and indigenous healers as key health care providers. Initially it was envisioned that PMVs could become the third leg of a triad system. Experience has shown that they could not fulfil this role due to their peculiar organization, but they none-the-less made contributions to the CPH movement. Over the six years of active CPH functioning, most have grown. This summary focuses on the experiences in Kano. Kano presented a challenge in that there is was a scarcity of available and willing private HCFs to join the CPH and around which dyads can form. The idea was originally put forth that in Kano, patent medicine vendors (PMVs) would not only be included in the CPH, but could form a third leg on which triads would be formed. In reality, the multiplicity of individual shops with one or two staff did not make an appropriate and comparable institutional alternative to HCFs, and PMVs were more generally recognized in Kano collectively, as another association or member CBO. While the numbers of PMVmembers increased, the number of CBOs and orthodox HCFs has declined, according to official reports. What actually appears to have occurred is that the existing association of PMVs in a community are considered to be CPH members in their status as another CBO, but one with special resources. Even though health care resources were scarce in the community, CPHs did not always welcome PMV members with open arms. This may stem from the fact that the bulk of proprietors belonged to a different ethnic group and had migrated from another part of the country to do business. A PMV from Gama-B CPH said that, “No participation from our members because we are never contacted as a member of the CPH, but we will only hear that a member has been chosen to attend and so without our elected officials knowledge which is very bad.” We have a “communication gap.” A PMV from Gwale offered another observation showing their apparent alienation from the CPH. “The leadership, I can’t say that they are good, they are just average. They are always fighting each other. They are not patient, some seem to be selfish.” In short, the Kano PMV association members tended to feel left out of CPH processes. Ironically, the only area of Kano CPH membership increase reported in the official inventory was among the indigenous providers and PMVs. Thus, major health care players in the Kano design of the PH program feel left out, the PMVs who are largely non-indigenes, and the TBAs who are women. Fortunately, there were roles designed for the PMVs in a number of projects undertaken by the CPH. “Our PMVs will be responsible for marketing of the condoms.” One PMV representative said, “The CPH is just about to execute a project on HIV/AIDS control. Our PMVs will be responsible for marketing of the condoms and offering these to CBD agents. One PMV described the benefits of their membership in the CPH as follows: “Our PMVs have been particularly singled out for some seminars on malaria control and NID. There is also an ongoing arrangement for the PMVs to buy directly from the genuine drug companies and at cheaper rates. Staff of PMV have become more confident. They (community members) see us as better drug sellers now. The local govt and the state government are even now encouraging us to extend our sales to the rural areas. Our clients get better services and are more confident about our drugs. We now have increased patronage at about 30% increase. We have records of sales. (Badawa CPH).

Another PMV from Gama-B CPH explained, "Many people come to my chemist because I give medicine as well as advice on what to do in cases of diarrhoea, vomiting, etc., and all these I learnt from the CPH. Relations with the community are cordial. They are more receptive and understanding." The PMVs, who were supposed to form the third leg of the "triads" in Kano, saw some benefits to their businesses and themselves. A good example came from Gama-B on how the PMVs have benefitted. "Because of our affiliation with the CPH, we have learnt about children's diseases that we don't know before now. I have benefitted because I attended and participated in a lot of their workshops and seminars. We are very much aware of sickness that can kill or harm our children and have learnt how to cope with them, for example, with ORT. Many people come to my chemist because I give medicine as well as advice on what to do in cases of diarrhoea, vomiting, etc, and all these I learnt from the CPH." A PMV from Gwale also saw benefits. "My benefit is the ORT corner and if there is a call to attend a workshop. I attended three workshops. My advantage is the training and linkage with more people" A PMV from Badawa observed that membership of their PMV Association in the CPH has resulted in a membership increase within the association from 17 to 40. He thought that they have benefitted by doing new activities such as mobilization for immunization, training on malaria control and helping conduct a community census. PMVs have also played a major health provider role for CPH members. Local government facilities are not always reliable. This example from Gwale CPH illustrates the problem with LGA facilities and how PMVs fill the gap. "Our (LGA) health facility has no drugs. They send out members to PMVs belonging to the CPH for the purchase of drugs." The involvement of PMVs in Kano has included a specific ORT component, and ORT was a component of local efforts in Kano to deal with a cholera outbreak. "I sell ORT and educate mothers on ORT corner." (PMV Member, Gwale, Kano) CPH members have had apositive influence on PMVs. A community leader observed that, "People of the community are so interested in the activities of the CPH," which he listed as immunization, environmental sanitation, clearing of drainage, female education, vocational training for women, and ensuring that the drugs in the PMV shops are genuine. The experiment with involving PMVs and TBAs in Kano was noteworthy, but did not work as these alternative health care providers ultimately took part in the CPH as a PMV or TBA association, that is just another CBO and not a health care provider partner. PMVs and TBAs certainly have not performed the leadership roles seen among HCF staff in other CPHs. Some Kano CPHs have tried to assist the LGA by building and/or staffing LGA health posts and clinics, but ultimately these are creatures of the LGA and have not served the leadership function seen in Aba or Lagos.

Brieger WR, Sesay HR, Adesina H, Mosanya ME, Ogunlade PB, Ayodele JO, Orisasona SA. Urban malaria treatment behaviour in the context of low levels of malaria transmission in Lagos, Nigeria. *African Journal of Medicine and Medical Sciences* (in press). Urban malaria in West Africa is not well documented. While rapid urbanisation may create environmental conditions that favour mosquito breeding, urban pollution may inhibit the growth of *Anopheles* species. In 1996, the Basic Support for Institutionalizing Child Survival (BASICS) Project of the U.S. Agency for International Development (USAID) started building urban community health coalitions in Lagos, Nigeria, to empower communities to provide prompt treatment and appropriate prevention for major causes of childhood morbidity and mortality, including malaria, diarrhoeal disease, acute respiratory infections and vaccine preventable diseases. Intervention against malaria was predicated on national policies that assumed Nigeria was holo-endemic for malaria and that prompt treatment of febrile illness with anti-malarial drugs was an appropriate action. At the suggestion and with the assistance of another USAID programme, the Environmental Health Project (EHP), BASICS embarked on a rapid assessment of the epidemiological, entomological and sociological situation of malaria transmission and case management in three Lagos communities. During April and May 1998, blood film investigation of 916 children between the ages of 6 months and 5 years yielded a

