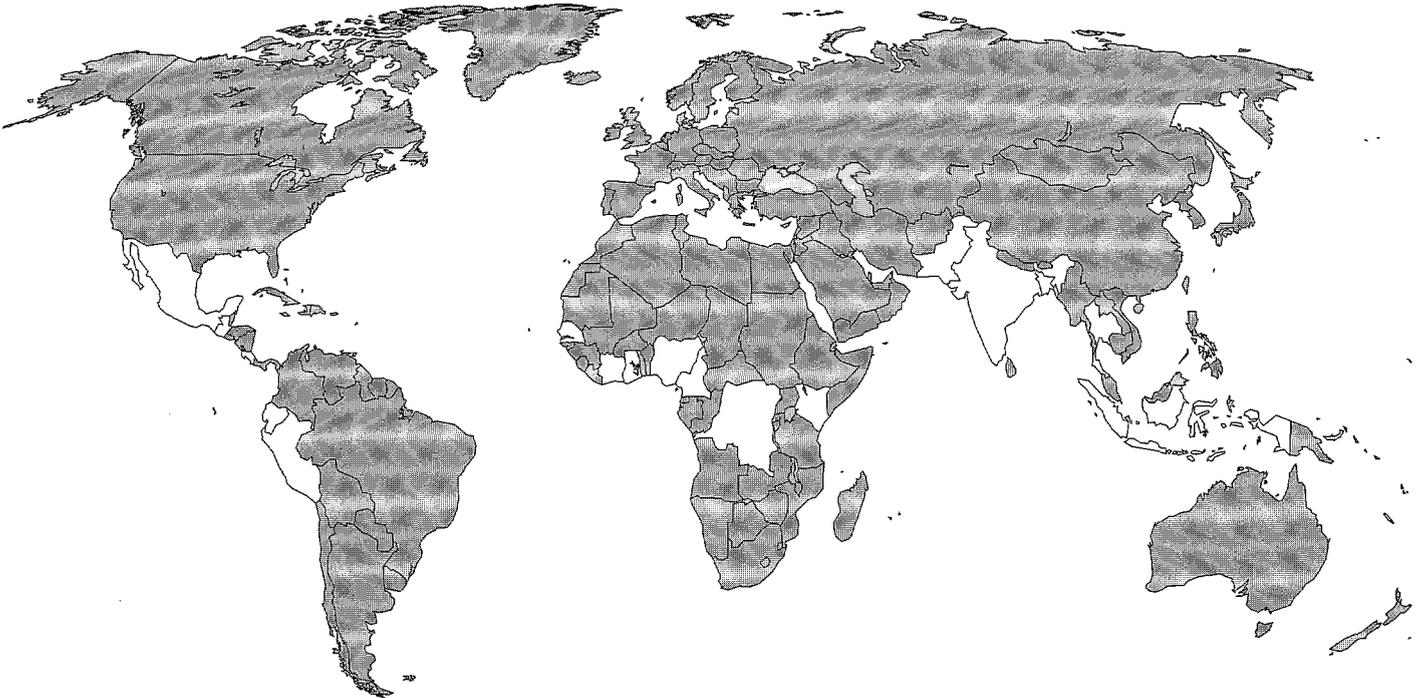


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ADDR Annual Report

1995

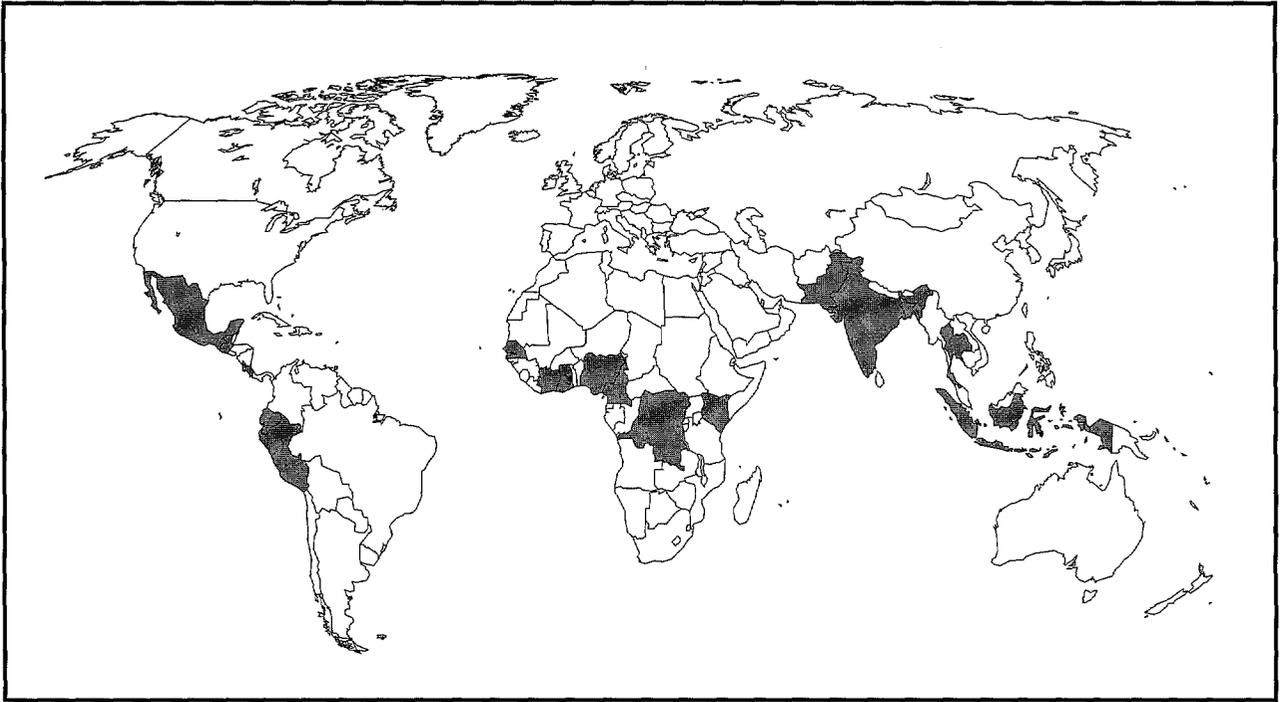


Applied Diarrheal Disease Research Project

Harvard Institute for International Development

in collaboration with
The New England Medical Center
Johns Hopkins University School of Hygiene and Public Health

funding from
United States Agency for International Development



The seventeen countries in which ADDR has supported research activities are highlighted to underscore the global reach of the ADDR project.

The Applied Diarrheal Disease Research Project (ADDR)

Annual Report 1995

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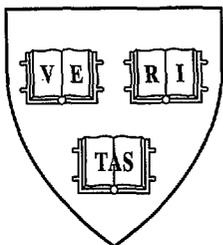
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2

Applied Diarrheal Disease Research Project
Harvard Institute for International Development
One Eliot Street
Cambridge, MA 02138
USA

Tel. (617) 495-9791

Fax (617) 495-9706

E-Mail Address: addr@hiid.harvard.edu

HIID web site: <http://www.hiid.harvard.edu>

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This Report summarizes ADDR activities for the year ending December 31, 1995.

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Foreword

With the submission of this 1995 ADDR Project Annual Report we bring to a close a ten-year experiment in funding applied research to address important issues in the improvement of child health worldwide, while also strengthening national capacities to design, implement, analyze, and disseminate research. The ADDR Project represents an innovative attempt to use science and the scientific approach as a tool for national and human development. Based on the experiences and the lessons learned, we look forward to the soon-to-be-awarded Applied Research on Child Health (ARCH) Project as an opportunity to further expand the use of applied research in addressing key public health questions and improving the links between research and health policy.

Development assistance in health has changed markedly during the past decade. We believe three changes have strongly influenced the role and conduct of applied research: the expansion of the number of technically trained research scientists in developing nations; the increased availability of data for decision-making; and the telecommunications revolution.

Through the internal support of national governments and external financing from sources such as USAID and the ADDR Project, the participation of national scientific communities in applied health research is expanding. The decentralization and deconcentration of scientific research from its historical base in western universities require the transfer of knowledge and skills to communities that have been largely excluded from research efforts to describe health status and discover new knowledge for the improvement of health. As a development project, ADDR has fostered a model of international scientific collaboration that answers research

questions, facilitates the transfer of the research technologies (both hard and soft), and strengthens the skill base of local researchers and institutions.

Second, rational and data-based health policy choices are far more possible now than a decade ago. Efforts during the past decade by national scientists and international donors to generate data on national populations and sub-populations have greatly added to our ability to understand and strengthen health care delivery systems. Many policy makers in developing countries now have access to valid data to construct rational, data-based policies for many of the most pressing health problems facing their people. Part of the challenge is to foster an environment where information is used appropriately. Improving decision making among policy and program personnel and linking research findings to policies and programs requires a sustained, creative, and multifaceted effort. Knowledge is a necessary but insufficient component of efforts to change policy formation behaviors. In addition to providing health policy personnel with scientific "facts," we must present research data in a format that is readily accessible, and in which the financial, political, and social benefits and costs are transparent. We need to better appreciate the complex nature of policy formation and look for opportunities to change and improve health policy and implementation.

Third, the revolution in telecommunications has greatly improved our ability to support research and offers exciting possibilities for accelerating the transfer of technology and the decentralization of science. When we began ten years ago, we struggled to communicate with members of the scientific network in Africa and parts of Asia. Telephone

service was intermittent, fax machines were less common and unreliable, and e-mail scarcely existed. Now, for example, a scientist in Southeast Asia with a question on whether to enroll a patient in a collaborative multicenter trial can post her inquiry on an electronic bulletin board and receive advice from Peru, Boston, Geneva, and Dhaka within twelve hours. She is no longer isolated from colleagues throughout the world working on similar research issues. Access to information has increased with the large health literature databases that are accessible at increasingly affordable prices through CD-ROM and Internet technology. We can develop e-mail discussion groups with research teams working on similar issues in the ADDR/ARCH Project network without reservation that the technology will not support the greater interaction.

Our partner in this Cooperative Agreement, the United States Agency for International Development (USAID), Office of Health and Nutrition, has allowed the Project to evolve over time, broadening its scientific mandate from a single emphasis on diarrheal diseases to a broader focus on important issues in child health. USAID has encouraged and assisted us in focusing greater attention on the utilization of research results, rather than being satisfied solely with the generation of scientific findings. Given the nature of research, USAID's commitment over the ten-year period has been essential to produce the Project's contributions to date; it high-

lights the value of longer-term donor commitment to development activities. USAID continues to serve as the leading donor agency worldwide in supporting applied research. As national governments and the private sector continue to broaden their health service delivery, expanding USAID's role as the major funding agency investing in health research will be crucial to identifying new technologies and testing future public health programs.

An estimated one million children are saved each year by appropriate use of oral rehydration therapy and proper case management. Case fatality from pneumonia is falling due to earlier case recognition and better treatment. Other child survival program interventions have become more focused and more effective, based on the lessons learned from applied research. These are the legacies of USAID's investment in research over the past twenty years. The benefits continue to accrue as more and more children are saved by the knowledge we have generated through research. Though the advances from the next round of research cannot yet be specified, history teaches us that we may be assured that the benefits to the world's children will come from continuing the search for health policy and program improvements through judicious investment in scientific research. The ADDR Project and the ARCH Project are eager to continue our contribution to these efforts.

Executive Summary

The ADDR Project supports research in diarrheal disease, acute respiratory infection (ARI), cholera, micronutrients, general nutrition, and malaria as it relates to diarrhea and ARI. The Project is six months from the end of its second five-year Cooperative Agreement with USAID (Number HRN-5986-A-00-2010-00). ADDR is organized with the Harvard Institute for International Development (HIID) as prime recipient, and New England Medical Center and the Johns Hopkins University School of Hygiene and Public Health as subrecipients.

ADDR is now summarizing, documenting, and synthesizing the results of its activities over the past decade. Both country-specific and global research topics have been investigated by ADDR-supported researchers. Important research findings in areas such as home case management, professional practices, use of foods and fluids, and clinical effectiveness have been produced. ADDR has introduced new programs on linking research and policy, measuring indicators of research capacity, and has fostered new collaborations with other donors and policy groups. Most ADDR-sponsored research teams have published or are completing analysis and dissemination of their results. Many of the investigators continue to implement their findings, push for policy change, and conduct research supported by other funding agencies.

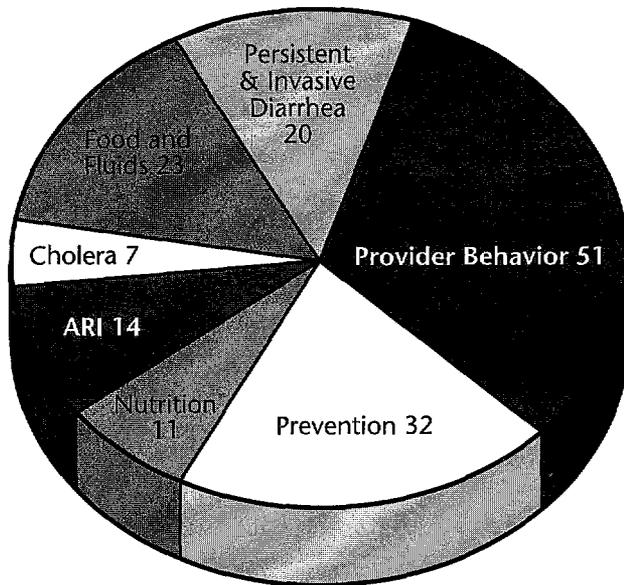
More than half of the 158 funded research studies have published one or more papers in international or national peer-reviewed journals, 39% have been completed (a final report submitted but the study not yet published), and a small number of studies are either still collecting or analyzing data, or were canceled for various reasons.

The ADDR network consists of more than 350 principal investigators and co-investigators. More than one thousand research

staff and field workers have learned research and data collection skills through support from ADDR funds. This network has produced 221 papers in books and journals, seventeen papers in institutional publications, and eleven master's and doctoral theses. Ten manuscripts from ADDR studies were published in 1995, and another nine papers were in press or accepted for publication at year end. A special issue of *Social Science & Medicine* entitled "Inappropriate Distribution of



Data collection in West Africa: understanding household behaviors is a key to improving care management



Research Grants by Category, 1985-1995
World

Medicines by Professionals in Developing Countries" has been compiled by ADDR and will appear in the spring of 1996. Papers from several ADDR-sponsored Nigerian investigators are being prepared for submission to the *Journal of Diarrhoeal Diseases Research*.

Over the life of the Project, a total of thirteen proposal development workshops and thirteen data analysis workshops have been conducted by ADDR. A proposal development workshop for the multicenter trials of a low osmolar oral rehydration solution was held in Bangladesh in March 1995. An ADDR data analysis workshop, emphasizing manuscript preparation for Latin American research teams, took place in Ecuador in June 1995. Finally, ADDR and UNICEF co-sponsored a workshop in June 1995 that presented findings from university-community linkage projects conducted by ADDR investigators in Nigeria.

Research Themes

Home case management of diarrhea

Studies in this area have examined local terminologies relating to diarrhea, differential management of diarrheal disease within and between countries, perceived etiologies, symptom recognition and response, and

risks, especially those related to breast feeding and weaning. Community-based education programs and improved epidemiologic surveillance are examples of how ADDR-sponsored intervention studies have used research to positively impact health policy.

Professional practices

Of the descriptive and intervention studies of medication usage by professionals and caretakers to treat both diarrheal diseases and ARI, eight have developed and tested educational or managerial interventions to improve prescribing practices. These studies have led to country-wide intervention campaigns, policy briefs to Ministers of Health, and a better understanding of the complex relationship between knowledge and practice in the treatment of diarrheal diseases and ARI.

Use of foods and fluids

Foods and fluids can be given to children with diarrhea as alternatives to milk-substitute formulas, commercial oral rehydration salts, or standard salt-sugar solution (SSS). ADDR has funded clinical research to test specific food preparations, and community-based studies to identify candidate foods and fluids that are inexpensive, available, and effective. Diets used to treat children with diarrhea in hospitals and in the community have been reformed as a result of these studies.

Cholera

Ecuador and Peru are two countries in which ADDR has focused its cholera research. Topics include case management and prevention through education and sanitation. A study in Ecuador measuring the costs of cholera treatment has already generated considerable local interest among government decision makers and representatives of international organizations. In Peru, it was demonstrated that by using certain microbiologic techniques to sample sewage, cholera outbreaks could be predicted weeks in advance of the first clinical cases.

Acute Respiratory Infection

The ARI studies sponsored by ADDR have examined the efficacy of clinical ARI case management, health care provider practices, and perceptions and practices of caretakers

in the home. A study in Pakistan demonstrated that it was neither necessary nor appropriate to change to a new drug for outpatient treatment of childhood pneumonia. Using this information, the National ARI Program saved significant amounts of money by not switching to a different antibiotic. In both Nigeria and Pakistan, major problems in professional management of ARI cases were identified, and training programs have been developed in response to these findings.

Treatment algorithm for persistent childhood diarrhea

ADDR and WHO funded a multicenter trial to evaluate the efficacy of a treatment algorithm for persistent diarrhea. The algorithm works in up to 80% of cases and is much less expensive than the traditional therapy, which is based on excessive use of antibiotics and antimotility drugs. The algorithm has been included by WHO as part of the standard recommended treatment guidelines for persistent diarrhea in children.

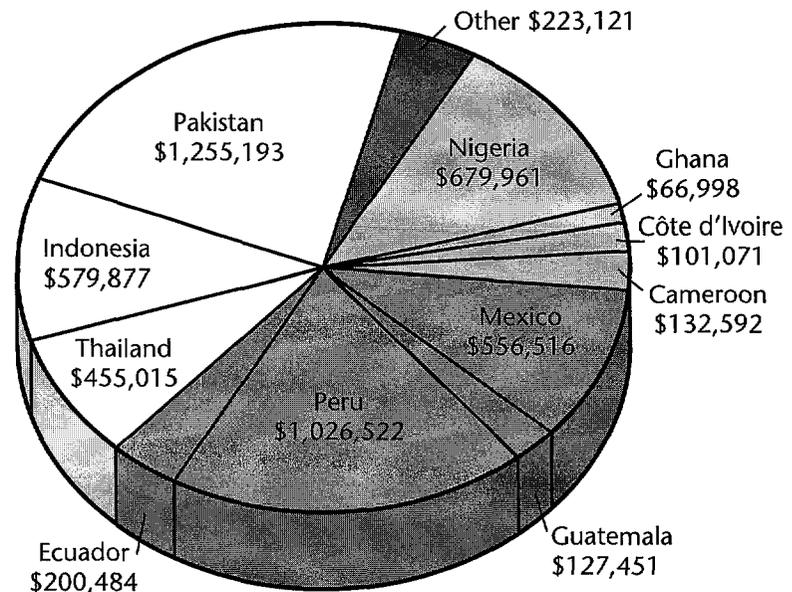
Low osmolar oral rehydration solution (ORS)

Following a proposal development workshop held in Bangladesh in the spring of 1995, ADDR, ICDDR,B, UNICEF, and WHO have funded an international multicenter clinical trial of a new low osmolarity ORS. This multicenter trial is based on studies from Egypt and elsewhere that suggest an ORS solution with lower sodium and lower glucose reduces duration and volume of diarrhea. Research groups in Bangladesh, Brazil, India, Indonesia, Peru, and Vietnam are assessing the impact of a low sodium and low glucose ORS preparation on duration and volume of diarrhea in children and adults. Data analysis will begin in the late spring of 1996.

Program highlights

Linking research and policy

To better understand factors that facilitate and impede the use of research data to develop policies and programs, ADDR has undertaken a variety of activities to explore links



Funds Expended by Country, 1985-1995
Grants, Conferences, and Equipment

between research and policy making. The Project has completed case studies on this topic in Mexico and Nigeria. ADDR is participating in an expanded, multi-donor case study of research use in four Mexican health programs (cholera, AIDS, family planning, and immunizations). ADDR also plans to conduct a case study on research-policy links in Pakistan in 1996. An international workshop to explore the relationship between research and policy will be held in Mexico in February 1996. Workshop proceedings and a set of guidelines for researchers will be two outputs from the meeting.

Measuring research capacity

From its inception, ADDR has believed it important to develop valid evaluation criteria both for its own efforts and for other similar research capacity strengthening programs. It has developed its own set of evaluation forms, and continues to collaborate with other organizations to develop indicators of research capacity. The indicators measure both process and outcomes for individual scientists and institutions. Promotion criteria and rates, ability to access additional research funds, number of scientific publications, professional involvement on scientific committees and editorial boards, and participation

in government activities in related areas are all part of the research capacity evaluation process.

Institutional collaboration

The Project has continued to increase its collaborations with other projects and programs at both international and country levels. Collaborative efforts are designed to increase the visibility and impact of research results and increase interest in the importance of supporting and funding local research activities. As an example, an innovative program designed in Nigeria and cofunded by ADDR and UNICEF has linked research universities with local communities through

projects that implemented ADDR-sponsored research results.

Future plans

To meet its goals over the next several months, the Project will emphasize the synthesis and dissemination of scientific results. ADDR will also summarize programmatic lessons, collaborate with other research and service programs, support the Integrated Management of the Sick Child Initiative and other global research priorities, and identify future directions and opportunities for applied research.

Year in Review

During 1995, the ADDR Project has endeavored to consolidate research results, support publication efforts, summarize activities, and explore broader health issues such as how research is linked to policy. This year's Annual Report will summarize research findings from recently completed studies and will provide an overview of the status of ongoing investigations, but will not review country-specific activities, as these topics have been well covered in previous ADDR Annual Reports. This Report will review the following topics, many of which are summary activities:

- Cholera studies
- Micronutrient studies
- Multicenter low sodium, low glucose oral rehydration solution trial
- Latin American Data Analysis and Publication Workshop
- ADDR's self-evaluation efforts
- The ADDR university-community linkage initiative in Nigeria
- Linking research to decision making including: research-to-policy case studies in Mexico; a Nigerian policy and research case study; a research-to-policy conference in Ecuador; and an international workshop on research-policy linkages.

Cholera

The seventh cholera pandemic reached Peru in early 1991 and rapidly spread to many other countries in Latin America, where it is now endemic. ADDR responded to the epidemic by sending technical consultants from the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) to Peru and Ecuador to assist the Ministries of Health with cholera control. ADDR also initiated a

set of applied research studies in response to the cholera outbreak, whose aims were to evaluate approaches to the treatment and prevention of cholera.

Two studies on the effectiveness of media campaigns to encourage safe water use and better personal hygiene were carried out in mountainous and coastal regions of Ecuador (Cañizares, Narvaez). Interviews of home caretakers in both studies demonstrated that community members correctly recalled the essence of public health messages but, when observed in the home setting, frequently failed to follow recommendations. Focus groups in the study communities were utilized to explore discrepancies between what people said they would do and what they actually did. The cultural background of the



Reports on cholera prevention published by the Universidad Católica de Guayaquil, Ecuador, in conjunction with ADDR

study participants and their perceptions of how cholera is transmitted, their perceptions of personal risk, and their ideas on how cholera could be prevented were some of the factors found to influence the observed behavior patterns.

The home use of water receptacles with narrow mouths, with or without chlorine, was evaluated to see if their use would reduce rates of diarrhea (Segura). There was a significant decrease in the incidence of diarrhea in children less than five years old, which was most pronounced in the group that used the water containers with chlorine.

Lanata and Penny used a combination of longitudinal survey and prevalence data to demonstrate that there was a transient drop in overall diarrhea incidence during the peak of the cholera epidemic in 1991. The exact reason for this decrease remains unclear, but it may have been due to a number of factors, including improved hygiene due to a fear of acquiring cholera and the temporary use of safer water supplies. The study results were presented to government and aca-

demical officials at a symposium hosted by the Pan American Health Organization (PAHO) in Lima.

A cost effectiveness study of in-hospital cholera therapy in Ecuador found an excess cost of 45% caused by an excessive duration of hospitalization, the overuse of intravenous hydration and antibiotics, and unnecessary diagnostic studies (Creamer). There was no correlation between the cost of treatment of cholera and the severity of disease. There was an inverse relationship between the costs of therapy and the level of complexity of the hospital, with the lowest cost of cholera treatment found in tertiary care facilities.

As a result of cholera having become endemic in Latin America and a resurgence of this disease in sub-Saharan Africa, where its presence has been accompanied by high

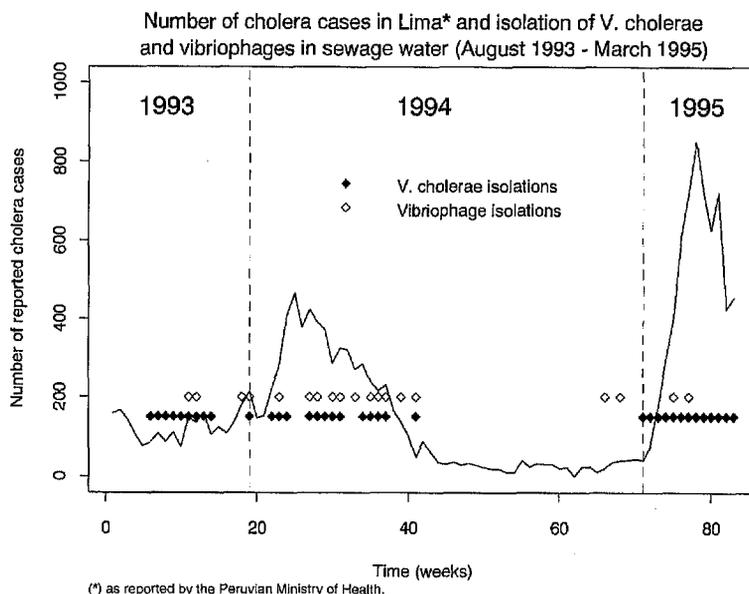
CHOLERA SURVEILLANCE

Grant C002 was provided to the Proyectos en Información Salud Medicina y Agricultura (PRISMA) for a pilot study of two methods for cholera surveillance to be conducted by Dr. Guillermo Madico. Samples taken weekly over a two year period from multiple sewage outlets in Lima, Peru were cultured for *Vibrio cholerae* and analyzed for the presence of vibriophages. Weekly reports of new chol-

era cases obtained from the Peruvian Ministry of Health were compared to the microbiological data for analysis.

During the study period, there were two epidemics of cholera in Lima. Vibriophages appeared in city sewage outlets four to six weeks before each epidemic, while routine cultures demonstrated the reappearance of *V. cholerae* prior to only one of the two outbreaks.

This study provides preliminary evidence of the potential efficacy of vibriophage surveillance of public water systems for prediction of an impending cholera outbreak. This pilot study has numerous public health implications. Early signs of an impending outbreak of cholera could be used to mobilize public health resources to prevent or diminish the severity of an epidemic. Similar surveillance methods could be used to detect and initiate an early response to outbreaks of other waterborne pathogens such as *Cryptosporidium*.



mortality rates, the ADDR Project continues to have a strong interest in research on cholera. Training of physicians and other health care providers in both Latin America and Africa by experienced physicians from the Indian subcontinent is a potential focus of future collaboration. This work could help lead to improvements in cholera treatment practices in regions where the disease is less understood, while facilitating an exchange between scientists from culturally distinct, less developed regions of the world.

Studies on micronutrients: zinc and vitamin A

Malnutrition and micronutrient deficiencies are common complications of diarrheal disease in children worldwide. Studies linking vitamin A deficiency with a higher risk of morbidity and mortality and a possible association between zinc deficiency and diarrheal disease have led the ADDR Project to develop an interest in the potential benefits of micronutrient supplementation. Since malnourished children often have multiple, concomitant micronutrient deficiencies, the Project has a special interest in the role of multiple micronutrient supplements in both diseased and well populations. The ADDR Project has sponsored one study whose purpose was to estimate the extent of vitamin A deficiency in a rural area of Western Africa and three micronutrient supplementation trials in children with diarrhea.

A cross-sectional survey was carried out in northwestern Côte d'Ivoire to estimate the prevalence of malnutrition and vitamin A deficiency in children less than five years old (Tebi). About one third of the children studied were vitamin A deficient and only 8% had consumed vitamin A rich foods the day before being evaluated. These results demonstrate a high prevalence of vitamin A deficiency in this region, which may stem from inadequate dietary intake. As a result of his efforts in performing this study, Dr. Tebi, who heads the nutrition department of the National Institute of Health in Abidjan, was appointed Coordinator of the National Campaign against Micronutrient Deficiencies. This campaign is supported by the Food and Agriculture Organization, UNICEF, and WHO.

ADDR sponsored a randomized, double-blind, placebo-controlled study of zinc supplementation in children with persistent diarrhea in Pakistan (Bhutta). Children hospitalized with diarrhea lasting for fourteen days or more received a special yogurt-rice-lentil diet and a multivitamin supplement with or without zinc. Although the supplemented children had a significant improvement in plasma zinc levels, there was no difference between the two study groups in terms of the severity and duration of diarrhea, weight gain, prevalence of intercurrent infections, or intestinal permeability. A final manuscript describing the results of the study is being prepared for publication.

ADDR, WHO, and Thrasher have funded a randomized, placebo-controlled, community-based trial of zinc supplementation with or without a complete mineral-vitamin mixture in children with persistent diarrhea in the shanty towns of Lima, Peru (Penny). This study will provide useful information on the potential effects of zinc and combined zinc-multivitamin supplementation on the duration of an episode of persistent diarrhea, prevalence of subsequent diarrheal and respiratory infections, appetite, energy intake,



Dr. Mubina Agboatwalla speaking at the ADDR/PMRC/WHO-sponsored conference in Pakistan

and growth. Data collection was completed in late 1995; data entry and analysis are ongoing.

ADDR and WHO are cosponsoring a randomized, double-blind, placebo-controlled trial of a multiple vitamin and mineral supplement in Mexican children aged eight to thirteen months living in rural communities (Rivera). The purpose of this study is to assess the effect of micronutrient supplementation on growth, appetite, and energy intake of children who are at high risk for stunting and micronutrient deficiencies. The duration of the micronutrient supplementation has been extended to one year; the full period of supplementation and clinical follow-up will be completed in 1996. Preliminary findings suggest that the multivitamin and mineral supplement has a positive effect on gain in length in children less than twelve months of age.

ADDR is funding a placebo-controlled, double-blind, randomized trial of the effects of micronutrient supplementation on intestinal permeability and the duration of acute diarrhea in Guatemala (Chew). Preschool

children begin receiving a combination of folic acid, zinc, and vitamin A when they are hospitalized with an episode of acute diarrhea. The study will determine the effects of micronutrient supplementation on the duration of diarrhea, stool output, weight, height, and intestinal permeability. Data collection will be completed in mid-1996.

ADDR will assist the aforementioned investigators with the analysis of data and manuscript preparation during the coming year. Depending on the results of these and other studies, it is likely that ADDR will be involved with multicenter trials of combined multivitamin and mineral supplements in the near future.

Multicenter trial of a nutritional management algorithm for persistent diarrhea

The aim of this multicenter cohort study was to evaluate an algorithm for the treatment of persistent diarrhea based on locally avail-

STRENGTHENING DATA ANALYSIS AND MANUSCRIPT PREPARATION SKILLS OF FUNDED RESEARCHERS

The ADDR Project has funded an extensive range of studies using a variety of methodologies appropriate to both clinical and community-based research. In addition to the logistical challenges inherent in conducting the research, many of the investigators faced challenges in the analysis, interpretation, and write-up of their results. During 1995, the Project has focused great effort on the provision of technical assistance with all aspects of data analysis and manuscript preparation. Led by the staff epidemiologist/biostatistician, with assistance from the rest of the technical staff and selected external consultants, several investigators have been guided through sophisticated techniques for multivariate analyses. Training investigators in the use of these analytic techniques has allowed some of the research teams to more fully analyze their data and to explain and/or predict major study outcomes.

This year also allowed us to begin to fully use the revolution in telecommunications to expand the number of technical contacts and improve the timeliness of technical assistance. Consulting on data analysis, previously accomplished largely through workshops and expensive field-based consultancies, is now managed extensively through e-mail. Queries on data, draft results, and drafts of manuscripts can be shared via e-mail, creating an interactive environment that offers the dialogue of an on-site consultancy – but at a fraction of the cost. Though we do not expect e-mail to fully replace our technical consultancies, it provides us an effective and inexpensive mechanism to improve the quality of our assistance. We expect to make even greater use of the technology in the ARCH Project as more of the ADDR-supported scientists go “on-line.”

able, inexpensive diets combined with a multivitamin and mineral supplement, as well as treatment of concurrent infections with appropriate antibiotics. The study, funded by ADDR and WHO, was conducted simultaneously in Bangladesh, India, Mexico, Pakistan, Peru, and Vietnam. A total of 460 children, aged 4 to 36 months, who had diarrhea of 14 days duration associated with moderate or severe malnutrition, dehydration, or serious infection requiring hospitalization, were enrolled. Once clinically stable, children were first administered a low lactose diet consisting of animal milk, milk formula, or yogurt with cereals (rice or maize), legumes, sucrose, and vegetable oil. If this diet did not result in recovery, a second lactose-free diet substituting chicken and eggs for milk and replacing part of the cereal with glucose or sucrose was provided.

The overall success of the nutritional management algorithm, defined as resolution of diarrhea within seven days and weight gain, was 80%. Weight gain occurred in 88% of the children. The highest risk of failure was in those children with acute associated illnesses such as cholera or septicemia, those who required intravenous antibiotics, and those who had the highest stool frequency in the first eight hours of the study. In general, expensive laboratory evaluations were found to be of little benefit in guiding the successful treatment of persistent diarrhea. These results suggest that severe persistent diarrhea and concomitant malnutrition can be safely and effectively treated using an algorithm based on locally available food, vitamin and mineral supplements, and antimicrobial therapy. The cost savings of dietary therapy versus traditional treatments such as antimotility drugs, special diets, and expensive diagnostic tests is likely to be significant. Study findings have been adopted as part of WHO's standard recommended guidelines for the treatment of persistent diarrhea in children. The results of this study will be published in an upcoming issue of the *Bulletin of the World Health Organization*.

Multicenter study to evaluate the efficacy and safety of a low sodium, low glucose oral rehydration salt solution

Several recent studies have evaluated various formulations of ORS that contain less sodium and have lower osmolarity than the standard ORS solution. Results of these studies, which were reviewed in a joint WHO/ICDDR,B consultative meeting on ORS formulation held in Dhaka in December 1994, indicated that volume of and dehydration from acute watery childhood diarrhea might be reduced with the low sodium, low glucose ORS. Based on the data presented, a consensus was reached about the composition of a new formulation of ORS that should be tested in the field. The new ORS would contain 75 meq/l sodium and 75 meq/l glucose (total osmolarity 245 meq/l).

The ADDR Project, ICDDR,B, UNICEF, and WHO agreed to co-fund a multicenter study to evaluate this formulation of ORS compared with the standard WHO/UNICEF ORS solution. At a workshop held in Dhaka in March 1995, it was proposed that two formal randomized, double-blind, controlled multicenter clinical trials be carried out to evaluate the safety and efficacy of the standard versus low osmolar formulation of ORS: one for children with acute watery diarrhea and one for adults with cholera. Protocols for the six sites (Bangladesh, Brazil, India, Indonesia, Peru, and Vietnam) were finalized in May of 1995. ADDR is supporting the study in Peru and providing expertise for workshops and on-site visits to studies in several locales. The studies and preliminary data analysis are expected to be completed in late 1996.

Latin American data analysis and publication workshop

Eight research teams who had completed ADDR-sponsored research projects in Ecuador and Peru participated in this workshop, held in Ibarra, Ecuador in June 1995. The



Participants at the 1995 Latin American Data Analysis and Publication Workshop in Ibarra, Ecuador

workshop was organized by ADDR in collaboration with PAHO. Workshop facilitators included ADDR staff members, a representative from the PAHO research grants program, an editor of the *Boletín de la Organización de Panamericana de la Salud (PAHO Bulletin)*, and a statistician from the Institute of Nutrition of Central America and Panama (INCAP) in Guatemala.

Draft manuscripts have been completed and prepared for submission by all the research groups. The participants of this workshop considered it a highly useful experience and an excellent way to focus on completing data analysis and preparing their research for publication. This successful collaboration between ADDR and PAHO has prompted an interest in future joint activities, as well as the possibility of a Spanish-language edition of the *PAHO Bulletin* devoted to the papers on cholera and diarrheal disease arising from this workshop.

ADDR's self-evaluation efforts

One of the fundamental goals of the ADDR Project has been to strengthen health research capacities in less developed countries through the provision of funds and technical assistance. A central question in the capacity building literature is: how can this process of building research capacity in developing countries be evaluated? Methods of

evaluating capacity are relatively underdeveloped. Many methods focus on numbers of publications or trainees, while others use opinions of experts.

The ADDR Project is particularly interested in determining whether its grants have had an impact on individual research careers, the output of scientific papers from institutions and individuals, and the development of cross-disciplinary research, as well as whether research has resulted in improved public health policy. ADDR has recently embarked upon an evaluation effort to learn more about the impact of individual grants on the careers

of grantees, their capacity to conduct cross-disciplinary research, and their institutions. This evaluation program is being coordinated with other programs that aim to strengthen research capabilities in the health sciences. It is part of the Project's overall effort to identify measurable indicators of human resource and institutional capacity strengthening.

All grantees have been mailed a set of survey instruments that assess: the skill-building and scientific productivity among grantees and the perceived impact of the grant on individual research careers; the impact of multiple grants on institutions; and the level of cross-disciplinary collaboration in ADDR-sponsored research projects. ADDR intends to use this information not only to document and evaluate its grant awarding approach, but also to identify areas for future programmatic improvements.

From health research to community development: the ADDR university-community linkage initiative in Nigeria

Community-based research has always been a major focus of the ADDR Project, with a simultaneous goal to use study results to inform health policy and programs. Between 1994 and 1995, ADDR began an innovative



Participants at the 1995 University-Community Linkage Workshop in Ibadan, Nigeria

university-community linkage project with additional financial support from UNICEF. This initiative in Nigeria was built on a partnership between communities, universities, and local government health agencies. Seventeen Nigerian investigators at eleven institutions developed proposals specifically designed to make university-based research more relevant to health action at the community and local government levels.

The ADDR-sponsored linkage projects addressed innovative, practical, and cost-effective ways to improve hygiene, to improve feeding of infants and children, and to prevent diarrheal diseases. Each research team was responsible for communicating study findings and discussing the implications of results with the community. Several university-community linkage teams conducted training activities for local government authority (LGA) officials, community health workers, and community leaders. A study at Obafemi Awolowo University in Ile-Ife, for example, conducted a training campaign for community health workers on the promotion of exclusive breast feeding. A linkage program in Maiduguri trained members of rural communities to become community trainers in the use of ORT/SSS in the appropriate home management of diarrhea.

The ADDR-sponsored linkage program achieved several important goals. First, communities and LGAs that had been unable to address local health problems because of political and economic difficulties were often able to overcome these obstacles to health improvement. Second, universities and schol-

ars were able to demonstrate that they were a relevant resource for improving health in the community. Third, the ADDR linkage program strengthened research capacity of individuals and institutions. Fourth, the program showed that communities can be empowered to address health problems when research studies are accepted and relevant to the community. This is particularly successful when communities develop ownership. One key to success appears to be the feedback given to communities and LGAs by the researchers on the results of their studies.

The Nigerian Nationwide Network for Health (a nongovernmental organization initiated by a group of former ADDR-supported investigators) hosted a workshop to summarize the linkage experience in June 1995. The workshop was also a critical arena for communicating research results to Nigerian health policy makers. The ADDR-sponsored linkage studies were presented in scientific sessions at the 1995 Annual General and Scientific Meeting of the West African College of Physicians in Lagos. Research results will also be presented at the Pediatrics Association of Nigeria conference in Maiduguri, in early 1996. The ADDR Project has prepared a publication documenting and evaluating its experience with the university-community linkage program in Nigeria. The document will be published in 1996.