parasite prevalence rate of 0.9%. Night knockdown collections of mosquitoes in rooms yielded only *C. quinquefasciatus* and *A. aegypti*. The same results were obtained for night landing collections on human bait. Very low densities of *A. gambiae* larvae were found in breeding sites in Lagos Island (0.7) and Ajegunle (0.3). In contrast, community members, during focus group discussion identified malaria, in it various culturally defined forms, as a major health problem. Among the children examined clinically, 186 (20.3%) reported an illness, which they called "malaria" in the previous two weeks, and 180 had sought treatment for this illness. Concerning the most popular sources of care, 35.% sought care from a medicine or chemist shop, 28.9% from a government clinic and 22.2% from a private clinic. Overall, the median cost of treatment reported by 137 who could remember was ₦150. This varied by source, with a median of ₦300 at private clinics, ₦208 at government clinics, and ₦120 at medicine shops. Data obtained from 303 shops in the area documented that a minimum of US $4,000 was spent on purchases of anti-malarial drugs in the previous week. The cheapest drugs in stock were chloroquine products (₦40-50), while the most expensive included Halfan, Fansimef and Paludrin (₦425-900). The implications of these findings for both professional and community education are discussed.

Edet EE. Fluid intake and feeding practices during diarrhoea in Odukpani, Nigeria. East Afr Med J 1996 May;73(5):289-91. Department of Community Health, University of Calabar, Cross River State, Nigeria. This study was designed to determine the fluid intake and feeding practices among under five year old children during episodes of diarrhoea. Fluid intake was low. The average amount of salt-sugar solution (SSS) and WHO/UNICEF recommended oral rehydration solution (ORS) formula drank within the preceding 24 hours of diarhoea was 368 mls and 274 mls respectively. Only 54.0% and 43.3% of children received same or more food and fluid respectively as compared with before the diarrhoea. Less than half of the children continued breastfeeding. Targeted health education, with emphasis on these findings, are recommended for improving fluid and food intake in the home management of diarrhoea.

Ene-Obong HN; Iroegbu CU; Uwaegbute AC. Perceived causes and management of diarrhoea in young children by market women in Enugu State, Nigeria. *Journal of Health, Population and Nutrition*. 2000 Sep;18(2):97-102. The aim of the study was to determine the perceptions of mothers regarding the causes and management of diarrhea of their children aged 0-24 months. In Enugu State, Nigeria, 80 market women whose children had diarrhea during last 6 months were interviewed fortnightly. When possible, the children were observed to determine the types of diarrhea and treatments given. 53 of the women brought their children to the market, and 27 left their children at home. 71% of the mothers perceived that diarrhea was caused by teething. The most common types of diarrhea occurring in these children were watery diarrhea (59%) and the so-called teething diarrhea (29%). Dysentery (6%) and jedi jedi or frothy and mucoid stools (4%) occurred less frequently. In 68% of the cases, drugs were used alone or in conjunction with salt-sugar solution (SSS) or other forms of treatment. These drugs were prescribed by medical personnel (40%), patent medicine dealers (23%), or mothers themselves (30%). About 26% and 39% of the mothers treated, respectively, watery and teething diarrheas with drugs only, while 23% used SSS alone. The drugs used were mainly antimicrobials (34%) and a combination of antimicrobial, antimalarial, antacid, analgesic, and some local herbal preparations (21%). The results of the study showed the evidence of unnecessary use of drugs and ignorance about their potential adverse effects. These underscore the need for appropriate primary care education among the market women in Nigeria. (author's)

Ezedinachi EN, Ejezie GC, Emeribe AO. Problems of chloroquine-resistant P. falciparum in Nigeria: one antimalaria drugs' utilisation in metropolitan Calabar. *Cent Afr J Med* 1991; 37(1): 16-20. We studied the antimalarial drugs utilisation pattern in urban Calabar, with a

view to determining what drugs people take when they have malaria attack and who diagnoses and prescribes the drugs. We used a standard questionnaire data sheet to record the results of the interview carried out by the authors. Malaria symptoms and the drugs consumed were diagnosed and prescribed respectively by self (54pc), qualified medical doctor (32pc) and others including paramedical staff (2pc). The rest (12pc) took traditional remedies. The antimalarial drugs (chloroquine, fansidar, camouqin) were chosen because of their efficacy/popularity (21pc), cheapness (43pc) and availability (34pc). Among those interviewed, only 21.2pc took the adequate curative dose of 25 mg/kg chloroquine for 3 days according to WHO recommendations. Majority of the consumers took their drugs orally, but some (17pc) had chloroquine injections, administered, in some cases, by ill-qualified patent medicine dealer. The results show that there is an association between the level of education and the pattern of remedy sought by the respondents (p less than 0.05). Self-medication was practised significantly more by those with formal education than by those without (p less than 0.05). The trend of consulting patent medicine dealers for prescription decreased with acquisition of more formal education. Conversely, significantly more of the respondents with higher education consulted qualified medical doctors or paramedical staff (P less than 0.05). Two aspects of drug abuse observed here, i.e. the utilisation of sub-curative doses of chloroquine and monotherapy are believed to be two of the factors that lead to the several chloroquine treatment failures which have been recently reported in Calabar, and other areas of Nigeria.