ADOPTION OF RESULTS OF PERSISTENT DIARRHEA FEEDING STUDY TO CHILD HEALTH PROGRAMS IN MEXICO

In early 1995, building on the results of the ADDR-sponsored study that evaluated three diets for treatment of severely malnourished children with chronic diarrhea (García and Nurko), the new Minister of Health in Mexico adopted the maize-milk formula as a model for the treatment of malnourished children, and later as an intervention to prevent malnutrition. About 1,100 community-based health care providers were trained in the preparation of the maize-milk formula; the number of trainees was later expanded to 14,600. The formula is now used throughout Mexico as a weaning and supple-

mental food. An NGO has raised funds to purchase more food and train over 5,000 health care providers to distribute it. UNICEF has provided money to further train community-based workers to prepare special diets. The chicken-based diet, which was the second line of therapy, has also been adopted country-wide for the treatment of children with malnutrition and diarrhea.

The formula has been approved and endorsed by the nutrition community of Mexico. The strongest endorsement has come from the President of Mexico, who has publicly stated that the government is launching a program to prevent and treat malnutrition. This formula is the centerpiece of that program.

Linking research to decision making

Successful applied research should improve programs, products, policies, and decisions. The steps between research results and their application, however, are often long and complex. To better understand these links, and explore how to improve them, ADDR has undertaken a number of country case studies, has supported a national conference on links between health research and policy, and will conduct an international workshop on linking research to policy.

Research-to-policy case studies in Mexico

ADDR initially undertook case studies in Mexico to examine the factors that impede and facilitate the use of research data to develop policies and programs in the field of diarrheal disease. The studies involved ADDR-funded scientists and policy makers. Although the preliminary results were interesting, it was concluded that the methods needed to be refined and tested in areas other than diarrheal disease research. ADDR thus joined four other donors (the Ford Foundation, the Mexican Ministry of Health, PAHO, and the Population Council) to fund

a study of the linkages between research and policy in Mexico in four thematic areas: family planning, AIDS, immunizations, and cholera.

Between October 1994 and August 1995, four local consultants in Mexico reviewed documents and interviewed more than sixty researchers and decision makers within the federal family planning, AIDS, cholera, and vaccination programs. The consultants identified the ways research results were used or neglected when public officials wrote national policies or implemented intervention campaigns. They identified important individuals, decisions, and pathways through which research led to health policy and programmatic change.

Some of the factors identified as obstacles to the use of research include the following:

- centralization of decision authority and information production within the same unit;
- pressure from outside interest groups;
- researchers' lack of expertise in marketing their issues and results to government officials;
- existence of a political culture among government officials that lends more credence to experience than to research results; and

- institutional or intellectual jealousies between researchers and policy makers.

The case study research also focused attention on a series of contextual factors that impact the adoption of research results by the policy-making community. The factors that seemed to influence decision makers' abilities to use research to make or reform policies include the following:

- the amount and depth of national political support and international leverage for policy change;
- the status of the topic itself as either an unexpected emergency (cholera and AIDS) or a long-term challenge (family planning and immunizations);
- the quantity, quality, and prestige of local research on the topic; and
- the presence or absence of researchers in important national policy roles.

With respect to the use of research to develop specific outreach campaigns:

- little attention was paid to local cultural differences;
- when consulted about message design, researchers generally recommended excessively complex language and content; and
- when communications experts with little technical background in the specific area designed programs, they often did not look for research results or know how to use them.

The case studies have been written up as separate chapters of a book and will be accompanied by chapters on methods, relevant theories, and a comparative analysis of the four areas. A workshop in the winter of 1996 will bring Mexican researchers and policy makers together to discuss the project's results and final recommendations.

Nigerian research and policy case study

ADDR commissioned a case study on the role and impact of research on health policy and development in Nigeria. Results were submitted to ADDR in early 1995 by a national consultant, Professor Ukwu I. Ukwu of



ADDR technical staff members assist Dr. O. O. Omotade with manuscript development

the University of Nigeria, Enugu. On the basis of an extensive review of unpublished data and in-depth interviews with numerous researchers and policy makers country-wide, the study provided an overview of the public health system in Nigeria and placed the research and policy linkage in a broad historical and structural framework.

Health research in Nigeria has a long and rich history. However, for a variety of reasons, the impact of health research on policy has been limited. Health research in Nigeria has suffered from problems of relevance, quality, and accessibility. The problem of relevance has been intensified by the fact that significant actors such as university-based academicians do not consistently participate in the initiation and formulation of research. In addition, there are insufficient institutional support facilities for health research. The poor information system in the country impedes the flow of information vital for both research and the dissemination of results. In addition, academic publications have limited circulation, are often irrelevant to national research priorities, or are written in language that is not understood by policy makers or the lay public.

The Nigerian case study identified a variety of political and structural factors that inhibit the full utilization of research results. In general, academic research is not highly

valued in Nigeria's current political environment. Specifically, major Nigerian institutions lack the capacity to translate research into policy. Donor interests are not sufficiently brought into harmony with national priorities and, as the case study's author stated: "mutual distrust between researchers and administrators reduces the scope for fruitful cooperation."

In spite of these shortcomings, the study demonstrated that health research has made some contributions to health policy and development. The study noted the positive impact of ADDR-sponsored and other research on diarrhea on the formulation of a new policy promoting the use of home fluids in the treatment of diarrhea. Ukwu concluded that "if health research is to improve health policy, the linkage between the two must be such as to stimulate relevant research, improve its quality and promote its availability and use in the policy process. It is necessary to open channels of communication among the actors and to create common institutions for the exchange of ideas and information on specific problems in specific areas of operation. The ultimate goal of the research-policy linkage is the evolution of a cohesive health community in which the various groups of actors work together purposefully and effectively in the identification and investigation of health problems and the finding and application of solutions."

Research to policy in Ecuador

Following the ADDR data analysis workshop in Ecuador in June 1995, a public meeting was held in Quito at the Facultad Latinoamericana de Ciencias Sociales (FLACSO) entitled "Scientific Research and the Formulation of Public Policies: Health and Other Cases in Ecuador." Presentations were made by government ministers, university rectors and deans, researchers, and directors

of local programs in health, nutrition, population, economics, and the environment.

Participants discussed the current status and future of research in Ecuador along with its actual and potential contribution to national policies and programs. Extensive budgetary constraints limit support for research in Ecuadorian universities and also limit government willingness to evaluate long term planning. Research results have played a larger role in Ecuadorian policies and programs when research studies have been more applied than basic in focus. They have also been more successful when researchers advocated the use of their results, transformed their technical language into simple language, and made efforts to communicate their results to policy makers early and informally. Lack of interdisciplinary language and experience, lack of institutional continuity, and problems in communicating with the public were identified as important barriers to using research in policy making.

The process developed at the conference is expected to lead to increased collaboration, both between researchers and policy makers and among researchers themselves. Identification of some of the ways that research results can better be communicated to public health policy makers will help improve the quality of short and long term health policy decisions in the future.



Example of ORS packet developed in Ecuador

28 *Guayaquil, martes 31 de enero de 1995*

Medicina y ciencia

La entrevista

Una lucha real contra el cólera

Después de varias campañas de lucha contra el cólera, ha ocurrido un peligroso rebrote de esta epidemia. ¿Por qué? Un estudio profundo sobre la actitud de la comunidad ante estas campañas ha revelado curiosos resultados.

Lunes 17 de abril de 1995 EL COMERCIO

Prevención • Los mensajes están, la población los entiende, pero por muchas razones no se aplican

La comunicación llega en los tiempos del cólera

El 90 por ciento de las madres sabe lo que debe hacer para prevenir el cólera. Pero sólo el 37.5 por ciento lo hace.

Mónica Mendoza Salas
REDACCIÓN QUAYAYQUIL



Sociedad • Encuesta de Harvard Salud: mensajes sin mucho eco

Las campañas publicitarias para prevenir las enfermedades no tienen el éxito esperado. Este es el resultado de una investigación realizada por el propio Ministerio de Salud, con la asesoría de la Universidad de Harvard (Estados Unidos). Se llegó a este resultado luego de realizar una encuesta sobre el conocimiento de la gente sobre temas de salud. Se constató el incumplimiento de las normas en más de un 80 por ciento de los encuestados. Según los investigadores, las campañas han logrado movilizar información, la gente está enterada y sabe cuál es la norma. El problema: las limitaciones socio-económicas y las incidencias culturales. La falta de las campañas está en la forma del mensaje.

Las cifras de la crisis

- En un país como el Ecuador el mejoramiento de la infraestructura es muy costoso y a corto plazo es difícil que se logre mejorar. Una de las alternativas es trabajar vía adecuación de los procesos de información y educación popular.
- Según normas de la Organización Mundial de la Salud (OMS), el ser humano tiene una necesidad diaria promedio de 1.50 litros de agua, para mantener un nivel de vida saludable y aceptable. En Guayaquil para aquellos que dependen de tanques se estima un promedio diario de consumo de 20 litros/persona/día, según el reporte del programa del control de pérdidas y uso eficiente de la empresa de agua potable del Guayas.
- Según el estudio de la U. Castilla, la población urbano marginal cree que para obtener salud lo principal es estar bien alimentado (30 por ciento), asado (22 por ciento), atendido por el médico (16 por ciento), cuidado por sí mismo (12 por ciento).

LA CIUDAD **EL UNIVERSO** / Jueves 19 de enero de 1995 ■ Primera Sección 13

Buscan sistema para concienciar a la gente a que evite el cólera

Tanto las autoridades sanitarias como profesores universitarios realizan investigaciones sobre la incidencia del cólera y coordinan campañas de concienciación a la ciudadanía.

Hoy, a partir de las 09h00, se reunirá el gobernador encargado del Guayas, abogado Gabriel Faidutti

miento poblacional-urbano marginales y las campañas educativas de prevención del cólera en Guayaquil".

Los resultados del estudio servirán para proveer información útil al Ministerio de Salud y otras autoridades, para revisar y diseñar los mensajes educativos de salud para la prevención del cólera.

The results of the study that compared stated practices and observations of behaviors related to cholera prevention (Cañizares) were publicized in the local and national press and other media in Ecuador

Linking applied research with health policy: an international workshop

As a culmination of ADDR's continued interest and involvement in the research-to-policy debate, the Project is coordinating an international workshop entitled, "Linking Applied Research with Health Policy." The workshop will be held in Cuernavaca, Mexico in February 1996. The objective of the workshop is to explore in a multidisciplinary dialogue the research-to-policy linkages in developing countries, and to identify strategies by which to improve the use of research results in policy making. Participants will include various stakeholders in the research-to-policy cycle, such as researchers, research managers, policy makers, representatives of donor agencies, and the media. Each session of the workshop will address a different theme, such as the theoretical basis of the research-to-policy process, the use of research results in policy making, and ways to

improve the dissemination and utilization of research results. Several outputs are planned for the workshop: the development of a conceptual framework on research-to-policy linkages based on an in-depth analysis of facilitating factors and impediments; a list of potential interventions with demonstrated effectiveness in improving the use of research findings in policy formation; a manual for researchers with guidelines on how to improve the use of research results in policy making; a summary of the proceedings, findings, and recommendations of the workshop; and an action agenda to study and improve research-to-policy linkages.

Grants Inventory

Columns, from left to right:

• *ADDR grant number* • *grant title* • *institution* • *principal investigator(s)* • *status*

Status Categories:

Canceled – *funding withdrawn by ADDR*

In Progress – *collecting or analyzing data*

Completed – *final report submitted, study not yet published*

Published – *study results presented in book or journal*

A glossary of abbreviations and acronyms is on the inside back cover of this report.

Bangladesh

028	Urban Volunteer Program	ICDDR,B	Silimperi	Completed
029	Design and implementation of epidemiologic research related to diarrheal disease in developing countries	ICDDR,B	Hlady	Completed
030	Design and implementation of research related to the shigellosis targeted research project	ICDDR,B	Keusch	Published
191	ORS Proposal Development Workshop, Dhaka, March 1995	ICDDR,B	ADDR/ICDDR,B/ UNICEF/WHO	Completed

Cameroon

056	An ethnomedical study of diarrheal disease in Cameroon	Université de Yaoundé	Nkwi	Published
153	Proposal Development Workshop, Kribi, October 1992	SESA	ADDR	Completed
161	Ethnographic decision tree modeling of mothers' responses to childhood diarrhea in Cameroon	Université de Yaoundé	Nkwi	Published
163	Practices and motivations of health care providers in the treatment of diarrhea in the Adamaoua Province of Cameroon, Central Africa	Provincial Public Health Delegation	Mbam Mbam	Canceled
164	Contribution of malaria and pneumonia in children less than 5 years old presenting with fever or history thereof and respiratory symptoms	Université de Yaoundé	Monebenimp	Canceled

Costa Rica

001	Ecology, management, and prevention of diarrheal diseases: Observations in two contrasting ecosystems	University of Costa Rica	Mata	Canceled
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Côte d'Ivoire

159	Représentations et traitement des diarrhées infantiles en milieu rural Ivoirien: Le cas des Gouros et des Betes (Disease concepts and treatment patterns of childhood diarrhea in rural Côte d'Ivoire: the case of the Gouros and the Betes)	Université Nationale de Côte d'Ivoire	Dedy	Completed
160	Etude du traitement médicamenteux utilisé pour la prise en charge des enfants diarrhéiques dans la communauté urbaine de Treichville (Study of drug use for the case management of childhood diarrhea in the urban community of Treichville)	INSP	Dogoré	Completed
162	Modèles explicatifs et pratiques sanitaires relatifs aux infections respiratoires aiguës chez les Gouro, Baoulé et Dioula dans la région de Bouaflé en Côte d'Ivoire (Explanatory models and health behavior related to ARI among the Gouro, Baoulé, and Dioula in the region of Bouaflé, Côte d'Ivoire)	INSP	Traoré & Timité-Konan	Completed
165	Etude de la prévalence de la déficience en vitamine A dans le nord de la Côte d'Ivoire (Study of the prevalence of vitamin A deficiency in the northern part of Côte d'Ivoire)	INSP	Tebi	Completed
189	Data Analysis and Publication Workshop, Bingerville, October 1994	INSP	ADDR	Completed

Ecuador

109	Risk of diarrheal disease in Ecuadorian children placed in day care centers of low-income urban communities	Corporación Ecuatoriana de Biotecnología	Sempértegui	Published
112	Support for ICDDR,B technical assistance in cholera control to Ministry of Public Health, Ecuador, May 1991	ICDDR,B	Siddique et al.	Completed
149	Technical assistance to the Ministry of Public Health, Ecuador, April 1992	ICDDR,B	Siddique & Salam	Completed
169	Proposal Development Workshop, Salcedo, October 1993	FLACSO	FLACSO/ADDR	Completed
178	Community water use and handwashing behaviors related to cholera prevention messages implemented by the Ministry of Public Health: a case study in marginal urban populations in the city of Guayaquil	Universidad Católica de Guayaquil	Cañizares	Completed

179	Practices and beliefs with respect to cholera and water use in Quichua communities of Imbabura Province, Ecuador: Why don't people comply with cholera prevention messages?	CEAS	Narvaez	In Progress
180	Determining costs of cholera care by type of treatment: Intravenous versus oral rehydration	FLACSO	Creamer	Completed
183	Support for plenary presentation at the Fourth Latin American Congress of Tropical Medicine, Guayaquil, Ecuador, May 1993	Universidad Central del Ecuador	Bennish & Gilman	Completed
193	Latin America Data Analysis and Publication Workshop, Ibarra, June 1995	FLACSO	ADDR/PAHO	Completed

Ghana

155	Proposal Development Workshop, Sogakofe, November 1992	Health Research Unit, MOH	ADDR	Completed
173	Case management of childhood acute respiratory infections by health care providers at first level health facilities in the central region of Ghana	Noguchi Memorial Institute for Medical Research	Afari	Completed
175	Response of caretakers of preschool children to ARI in Afigya Sekyere District	MOH	Amofah	Published
176	Perceptions of ARI and home management practices/self-medication in Dangme West District, Ghana	Dangme West Research Station	Malm	Completed

Guatemala

086	Characteristics of the rate of recovery of growth, vitamin A status, and body composition after dysentery caused by <i>Shigella</i>	CeSSIAM	Bulux	Published
098	Analysis of host risk factors for the development of bloody diarrhea and dysentery following infection by <i>Shigella</i> and <i>Campylobacter jejuni</i>	INCAP	Cruz	Published
099	Evaluation of different concentrations of rice-ORS with amylase added for the management of acute diarrhea and dehydration in infants	CeSSIAM	Molina	Completed
188	Effects of micronutrient (zinc, folate, and vitamin A) supplementation on intestinal permeability and duration of acute diarrhea	INCAP	Chew	In Progress

India

110	Persistent Diarrhea Proposal Development Workshop, New Delhi, June 1991	Bhan	ADDR/WHO	Completed
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Indonesia

022a	Proposal Development Workshop, Depok, West Java, June-July 1988	CCS	CCS/ADDR	Completed
022b	Core support for the Center for Child Survival, University of Indonesia	CCS	Papilaya	Completed
043	Social psychological aspects of diarrheal disease	University of Indonesia	Sarwono	Completed
044	Beliefs and practices of physicians in the case management of diarrheal diseases in children	Atma Jaya Foundation	Gani	Published
045	Study of case management of acute diarrheal diseases by mothers at home in Denpasar District, Bali	Udayana University	Muninjaya	Published
046	Water use practices as risk factors for diarrheal disease in South Kalimantan	University of Indonesia	Prihartono	Published
047	A study of personal and domestic hygiene behavior and its relationship to the incidence of diarrhea	Sriwijaya University	Aulia	Published
053	Feeding practices during acute diarrhea in rural South Sumatra	Sriwijaya University	Pardede	Published
058	Core award to the Center for Child Survival, University of Indonesia, to support the management of ADDR activities	CCS	Papilaya	Completed
059	Data Analysis/Report Writing Workshop, Depok, West Java, August 1989	CCS	Papilaya	Completed
060	Institutional support grant to the Center for Child Survival, University of Indonesia for computer equipment	CCS	Papilaya	Completed
062	Some severe dehydration risk factors for diarrhea in children under three years of age in hospitals and community health centers	University of Indonesia	Prasetyo	Canceled
070	Study of the role of <i>teungku meunasah</i> in the education and prevention of diarrheal diseases program at Aceh Besar Regency	Syiah Kuala University	Siregar	Completed
080	Improving the rational use of drugs in diarrhea	Gadjah Mada University	Santoso	Published
081	An experiment to improve the knowledge and practices of <i>warung</i> owners in diarrheal treatment	University of Indonesia	Djuwita	Completed
091	The role of religious leaders to increase the knowledge of drinking water as part of diarrheal disease prevention in South Kalimantan	University of Indonesia	Prihartono	Published
092	Development of an educational program on home case management of acute diarrhea in Lombok	Udayana University	Muninjaya	Published
101	Antibiotic therapy for invasive bacterial diarrhea: an exploratory clinical trial at the Out-patient Clinic, Department of Child Health, Palembang General Hospital	Sriwijaya University	Ismail	Published

102	Dysentery in children under five years of age in primary health care in Indonesia	Gadjah Mada University	Soenarto	Completed
103	Case control studies on the risk factors of severity of dehydration from acute diarrhea in children under five years in Bandung, West Java	Sub-Directorate for Control of Diarrheal Diseases	Hernani	Completed
106	Controlled study of an educational approach to improve the rational case management of diarrheal disease in young children	Atma Jaya Foundation	Gani	Completed
144	International Conference on Diarrheal Disease, Bali, January 1992	Udayana University	Muninjaya	Completed
157	Data Analysis Workshop, Puncak, West Java, April 1993	CCS/ADDR	ADDR	Completed

Kenya

021	Commissioned paper on infant feeding and weaning practices during health and diarrheal disease	KEMRI	Thiuri	Completed
027	Kenya Proposal Development Workshop, Njoro, May 1988	KEMRI	Kinoti	Completed
038	Incidence and severity of measles-associated diarrhea in children admitted with acute measles at Kenyatta National Hospital	University of Nairobi	Orinda	Published
039	Some determinants of outcome of diarrhea in an urban slum in Nairobi, Kenya	University of Nairobi	Mirza	Published
040	Improving water usage and sanitation behavior in an urban slum area by health education	University of Nairobi	Njai	Canceled
041	Technical assistance to the Applied Human Nutrition Unit	University of Nairobi, Kabete	Kielmann	Completed
051	Institutional support grant, University of Nairobi, Department of Paediatrics for computer equipment	University of Nairobi	Onyango	Completed
077	Support for Conference on Persistent Diarrhea, Mombasa, January 1991	Johns Hopkins University	ADDR	Completed
151	International Congress for Infectious Diseases, Nairobi, June 1992	Johns Hopkins University	Black	Completed

Mexico

009	Normalized treatment algorithm for acute infectious diarrhea at primary care units: evaluation of its impact on the use of antibiotics and other aspects of treatment	IMSS	Gutiérrez	Published
010	A clinical and field study of the efficacy, safety, acceptability and effectiveness of home-based beverages and early feeding for the management of acute diarrhea in childhood	INN	Martínez & Calva	Published
017	Applied ethnographic training session, Solis, January 1988	IMSS/INN	Martínez & Guiscafré	Completed

Mexico, continued

049	Mothers' beliefs and practices regarding the treatment of acute diarrhea in rural Mexico	INN	Martínez & Calva	Published
069	Factors which affect physician prescribing behavior and willingness to change treatment of acute infectious diarrhea	El Colegio de México	Bronfman	Published
076	Evaluation of a strategy for improving the treatment prescribed by primary health care physicians of a district of Mexico City, for diarrhea and acute respiratory infection	IMSS	Gutiérrez	Published
078	Dietary management of severely malnourished infants and children with chronic diarrhea: a comparative study of three different formulas	Hospital Infantil de México Federico Gomez	Nurko	Completed
079	A controlled comparative study of a complete diet based on usual foods and soy formula in children with acute diarrhea	Instituto Nacional de Pediatría de México	Maulén-Radován	Published
094	Assessment of medical treatment of cyst passers of <i>Entamoeba histolytica</i> through a study of cost-effectiveness	IMSS	Muñoz	Completed
095	Microbiology and strategies for treatment in acute bloody diarrhea	IMSS	Torres	Published
108	Acceptability of a rice-based beverage as an ORS in the field	INN	Martínez	Completed
120	Evaluation of an algorithm for the management of persistent diarrhea and malnutrition in infants and children (Mexico)	Hospital Infantil de México Federico Gomez	García & Nurko	Published
168	Persistent Diarrhea Workshop, Cuernavaca, November 1993	Hospital Infantil de México Federico Gomez	ADDR/WHO	Completed
184	Effect of micronutrient supplementation on appetite and energy intake of Mexican children living in rural communities	Instituto Nacional de Salud Pública	Rivera	In Progress

Nigeria

013	Maternal education, maternal behaviors, and risk factors for diarrheal disease in children in urban Nigeria	University of Ilorin	Oni	Published
025	Food hygiene practices and the risk of diarrhea: a case-control study	University of Lagos	Ekanem	Published
052	Conference on Diarrheal Disease Research in Zone A, Nigeria, Enugu, April 1989	University of Nigeria, Enugu	Okeahialam	Completed
054	Support of Nigerian scientists and other activities at AFCODD, Nairobi, April 1989	KEMRI	Aziz & Kinoti	Completed
064	Prescribing practices for diarrheal diseases by formal and unlicensed pharmacies in Borno State, Nigeria	University of Maiduguri	Igun	Published

071	Evaluation of cassava/salt solution in the management of infants and children with acute diarrhea	University of Lagos	Grange	Published
074	Support for Nigerian scientists to present at the twenty-first Annual Conference of the Paediatric Association of Nigeria, Lagos, January 1990	Paediatric Association of Nigeria	Igun, Oni, & Ekanem	Completed
097	Nutritional status and the incidence and duration of diarrheal diseases in coastal Nigeria	NIMR	Afolabi	Published
100	Impact of a health education intervention on selected personal and domestic hygiene behaviors and diarrhea morbidity rates: a community trial	University of Lagos	Ekanem	Published
111	Support for presentation at Hygiene Conference, Oxford, June 1991	London School of Hygiene & Tropical Medicine	Ekanem	Completed
116	Support for organizing committee, Fourth African Conference on Diarrheal Diseases, Lagos	University of Lagos, College of Medicine	Grange	Completed
122	Proposal Development Workshop, Ibadan, June 1992	IITA	ADDR	Completed
123	Evaluation of the impact of diarrhea training units (DTUs) on the practice of physicians in Nigeria	University of Lagos	Grange	Canceled
124	Malaria in the etiology of childhood acute diarrhea in Ibadan	University of Ibadan	Sodeinde	Published
125	Promotion of breast feeding as intervention for the control of diarrhea among infants	Obefemi Awolowo University	Davies-Adetugbo	Published
126	Assessment of the current status of ORT, modern and traditional methods in the management of diarrheal diseases in children in rural areas of Enugu State of Nigeria	University of Nigeria, Nsukka	Uwaegbute	Published
127	Children of market women in Enugu State: a comparative study of diarrhea, feeding patterns, and nutritional status between children taken to market and those cared for at home	University of Nigeria, Nsukka	Ene-Obong	Completed
128	Home-based management of diarrheal diseases and impediments to changing behaviors related to diarrheal diseases in rural communities of Enugu State	University of Nigeria, Nsukka	Asobie	Published
129	Comparative study of the perception and treatment of diarrhea among the three major ethnic groups in Borno State, northeastern Nigeria	University of Maiduguri	Akpede	Published
130	Effect of diarrhea on feeding patterns and dietary intake in children 0-24 months old	Nnamdi Azikwe University	Ogbuagu	Published
131	Community and ecological factors impeding the use of ORT in riverine areas of Ondo State	University of Ibadan	Iyun	Canceled
132	Antibiotic susceptibility patterns of bacterial agents of diarrhea in urban and rural areas of Nigeria	Edo State University	Obi	Published

Nigeria, continued

133	Impact of educational intervention on personal and domestic hygiene behaviors related to childhood diarrheal morbidity in rural Yoruba communities, Osun State, Nigeria	Obefemi Awolowo University	Jinadu	Published
134	A study of the case management of diarrheal diseases in a rural community of northern Nigeria and some factors influencing these practices	Ahmadu Bello University	Yakubu	Published
135	Evaluation of ORT educational intervention in a rural Nigerian community	University of Ibadan	Oladepo	Published
136	Evaluation of the impact of an educational program on the modification of behavior towards preventive management of diarrheal disease in Ona Ara Local Government Area of Oyo State, Nigeria	University of Ibadan	Omotade	Published
137	Cultural beliefs, perceptions, and caretakers' management behavior of childhood bloody diarrhea in rural settings of the Yoruba cultural area of Nigeria	University of Ibadan	Adisa	Published
138	Management of childhood diarrhea at the household level in Nigeria	University of Jos	Alubo	Published
140	Rational use of drugs in the management of childhood diarrhea by retail pharmacists	University of Maiduguri	Igun	Completed
190	Data analysis and publication workshop, Ibadan, December 1994	IITA	ADDR	Completed
192	University-Community Linkage Workshop, Ibadan, June 1995	IITA	ADDR/UNICEF	Completed
199	Support for attendance at Workshop on Capacity Enhancement for the Social Sciences in Health, Toronto, October 1995	Ogun State University	Erinosho	Completed

Pakistan

005	A study on the dietary management of persistent diarrhea	Aga Khan University	Bhutta	Published
006	The role of food in the management of acute diarrhea in children	Aga Khan University	Shaikh	Published
018	Cultural and environmental factors in diarrheal disease and treatment	Army Medical College	Malik	Published
034	A study of the efficacy and digestibility of cereal-based ORS solution in infants with acute diarrhea	Aga Khan University	Islam	Published
035	Survey of the prevalence of vitamin A deficiency in children in the slums of Karachi	Aga Khan University	Molla	Published
036	Perceptions of illness, home care, and health-seeking behavior in childhood diarrhea	Aga Khan University	Qureshi	Published

037	A study of the dietary management of persistent diarrhea in severely malnourished children	Aga Khan University	Bhutta	Published
057	Data analysis, writeup, and interpretation for Army Medical College study of diarrheal disease among children in rural and urban northern Punjab, Pakistan	Army Medical College	Malik	Completed
063	Investigation of diarrhea and dysentery in a community in Gilgit, Northern Areas, Pakistan	Aga Khan University	Rasmussen	Published
065	Support for ten scientists to attend International Symposium on Food-Based ORT, Karachi, November 1989	Aga Khan University	Molla	Completed
072	Contingency funds for the transport and care of treatment failures at the Aga Khan University Paediatric Intensive Care Unit	Aga Khan University	Molla	Completed
075	Support for special session on diarrheal disease and nutrition at the Pakistan Paediatric Conference, Quetta, May 1990	Pakistan Paediatric Association	ADDR	Completed
114	Support for panel presentation of study results at Society for Pediatric Research, New Orleans, May 1991	Aga Khan University	Molla	Completed
121	Evaluation of an algorithm for the management of persistent diarrhea and malnutrition in infants and children (Pakistan)	Aga Khan University	Thobani	Published
145	Epi Info Statistical Analysis Training Workshop, Islamabad and Rawalpindi, February-March 1992	PIMS	ADDR	Completed
147	General training sessions on statistics/epidemiology for research teams supported by ADDR, Karachi and Lahore, April 1992	Shaikh Zayed Hospital & Aga Khan University	ADDR	Completed
148	Epi Info Statistical Analysis Training Workshop, Lahore, April 1992	Shaikh Zayed Hospital	ADDR	Completed
150	Training on detection of toxin-producing organisms causing hemolytic uremic syndrome, Shaikh Zayed Hospital, Lahore, May 1992	Shaikh Zayed Hospital	Maqbool	Completed
158	Data Analysis Workshop, Islamabad, June 1993	National Agricultural Research Centre	ADDR	Completed
170	Data Analysis Workshop, Lahore, October 1993	NIPA	ADDR	Completed
171	Data Analysis Workshop, Lahore, November 1993	NIPA	ADDR	Completed
P001	Proposal Development Workshop, Quetta, July 1991	MOH	ADDR	Completed
P002	Evaluation of <i>dowdo</i> as a diet for children with acute diarrhea	District Headquarters Hospital, Gilgit	Jan	Completed
P003	Home fluids in the management of diarrheal disease in children	PIMS	Khan	Published
P004	Comparison of yogurt with soya based lactose-free formula in secondary lactase deficiency	Allama Iqbal Medical College	Waheed	Canceled

Pakistan, continued

P005	A study of the efficacy of cereal-based (<i>sabodana</i>) ORS in children with acute diarrhea	Jinnah Postgraduate Medical Centre	Isani	Completed
P006	Risk factors for diarrhea-associated ileus in infants in Lahore	King Edward Medical College/Mayo Hospital	Khan	Completed
P007	Drug prescribing practices in childhood diarrhea	Aga Khan University	Nizami	Published
P008	Risk factors for the hemolytic uremic syndrome in children	Shaikh Zayed Hospital	Maqbool	Completed
P009	Simple health messages and their impact on duration of exclusive breast-feeding and improved weaning practices	Dow Medical College & Civil Hospital	Biloo	Completed
P010	Promotion of exclusive breast-feeding and its effect on diarrhea morbidity	Dow Medical College & Civil Hospital	Akram	Completed
P011	Dietary management of persistent diarrhea in malnourished children: a controlled trial	Dow Medical College & Civil Hospital	Akram	Completed
P012	Evaluation of diarrhea training units (DTUs)	NICH, Karachi	Isani	Completed
P014	Assessment of practices of doctors trained at the diarrhoea training unit, Rawalpindi General Hospital, Rawalpindi	Rawalpindi General Hospital	Kundi	Completed
P015	Knowledge and practices of mothers regarding the use of drugs for the treatment of acute watery diarrhea in children in urban slums of Lahore	Allama Iqbal Medical College	Javid	Completed
P016	Study of current practices and factors affecting the management of acute watery diarrhea in children below 5 years by general physicians in Lahore	Allama Iqbal Medical College	Mubasher	Published
P017	Proposal Development Workshop, Bhurban, April 1992	MOH	ADDR	Completed
P018	Impact of appropriate breast-feeding practices on diarrhea morbidity and nutritional status of infants	Aga Khan University	Badruddin	In Progress
P019	Impact of vitamin A supplementation on acute respiratory infections in 6-24 months old children in the urban slums of Lahore	King Edward Medical College/Mayo Hospital	Jalil	Canceled
P020	Assessment of nutritional beliefs and practices in pregnant and lactating women: a community study	Allama Iqbal Medical College	Mahmood	Completed
P021	A study of Pakistani mothers' knowledge and management of ARI	Shaikh Zayed Hospital	Hussain	Published
P022	Assessment of maternal risk factors for birth of small for gestational age babies in hospital-based urban populations	NICH	Arif	Completed
P023	Management of ARI in children by health practitioners in government health care facilities in District Peshawar	PMRC, Khyber Medical College	Akhtar	Completed

P024	Efficacy of aerosolized salbutamol in bronchiolitis	King Edward Medical College/Mayo Hospital	Taj	In Progress
P025	Role of community health workers in detection and management of pneumonia and determination of cost and time savings by the community and health care system	Dow Medical College & Civil Hospital	Mehnaz	Completed
P026	Assessment of breast feeding and weaning beliefs and practices among mothers following their infants to four months of age in an urban community of Lahore, Pakistan	College of Community Medicine, Lahore	Ume Kulsoom	Completed
P027	ARI in children in urban slums and rural localities of Rawalpindi/Islamabad, Pakistan: a behavioral study	Army Medical College	Malik	Completed
P028	Assessment of the effect of vitamin A on the immune response of measles vaccine in 9 month old children in rural areas of Rawalpindi/Islamabad	National Institute for Health	Asghar	Canceled
P029	Community perceptions of ARI in urban slums of Karachi	Aga Khan University	Hussain	Completed
P030	Impact of iron supplementation on infant morbidity and growth pattern in North West Frontier Province, Pakistan	North-West Frontier Province Agriculture University	Paracha	Completed
P031	A sociological study of malnutrition among children 6-36 months of age in Lahore	University of the Punjab	Toor	Completed
P032	Clinical diagnosis and case management of children with ARI presenting to general practitioners	Nishtar Hospital	Iqbal	Completed
P033	Childhood pneumonia in the Northern Areas of Pakistan: relationship of in vitro antibiotic resistance with clinical response to cotrimoxazole	Aga Khan University	Rasmussen	Completed
P034	Clinical signs, etiology, and outcome of pneumonia in severely undernourished children 2-59 months of age: a comparative study	The Children's Hospital, PIMS	Qazi	Completed
P035	A randomized controlled trial of zinc supplementation in children with persistent diarrhea: impact on diarrhea and nutritional status	Aga Khan University	Bhutta	Completed
198	Support for presentation at Annual Meeting of International Union Against Tuberculosis and Lung Disease, Paris, September 1995	University of the Witwatersrand/ADDR	Klugman/Qazi	Completed

Peru

002	Epidemiology of prolonged diarrhea in Lima	IIN	Lanata	Published
003a	Development and field testing of a soup-based ORS in Lima	Universidad Peruana Cayetano Heredia	Salazar-Lindo	Completed
003b	Development and field testing of a soup-based ORS in Lima	IIN	Lanata	Completed

Peru, continued

004	Physicians' practices related to the treatment of childhood diarrhea in two areas of Peru, with special emphasis on nutritional aspects of therapy	IIN	del Aguila	Published
023	Evaluation of an in-service training program on clinical management of diarrhea in children	Universidad Peruana Cayetano Heredia	Salazar-Lindo	Published
024	Data analysis of fecal contamination of toddler-aged children from domestic chickens in peri-urban slum areas of Lima	Universidad Peruana Cayetano Heredia	Miranda & Carbajal	Published
031	Clinical and nutritional effects of legumes added to a mixed diet for the early nutritional therapy of acute childhood diarrhea	IIN	Alarcón	Published
067	Institutional support grant for computers	Universidad Peruana Cayetano Heredia	Campos	Completed
068	Efficacy of a diet made of widely available, inexpensive ingredients vs. a lactose-free formula for the management of severely malnourished children with diarrhea	IIN	Gastañaduy	Completed
082	Design of neighborhood dispensary for the treatment of diarrhea and other illnesses	Asociación Benéfica PRISMA	Haustein	Completed
088	Training mothers in the dietetic management of children's diarrhea and weaning foods	IIN	Benavides	Published
089	Family water and soap usage in a water-scarce shanty town in Lima before and after the introduction of in-house water systems	Asociación Benéfica PRISMA	Marín	Completed
090	Diarrheal disease under economic stress	Asociación Benéfica PRISMA	Diaz	Completed
096	The role of dietary fiber in the management of acute diarrhea	IIN	Alarcón	Published
104	Study of the determinants of inappropriate prescribing for childhood diarrhea among doctors in Lima	IIN	Paredes	Published
118	Support for presentation of research results at First International Conference on Social and Cultural Aspects of Pharmaceuticals, Amsterdam, October 1991	University of Amsterdam	Paredes	Completed
119	Evaluation of an algorithm for the management of persistent diarrhea and malnutrition in infants and children (Peru)	IIN	Penny	Published
146	Technical assistance to the Peruvian Ministry of Health, March 1992	MOH/ICDDR,B	Alam	Completed
167	Intervention trial to decrease the inappropriate use of drugs during childhood diarrhea	IIN	Paredes	Completed
177	Effects of a zinc supplement with and without additional micronutrients on the dietary intake of children at high risk of zinc deficiency	IIN	Penny	In Progress

181	Impact of cholera on infantile diarrhea in Peru	IIN	Lanata	Published
182	Technical assistance in cholera for the Peruvian government, Lima, November 1993	ICDDR,B	Alam	Completed
196	Multicentre study to evaluate the efficacy/safety of reduced osmolarity ORS solution in children with acute watery diarrhoea	Universidad Peruana Cayetano Heredia	Chea-Woo	In Progress
197	Conference on Scientific Research and the Formulation of Public Policies, Quito, June 1995	FLACSO	ADDR	Completed
C001	Effect of two different interventions involving household water on the incidence of cholera infection	Asociación Benéfica PRISMA	Segura	Completed
C002	An early warning system based on longitudinal sampling of potable water and sewage for the presence of <i>Vibrio cholerae</i> 01	Asociación Benéfica PRISMA	Madico	Completed
C003	Mapping of cholera in Lima	Asociación Benéfica PRISMA	Marin	Completed

Senegal

016	Provider-patient interaction during diagnosis and counseling of diarrhea patients	ORANA	Kane	Completed
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Thailand

007	Culture and control of diarrheal illness	Thai Ministry of Public Health	Choprapawon	Published
011	Proposal Development Workshop, Bangkok, October 1987	Mahidol University	Varavithya	Completed
014	Diarrheal disease in relation to water supply and sanitation: analysis of pilot study and proposal development	Mahidol University	Tunyavanich	Published
015	Weaning education for control of diarrheal disease	Mahidol University	Pradipasen	Completed
019	Incidence and risk factors of diarrhea in Khon Kaen	Khon Kaen University	Sutra	Published
020	Participatory action research approach for the reduction of child diarrhea in a slum area of Bangkok	Chulalongkorn University	Jongpiputvanich	Completed
026	Diarrhea requiring specific therapy in Thai children in a low-income urban community: incidence and clinical features	Mahidol University	Varavithya	Published
032	Diarrheal diseases in four areas in Thailand: a comparative study of morbidity, risk factors, and help-seeking behaviors	Mahidol University	Navawongs	Published
033	Clinical epidemiology of acute diarrheal diseases in children under two years in urban Chonburi, Thailand: an investigation of maternal and sociocultural factors contributing to clinical severity	Mahidol University	Sabchareon	Published

Thailand, *continued*

042	Study of school and home handwashing behavior	Chiang Mai University	Nilkaew	Completed
048	A study of family health behaviors and cultural factors relating to transmission of diarrheal disease agents among children under five years in Hmong villages, northern Thailand	Mahidol University	Butraporn	Completed
050	Conference on Invasive Diarrheas and Dysentery, Bangkok, December 1988	Mahidol University	Keusch	Completed
061	Thailand Data Analysis Workshop, Salaya, August 1989	Mahidol University	Varavithya	Completed
073	Thai/Indonesian Proposal Development Workshop, Salaya, March 1990	Mahidol University	Varavithya	Completed
083	An intervention model for home use of ORS in slum areas, urban Thailand	Mahidol University	Sabchareon	Completed
084	Effectiveness of a community participatory action approach to reduce morbidity from diarrheal disease in children aged 0-5 years in Khon Kaen, northeastern Thailand	Khon Kaen University	Sutra	Completed
085	Factors influencing hygiene behavior and the sources of health information in Suphanburi, Thailand	Mahidol University	Rauyajin	Published
087	Impact of an education program on the knowledge and diarrheal treatment practices of pharmacists and druggsellers	Mahidol University	Varavithya	Published
093	Weaning education for control of diarrheal disease: Phase II	Mahidol University	Pradipasen	Canceled
105	A feasibility study of the water-sanitation improvement program of Kanchanaburi Province	Mahidol University	Butraporn	Canceled
115	Support for presentation of research results at Seventh Asian Conference of Paediatrics and Annual Scientific Meeting of the Australian College of Paediatrics, Perth, May 1991	Mahidol University	Sabchareon	Completed

Zaire

107	Etiology, natural history, and incidence of persistent diarrhea in children with perinatally acquired HIV infection	Department of Public Health	Kamenga	Canceled
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Publications

I. ADDR-Supported Publications, 1995–1996

This list includes publications from books and journals. Where publications were supported by ADDR research grants, the grant number precedes the citation; citations without numbers came from ADDR staff or ADDR-sponsored publications. As the ADDR Project will complete its activities in May 1996, we have decided to include, for the convenience of our readers, publications appearing in early 1996.