Feyisetan BJ, Asa S, Ebigbola JA. Mothers' management of childhood diseases in Yorubaland: the influence of cultural beliefs. Health Transit Rev 1997 Oct;7(2):221-34. Department of Demography and Social Statistics, Obafemi Awolowo University, Ile-Ife, Nigeria. Several studies have noted that, besides inadequate availability of health care services in many areas, especially the less developed countries, certain disease-specific and non-disease-specific cultural beliefs may influence people's health seeking behaviour. It has even been noted that health services may be underutilized and several health and child care instructions may be ineffective or ignored in traditional and transitional societies where people's ideas and behavioural patterns conflict with the knowledge being passed to them (Feyisetan and Adeokun 1992; Feyisetan 1992). Feyisetan and Adeokun (1992) argued that non-adoption of modern preventive and curative measures cannot be attributed to poverty alone since the costs of some preventive and curative measures are not exorbitant in several of these societies. Rather, they suggested that the gap between awareness of modern health measures and health seeking behaviour must be sought in the social and cultural determinants of behaviour in such matters as child care and disease management. Earlier studies have noted that children in Nigeria die mainly from malaria, diarrhoea, measles, neonatal tetanus, whooping cough, tuberculosis, and bronchopneumonia (Morley and MacWilliam 1961; Ogunlesi 1961; Morley, Woodland and Martin 1963, 1966; Baxter-Grillo and Leshi 1964; Animashaun 1977; Tomkins 1981). Because these diseases are preventable at low cost to the individual, there is a need to investigate why large percentages of children are still subjected to many episodes of these diseases. In this paper, we examine (1) the mothers' perceptions of the aetiology of the three most cited childhood diseases in our study areas, measles, diarrhoea and fever, and the effect of these perceptions on the mothers' suggested curative measures; and (2) the persistence of the belief in abiku and how this cultural belief can influence mothers' management of childhood diseases. Since, for most mothers, perceptions of the aetiology of the childhood diseases are rooted in cultural beliefs, a brief review of disease-specific cultural beliefs is undertaken. In order to determine the effect of socio-economic factors, the mothers' perceptions of the aetiology of the childhood diseases, their recommended curative measures and the belief in abiku are examined according to selected socio-economic variables.

Igun UA. Reported and actual prescription of oral rehydration therapy for childhood diarrhoeas by retail pharmacists in Nigeria. *Social Science and Medicine*. 1994; 39(6): 797-806. This study documented what retail pharmacists and operators of patent medicine shops prescribe for childhood diarrhea in Borno State in the northeastern part of Nigeria. Data was generated by a combination of open and confederates survey of 135 pharmacies and patent medicine shops in the state. The study found that retail pharmacies and patent medicine shop operators, in the overwhelming majority, routinely prescribe drugs, particularly antibiotics, for both watery and bloody diarrhea. Very few of the pharmacists and almost none of the patent medicine shop operators prescribed any form of oral rehydration therapy (ORT) for watery diarrhea. There was very high discrepancy between what respondents told interviewers they usually prescribe and what was actually prescribed to confederates in their facilities. It is suggested that the non-prescription of ORT by the majority of facilities could be accounted for by pharmacists' permissive attitude to the norms. This permissive attitude was generated by the profit motive and reinforced by mothers' expectations. The study concludes that more operators can be made to prescribe ORT by instituting incentives for those who prescribe and overt sanctions for those who do not. (author's)

Igun UA. The knowledge-practice gap: an empirical example from prescription for diarrhoea in Nigeria. *J Diarrhoeal Dis Res* 1994; 12(1): 65-9. Based on a survey of 130 pharmacies and patent medicine shops in Borno State, Nigeria, this study documented and analysed what retail pharmacies prescribed for acute childhood diarrhoeas. It related their knowledge of appropriate prescriptions for watery diarrhoea with their actual prescriptions. The study found that appropriate knowledge was not reflected in appropriate prescribing. Those with appropriate knowledge, as well as those without such knowledge, routinely prescribed drugs instead of oral rehydration therapy (ORT) for watery diarrhoea. The motivations for such inappropriate prescribing were identified as the factors to be addressed in interventions aimed at improving prescribing.

Jimmy EO; Achelonu E; Orji S. Antimalarials dispensing pattern by patent medicine dealers in rural settlements in Nigeria. *Public Health* 2000;114(4): 282-5. The pattern of antimalarial drug dispensing by Patent Medicine Dealers (PMDs) was studied in 17 villages of Gokana (Ogoni Land) in Rivers State of Nigeria. Of the 40 PMDs studied only 8 (20%) had had normal health training and only 8 could understand doctor's prescriptions. In total, 19 different types of antimalarials could be obtained from the individual ranges of antimalarials displayed by the 40 PMDs in the study. Chloroquine phosphate was the most frequently available. 23 (57.5%) of the PMDs administered Chloroquine at below the recommended dose of this drug. 12 (30%) PMDs, 8 with formal training and 4 others, administered the correct dose, while 5 (12.5%) gave too much. All 40 PMDs studied knew how to dispense Daraprim and Fansidar correctly. The authors concluded that malaria control through prevention and treatment would be more effective if PMDs were to receive training on antimalarial dispensing alongside Community Health Workers.

Ofovwe GE, Ibadin OM, Ofovwe EC, Okolo AA. Home management of febrile convulsion in an African population: a comparison of urban and rural mothers' knowledge attitude and practice. J Neurol Sci 2002 Aug 15;200(1-2):49-52. Department of Child Health, University of Benin Teaching Hospital, P.M.B. 1111, Benin City, Nigeria. To determine the knowledge, attitude and practice (KAP) of home management of febrile convulsion (FC), by mothers in the community, focus group discussions (FGD) were conducted in two communities, Uselu (urban) and Evbuomodu village (rural), both in Edo State, Southern Nigeria. The study was conducted between December 2000 and February 2001. Our findings show that 71% of urban mothers compared to 25% of rural mothers attributed the cause of FC to fever (chi(2)=24.17: $p<0.001$). Seventy-five percent of mothers from rural community and 28.6% of urban mothers

attributed the cause to witchcraft and/or evil spirits. Twenty-five percent of rural mothers also attributed abnormality of the spleen as a cause of FC. All the mothers, both urban and rural, were not directly involved in the management of the convulsive episode due to panic and confusion. Ninety-two percent of urban and all the rural mothers permitted the use of traditional medicine while 7.1% of urban mothers employed prayers during convulsion. Twenty percent of urban and twenty-two percent of rural mothers use urine (human and or cow's) for treating FC at home. Other home remedies include kerosene, fuel and crude oil.Mass enlightenment campaign for the community, especially the rural, against use of harmful traditional remedies to treat FC at home is strongly advised.

Ohuabunwa SI. The role of pharmaceutical companies in the control of prescription-only drugs in Nigeria. *BMJ, West Africa Edition* 3(1): 7-8. January 2000. There are myriads of problems facing Nigeria's health system. These include the inadequate number of health facilities, inadequate number of health personnel and inconsistent supply of essential drugs. Data from the pharmaceutical services in the country show that 60% of the drugs used in this country belong to over-the-counter medications covered by the Classes B and C licenses, that patent medicine sellers receive, while the other 40% of drugs belong to the prescription only class (ethical products). The formal health sector views with alarm the activities of PMV.

Ojuawo A; Oyaniyi OT. Treatment of diarrhoea by proprietary-medicine vendors. *Nigerian Journal of Paediatrics*. 1993; 20(2): 41-4. Although oral rehydration therapy (ORT) is an effective and inexpensive means of treating dehydration resulting from acute gastroenteritis, many parents in Nigeria usually first seek treatment from patent-medicine dealers for their children with diarrheal diseases. The authors investigated the treatment of diarrhea by 75 patent and proprietary medicine store vendors in Ilorin, capital of Kwara State. There are 417 registered patent and proprietary medicine stores in the city. Seven investigators visited the stores where they individually presented themselves as parents or guardians of a child with diarrhea. 33.3% of respondents selling the medicines at the stores were owners, while the rest were only employees. 30% of the employees were primary school students. The storekeepers and employees rarely asked questions about the diarrhea and did not ask to see the child with diarrhea to determine whether there were signs of dehydration. Unaware of the efficacy of ORT, respondents at all stores recommended drugs to treat diarrhea. Storekeepers also poorly understood the seriousness of the condition and the need to refer some cases to a medical center. The government needs to review the existing laws which regulate the establishment and functions of such proprietary medicine stores. Furthermore, courses for store vendors need to be updated, with vendor training supervised by a monitoring system.

Okafor CB. Availability and use of services for maternal and child health care in rural Nigeria. Int J Gynaecol Obstet 1991 Apr;34(4):331-46. A personal in-home interview was conducted in 4 rural towns in Nigeria whose aims were to describe the content of Maternal and Child Health (MCH) care in these rural towns and to assess how patterns of prenatal, delivery, and postnatal service use are related to a variety of demographic and socioeconomic variables in the population. Findings from data analysis indicate that services available are deficient in terms of the number of centers and content of care. Variables found to be statistically significant (p0.01) for use of services are maternal education, occupation, distance, and previous use of a physician. Husband's occupation was significant only for prenatal registration but not for subsequent use of services. Recommendations include a reorganization of rural MCH services and an introduction of female literacy programs, especially at the rural level.

Okeke TA, Okafor HU, Amah AC, Onwuasigwe CN, Ndu AC. Knowledge, attitude, practice and prescribing pattern of oral rehydration therapy among private practitioners in Nigeria. J

Diaddhoeal Dis Res. 1996; 14(1): 33-36. To determine the knowledge, attitude and practice of oral rehydration therapy (ORT) among private medical practitioners in Enugu, Nigeria, 91 doctors were interviewed using a structured questionnaire. All the doctors had heard of ORT and believed in its efficacy. The commonest source of information on ORT was the medical school (44%). Fifty percent would recommend salt-sugar solution (SSS) rather than oral rehydration salts ORS). The main reason is its cost-effectiveness and easy availability. Only 55% of the respondents knew how to prepare SSS correctly. The percentage of doctors who prescribe smooth muscle relaxant (spasmolytic use rate) was 41%, and the commonest reason was to reduce bowel movement. The influence of year of medical education on spasmolytic use was found to be statistically significant ($p<0.05$). Antibiotics were commonly used, although most (76%) doctors believed that viral infections were a common cause of childhood diarrhoea. All the respondents would recommend continued breastfeeding during diarrhoeal episodes. The study revealed a high rate of inappropriate drug use and a deficiency in the knowledge and practice of ORT.

Okoro BA, Jones IO. Pattern of drug therapy in home management of diarrhoea in rural communities of Nigeria. *J Diarrhoeal Dis Res* 1995; 13(3): 151-4. A prospective study was carried out in 72 rural communities in Nigeria to determine the pattern of drug therapy and other treatment modalities in case management of diarrhoea at home. The communities were selected using the cluster-sampling technique, and the survey was carried out using the standard methodology of WHO/CDD diarrhoea case management and morbidity. A total of 9,293 children aged less than 5 years were studied, of which 488 had diarrhoea in the preceding 24 hours of the medical examination. Oral rehydration salts (ORS) solution and drugs were used by 20.1%, of the children ORS alone by 2.7%, home-based fluids alone by 21.7%, drugs and salt-sugar solution (SSS) by 31.8%, and drugs and other home-based fluids by 23.7%. The drug-use rate was 75.6%, and polypharmacy occurred in 56.9%. The injection-use rate was 18.4%. Antibiotics (40.3%), antiprotozoals (24.6%), and antidiarrhoeals (15.3%) were the main groups of drugs used. The government doctors, health workers, pharmacists, and patent medicine dealers were the main sources of prescription and supply of drugs. The village health workers, traditional birth attendants, and traditional doctors, who together provided significant proportion of these functions, are an important group requiring training.

Omotade OO, Adeyemo AA, Kayode CM, Oladepo O. Treatment of childhood diarrhoea in Nigeria: need for adaptation of health policy and programmes to cultural norms. J Health Popul Nutr 2000 Dec;18(3):139-44. A community survey of treatment regimens for acute diarrhoea in children was carried out in 10 villages in the Ona Ara Local Government Area of Oyo State, Nigeria, using a combination of qualitative (focus-group discussions) and quantitative (weekly surveillance of diarrhoea) methods. Focus-group discussions were conducted with parents of children aged less than 5 years, while a surveillance of diarrhoea among 550 children of same age was carried out during a 6-month period. The findings of the study showed that not all types of diarrhoea were recognized as illnesses, and only those considered to be illnesses were treated. Treatment often involved an adhoc group which comprised adults who were present at the time the illness occurred (including parents, neighbours, relatives, and elders). Certain beliefs and practices, such as associating types of diarrhoea with occupation or ethnic groups, categorizing the severity on perceived causes, and withholding certain foods during episodes of diarrhoea, were common factors in decision-making for seeking treatment. Antimicrobial agents were used in the case of 46.8% of 205 diarrhoeal episodes, and 28.5% were not at all treated. The usual practice of focusing on a target group, such as mothers, during educational interventions may need to be modified in communities where nearly every adult has a role in decision-making in relation to health. The need to adapt health policy and programmes to cultural norms should be addressed to improve the impact of programmes.