- 129 Akpede GO, Omotara BA, Shettima AG.**
Awareness claims versus actual knowledge and use of oral rehydration therapy and the salt sugar solution in northeastern Nigeria. *J Trop Pediatr* 1996;42(3):180–182.
- 129 Akpede GO, Omotara BA, Gazali W.**
Severity signs of childhood diarrhoea in northeastern Nigeria. *J Roy Soc Health* June 1995:164–174.
- 096 Alarcón P, Alarcón JL.**
Propuesta para un manejo diagnóstico práctico de la etiología de la diarrea aguda infantil. *Rev Gastroenterol* 1994;14:145–149.
[not listed in the 1994 annual report]
- 175 Amofah GK, Essegbey IT, Opoku SA, Oduro J.**
Perceptions of and intended responses to ARI by caretakers of pre-school children in a rural district in Ghana. *Health Courier* 1995;5(5): 23–25.
- 037 Bhutta ZA, Hendricks KM.**
Nutritional management of persistent diarrhea in childhood: a developing world perspective. *J Pediatr Gastroenterol Nutr* 1996;22:17–37.
- 098 Cruz JR, Cano F, Bartlett AV, Méndez H.**
Infection, diarrhea, and dysentery caused by *Shigella* species and *Campylobacter jejuni* among Guatemalan rural children. *Pediatr Infect Dis J* 1994;13(3):216–223. [not listed in the 1994 annual report]
- 009 Guiscafré H, Martínez H, Reyes H, Pérez-Cuevas R, Castro R, Muñoz O, Gutiérrez G.**
From research to public health interventions. I. Impact of an educational strategy for physicians to improve treatment practices of common diseases. *Arch Med Res* 1995;26(Suppl): 31–39.
- P021 Hussain W, Anwar M, Maqbool S, Mahmood N.**
Mothers' knowledge of acute respiratory infections in children under five. *Pak Pediatr J* 1994;18(4):177–181.
[not listed in the 1994 annual report]
- 119, 120, 121 International Working Group on Persistent Diarrhea**
Evaluation of an algorithm for the treatment of persistent diarrhoea: a multicentre study. *Bulletin of the World Health Organization* (accepted for publication).

- P016 Mubasher M and Choudry AJ.**
Management of acute watery diarrhoea in children below 5 years – reported practices by general physicians of Lahore, Pakistan. *Pak J Health* 1994;31(3–4):18–24. [not listed in the 1994 annual report]
- 095 Muñoz O, Solórzano F, Torres J, Cedillo R.**
Tratamiento de la diarrea aguda con sangre. In: Mota-Hernandez F (ed.) *Avances en el control de las enfermedades diarreicas*. Mexico: Consejo Nacional Para El Control De Las Enfermedades Diarreicas, 1995: 173–180.
- P007 Nizami SQ, Khan IA, Bhutta ZA.**
Differences in self-reported and observed prescribing practices of general practitioners and paediatricians for acute watery diarrhoea in children of Karachi, Pakistan. *J Diarrhoeal Dis Res* 1995;13(1):29–32.
- P007 Nizami SQ, Khan IA, Bhutta ZA.**
Drug prescribing practices of general practitioners and paediatricians for childhood diarrhoea in Karachi, Pakistan. *Soc Sci Med* 1996;42(8):1133–1139.
- P007 Nizami SQ, Khan IA, Bhutta ZA.**
Self-reported concepts about ORS, drug-prescribing and reasons for prescribing antidiarrhoeals for acute watery diarrhoea in children. *Trop Doctor* (accepted for publication).
- P007 Nizami SQ, Khan IA, Bhutta ZA, Shah SM.**
Awareness of National ARI control program among practitioners in Karachi and their prescribing behaviour for fever in children under five years of age. *Quarterly Specialist, Pak J Med Sci* 1996;12(2):165–169.
- 161 Nkwi PN, Ndonko FT, Mbeh GN.**
Ethnographic decision tree modeling of caretakers' responses to childhood diarrhea in two Cameroonian villages. *Coll Antropol* 1994;18(2): 199–204. [not listed in the 1994 annual report]
- 132 Obi CL, Coker AO, Epoke J, Ndip R.**
Aeromonas and *Plesiomonas* species as bacterial agents of diarrhoea in urban and rural areas of Nigeria: antibiogram of isolates. *Cent Afr J Med* 1995;41(12):397–403.
- 128 Okeibunor JC, Asobie FC, Igboeli CC.**
Factors associated with the use of SSS among mothers in Nsukka Zone of Enugu State, Nigeria. *Int Q Commun Health Educ* 1995;15(2): 127–136.
- 136 Omotade OO, Kayode CM, Adeyemo AA, Oladepo O.**
Observations on handwashing practices of mothers and environmental conditions in Ona-Ara local government area of Oyo State, Nigeria. *J Diarrhoeal Dis Res* 1995;13(4): 224–228.
- 104 Paredes P, de la Peña M, Flores-Guerra E, Díaz J, Trostle J.**
Factors influencing physicians' prescribing behavior in the treatment of childhood diarrhoea: knowledge may not be the clue. *Soc Sci Med* 1996; 42(8):1141–1153.
- 076 Pérez-Cuevas R, Guiscafré H, Muñoz O, Reyes H, Tomé P, Libreros V, Gutiérrez G.**
Improving physician prescribing patterns to treat rhinopharyngitis: intervention strategies in two health systems of Mexico. *Soc Sci Med* 1996; 42(8):1185–1194.
- 036 Qureshi AF, Lobo MA.**
Home management of childhood diarrhoea in the urban poor; implications for policy. *Pak Ped J* 1994;17(3): 99–113. [not listed in the 1994 annual report]
- 036 Qureshi AF, Lobo MA.**
Socio-anthropological determinants and home management in childhood diarrhoea in a squatter settlement of Karachi, Pakistan. *J Trop Paed* 1994;40:378–380. [not listed in the 1994 annual report]

- 080 Santoso B, Suryawati S, Prawitasari JE. Small group intervention vs. formal seminar for improving appropriate drug use. *Soc Sci Med* 1996;42(8): 1163–1168.
- 109 Sempértigui F, Estrella B, Egas J, Carrión P, Yerovi L, Díaz S, Lascano M, Aranha R, Ortiz W, Zabala A, Izurieta R, Griffiths JK. Risk of diarrheal disease in Ecuadorian day-care centers. *Pediatr Infect Dis J* 1995;14:606–612.
- 095 Torres J, Gonzalez-Arroyo S, Perez R, Muñoz O. Inappropriate treatment in children with bloody diarrhea: clinical and microbiological studies. *Arch Med Res* 1995;26(1):23–29.
- 092 Widarsa KT, Muninjaya AG. Factors associated with the use of oral rehydration solution among mothers in West Lombok, Indonesia. *J Diarrhoeal Dis Res* 1994;12(4): 261–264. [not listed in the 1994 annual report]

II. Abstracts of Recent ADDR Publications

129 Akpede GO, Omotara BA, Shettima AG. Awareness claims versus actual knowledge and use of oral rehydration therapy and the salt sugar solution in northeastern Nigeria. *J Trop Pediatr* 1996;42(3):180–182.

Focus group discussions involving rural and urban residents drawn from Kanuri and Bura settlements were conducted as part of an ongoing survey of the perception and treatment of diarrhoea among major ethnic groups in northeastern Nigeria. Awareness of oral rehydration therapy (ORT) was universal among participants, but knowledge of its function and the preparation of the sugar salt solution (SSS) was markedly deficient among the Kanuris, especially in rural areas. Reported SSS use parallels the knowledge of ORT function/SSS preparation and seemed heightened by church-fellowship activities among the rural Buras. Surprisingly, tasting was apparently not realised by participants to be an important step in SSS preparation. These preliminary results suggest that knowledge of ORT function and SSS preparation need further emphasis in ORT awareness campaigns, and that religion-based activities could be a potent and actualizable method of ORT promotion.

129 Akpede GO, Omotara BA, Gazali W. Severity signs of childhood diarrhoea in northeastern Nigeria. *J Roy Soc Health* 1995; 164–174.

Oral rehydration therapy (ORT) use in Nigeria is currently far short of the national Control of Diarrhoeal Diseases (CDD) programme goals. Toward designing health education strategies to improve this, maternal lay health concerns during diarrhoea in under-five children were examined among two large ethnic groups, the Kanuris and Buras, in northeastern Nigeria. Over half of the respondents judged the severity of diarrhoea by more than one sign and expected ORT to stop diarrhoea. Severity signs frequently designated (averaging from one quarter to a half of respondents) included weakness and refusal of food; frequent stooling and fever were more frequently used by the Kanuris ($p < 0.0001$) compared to Buras, and weight loss and dehydration by the Buras ($p < 0.01$) compared to Kanuris. Generally, rural residents were less concerned with dehydration and weight loss ($p < 0.0001$ and 0.003 respectively, compared to urban residents) and more concerned with restlessness, including excessive crying ($p < 0.07$ to 0.0001). Stool characteristics and vomiting were rarely used as severity signs, although

the Kanuris in focus group discussions related severity to diarrhoea typology. Concerns with persistent diarrhoea, and diarrhoea associated with measles, were rarely expressed by participants, irrespective of ethnic group and domicile, suggesting that health education aimed at increasing awareness in relation to these two serious illnesses is urgently needed in Nigeria. Several of the lay health concerns expressed by participants in the study could form a useful basis for promoting ORT use in Nigeria and elsewhere.

096 Alarcón P, Alarcón JL. Propuesta para un manejo diagnóstico práctico de la etiología de la diarrea aguda infantil. *Rev Gastroenterol* 1994;14:145-149.

Acute childhood diarrhea is highly common in our country and its treatment includes rehydration, the early dietary management and, in certain cases, the use of antibiotics. At the same time, watery diarrhea is much more common than bloody diarrhea. The ideal in the management of infectious diarrhea is to identify the microorganisms that are producing the disease; however, it is very important to mention that in the majority of etiological studies done in our country, two were the more common identified microorganisms: *Rotavirus* and *E. coli* (in its different types). Due to the high price of laboratory tests, we do not search those microorganisms and the majority of laboratories used to report as a result, *Salmonella*, *Shigella* or negative. Normally, we receive the results of these cultures after a few days and, as we can understand, these results are not necessarily useful in the early management of the disease; furthermore, as we mentioned, these results will not include the more common pathogens.

In this article, we propose to perform three simple fecal tests in patients affected with acute diarrhea: 1) count and differentiation of leukocytes; 2) occult blood; 3) reducing substances.

Using these three results, it is not too difficult to suspect the probable pathogen that is affecting our patient. In that concern, we propose this very simple, cheap and highly practical method for the etiological management of our patients that, of course, is not infallible, but our experience for many years

has shown us that it is of great help for pediatricians in their daily work.

175 Amofah GK, Essegbey IT, Opoku SA, Oduro J. Perceptions of and intended responses to ARI by caretakers of pre-school children in a rural district in Ghana. *Health Courier* 1995;5(5):23-25.

This study was conducted in order to examine the paucity of data on perceptions and health seeking behaviours of caretakers in relation to ARI. This information is needed for successful implementation of the recently formulated national control programme at the district level. Data were collected from 400 caretakers of pre-school children using a combination of focus group discussions, key informant interviews, and a structured community survey from 30 rural and 10 urban communities in Afigya Sekyere District, Ashanti. ARI was perceived as an important health problem by caretakers, who used a variety of local terms to describe ARI. Most caretakers were able to recognize at least one cardinal sign of severe ARI in children over two months old, but were often unable to recognize important symptoms and signs in infants less than two months of age. Exposure to cold, overwork, and air pollution were considered causes of ARI, while the concept of germ theory was not commonly appreciated. Drugs and herbal preparations were often used for the home management of mild ARI, whereas cases of more severe ARI were usually taken to health centers for treatment. The results of this study were used to formulate a series of recommendations for improving the recognition and treatment of ARI in the community.

037 Bhutta ZA, Hendricks KM. Nutritional management of persistent diarrhea in childhood: a developing world perspective. *J Pediatr Gastroenterol Nutr* 1996;22:17-37.

Nearly a decade ago the World Health Organization (WHO) estimated that there were approximately 700 million episodes of diarrhea annually among children under 5 years old in developing countries, resulting in 4.6 million deaths. Despite vast improvement in the management of acute diarrheal

disorders and oral rehydration therapy, it is estimated that diarrheal diseases still account for up to 30% of all hospital admissions in developing countries. A recent review of the global status of diarrhea indicates that although there has been a general reduction in mortality rates due to acute dehydration, there has been little decrease in the incidence of diarrheal disorders. Of the various aspects of childhood diarrheal disorders, in recent years persistent diarrhea (PD) has assumed special importance for health workers and program planners.

This article reviews the nutritional management of persistent diarrhea in childhood and recommends current clinical approaches to treatment. Research recommendations are also offered. The following areas are critically reviewed: clinical factors predisposing to PD and their implications for therapy; the pathology of PD and impact on nutrient absorption; route of feeding; what to feed, including a critical review of therapeutic options; other factors influencing dietary therapy of PD; and research recommendations.

098 Cruz JR, Cano F, Bartlett AV, Méndez H. Infection, diarrhea, and dysentery caused by *Shigella* species and *Campylobacter jejuni* among Guatemalan rural children. *Pediatr Infect Dis J* 1994;13(3): 216-223.

To examine the factors that may influence the outcome of infections by *Shigella* spp. and *Campylobacter jejuni* we followed for 24 consecutive months 321 rural Guatemalan children 0 to 35 months old. Home visits were made to determine child morbidity patterns with emphasis on diarrhea and dysentery. Fecal samples for microbiologic studies were obtained from the participants when they were ill and during healthy periods. *Shigella* spp. were isolated from 9.8% and 4.0% of ill and healthy children, respectively; the figures for *C. jejuni* were 12.1% and 8.1%. *Shigella flexneri* 1, 2, and 6 and *Shigella sonnei* accounted for 70% of all *Shigella* isolates. Twenty-four percent of *Shigella* spp. and 7% of *C. jejuni* infections resulted in dysentery. *Shigella dysenteriae* and *Shigella flexneri* were more likely to induce dysentery than the other species. The incidence of dysentery was

0.84 of 100 child weeks. Age, gender, nutritional status, and feeding habits of the children did not affect the outcome of *Shigella* infection. Fat consumption favored the development of dysentery caused by *C. jejuni*. The development of dysentery seems to be associated with microbial factors and not with host variables, although specific *Shigella* serotype protection against symptomatic infection may be functional for prolonged periods after natural exposure.

009 Guiscafré R, Martínez T, Reyes H, Pérez-Cuevas R, Castro R, Muñoz O, Gutiérrez G. From research to public health interventions. I. Impact of an educational strategy for physicians to improve treatment practices of common diseases. *Arch Méd Res* 1995;26(suppl):31-39.

Errors in treating common diseases occur very frequently in primary health care practice. While many of these mistakes are not life-threatening, the costs of abuse in drug prescription may be greatly increased. An educational strategy aimed to improve physicians' prescribing practices for acute diarrhea (AD) and acute respiratory infection (ARI) was developed as a research study, involving three medical care units. The strategy was largely based on promoting active participation of the trainees in the whole process, including: (a) group participation in a literature review of updated articles related to management of AD and ARI; (b) analysis of prescribing practices before the intervention; (c) participation in the development of a clinical algorithm for the therapeutic management of these illnesses; and (d) discussion of the usefulness of the algorithm during peer review committee meetings. Successful results of this intervention, as judged by the improvement of treatment practices and the persistence of changes for up to 2 years after the intervention, as well as its ease of application and low costs, motivated its extension to a health District and a State. In these sites, the intervention was led by medical leaders from the clinics and medical heads of the local health systems, respectively. The extension of the educational strategy was accompanied by a relative reduction in AD from 46.7% to 6.5% and in ARI from 32.6%

to 8.5%. However, the benefit-cost ratio showed a dramatic increase when comparing results from the research study and from the State intervention, for both AD (from 3.3% to 4.4%) and ARI (from 16.2% to 21.6%), for an overall net increase of 33.3%. Based on these results, the educational strategy was adopted by the National Program for the Control of Diarrheal Diseases, and was used to train public health physicians throughout the country, from 1992 to 1994.

021 Hussain W, Anwar M, Maqbool S, Mahmood N. Mothers' knowledge of acute respiratory infections in children under five. *Pak Ped J* 1994; 18(4):177-181.

To better understand primary caretakers' (usually mothers) awareness and health seeking behaviors with regard to ARI in children, we randomly selected fifty mothers living in a lower class locality (LCL) and fifty mothers from a middle class locality (MCL) with a child less than five years of age who experienced an episode of ARI, which led mothers to seek care at the outpatient clinic of our hospital during the 1992-93 winter season. All the children resided within one kilometer of Shaikh Zayed Hospital in Lahore, Pakistan. Most of the mothers reported that their child suffered from cold (*nazla/zukam*), cough (*khansi*), and fever (*bukhar*). Irrespective of social class, age, or education, mothers reported "exposure to cold" as the principal cause of the episode of ARI. None of the LCL mothers and only 12% of the MCL mothers used scientific terms such as pneumonia or infection. Difficulty in breathing (*sans ki takleef*) was most frequently mentioned as the symptom that mothers perceived as dangerous and triggered their decision to seek care at the hospital. Chest indrawing (a WHO-recommended danger sign for identifying possible cases of pneumonia) was less often identified by mothers, partly due to the practice of wrapping the child in warm clothes and an unwillingness to expose the chest of the child to the cold in the winter season. When chest indrawing was seen, however, it was a symptom that caused most mothers to seek professional medical care. This study highlights the importance of physicians understanding and using local terminology to describe ARI and suggests that

community health education campaigns focus on difficult breathing rather than chest indrawing as a key symptom in educating mothers when to seek medical care for their children during an episode of ARI.

119, 120, 121 International Working Group on Persistent Diarrhea. Evaluation of an algorithm for the treatment of persistent diarrhoea: a multicentre study. *Bulletin of the World Health Organization* (accepted for publication).