Onwujekwe O, Chima R, Okonkwo P. Economic burden of malaria illness on households versus that of all other illness episodes: a study in five malaria holo-endemic Nigerian communities. Health policy 2000; 54: 143-159. College of Medicine, University of Nigeria, Enugu Campus. We compared the financial and economic costs of malaria attack to that of a combination of other illnesses on households in five malaria holo-endemic rural communities. The data was collected from household heads or their representatives using pre-tested interviewer-administered questionnaire. Information was collected on the amount of money household spent to treat both malaria and other illnesses respectively, together with the time lost due to both the groups of illnesses within 1 month prior to the interview. The findings showed that the cost of treating malaria illness accounted for 49.87% of curative health care costs incurred by the households. Average malaria expenditure was $1.84 per household per month, while it was $2.60 per month for the combination of other illnesses. The average person-days lost due to malaria and the combination of other illnesses were almost equal. If the financial costs of treating malaria and the other illnesses are combined, this cost will deplete 7.03% of the monthly average household income, with treatment of malaria illness alone depleting 2.91% thus, malaria is a big contributor to the economic burden of disease in malaria holo-endemic communities. Community-effective malaria control programs are needed to reduce this burden on the households.

Orubuloye IO, Caldwell JC, Caldwell P, Bledsoe CH. The impact of family and budget structure on health treatment in Nigeria. Health Transit Rev 1991 Oct;1(2):189-210. Health-treatment decisions, in much of the world, are affected by the family's ability to meet the cost. In West Africa the situation is more complex because husbands and wives typically have separate budgets. This article reports an exploration of the impact on treatment of divided family budgets in Nigeria where health services now charge for prescribed drugs. It was found that most child treatment is paid for by one person only, usually a parent, and that the treatment chosen is decided by the person meeting the cost. Mothers are most likely to pay for minor illnesses but the father's role becomes more important as the cost rises. Because the type, and even fact, of treatment depends on the ability to pay, and because the family is not a unity in these decisions, the health system may have to devise charging procedures that make both parents responsible, possibly with community involvement in securing payment.

Osamor PE. Knowledge and Selling Practice of Patent Medicine Vendors (PMV) Regarding the Treatment of Malaria in Idikan Community, Ibadan, Oyo State. A dissertation in the Department of Health promotion and Education, College of Medicine, University of Ibadan, 2001. Malaria, a major cause of morbidity and mortality among children in Africa, is usually treated with medicines bought from patent medicine vendors (PMVs). In Nigeria, shops and patent medicine shops is the source for a considerable amount of anti- malaria drugs consumed by a large proportion of the general population. This is because of the nearness of these shops to the community members, availability of drugs in their shops and visiting them is regarded as time saving. While PMVs are legally allowed to sell proprietary antimalarial drugs, little is known about the nature and extent of services they provide concerning malaria treatment, including patient education beyond their role as vendors. This study therefore, is aimed at documenting the malaria knowledge and treatment practices of PMVs in the Idikan community of Ibadan North West Local Government Area in Oyo State. This descriptive, cross-sectional study of PMVs involved use of both a structured questionnaire and an observational checklist, both of which were pre-tested. There are about 150 registered PMVs in the Idikan community and all are approached for enrollment into the study. The questionnaire sought information on the knowledge, level of self-confidence and selling practices regarding the treatment of malaria in Idikan. Of the 150 registered PMVs approached for enrollment, 129(86%) responded. In-shop observations of 122 customers,

visits were performed in 41 shops, which were randomly selected. The respondents included 107 (83%) shop owners and 22 (17%) clerks/apprentices. Their average age was 31 years, and 76 (59%) were female. Only 20 (16%) had not completed secondary school. When asked how they recognize malaria, only 58 (45%) mentioned fever. Although 116 (90%) said malaria was transmitted by mosquito bites, other common ideas were exposure to heat and sun (23%) and stress (15%). Chloroquine product was mentioned by 114 (90%) as the most common drug people in the community buy for malaria. When asked what they would do if a mother walked into their shop and said her child had malaria, 67 (52%) would sell an antimalarial drug immediately, 37 (29%) would ask questions about the child's condition, and 12 (9%) would examine the child. The remaining 13 (10%) would refer to a doctor, try to determine the type of malaria or give the mother a choice among drugs. Only 31 (25%) knew the correct dose of chloroquine for a two-year old child. Those who knew the correct dose were significantly older (34 years) than those who did not (31 years) ($p < 0.02$), but educational level was not associated with knowledge. A 15-point scale was constructed concerning how frequently PMVs provided five items of information to customers when selling drugs. Shop owners had a significantly higher mean score (11.0 points) than did clerks/attendants (9.7) ($p < 0.02$). During shop observations 60 (49%) of customers bought an antimalarial drug. Overall, 70 (57%) of attendants gave instructions on dose, side effects or precautions. In conclusion, the study shows that PMVs recognizes malaria with such symptoms as fever, headache, bodyache.Mosquitoe bite was mentioned as the cause of malaria. In examining the treatment of malaria by the PMVs, typically, dosages of chloroquine used are incorrect. Although they report a fairly high average score for giving instruction to customers, in reality many do not give such instruction.PMVs need training in disease recognition and correct dosage in common antimalaria drugs they sell, with particular attention to clerks and apprentices who are less experienced.

Oshiname FO; Brieger WR. Primary care training for patent medicine vendors in rural Nigeria. *Social Science and Medicine.* 1992; 35(12): 1477-84. The provision of essential drugs and the involvement of various potential and existing health care providers (e.g. teachers and traditional healers) are 2 important primary health care strategies. One local group that is already actively supplying the medication needs of the community is the patent medicine vendors (PMVs), but the formal health establishment often views their activities with alarm. One way to improve the quality of the PMVs' contribution to primary care is through training, since no formal course is required of them before they are issued a license by government. Primary care training was offered to the 49 members of the Patent Medicine Sellers Association of Igbo-Ora, a small town in western Nigeria. Baseline information was gathered through interview, observation and pretest. A training committee of Association members helped prioritize training needs and manage training logistics, 37 members and their apprentices underwent the 8 weekly 2-hour sessions on recognition and treatment (including nondrug therapies) for malaria, diarrhea, guinea worm, sexually transmitted diseases, respiratory infections, and malnutrition, plus sessions on reading doctor's prescriptions and medication counseling. The group scored significantly higher at post-test and also showed significant gains over a control group of PMVs from another town in the district. The Igbo-Ora experience shows that PMVs can improve their health care knowledge and thus increase their potential value as primary health care team members.

Osibogun A. Utilisation differentials in a rural Nigerian health centre. West Afr J Med 1998 Jan-Mar;17(1):31-5.Dept of Community Medicine & Pry Care, College of Health Sciences, Ogun State University, Sagamu, Nigeria. The Ala-Idowa health centre was established in 1980 to serve the two contiguous communities of Ala and Idowa with population of 3960 and 6580 respectively. Situated reasonably between the two communities, there is adequate physical accessibility to the health centre from both sides. The population structure of the

combined community was determined through a household survey involving 125 households selected systematically from the total of 2500 households. A comparison is presented between this structure and that of the population of attendees at the outpatient department of the Ala/Idowa health centre as recorded in the outpatient register with a view to discerning differentials in utilisation among different age groups. The data showed that those under the age of 15 years made more use of the health centre services than any other age group. Also, of the total of 958 patients for whom a diagnosis was recorded, 565 (56%) presented with an infection or infestation alone while another 4% presented with an infection together with another condition. Malaria accounted for 358 (63.4%) of all reported cases of infection/infestation. It is hoped that the findings of this study can be used to further target health centre services at the appropriate groups within the community as well as directed to those conditions, particularly communicable and preventable, that continue to exert great morbidity on the populations of developing communities.

Osinusi K, Oyejide CO. Child care practices with respect to acute respiratory tract infection in a poor, urban community in Nigeria. *Rev Infect Dis* 1990; 12 Suppl 8: S1039-41. A longitudinal study conducted over a 3-year period in a poor, urban community in Nigeria, a developing country, found that acute respiratory tract infection (ARI) was common, in particular among infants and boys. Between 81% and 95% of the children treated for ARI over the 3-year period were brought to the clinic by their mothers. About 32% of these children had been treated with cough medicines, 42% with antipyretics, 5% with antibiotics, and 10% with hematinics before they were brought to the clinic. The source of such medications included medicines left over from previous prescriptions and those bought from chemists' shops and street vendors. Up to 64% of the children treated for ARI had been force-fed local herbal teas by their mothers; herbal teas were used for both preventive and curative purposes.

Oyejide CO and Oke EA. An ethnographic study of acute respiratory infection in four local government areas of Nigeria. Afr J Med med Sci. 1995; 24: 85-91. An ethnographic study was conducted in four local government areas of Nigeria. The techniques of informal unstructured interviews and participant observation were used. A total of 104 focus groups discussions with 53 groups of mothers, 21 groups of grandmothers and 30 groups of fathers were conducted. Perception of causes of ARI ranged from cold water, to heredity, poor hygiene, exposure to smoke and dust and the supernatural forces. Preventive measures described were related to the perceived causes. For those groups that discussed home remedies to the treatment of ARI, the remedies described for cough included herbal drinks (39% or groups); honey with lemon (19.5%); eating specific vegetables believed to relieve cough (8.4%); and preparations containing palm oil (21.7%). Remedies described for measles included herbal drinks (62%); local topical creams (24%); and palm wine (13.7%). Those for ear infections included drops of herbal mixtures in the ear (29.4%); putting various type of oil in the ear (38%); plugging the ear with cotton wool previously dipped in honey or ancohol (17%). The findings of this study have implications for the Health Education Component of the National AIR Control Program which Nigeria recently embarked upon. There is also the need for research on the efficacy and any possible adverse effects of identified home remedies.

Salako LA, Brieger WR, Afolabi BM, Umeh RE, Agomo PU, Asa S, Adeneye AK, Nwankwo BO, Akinlade CO. Treatment of childhood fevers and other illnesses in three rural Nigerian communities. J Trop Pediatr 2001 Aug;47(4):230-8. Nigerian Institute of Medical Research and Training, Yaba, Lagos. The seeking of healthcare for childhood illnesses was studied in three rural Nigerian communities of approximately 10,000 population each. The aim was to provide a baseline understanding of illness behaviour on which to build a programme for the

promotion of prepackaged chloroquine and cotrimoxazole for early and appropriate treatment of childhood fevers at the community level. A total of 3117 parents of children who had been ill during the 2 weeks prior to interview responded to questions about the nature of the illness and the actions taken. Local illness terms were elicited, and the most prevalent recent illness and the actions taken. Local illness terms were elicited, and the most prevalent recent illnesses were 'hot body' (43.9 per cent), malaria, known as iba (17.7 per cent), and cough (7.4 per cent). The most common form of first-line treatment was drugs from a patent medicine vendor or drug hawker (49.6 per cent). Only 3.6 per cent did nothing. Most who sought care (77.5 per cent) were satisfied with their first line of action, and did not seek further treatment. The average cost of an illness episode was less than US$2.00 with a median of US$1.00. Specifically, chloroquine tablets cost an average of US 29 cents per course. Analysis found a configuration of signs and symptoms associated with chloroquine use, to include perception of the child having malaria, high temperature and loss of appetite. The configuration positively associated with antibiotic use consisted of cough and difficult breathing. The ability of the child's care-givers, both parental and professional, to make these distinctions in medication use will provide the foundation for health education in the promotion of appropriate early treatment of childhood fevers in the three study sites.

E. Other Child Health Concerns

Etuk SJ, Etuk IS, Ekott MI, Udoma EJ. Perinatal outcome in pregnancies booked for antenatal care but delivered outside health facilities in Calabar, Nigeria. Acta Tropica 2000; 75: 29-33. Pregnancies that were booked for antenatal care but delivered outside the health facilities were studied. The aim was to determine the perinatal outcome of these pregnancies, and also to compare the outcome with that of pregnancies that were booked and delivered in the University of Calabar Teaching Hospital (UCTH). Birth asphyxia was the commonest perinatal morbidity in both the study (14.3%) and control (4.8%) groups and was significantly higher in the study group than in the control ($p<0.01$ - $p<0.05$). Incidence of neonatal infection/tetanus and birth trauma was also significantly higher in the study than in the control groups ($p<0.01$ - $p<0.05$). The incidence f prematurity, neonatal jaundice and congenital abnormality did not show any significant differences in the two groups. ($P>0.05$). The risk of perinatal death was three times higher in the study group than in the control. Proper public enlightenment campaigns and the establishment of a national health insurance scheme which may strengthen the use of orthodox health facilities for delivery, may improve the poor perinatal outcomes in our community.