Objective. Although persistent diarrhoea and associated malnutrition are serious health problems in children, no effective and widely practiced therapeutic regimen is available. We have conducted a multicentre cohort study to test an algorithm to treat persistent diarrhoea based on the use of locally available, inexpensive diets with similar nutritional contents, vitamin and mineral supplementation and the selective use of antibiotics to treat associated infections.

Methodology. The multicentre cohort design was chosen to insure an adequate number of patients and to permit evaluation of the similar but uniquely crafted local diets as part of the three component algorithm. The initial diet (diet A) contained cereals, vegetable oil, and animal milk or yogurt (lactose < 3.7 g/150 kcal diet). In some centres, diet A also contained sugar, lentils or soy flour. The diet offered when the patient did not improve with the initial regimen (diet B) was lactose-free and the energy from staple food was partially replaced by simple sugars.

Results. Four hundred and sixty children, aged 4-36 months, were enrolled at the collaborating centres in Bangladesh, India, Mexico, Pakistan, Peru and Viet Nam if they had diarrhoea of ≥ 14 days duration and associated moderate or severe malnutrition, dehydration or serious infection requiring hospitalization. The study population was young (11.5 ± 5.7 months), malnourished (mean weight-for-age z-score = -3.03 ± 0.86) and severe associated conditions were common (45% of the children required rehydration or treatment of severe infection on admission). The overall success rate of the treatment algorithm was 80% (95% CI 76-84%). The recovery rate among all children evaluated while receiving the diet A component

was 65% (95% CI 61–70%) and was 71% (95% CI 62–81%) for those evaluated after receiving the diet B component of the algorithm. Weight gain was achieved in 88% of children, and the increase, after correction of any dehydration on admission, averaged about 35 g/day for all children for the mean of nearly 9 days of treatment.

The children at greatest risk of treatment failure were those who had acute associated illnesses (including cholera, septicemia, and urinary tract infection), required intravenous antibiotics and had the highest initial purging rates. In general, we found that expensive laboratory evaluations added little to the successful management of the children.

Conclusions. These results indicate that the short term treatment of severe persistent diarrhoea can be accomplished safely and effectively, in the majority of patients, using an algorithm relying primarily on locally available diets and simple clinical guidelines. This algorithm should help establish a rational and effective treatment of persistent diarrhoea.

016 Mubasher M, Choudhry AJ. Management of acute watery diarrhoea in children below 5 years – reported practices by general physicians of Lahore, Pakistan. *Pak J Health* 1994;31(3–4):18–24.

Two hundred and sixty-two randomly sampled general physicians of Lahore were interviewed to study the current practices and factors affecting the management of acute watery diarrhoea in children under 5 years of age in comparison with the World Health Organization (WHO) guidelines. Among the physicians, 19.1% said they would prescribe ORS alone, 60.7% ORS with some drug, 14.9% drugs alone, and 53% increased fluids only. Physicians in the government sector as compared to the private sector, physicians trained in a paediatrics unit as compared to not trained in a paediatrics unit, and recent graduates as compared to older graduates reported they prescribe more in accordance with the WHO guidelines ($p < 0.05$). No statistically significant relationship was found between reported prescribing according to WHO guidelines and attendance at a diarrhoea training unit (DTU) course, reading WHO guidelines for manage-

ment of diarrhoea, and total number of parents seen daily. Physicians were more likely to report that they prescribed according to WHO guidelines if they believed that mothers were satisfied with ORS. Two hundred and fifty-five (97.3%) physicians thought that the majority of other physicians prescribed drugs for the management of acute watery diarrhoea. The most commonly cited reasons were because they wanted to satisfy the mother of the children, the physicians' belief in the effectiveness of drugs, and competition in practice.

095 Muñoz HO, Solórzano F, Torres J, Cedillo R. Tratamiento de la diarrea aguda con sangre. In: Mota-Hernandez F (ed.) *Avances en el control de las enfermedades diarreicas*. Mexico: Consejo Nacional Para El Control De Las Enfermedades Diarreicas, 1995:173–180.

Cases of bloody diarrhea are presented in about 10% of all acute diarrhea episodes. We studied 119 children from the Southwest region of Mexico City, presenting bloody diarrhea. In children below one year of age, *Campylobacter* and *Salmonella* were more frequently isolated (29% and 22% respectively), whereas enterohemorrhagic *E. coli* and *Shigella* were less frequent (13% and 10% respectively). In children one to five years old, *Shigella* was the most frequently isolated (35%), followed by EHEC (20%) and *Campylobacter* (12%). In children less than one year old with *Shigella*, diarrhea and blood in faeces last longer than in children with other etiologies (median of 12 days for diarrhea, and 6 days for blood). In children 1 to 5 years with episodes with *Shigella* were less severe (median of 5 days for diarrhea, and 1.5 days with blood) than those with EHEC (a mean of 10.5 days with diarrhea). *E. histolytica* was exclusively found in children older than 5 years of age (10%). *Shigella* strains were highly resistant to ampicillin (48%) and chloramphenicol (37%), whereas 20% were resistant to TMP/SMZ; resistance to furazolidone and nalidixic acid was low. The efficacy of three antibiotics was analysed in a small group of children; in children less than one year old receiving TMP/SMZ diarrhea lasted for 5 days and blood 1 day, in children

receiving furazolidone diarrhea lasted for 5 days and blood for 2 days. In children 1 to 5 years severity of disease was similar in both those treated with TMP/SMZ and those treated with nalidixic acid. Treatment of children with dysentery should be similar to treatment of children with watery diarrhea, plus an antibiotic treatment against *Shigella* (TMP/SMZ or nalidixic acid). If the child does not improve after 48 hours, one should consider resistance and shift antibiotic; whereas in children older than 6 years, empirical treatment vs. *E. histolytica* should be considered.

P007 Nizami SQ, Khan IA, Bhutta ZA. Differences in self-reported and observed prescribing practice of general practitioners and paediatricians for acute watery diarrhoea in children of Karachi, Pakistan. *J Diarrhoeal Dis Res* 1995;13(1): 29–32.

The practice of 60 general practitioners (GPs) and 26 paediatricians prescribing for acute watery diarrhoea in children was observed. Later, these GPs and paediatricians were interviewed to record their self-reported prescribing behaviour. Fifty-two percent of the GPs and 12% of the paediatricians reported prescribing antibiotics, but 77% of the GPs and 85% of the paediatricians were observed prescribing antibiotics for acute watery diarrhea. Regarding antiamoebics, no difference was seen in number of self-reporting and observed GPs, but significant difference was seen in paediatricians. Of the paediatricians, only 12% reported prescribing antiamoebics, but 62% were observed prescribing these drugs. Similarly, kaolin compounds were observed to be prescribed by a smaller number of GPs (63%) than self-reporting ones (80%). Of the paediatricians, 31% reported to prescribe but 38% were observed prescribing kaolin compounds. These results show differences between self-reported and observed drug prescribing practices for acute watery diarrhoea in children. This difference was much wider in paediatricians than in GPs.

P007 Nizami SQ, Khan IA, Bhutta ZA. Drug prescribing practices of general practitioners and paediatricians for childhood diarrhoea in Karachi, Pakistan. *Soc Sci Med* 1996;42(8):1133–1139.

Observations were made of 996 encounters between children with diarrhoea and practitioners (28 paediatricians, 62 general practitioners) in Karachi, Pakistan. Oral rehydration salt (ORS) was prescribed in more than 50% of encounters by 53% of general practitioners (GPs) and 61% of paediatricians. Sixty-six percent of GPs and 50% of paediatricians prescribed antibacterials, 60% of GPs and 28 % of paediatricians prescribed antiamoebics in more than 30% of their encounters. Looking at all the encounters, we observed that ORS was prescribed in 52% and 51%, antibacterials in 41% and 36%, antidiarrhoeals in 48% and 29%, and antiamoebics in 26% and 22% of encounters by GPs and paediatricians, respectively. Cotrimoxazole was the antibacterial most frequently prescribed by both types of practitioners. Antidiarrhoeals were prescribed more often by GPs than by paediatricians. In 77% of their encounters, GPs dispensed drug formulations known as "mixtures" made in their own dispensing corners. The mean duration of encounters between patients and GPs was 3 ± 2 minutes and between patients and paediatricians was 9 ± 4 minutes. These results indicate inadequate prescription of ORS and excessive prescription of antibacterials, antidiarrhoeals, and antiamoebics. Intervention strategies need to be planned to improve the prescribing practices of both groups.

P007 Nizami SQ, Khan IA, Bhutta ZA. Self-reported concepts about ORS, drug-prescribing and reasons for prescribing antidiarrheals for acute watery diarrhoea in children. *Trop Doctor* (accepted for publication).

Sixty-seven general practitioners (GPs) and 27 pediatricians practicing in Karachi were interviewed to evaluate their knowledge and attitude towards use of ORS and management of acute watery diarrhoea (AWD) in children and to define factors for their self-reported prescribing of antidiarrhoeals.

Nearly 50% of them reported ORS to be palatable and acceptable by children. But according to 80% of them, ORS was not accepted by parents as sole treatment. Eighty percent of GPs and 37% of pediatricians reported prescribing antidiarrhoeals for acute watery diarrhoea in children. "Parental pressure" and "use as placebo" were the commonest reasons reported for prescribing antidiarrhoeals. In addition, 45% of GPs believed in the efficacy of antidiarrhoeals and thought these drugs necessary for the control of diarrhoea.

P007 Nizami SQ, Khan IA, Bhutta ZA, Shah SM. Awareness of National ARI Control Program among practitioners in Karachi and their prescribing behaviour for fever in children under five years of age. *Quarterly Specialist, Pakistan J Med Sci* 1996; 12(2):165-169.

Objective: To see awareness of National ARI Control Program among general practitioners (GPs) and paediatricians in Karachi and to describe their self-reported and observed prescribing practice for febrile children under five years of age.

Design: Observation of practice of selected practitioners by trained observers and their interview by one of the authors.

Setting: Clinics of GPs and paediatricians practicing in Karachi.

Subject: Sixty-seven GPs and twenty-seven paediatricians.

Main outcome measures: Number of practitioners aware of National ARI Control Programme, self-reported and observed prescribing of antibiotics for febrile children.

Results: Sixty-two GPs and five paediatricians had never heard of National ARI Control Programme. Thirty-one (46%) GPs and 3 (11%) paediatricians reported prescribing antibiotics for febrile children without any focus of infection. Parental demand and expansive tests were the two main reasons quoted for prescribing antibiotics. Observation of practice revealed that antibiotics were prescribed in 59% of encounters with GPs and 49% encounters with paediatricians for febrile children under five years of age.

Conclusions: Practitioners in Karachi are not aware of National ARI Control Programme of

Pakistan. Antibiotics are often prescribed for febrile children without clinical evidence of bacterial infection.

161 Nkwi PN, Ndonko FT, Mbeh GN. Ethnographic decision tree modeling of caretakers' responses to childhood diarrhea in two Cameroonian villages. *Coll Antropol* 1994;18(2):199-204.

The main objective of this study was to design a decision tree model of mothers' responses to childhood diarrhea in Cameroon. Data was collected in two geographically and culturally different sites. We found out that mothers do not generally panic when a child is struck by a diarrheal episode, especially when such cases are associated with developmental stages of the child (teething, walking, and crawling). Our findings indicate that most mothers do not seek treatment outside the home until the third day. The decision-making process is influenced by cultural nosography, distance to health facilities, access to ORS (Oral Rehydration Solution), and availability of other pharmaceutical products and of financial resources. However, treatment outside the home is sought only when the episode persists and is resistant to home management techniques. Mothers' decision to seek health care in modern facilities comes after a complicated process of choices or alternatives.

132 Obi CL, Coker AO, Epoke J, Ndip R. *Aeromonas* and *Plesiomonas* species as bacterial agents of diarrhoea in urban and rural areas of Nigeria: antibiogram of isolates. *Cent African J Med* 1995;41(12): 397-403.

Two thousand four hundred stool samples comprising 1,200 each from diarrhoeal and non-diarrhoeal (control) cases with 600 of each category from urban and rural areas were screened for the prevalence of *Aeromonas* and *Plesiomonas* species in the different groups. Thirty (5 pc) and (14,8 pc) of *Aeromonas* species and 14 (2,3 pc) and 46 (7,7 pc) of *Plesiomonas shigelloides* were isolated from urban and rural areas respectively for diarrhoea cases. Only eight (1,3 pc) and 18 (3 pc) of *Aeromonas* spp. from urban and

rural areas respectively and none of *P. shigelloides* were isolated from controls. Both organisms were more commonly associated with females than males. This may be attributable to the fact that both organisms are environmental water bacteria; in rural areas, females engage more in domestic activities than males and have more frequent contacts with the water sources such as rivers, streams, and ponds. Most rural areas lacked a piped water supply. Diarrhoea due to both organisms was associated with fever and vomiting; mainly watery but mucoid and bloody stools were also noted. Antibiogram of isolates showed over 70 pc resistance to ampicillin and streptomycin in both rural and urban areas whereas over 90% of both organisms were sensitive to nalidixic acid and gentamycin in urban and rural areas. Antibiogram of isolates was independent of age, sex, and area of residence. Finally, for cases of infections due to *Aeromonas* spp. and *P. shigelloides*, the use of gentamycin, nalidixic acid and nitrofurantoin would be appropriate in both urban and rural areas.

128 Okeibunor JC, Asobie FC, Igboeli CC. Factors associated with the use of SSS among mothers in Nsukka Zone of Enugu State, Nigeria. *Int Q Commun Health Educ* 1995;15(2):127–136.

This study was designed to identify factors influencing mothers' use of SSS in the management of diarrhoea in children. A survey questionnaire was used and a total of 652 mothers drawn from both rural and urban communities were interviewed. The two perceptual factors, perceived seriousness of diarrhoea and perceived efficacy of salt sugar solution (SSS), were found to relate significantly with SSS use. Similar associations were found between knowledge of SSS preparation and beliefs about diarrhoeal illness causation. Of the three demographic factors tested, only one, education, showed potential for influencing SSS use. Religion and residence (rural, urban) were not found to be predictors of SSS use. The positive association of clinic use (as measured by place where the mother gave birth to her last child) with SSS points to the need to improve the quality of facility-based health education with

special focus on improving knowledge of SSS preparation procedures and perception of SSS efficacy.

136 Omotade OO, Kayode CM, Adeyemo AA, Oladepo O. Observations on hand-washing practices of mothers and environmental conditions in Ona-Ara local government area of Oyo State, Nigeria. *J Diarrhoeal Dis Res* 1995;13(4):224–228.

During a baseline survey before developing an educational intervention programme for modifying behaviours toward improved home management of diarrhoea, handwashing practices and environmental conditions of 549 mothers and health care-providers of 638 children aged less than 5 years in Ona-Ara Local Government Area (LGA) were observed. The aims of the study were to describe the patterns of maternal handwashing behaviour in relation to disposal of faeces and feeding of children, and to describe environmental conditions of the households. Handwashing behaviours after cleaning a child who has just defecated and after disposal of faeces were observed in 29.3% episodes, while handwashing before feeding the child occurred in 12.4% of observations. Handwashing in relation to these events occurred more frequently in periurban than in rural villages ($p < 0.001$). These differences may be due to higher education of the periurban women compared to their rural counterparts. Handwashing was apparently not associated with distance from the water source or with the age groups of the children. Environmental observation revealed the presence of uncovered food (13%), human faeces (17%), animal dung (71%), animals (82%), and unprotected pit latrines (11%) in and around the house. There were significant rural/periurban differences in environmental conditions of the rural and periurban areas. It is recommended that the characteristics of areas selected for intervention be considered and that important subgroup differences be identified before planning and implementing such interventions.

104 Paredes P, De la Pena M, Flores-Guerra E, Diaz J, Trostle J. Factors influencing physicians' prescribing behavior in the treatment of childhood diarrhoea: knowledge may not be the clue. *Soc Sci Med* 1996;42(8):1141-1153.

Proper diarrhoea treatment has received greater attention during the last ten years. However, the unjustified use of medicines to treat simple episodes of acute diarrhoea continues to divert attention and available resources away from appropriate treatment. A study to identify the factors determining prescribing practices for diarrhoea treatment was carried out in a periurban part of Lima, Peru in 1991. Physicians were interviewed, and then their practice was assessed by visits of confederates with healthy children described as ill, by interviews with mothers of sick children leaving the clinic, or by both of these methods. Physicians' reported practices in treating diarrhoea cases were compared to their actual practices. Although physicians' knowledge of drug management seemed to influence the low frequency of prescription of antidiarrhoeal drugs, it did not have the same influence on prescription of antimicrobials. Our results suggest that the diagnostic process and consequently the treatment decision do not follow a scientific rationale for this illness. The physicians' prescribing practices seemed to be more related to agreement with social expectations and the caretakers' perception of the physicians' role than they were to the standard biomedical rules of diarrhoeal management.

076 Pérez-Cuevas R, Guiscafré H, Muñoz O, Reyes H, Tomé P, Libreros V, Gutiérrez G. Improving physician prescribing patterns to treat rhinopharyngitis. Intervention strategies in two health systems of Mexico. *Soc Sci Med* 1996;42(8):1185-1194.

To improve prescribing practices for rhinopharyngitis, an interactive educational intervention and a managerial intervention were carried out in 18 primary care facilities in metropolitan Mexico City. Four family medicine clinics of the Mexican Social Security Ansated (IMSS) and 14 health centres of the Ministry of Health (SSA) were included.

A quasi-experimental design was employed. One hundred and nineteen physicians (IMSS 68, SSA 51) participated. Sixty-five physicians (IMSS 32, SSA 33) were in the study group, while 54 were in the control group (IMSS 36, SSA 18). The study had four stages: (i) baseline, to evaluate the physicians' prescribing behaviour for rhinopharyngitis; (ii) intervention, using an interactive educational workshop and a managerial peer review committee; (iii) post-intervention, evaluation of short-term impact; (iv) follow-up evaluation of long-term effect 18 months after the workshop. The control group did not receive any intervention but was evaluated at the same time as the study group. At baseline, most patients in both institutions received antibiotic prescriptions (IMSS 85.2%, SSA 68.8%). After the workshop, the percentage of patients receiving antibiotic prescriptions in the IMSS went from 85.2% to 48.1%, while in the SSA it went from 68.8% to 49.1%. Appropriateness of treatment was analyzed using the physician as the unit of analysis. At baseline, 30% of IMSS physicians in the study group treated their patients appropriately. After the intervention, the percentage increased to 57.7%, and at the 18-month follow-up it was 54.2%. The SSA study group increased the appropriate use of antibiotics from 35.7% to 46.2%, with this percentage falling to 40.9% after the 18-month follow-up period. In the control group there were no significant changes in prescribing patterns with respect to either the prescribing of antibiotics or the appropriateness of treatment. The intervention strategies were successful in both institutions. Forty percent of physicians improved their prescribing practices after the workshop, with this change remaining in 27.5% of them throughout the follow-up period. On the other hand, 42.5% of the physicians did not change their prescribing practices after the intervention. The rest (17.5%) showed appropriate prescribing practices during all the stages of the study. We conclude that it is possible to improve the physicians' prescribing practices through interactive educational strategies and managerial interventions. This type of intervention can be an affordable way to provide continuing medical education to primary care physicians who do not have

access to continuing educational activities, and to improve the quality of care they provide.

036 Qureshi AF, Lobo MA. Home management of childhood diarrhoea in the urban poor: implications for policy. *Pak Pediatr J* 1994;17(3):99-113.

A cross-sectional study was done to elicit local beliefs and practices surrounding diarrhoeal disease in a squatter settlement of Karachi, Pakistan. Two hundred and fourteen families (with 440 children) selected by simple random sampling were interviewed during the summer of 1989. Point prevalence of diarrhoea was 8.2% (36 cases) in children under five, while prevalence in the two weeks prior to the interview was 13.4% (59 cases). Mothers attributed 57% of episodes to causes such as teething, hot/indigestible/contaminated foods, and evil eye.

Hot and/or indigestible foods were perceived to aggravate diarrhoea by 75% of respondents. Eighty-nine percent reported using *khitchri* (seen as a "cold food good for diarrhoea" by 68%).

In the 95 reported episodes of diarrhoea, oral rehydration salts were used by 38% and sugar-salt solution by 12%. Fluids were not withheld in any instance. No drugs were used in 44% episodes of current diarrhoea; use of antidiarrhoeals was identified in 19% of these episodes.

036 Qureshi AF, Lobo MA. Socio-anthropological determinants and home management in childhood diarrhoea in a squatter settlement of Karachi, Pakistan. *J Trop Pediatr* 1994;40:378-380.

We studied local beliefs and practices in diarrhoeal disease in an economically deprived population in an attempt to help decrease the impact of diarrhoea by reducing its nutritional consequences and associated mortality. A cross-sectional knowledge, attitudes, and practices (KAP) study was done using a structured questionnaire based on key informant interviews to determine maternal perceptions, beliefs, and health care-seeking behaviour in cases of diarrhoea in children under 5. There were 440 children under the

age of 5 years in 214 families approached. Point prevalence of diarrhoea was 8 percent in these children, while diarrhoea in the 2 weeks before the interview was reported in 13 percent. In these diarrhoea cases, mothers reported teething as the leading cause, followed by eating hot, indigestible foods. Fluids were not withheld by any; ORT was used in 44 of the 95 diarrhoeal cases reported. Most of the 214 respondents had heard of ORS, and 82 percent had "ever used" packet and/or home made sugar-salt solution (SSS). On being asked to actually prepare the solutions, 42 percent of those using SSS and 72 percent of those using packets prepared solutions with an estimated sodium content of 50-100 mmol/l. In 94 percent of the episodes, decisions regarding treatment were made by women, mainly mothers. In 53 percent of the episodes, allopathic therapy was preferred. Antidiarrhoeals, antibiotics, or other drugs were used in 65 percent of episodes. Interestingly, we found that decisions regarding treatment are generally taken by women and that ORT was widely known and used. ORS was often seen as a treatment for diarrhoea and loss of body water and used with the expectation of stopping diarrhoea. In our study, breast feeding was continued, and medical belief to the contrary, food was not routinely withheld. Instead, a shift in diet occurs. These findings underscore the need to target mothers for education regarding the nutritional consequences, morbidity, and mortality associated with diarrhoea.

080 Santoso B, Suryawati S, Prawitasari JE. Small group intervention vs. formal seminar for improving appropriate drug use. *Soc Sci Med* 1996;42(8):1163-1168.

In an attempt to evaluate the efficacy of different methods of interventions to improve the appropriate use of drugs for acute diarrhoea, a controlled study has been carried out in 6 districts in Yogyakarta and Central Java provinces, Indonesia. This study was designed to investigate the impacts of two different methods of educational intervention, i.e. a small group face-to-face intervention and a formal seminar for prescribers, on prescribing practice in acute diarrhoea. The

districts were randomly assigned into 3 groups and 15 health centers were selected from each district. Prescribers in Group 1 underwent a small face-to-face intervention conducted in the respective health center. Those in Group 2 attended a small formal seminar conducted at the district level. Prescribers in Group 3 served as the control group. Both interventions were given on a single occasion without follow-up supervision or monitoring. Written information materials on the appropriate management of acute diarrhoea were developed and provided to all prescribers and consumers in the intervention groups. Focus group discussions (FGDs) involving prescribers and consumers in the 6 districts were carried out to identify various underlying motivations of drug use in acute diarrhoea. The findings of the FGDs were used as part of the intervention materials. To evaluate the impact of these interventions on prescribing practice, a prescribing survey for patients under five years old with acute diarrhoea was carried out in health centers covering 3-month periods before and after the intervention.

The results showed that both interventions were equally effective in improving the levels of knowledge of prescribers about the appropriate management of acute diarrhoea. They were also partially effective in improving the appropriate use of drugs, reducing the use of non-rehydration medications. There was a highly significant reduction of antimicrobial usage either after small-group face-to-face intervention ($77.4 \pm 2.7\%$ to $60.4 \pm 2.9\%$; $P < 0.001$) or formal seminar ($82.3 \pm 3.0\%$ to $72.3 \pm 3.6\%$; $P < 0.001$), and the former caused significantly ($P < 0.001$) greater reduction than the later. There was also a significant ($P < 0.01$) reduction in the usage of antidiarrhoeals after both interventions, i.e. from $20.3 \pm 3.7\%$ to $12.5 \pm 3.3\%$ ($P < 0.01$) after face-to-face intervention and from $48.5 \pm 4.1\%$ to $27.0 \pm 4.3\%$ ($P < 0.01$) after the seminar. However, the formal seminar had a significantly ($P < 0.01$) greater impact than the small group face-to-face intervention. There was also a trend toward increased oral rehydration solution (ORS) usage after both interventions, but this did not achieve the level of statistical significance

($P > 0.05$). No changes were observed in the control group.

Although the small group face-to-face intervention did not appear to offer greater impacts over large seminars in improving the appropriate use of drugs in acute diarrhoea, the unit cost of training is far less costly than the seminar, and it might be feasibly implemented in the existing supervisory structure of the health system.

109 Sempértégui F, Estrella B, Egas J, Carrión P, Yerovi L, Díaz S, Lascano M, Aranha R, Ortiz W, Zabala A, Izurieta R, Griffiths JK. Risk of diarrheal disease in Ecuadorian day-care centers. *Pediatr Infect Dis J* 1995;14:606–612.

To determine the risk for diarrheal disease (DD) in day-care centers (DCC) for children residing in a poor urban slum area of Quito, Ecuador, compared with that for children from the same environment but cared for in their own residential home (RH), a prospective age-, sex- and locale-controlled study of DD was conducted, including 115 children in DCC and 115 in RH, ages 12 to 42 months. The overall incidence of DD was 46/1000 child weeks. Diarrhea was more common in DCC than in RH (relative risk (RR), 1.75; 95% confidence interval (CI), 1.38 to 2.22; $P < 0.001$). Poor hygienic practices were more prevalent in DCC than in RH. The use of reused water for child handwashing before eating and for washing raw vegetables was associated with a higher risk of DD in DCC than in RH (RR = 4.08, CI 2.93 to 5.67, $P < 0.001$; RR = 3.90, CI 2.79 to 5.44, $P < 0.001$, respectively). These two practices were risk factors in the DCC (RR = 2.74, CI 2.08 to 3.68, $P < 0.001$; RR = 2.05, CI 1.55 to 2.71, $P < 0.001$, respectively) when compared with their absence in the same DCC. *Shigella* (RR = 3.58, CI 1.19 to 10.78, $P < 0.02$), *Aeromonas* (RR = 10.47, CI 1.35 to 81.05, $P < 0.01$), rotavirus (RR = 2.86, CI 1.87 to 4.39, $P < 0.001$), and *Giardia* (RR = 1.59, CI 1.00 to 2.59, $P < 0.05$) were more common in DCC than in RH. More than two-fifths of the *Shigella* and *Aeromonas* isolates were resistant to trimethoprim-sulfamethoxazole. Although the incidence of DD was lower in

this high Andean community than reported in many developing countries, DCC significantly increased the risk of disease. Poor hygiene in DCC, particularly the reuse of the scarce available water, was identified as an important risk factor. Increasing use of DCC in poor communities will likely increase DD and its adverse consequences in developing country settings unless an effort is made to improve hygienic practices.

095 Torres J, Gonzalez-Arroyo S, Perez R, Muñoz O. Inappropriate treatment in children with bloody diarrhea: clinical and microbiological studies. *Arch Med Res* 1995;26(1):23–29.

It is suggested that in dysentery physicians should treat empirically, as early treatment seems to improve outcome. A constantly updated knowledge of the relative frequency of enteropathogens and their sensitivity to antimicrobials is needed to choose the right therapy. We studied microbiological and clinical findings in 119 children with bloody diarrhea in Mexico City. Patients were divided into those <1 year (infants) and those 1–5 years (children). *Shigella* was more frequent in children (35%) than in infants (10%). *Campylobacter* was more common in infants (29%) than in children (12%); *Salmonella* was more frequent in infants (22%) than in children (8%); cytotoxic *E. coli* (EHEC) was more frequent in children (20%) than in infants (13%). No cases of amebiasis were identified. Fever was the most sensitive indicator of infection for *Shigella* (70%), as compared for *Salmonella* (50%), *Campylobacter* (42%), and EHEC (36%); whereas specificity was about 50% for all pathogens. In contrast, the absence of fever was 80% predictive in the absence of culture. Almost 50% of the *Shigella*, *Salmonella* and EHEC isolates were resistant to ampicillin. In our community, the

use of ampicillin and metronidazole should be discouraged.

092 Widarsa KT, Muninjaya AG. Factors associated with the use of oral rehydration solution among mothers in West Lombok, Indonesia. *J Diarrhoeal Dis Res* 1994;12(4):261–264.

To determine factors associated with the use of oral rehydration solution (ORS) in West Lombok, Indonesia, interviews were conducted among 293 mothers in six villages with a total population of 54,324. This study included mothers of children aged less than 2 years. The children had episodes of diarrhoea in the past week during the 3-month survey period of June–August 1991. Questions asked included when ORS was used, how often it was used, how to make ORS, and the availability and accessibility of ORS in the community. Mothers were observed when preparing ORS. More than 66% of the mothers questioned had used oral rehydration therapy for home management of diarrhoea, either as packaged oral rehydration solution (ORS) or as salt-sugar solution (SSS). Fifty-six percent of mothers reported giving ORS and 10% reported giving SSS. Only 37% of mothers, however, were able to prepare ORS properly, and only 9% were able to prepare SSS properly. The following factors significantly increased the likelihood that a mother would use ORS: watching a demonstration of how to prepare ORS (odds ratio 6.34), availability of ORS (odds ratio 2.37), and accessibility of ORS (odds ratio 3.50). However, the ability to prepare ORS properly did not significantly increase the likelihood of feeding ORS. These results indicate that demonstrations of preparation of ORS and availability of ORS are necessary to increase the use of ORS for management of acute diarrhoea in West Lombok.

III. Journal of Diarrhoeal Diseases Research – special issue

This is the second special issue of the *Journal of Diarrhoeal Diseases Research* devoted to research supported by the ADDR Project. Studies addressed risk factors for childhood diarrhea and ways to prevent and manage diarrheal disease in a wide range of countries in Asia, Africa, and Latin America. The studies in this special issue focused on the sociocultural and psychological aspects of human behavior contributing to the risk of developing diarrhea, particularly hygiene behaviors. Several studies evaluated perceptions about diarrhea. Others described how mothers' perceptions influenced the prompt recognition of diarrheal disease and the way that it was treated. Many investigators identified behaviors and perceptions to target for prevention efforts in the future.

Hygiene behaviors in the homes of people living in a shanty town were observed by investigators in Lima, Peru (Huttly and Lanata). Handwashing after defecation was rare (11% of occasions) and stools of children were often not placed in a latrine, but left in places accessible to children and animals. The investigators recommended that interventions focus on clearing stools from home surroundings and increasing the use of potties and latrines. Investigators from Indonesia reached similar conclusions. Aulia et al. reported on risk factors for diarrhea. They compared hygiene behavior in households where children had many episodes of diarrhea with hygiene behaviors in households where children had few episodes of diarrhea. Children with more episodes of diarrhea lived in households where feces were disposed of in places other than the latrine.

Persistent diarrhea is a major cause of childhood morbidity and mortality in many countries. Ekanem et al. studied risk factors for persistent diarrhea in children living in a semi-urban area of Lagos, Nigeria. Using a case control design, the investigators found that children fed with a low-energy, low-nutrient diet were at particularly high risk for persistent diarrhea if they also ate food

from local vendors. Pardede et al. reported that children living in a rural area of South Sumatera, Indonesia, were given less food during an episode of diarrhea, partly because they had anorexia. Although decreased food intake was associated with fewer stools, there was no reduction in the duration of the episode of diarrhea. The investigators discussed the importance of educating mothers to continue to feed their children during episodes of persistent diarrhea to prevent malnutrition. To address food intake during an episode of diarrhea, investigators from Lagos, Nigeria evaluated a locally available suitable substrate for oral rehydration therapy – cassava-salt suspension – in a randomized clinical trial (Grange). Investigators concluded that the cassava-salt solution was as safe and as effective as oral rehydration therapy. These studies identified problems associated with dietary intake during episodes of diarrhea and potential solutions that may be more widely applicable to other countries.

Researchers in central Thailand convened focus groups to investigate mothers' perceptions about the causes and treatments for childhood diarrhea and concluded that there was widespread misunderstanding about diarrheal diseases (Rauyajin). They proposed that health education messages be delivered using local terminology. Investigators in Cameroon found that mothers treated diarrhea in the home, but if the mother suspected a social or spiritual cause, they resorted to a traditional healer (Nkwi). Only if illness persisted or became severe would the mothers resort to medical care. Oral rehydration therapy was ignored by most mothers surveyed. Again, education of mothers was recognized as critically important to improved child health. Jacoby et al. evaluated ways of teaching mothers to use oral rehydration therapy in Lima, Peru. They concluded that simple methods, including counseling and a cooking demonstration, were effective for transferring and retaining knowledge about this form of therapy.

A word of caution about medical practices was discussed by Igun based on data collected from pharmacies and patent medicine shops in Borno State, Nigeria. Igun reported that there was a wide gap between knowledge and prescribing practices and discussed potential ways to improve prescribing practices. The wide range of studies presented in this issue of JDDR has already led to a variety of innovative follow-up studies by some of the same investigative teams.

Articles

Journal of Diarrhoeal Diseases Research 1994;12(1).

- Henry FJ.
Towards transdisciplinary research on diarrhoeal diseases.
- P018 Hendricks KM, Badruddin SH.**
Weaning and diarrhoeal disease.
- 002 Huttly SRA, Lanata CF, Gonzales H, Aguilar I, Fukumoto M, Verastegui H, Black RE.**
Observations on handwashing and defecation practices in a shanty town of Lima, Peru.
- 025 Ekanem EE, Adedeji OT, Akitoye CO.**
Environmental and behavioural risk factors for prolonged diarrhoea in Nigerian children.
- 085 Rauyajin O, Pasandhanatorn V, Rauyajin V, Na-nakorn S,**
Ngarmyithayapong, Varothai C.
Mothers' hygiene behaviours and their determinants in Suphanburi, Thailand.
- 056 Nkwi PN.**
Perceptions and treatment of diarrhoeal diseases in Cameroon.
- 047 Aulia H, Surapaty SC, Bahar E, Susanto TA, Roisuddin, Hamzah M, Ismail R.**
Personal and domestic hygiene and its relationship to the incidence of diarrhoea in South Sumatera.
- 053 Pardede N, Burhanuddin D, Ismail R, Asyiek F, Arisman EB.**
Calorie intake, frequency of stool and duration of diarrhoea in children in rural South Sumatera, Indonesia.
- 071 Grange AO.**
Evaluation of cassava-salt suspension in the management of acute diarrhoea in infants and children.
- 088 Jacoby ER, Benavides BM, Bartlett JC, Figueroa D.**
Effectiveness of two methods of advising mothers on infant feeding and dietetic management of diarrhoea at an outpatient clinic in Peru.
- 064 Igun UA.**
The knowledge-practice gap: an empirical example from prescription for diarrhoea in Nigeria.

IV. Nigerian Journal of Paediatrics – special issue

This special issue of the *Nigerian Journal of Paediatrics* is devoted to fourteen papers developed from ADDR-sponsored research. The investigators used surveys and focus group discussions to study local perceptions of which factors are responsible for diarrheal disease, how these perceptions influence treatment practices in the home, and which characteristics of a child's illness prompt their caretakers to seek medical attention outside

the home. A detailed understanding of how caretakers perceive diarrheal disease and their responses to illness in their children is critical to the development of effective, locally acceptable public health interventions. The investigators contributing to this special issue uncovered findings that may help to bridge the gap between caretakers' knowledge and practice in the management of diarrheal disease.

The Nigerian investigators found that mothers or other caretakers attribute diarrhea to a number of different causes, depending on the type of diarrhea. Researchers found that teething is commonly mentioned by caretakers as a cause of diarrhea. Poor personal hygiene, contaminated food, unclean water, and houseflies are frequently described as causes of childhood diarrhea. Less common etiologies of diarrhea as perceived by study participants include supernatural causes, "sour" breastmilk (Davies-Adetugbo), and an association with childhood illnesses such as measles. Although there is overlap in the attributed causes of diarrhea from region to region, there are also major differences between tribes and rural versus urban communities within Nigeria.

Specific local terms for diarrheal illness are often used by caretakers to classify diarrhea and to relate it to a specific cause. The way diarrhea is categorized frequently influences the caretaker's perception of the severity of an episode. For example, the Yoruba, Kanuri, Bura, and other tribes have extensive local classification systems that they use to describe specific types of diarrhea (Jinadu, Akpede). Certain forms of diarrhea, such as those characterized by frequent watery stools, are perceived as more severe by mothers. Cholera and dysentery are often considered to be the most dangerous types of diarrhea; this is true of both urban and rural communities. On the other hand, diarrhea associated with teething is often perceived as less serious. Caretakers' perceptions of the nature and severity of diarrhea strongly affect their initial home management of the illness and the likelihood of seeking medical attention from a traditional healer or at a health center.

The initial choice of therapy is often based on the caretakers' perception and classification of the episode of diarrheal illness. For example, diarrhea associated with teething is frequently expected to stop spontaneously or is treated with combinations of traditional remedies such as amulets, special soaps, and limiting a child's diet to certain foods. Purgatives may be administered to children with diarrhea in order to cause the disease to leave the body or to "clean a dirty stomach."

The association of certain foods with diarrhea may lead to their being withheld. Sugary foods are frequently considered to be a cause of diarrhea; sweet foods such as fruits are often avoided (Ogbuagu, Uwaegbute). The association of sugary foods with diarrhea may also lead to the belief that salt-sugar solutions are not beneficial and, therefore, should be avoided in certain forms of diarrhea. The association of "sour breastmilk" with diarrhea may lead to a cessation of breast feeding. These different examples demonstrate the strong influences cultural perceptions about the nature, cause, and severity of diarrhea have on the initial choice of treatment in Nigeria.

Oral rehydration therapy is used in the home management of diarrhea in 16% to 36% of episodes (Sodeinde, Omotade). However, antibiotics and antimotility drugs play an even greater role, being used in up to half of all diarrheal episodes (Alubo, Jinadu). Antimicrobials are resorted to more frequently when a child has prolonged diarrhea, i.e., lasting more than seven days (Omotade). Herbal remedies are also commonly used as a part of the initial home treatment of diarrhea. Mothers in some areas of Nigeria perceive deteriorating and improving signs and symptoms during diarrhea in a way that usually coincides with the medically established signs of dehydration. Thus mothers know how to recognize signs of dehydration and may be convinced to use ORS if this information is presented within appropriate cultural contexts.

The findings from the ADDR-funded studies in this special edition of the *Nigerian Journal of Paediatrics* demonstrate the powerful influence that local perceptions of the cause, nature, and severity of diarrhea have on treatment practices. These studies show that there are many dangers inherent in local perceptions of diarrhea which may lead to adverse outcomes such as malnutrition or even death. Limiting fluid intake during an episode of acute diarrhea can exacerbate dehydration, while withholding certain foods can lead to a worsening of a child's nutritional status. The use of antibiotics when not indicated or in inappropriate amounts or durations may lead to serious adverse events and may foster antimicrobial resistance of the diarrheal pathogens.

A clear understanding of the local interpretation of different terms for diarrhea is needed to avoid misinterpretation by members of a community. Intervention programs also need to take into account why caretakers are reluctant to make use of salt-sugar solutions; education regarding the purpose of these solutions must be a component of oral rehydration campaigns. In the future, health education programs will need to be flexible in dealing with the many differences in local perceptions of disease causation, severity, and treatment. The findings offered in this issue will be very useful in the reconceptualization of the Nigerian CDD programs proposed for the next five years.

Articles

Nigerian Journal of Pediatrics 1994;21(Suppl).