Folayan MO, Fakande I, Ogunbodede EO. Caring for the people living with HIV/AIDS and AIDS orphans in Osun State: a rapid survey report. Niger J Med 2001 Oct-Dec;10(4):177-81. Department of Preventive Dentistry, Obafemi Awolowo University, Ile-Ife, Nigeria. The aim of the study is to obtain the views and opinions of People Living with HIV/AIDS (PLWHAS), community leaders and other stake holders (care providers and AIDS orphans), so as to assess the role of Non-Governmental Organisations in the control of HIV infection with the purpose of making appropriate recommendations for policy formulation on issues related to the health and care of PLWHAs. A qualitative research was carried out using in-depth interview method with a questionnaires as a guide. In all, 12 seropositives, 13 community leaders and 34 AIDS orphans were interviewed. Results indicate that there was a lack of networking between the six Non-Governmental Organisations working in the state in relation to HIV/AID. Also, none of these PLWHAs had concrete plans for the future of their children, though they all expressed some form of anxiety about their children's future. The burden of care of AIDS orphans often fall on the maternal family members. Top on the list of the problem of AIDS orphans was their poor education due to financial difficulties. There is the need for the government to provide, support, encourage and monitor the activities of the Non-Governmental Organisations and network with them so as to maximise the benefits that can be obtained from the role they play in HIV/AIDS management.

Hargreaves S. Time to right the wrongs: improving basic health care in Nigeria. Lancet 2002 Jun 8;359(9322):2030-5. The Lancet, 32 Jamestown Road, London NW1 7BY, UK. salhargreaves@hotmail.com. Nigeria, once heralded as the beacon of Africa, has fallen somewhat short of this potential. Years of kleptocratic repressive dictators and military rule, coupled with widespread corruption, have resulted in large-scale neglect and deterioration of public services. Nowhere is this more apparent than within the health sector. Government-run health-care services barely function: half the population are unvaccinated for routine diseases, and a burgeoning epidemic of HIV/AIDS, only now being adequately addressed, leaves 3.5 million already infected and without access to the most basic of care. A poorly structured health service that relies on vertical programmes for HIV, tuberculosis, and malaria, means that coordination is chaotic, and already scant resources fail to reach the lower levels in which they are needed most. I visited Nigeria in October, 2001, with Medecins Sans Frontieres, a humanitarian aid organisation that has been working in Nigeria since 1996. I witnessed the poor level of health care in Nigeria for myself--a country that is more than capable of providing effective services--and concluded that, even now, political priorities are being put

ahead of the population's basic needs. The challenges to the new civilian government are monumental, and it is yet to show any solid commitment to improving the health of Africa's biggest nation.

Johnson WB, Aderele WI, Gbadero DA. Host factors and acute lower respiratory infections in pre-school children. J Trop Pediatr 1992 Jun;38(3):132-6. Department of Paediatrics, University College Hospital, Ibadan. The relationship between certain host-related variables and the short-term outcome of hospitalization for severe acute lower respiratory infections was studied prospectively in a cohort of 103 pre-school Nigerian children. The respective mean ages of those with bronchiolitis and croup were 3.2 months and 18.9 months while the corresponding M:F ratios were 2.5:1 and 1:1. It was highly significant that all the eight children that died were malnourished (P less than 0.01). Furthermore, malnourished subjects with pleural effusion, in whom bacteraemia was common, stayed longest in hospital while subjects with bronchiolitis and croup, in whom malnutrition was distinctly uncommon, had the shortest duration of admission. Multiple microbial identifications and bacteraemia were common in malnourished subjects with ALRI. Mortality was significantly higher in older children (P less than 0.05), but sex, immunization/breast-feeding status and co-existing measles or pertussis, were individually neither related to the admission outcome nor the duration. It is concluded that malnutrition is a strong predictor of ALRI-related death in the pre-school child. The significance of bacteraemia and multiple microbial identifications in malnourished children, and the ARI-control implications of the study are discussed.

Kayode CM, Adeyemo AA, Omotade OO. Beliefs and perceptions about HIV infection and AIDS among mothers of infants in Ibadan, Nigeria. West Afr J Med 2002 Jan-Mar;21(1):43-7. Institute of Child Health and Department of Paediatrics, College of Medicine, University of Ibadan, Nigeria. In view of the growing importance of the human immunodeficiency virus (HIV) infection and the Acquired Immunodeficiency Syndrome (AIDS) in Nigeria, 221 mothers were interviewed by means of semi-structured questionnaires in an infant welfare clinic in Ibadan, Nigeria, about their perceptions and beliefs about HIV/AIDS infection with particular emphasis on how the infection could be acquired, how the risk of its acquisition can be reduced and whether how children could be infected. The findings revealed that 81% of the respondents believe that HIV infection does exist in Nigeria but only 17.6% think they have seen an AIDS patient. About two-thirds (68.8%) believe that children can be infected with HIV, 70.6% believe that a mother can transmit the infection to her child and 58% believe that HIV can be transmitted through breast milk. Eighty percent believe that people can protect themselves from having the infection by various means, including avoiding sharing needles or reusing hypodermic needles (83.3%), receiving unscreened blood (79.2%), mutual fidelity with a single sexual partner (73.8%), use of condoms (67.9%), avoiding the use of public toilets (56.1%) and avoiding mosquito bites (35.3%). Those with higher education showed better knowledge than those with lower education. In spite of the strong correlation with formal education, some misconceptions existed in all groups. For example, those without any formal education compared with those with some formal education believed that use of public toilet can cause HIV to be transmitted, the difference was not statistically significant (chi2 = 8.87; p = 0.064). Interestingly more of the highly literate women believed that HIV infection can be acquired by mosquito bites (chi2 = 16.82; p = 0.002). It was concluded that awareness of HIV infection and AIDS is high among mothers of infants attending the infant welfare clinic of the Institute of child Health, Ibadan. Whatever educational interventions is planned for this facility should take these findings into account and specially target those with none or little formal education.

Omotade O, Olaleye DO, Saliu L, Odaibo NG, Adeyemo AA. Human immunodeficiency seropositivity among mother-child pairs in South West Nigeria: a community-based survey.

West Afr J Med 2001 Oct-Dec;20(4):232-6. Institute of Child Health and Department of Peadiatrics, College of Medicine, University of Ibadan & University College Hospital, Nigeria. A community based survey to determine the prevalence of human immunodeficiency infection in Nigerian women and children in South Western Nigeria is reported. A multi-stage cluster random sampling procedure was used to select mother-child pairs from 35 enumeration areas in South western Nigeria. The final study sample consisted of 460 mothers and 476 children (including 16 sets of twins). A commercially available recombinant antigen-based ELISA method was used to test for HIV-1 and HIV-2 antibody in sera and Western blotting was used as a confirmatory test for initially reactive samples. Only one mother-child pair (out of 460 mother-child pairs) was found to be positive for HIV antibody giving a mother-child concordance for HIV infection of 0.22%. Antibody to either HIV-1 or HIV-2 was detected in 3.8% (18/476) of the children's sera and in 43% (20/460) of mothers sera. HIV-1 reactivity was commoner than HIV-2 reactivity (2.9% versus 0.8% among children and 2.8% versus 1.5% among mothers). There were many more positive samples in the rural than in urban areas among children (7.1% versus 1.1%) and also among mothers (6.8% versus 2.4%), ($p<0.001$). Thus, HIV infection appears to be a real problem in South western Nigeria. The lack of concordance between mother-child sera suggests that vertical transmission may not be a major route of transmission of HIV infection in children in South western Nigeria. It is suggested that certain high risk practices (such as the re-use of unsterilised hypodermic needles for injections and surgical knives in local scarification) which are common practices, especially in rural areas, need to be investigated as potential major modes of transmission of the infection. Control programmes need to take note of these findings in order to adequately plan comprehensive health education which will cover the whole population, including children.

Owa JA, Osinaike AI. Neonatal morbidity and mortality in Nigeria. Indian J Pediatr 1998 May-Jun;65(3):441-9. Department of Paediatrics and Child Health, Obafemi Awolowo University, Ile-Ife, Nigeria. A retrospective analysis of neonatal morbidity and mortality was conducted over a ten-year period (1981-1990) at a tertiary hospital in Ilesa, Nigeria, to determine the trends in neonatal morbidity and mortality in relation to places of delivery. 7,225 babies were admitted into the neonatal unit during the period wherein 3,232 (44.7%) were inborns and 3,993 (55.3%) outborns. Places of delivery of outborn babies were government hospitals/maternity centres (44.1%), home (28.5%), private hospitals/clinics (18.8%), and mission houses (8.7%). Major indications for admission among inborns were neonatal jaundice (45.6%), low birthweight (18.6%), birth asphyxia (14.2%), and neonatal infections (9.3%), while those for outborns were neonatal jaundice (39.5%), low birthweight (23.2%), neonatal infections (18.0%), neonatal tetanus (5.7%), birth asphyxia (4.8%). Overall mortality rate was 13.0%. It was higher in outborns than inborns ($p < 0.001$). Mortality was lowest in 1983 and peaked in 1987 and 1988. It was higher in outborns than inborns during the period ($p < 0.001$). Major causes of death were low birth weight (42.8%), neonatal jaundice (14.1%), neonatal tetanus (12.8%), infections (12.4%), and birth asphyxia (11.6%). In almost all cases, case fatality rates were higher among the outborns ($p < 0.001$). Similarly, mortality was higher in outborns than inborns in almost all the weight range. Among the outborns, mortality was highest in babies delivered at home and private hospitals. Improved access to neonatal medical and antenatal care will significantly reduce neonatal morbidity and mortality in Nigeria.

Stephens TT, Oriuwa CL, Uzoho M. Enhancing participation of women of child-bearing age in a literacy for health project in southeastern Nigeria. Trop Doct 1999 Jan;29(1):12-8. Rollins School of Public Health, Department of Behavioral Sciences and Health Education, Atlanta, GA 30322, USA. This paper summarizes the approach of a 'literacy for health project' in southeastern Nigeria to recruit and maintain participants. Literacy for health

projects enhance and develop the educational abilities of women while at the same time acting as a vehicle to combat the problems associated with maternal and child health. We describe ways to foster and enhance the participation of women of child-bearing age in a literacy for health project operated in Igbo-speaking southeastern Nigeria. Findings reveal that of four literacy centres, participation rates ranged from 50.35% to 61.1%. We maintain that efforts designed to impart the transference of literacy and numeracy skills to such women in southeastern Nigeria must: (a) address the farming needs, practices and operations of the target community prior to programme implementation; (b) consider the inclusion of counsellors in addition to traditional village health workers and/or literacy instructors; (c) determine the impact of using other sites based on community activities; as opposed to traditional locations such as schools and churches; (d) use incentives to motivate participants; and (e) extend the current level of participation beyond focus groups to planning beyond curriculum development.

Uwaezuoke SN, Emodi IJ, Ibe BC. Maternal perception of pneumonia in children: a health facility survey in Enugu, eastern Nigeria. Ann Trop Paediatr 2002 Sep;22(3):281-5. Institute of Child Health, University of Nigeria Teaching Hospital, Enugu, Nigeria. snuwaezuoke@yahoo.com. In a health facility-based study to determine the knowledge of mothers regarding recognition of pneumonia in their pre-school children, 400 women were interviewed using a pre-tested structured questionnaire. Sixty-one per cent of them would recognise pneumonia by difficult breathing, 42% by fast breathing and 26.5% by severe cough. Few of the mothers mentioned signs suggestive of 'chest indrawing' (8.5%) and 'central cyanosis' (1%). The maternal knowledge score on pneumonia signs increased significantly with educational status and social class ($p < 0.05$). While a substantial number of mothers (51%) perceived fast breathing to be an indication of severe pneumonia, a sizeable number (87.5%) were unsure if late signs such as chest indrawing and central cyanosis suggested severe disease. On the basis of the WHO criteria, it is concluded that maternal recognition of pneumonia in children is at best modest while knowledge of signs indicating severe disease is poor. These findings underscore the need to modify the WHO criteria to include difficult breathing and to highlight during local ARI health education campaigns that late signs such as chest indrawing and central cyanosis indicate severe and potentially fatal pneumonia.