- Henry FJ.
Bridging the knowledge-practice gap in the management of childhood diarrhoea in Nigeria.
- 135 **Oladepo O.**
Educational intervention strategies based on rural-urban differences in perceptions and treatment of childhood diarrhoea in southwestern Nigeria.
- 133 **Jinadu MK, Fajewonyomi BA, Odebiyi O.**
Yoruba perceptions and treatment of diarrhoeal illnesses in rural areas of Osun State.
- 130 **Ogbuagu KF, Eneanya CI, Ebenebe C.**
Igbo mothers' perceptions and treatment of diarrhoea in eastern Nigeria.
- 125 **Davies-Adetugbo AA, Irinoye OO.**
Perception of breast feeding and diarrhoea in rural communities of Osun State in Nigeria.
- 134 **Yakubu AM, Ogala WA, Ifere OAS, Aikhionbare HA, Bugaje M, Bwala H, Masokano KA, Shinkafi M.**
Traditional concepts of childhood diarrhoea in a Hausa-Fulani community of northern Nigeria.
- 128 **Asobie FC, Igboeli CC, Okeibunor JC.**
Indigenous perceptions of childhood diarrhoea in Enugu: implications for diarrhoea prevention.
- 129 **Akpede GO, Omotara BA, Webb GD, Bassi AP, Shettima AG.**
The Kanuris and Buras of northeastern Nigeria: implication of differences in perception and treatment of diarrhoea.
- 136 **Omotade OO, Kayode CM, Dare OO, Oladepo O, Adeyemo AA.**
Perceptions and first-line home treatment of diarrhoeal diseases in Ona-Ara local government area of Oyo State.
- 137 **Adisa J, Sunmola G, Dipeolu M.**
Developing control strategies using Yoruba perceptions of bloody diarrhoea.
- 126 **Uwaegbute AC, Ene-Obong HE, Onwurah AE, Amazigo UV.**
Influence of perceptions on treatment practices for diarrhoea in two Igbo communities in Nigeria.
- 138 **Alubo SO, Ibang A.**
Household management of childhood diarrhoea in Plateau State, Nigeria.
- 097 **Afolabi BM, Ekanem EE, Sodeinde O, Randle SA.**
Traditional and other remedies in childhood diarrhoea in coastal Lagos, Nigeria.
- 124 **Sodeinde O, Gbadegehin RA, Adeyemo AA, Ademowo OG.**
Pre-hospital treatment of acute childhood diarrhoea in Ibadan, Nigeria.
- 100 **Akitoye CO, Ekanem EE.**
Folk concepts of diarrhoea and caretakers' knowledge and utilization of salt-sugar solution in peri-urban Lagos.

V. Social Science & Medicine – special issue

As modern medicines are absorbed rapidly into local customs and markets throughout the developing world, the potential for inappropriate prescribing and use of those medicines has increased dramatically. To address this issue, the ADDR Project has developed a cross-disciplinary portfolio of research studies on prescribing practices and medication use in developing countries. To help disseminate research findings on this topic, ADDR has also compiled a special issue of *Social Science & Medicine* from research supported by ADDR, the International Clinical Epidemiology Network (INCLEN), the International Network for the Rational Use of Drugs (INRUD), and WHO. The papers in this special issue represent descriptive studies of prescribing practices and drug use, intervention studies among drug providers, and evaluation of interventions. The papers examine medication prescription and use for diseases including childhood diarrhea, respiratory infections, malaria, and arthritis.

In developing countries, medications are especially vulnerable to misuse because of their accessibility, positive associations and image, and poor regulation. In their descriptive study of prescribing practices for diarrhea among general practitioners and pediatricians in Pakistan, Nizami et al. found tendencies among both groups toward over-prescription of antibiotics, antidiarrheals, and antiamoebics, and under-prescription of ORS; the tendency toward over-prescription of drugs was more pronounced among general practitioners. Only in a minority of cases were instructions for the preparation of ORS provided to patients by either type of practitioner. General practitioners, on average, spent only one-third as much time on consultations with patients as did pediatricians (3 ± 2 minutes versus 9 ± 4 minutes). In either case, the short duration of encounters between doctor and patient leaves little room for in-depth diagnostic questions or treatment innovations.

In a descriptive study of pharmacies and households in a periurban community in Mexico City, Calva and Bojalil demonstrated that antibiotics accounted for 29% of drug

sales, and that the main perceived reasons for drug use were acute respiratory tract illness and gastroenteritis. Antibiotic therapy was given in 37% of diarrheal episodes and in 27% of respiratory diseases. The majority of antibiotics were prescribed by physicians, although self-medication and drug purchases were common. Approximately two-thirds of individuals used antibiotics for less than five days, and nearly three-quarters of the purchases were for insufficient quantities of drugs.

While biomedical practitioners prescribe pills to treat physical ailments, they also understand the attendant social influences on and benefits of dispensing medication to their patients. These include opportunities to indicate that the consultation has ended through the prescription of medications, to generate additional income, and to remain competitive with their colleagues. In a study of reported versus actual prescribing practices among physicians in a periurban community in Lima, Peru, Paredes et al. attempted to isolate the factors that influence prescribing practices for diarrhea treatment. The team found first that antimicrobials were part of physicians' routine prescribing practices, but that antidiarrheals were more subject to outside influence. Second, physicians seemed to prescribe more in accordance with the social expectations of caretakers than on the basis of standard biomedical guidelines for the management of diarrheal disease.

The importance of evaluating the behavior of pharmacists was attested to by the results of a review on the availability of over-the-counter drugs for arthritis carried out by Bosi-Ferraz et al. in Sao Paulo, Brazil. The study suggests that at least 20% of pharmacies do not follow a government regulation designed to limit inappropriate prescribing. Researchers posing as clients presenting with a standardized complaint of arthritis symptoms rarely found an officially qualified pharmacist (i.e., someone with a university degree) present at the pharmacy. These "clients" were able to obtain drugs many times without presenting a prescription, and drug sellers seldom recommended that they consult a physician. Pharmacy sellers often

failed to give advice about the adverse effects of drugs. This study confirms findings that prescribing practices can be strongly influenced by social roles and market interests.

The common thread in the papers is that practitioners' knowledge does not necessarily correlate with practice. Designing interventions to reform prescribing practices and inappropriate drug use was the challenge undertaken by the other contributors to this special issue. Bhutta and Balchin evaluated the effects of a government intervention in Pakistan where pediatric formulations of antimotility drugs were deregistered. They discovered that while the regulatory intervention had effectively removed the deregistered products from most retail outlets, physicians were prescribing adult formulations instead, and, in one city, the pediatric drugs were widely available on the black market. This study suggests that interventions to regulate drug use must account for social attitudes and patient demand factors if they are to achieve full success.

Addressing the problem of overuse of injections in Indonesia, Prawitasari et al. developed and evaluated a group discussion intervention to improve prescribing practices. In a controlled trial, the researchers used interactional group discussions (IGDs) – attended by equal numbers of prescribers and patients and facilitated by a behavioral scientist and a clinician – to test prescribers' assumptions about patient beliefs, impart scientific information about injection efficacy, and establish peer norms about appropriate behavior. The IGDs were found to be effective behavioral interventions for reducing the overuse of injections. On the basis of this study, the researchers suggest that the interactive group discussion method of intervention may be expanded to improve prescribing practices in other areas.

In Mexico City, Pérez-Cuevas et al. conducted an interactive educational and managerial intervention at 18 primary care facilities within the Ministry of Health (IMSS) and Social Security Institute (SSA) health systems to improve prescribing practices for rhinopharyngitis. Behavior change was monitored for 18 months post-intervention, thus permitting the sustainability of interventions to be assessed. The researchers concluded that interactive educational workshops and

a managerial peer review committee intervention improved physicians' prescribing behavior. The number of patients receiving antibiotics decreased from 85.2% at baseline to 48.1% in the IMSS, and from 68.8% to 49.1% in the SSA. Appropriateness of treatment by physicians increased from 30% at baseline to 54.2% in the IMSS (after the 18-month follow-up period), and from 35.7% to 40.9% during the same period in the SSA. The study suggests that such educational and managerial interventions can provide an effective and affordable means of providing continuing professional education to primary care physicians.

In Indonesia, Santoso et al. conducted a controlled comparative trial of small group face-to-face versus formal seminar interventions designed to improve the appropriate use of drugs for acute diarrhea among prescribers. Their data revealed that the impacts of the two methods on improving prescribers' knowledge about the appropriate management of acute diarrhea were similar, and that the interventions were partially effective in improving the appropriate use of drugs, significantly reducing the use of non-rehydration medications. The comparable effects of the two interventions notwithstanding, the researchers suggest that the small group face-to-face intervention would be more cost effective and far easier to implement within the existing supervisory structure of the Indonesian health system.

The effect of inservice training on the clinical management of malaria was explored in Ghana by Ofori-Adjei et al., in an intervention designed to improve dosage and administration of drugs. Using prescription surveys, assessment questionnaires and focus group discussions, the researchers found that gains in knowledge following inservice training deteriorated within a year, and that gaps persisted between knowledge and practice of malaria treatment. The demonstrated preference for injections and high tendency toward polypharmacy were found to have sociocultural antecedents, including patient demands and attitudes, prescriber self-interests, and cultural stereotypes. The study suggests that more emphasis needs to be placed on the cultural context of drug use in future training programs.

Work by Goel et al. highlights the need for more systematic evaluation of the role played by pharmacies in prescribing practices. While pharmacies are one of the most important sources of advice on drugs and drug use in developing countries, the appropriateness of prescribing behavior among pharmacy staff is often far from acceptable. In developing a conceptual framework for the analysis of prescribing behavior and for the design of interventions, Goel et al. highlight four sets of factors that may influence pharmacy prescribing behavior: pharmacy factors, client factors, physician practice, and regulatory factors. The authors further suggest that four types of interventions might be used to change the prescribing practices of pharmacy staff: information alone, persuasion, incentives, and coercion. The paper suggests that this behavior and intervention framework can be used to guide future research in prescribing practices.

The studies in this special issue present the complex picture of the factors influencing prescribing behavior and drug use in developing countries. They also raise important questions about the diversity of determinants across cultural settings and types of biomedical treatments. These studies suggest that the efficacy of traditional, more uniform approaches to interventions may be improved if the impact of such diverse factors is taken into account.

The results from these studies indicate that successful interventions typically involve the actual prescribers or consumers themselves, include some follow-up over time, utilize multiple types of materials and messages, and are sufficiently flexible to accommodate specific motivations and communication preferences of the target audience. Training programs should be fortified by managerial support and regulations. Regulatory interventions alone are ineffective. Although questions remain regarding the ideal combination of interventions and the influence of economics and practice-based incentives on prescribing behavior, this special issue of *Social Science and Medicine* reaffirms the importance of examining prescribing practices in context and points researchers in the direction for further inquiry into the appropriate use of drugs.

Articles

***Social Science & Medicine* 1996; 42(8):1117–1202.**

Trostle J. Introduction. Inappropriate distribution of medicines by professionals in developing countries.

Calva JJ and Bojalil R. Antibiotic use in a periurban community in Mexico: a household and drugstore survey. (INCLLEN-funded)

Bosi Ferraz MD, Borges Pereira R, Paiva JGA, Atra E, and Quirino dos Santos J. Availability of over-the-counter drugs for arthritis in Sao Paulo, Brazil. (INCLLEN-funded)

Nizami SQ, Khan IA, and Bhutta ZA. Drug prescribing practices of general practitioners and paediatricians for childhood diarrhoea in Karachi, Pakistan. (ADDR-funded)

Paredes P, de la Peña M, Flores-Guerra E, Diaz J, Trostle J. Factors influencing physicians' prescribing behavior in the treatment of childhood diarrhoea: knowledge may not be the clue. (ADDR-funded)

Goel P, Ross-Degnan D, Berman P, and Soumerai S. Retail pharmacies in developing countries: a behavior and intervention framework. (INRUD-funded)

Ofori-Adjei D and Arhinful DK. Effect of training on the clinical management of malaria by medical assistants in Ghana. (INRUD-funded)

Santoso B, Suryawati S, and Prawitasari JE. Small group intervention vs. formal seminar for improving appropriate drug use. (ADDR-funded)

Prawitasari Hadiyono JE, Suryawati S, Danu SS, Sunartono, and Santoso B. Interactional group discussion: results of a controlled trial using a behavioral intervention to reduce the use of injections in public health facilities. (INRUD-funded)

Pérez-Cuevas R, Guiscafré H, Muñoz O, Reyes P, Tomé P, Libreros V, and Gutiérrez G. Improving physician prescribing patterns to treat rhinopharyngitis. Intervention strategies in two health systems of Mexico. (ADDR-funded)

Bhutta TI and Balchin C. Assessing the impact of a regulatory intervention in Pakistan. (WHO-funded)

**JOURNAL OF THE PAKISTAN MEDICAL ASSOCIATION (JPMA) –
special issue under development**

In order to disseminate widely the results of their ADDR-supported research, the Pakistani network of scientists decided to present many of their papers in their country's premier medical journal. The Journal of the Pakistan Medical Association is the most widely read journal in the Pakistani medical community, and allows the researchers to reach physicians working in the private and government sectors, as well as their colleagues at academic medical institutions. JPMA was eager to present a special issue on child health, as the topic has historically been under-represented in the journal. Grouped thematically, the special issue will present up-to-date information on childhood diarrhea, pneumonia, and community-based interventions to improve child nutrition.

- P002 Jan A, Rafi M, Mustafa S, Rasmussen Z, Thobani S, Badruddin S.**
Evaluation of *dowdo* as a diet in children with acute diarrhoea.
- P003 Rehman GN, Qazi S, Khan M, Aziz A.**
Use of home fluids in childhood diarrhea in Islamabad, Pakistan.
- P005 Ibrahim S, Issani A, Raza J.**
A comparison of *sabodana*-based oral rehydration solution with rice based oral rehydration solution in the management of acute diarrhoea in Pakistani children aged 3 months to 2 years.
- P007 Nizami SQ, Khan IA, Bhutta ZA.**
Pediatric prescribing in Karachi, Pakistan.
- P010 Akram DS, Agboatwalla M, Zakir L, Sarnia.**
Effect of intervention on promotion of exclusive breast feeding.
- P012 Issani Z, Ibrahim S, Raza J.**
Evaluation of diarrhoea training unit.

- P014 Kundi ZM, Ahmad I, Anjum M.**
Evaluation of practices of doctors trained at the diarrhoeal training unit of Rawalpindi General Hospital.
- P020 Mahmood S, Arif F.**
Assessment of nutritional beliefs and practices in pregnant and lactating mothers in a community.
- P021 Hussain W, Mahmood N, Anwar M, Maqbool S.**
Management of ARI by mothers in the community.
- P025 Mehnaz A, Biloo AG.**
Detection and management of pneumonia by community health workers.
- P026 Ume-Kulsoom, Saeed A.**
Breast feeding practices and beliefs about weaning among mothers of infants aged 0–12 months.
- P030 Paracha PI, Hameed A, Simon J, Jamil A, Nawab G.**
Prevalence of anaemia in semi-urban areas of Peshawar, Pakistan: a challenge for health professionals and policy makers.
- P032 Iqbal I.**
Clinical diagnosis and case management of children with ARI presenting to general practitioners in Multan.
- P033 Rasmussen Z.**
ARI epidemiology in Oshikhandass.
- P035 Bhutta ZA, Nizami SQ, Issani Z.**
Lactose intolerance in persistent diarrhea during childhood: the role of a traditional rice-lentil (*khitchri*) and yogurt diet in nutritional management.

VI. Cumulative ADDR Publications List

A. Publications in books and journals

- 137 **Adisa J, Sunmola G, Dipeolu M.** Developing control strategies using Yoruba perceptions of bloody diarrhoea. *Nigerian J Paediatr* 1994; 21(Suppl):88–98.
- 097 **Afolabi BM, Ekanem EE, Sodeinde O, Randle SA.** Traditional and other remedies in childhood diarrhoea in coastal Lagos, Nigeria. *Nigerian J Paediatr* 1994; 21(Suppl):121–131.
- 018 **Ahmed A, Malik IA, Iqbal M, Nawaz M, Azim S, Bukhtiari N, Bhatti RS.** The use of ORS (Nimkol) in management of childhood diarrhoea by mothers in the suburbs of Rawalpindi, Islamabad. *J Pak Med Assoc* 1990;40: 178–182.
- 100 **Akitoye CO, Ekanem EE.** Folk concepts of diarrhoea and caretakers' knowledge and utilization of salt-sugar solution in periurban Lagos. *Nigerian J Paediatr* 1994; 21(Suppl): 137–144.
- 129 **Akpede GO, Omotara BA, Shettima AG.** Awareness claims versus actual knowledge and use of oral rehydration therapy and the salt sugar solution in northeastern Nigeria. *J Trop Pediatr* 1996;42(3):180–182.
- 129 **Akpede GO, Omotara BA, Webb GD, Bassi AP, Shettima AG.** The Kanuris and Buras of northeastern Nigeria: implication of differences in perception and treatment of diarrhoea. *Nigerian J Paediatr* 1994; 21(Suppl):66–79.
- 129 **Akpede GO, Omotara BA, Gazali W.** Severity signs of childhood diarrhoea in northeastern Nigeria. *J Roy Soc Health* June 1995:164–174.
- 096 **Alarcón P, Alarcón JL.** Propuesta para un manejo diagnóstico práctico de la etiología de la diarrea aguda infantil. *Rev Gastroenterol* 1994;14:145–149.
- 031 **Alarcón P, Montoya R, Rivera J, Perez F, Peerson JM, Brown KH.** Effect of inclusion of beans in a mixed diet for the treatment of Peruvian children with acute watery diarrhea. *Pediatrics* 1992;90:58–65.
- 138 **Alubo SO, Ibanga A.** Household management of childhood diarrhoea in Plateau State, Nigeria. *Nigerian J Paediatr* 1994; 21(Suppl): 111–120.
- 175 **Amofah GK, Essegbey IT, Opoku SA, Oduro J.** Perceptions of and intended responses to ARI by caretakers of pre-school children in a rural district in Ghana. *Health Courier* 1995;5(5):23–25.
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- ii. Theses and Dissertations**
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Appendix A: Contact List

This appendix contains contact information for ADDR principal investigators, listed by ADDR grant number. It includes entries for research grants only.

- 001 Dr. Leonardo Mata**
Institute for Health Research
University of Costa Rica
San Jose, Costa Rica
- 002 Dr. Claudio Lanata**
Instituto de Investigación Nutricional
(IIN)
Av. La Universidad s/n - La Molina
Apartado 18-0191
Lima 18, Perú
tel: (51 14) 369-123
fax: (51 14) 367-671
e-mail: clanata@iin.sld.pe
- 003a Dr. Eduardo Salazar-Lindo**
Pediatric Department
Universidad Peruana Cayetano
Heredia
Apartado 5045
Lima, Perú
tel: (51 14) 824 291
fax: (51 14) 824-291, 824-541
- 003b see 002**
- 004 Dr. Roberto del Aguila**
Instituto de Investigación Nutricional
(IIN)
Av. La Universidad s/n - La Molina
Apartado 18-0191
Lima 18, Perú
tel: (51 14) 369-123
fax: (51 14) 367-671
- 005 Dr. Zulfiqar Bhutta**
Department of Paediatrics
Aga Khan University Hospital
Stadium Road, PO Box 3500
Karachi 74800, Pakistan
tel: (92 21) 493-0051
fax: (92 21) 493-4294
- 006 Dr. Salahuddin Shaikh**
Department of Paediatrics
Aga Khan University Hospital
Stadium Road, PO Box 3500
Karachi 74800, Pakistan
tel: (92 21) 493-0051
fax: (92 21) 493-4294
telex: 23667 AKHMCPK
- 007 Dr. Chanpen Choprapawon**
The National Epidemiology Board of
Thailand
Ministry of Public Health
Devavesm Palace
Bangkok 10200, Thailand
tel: (66 2) 280-1746
fax: (66 2) 280-1275
- 009 Dr. Gonzalo Gutiérrez**
Dirección General de Planeación
Información y Evaluación
Lieja Num. 7-9. B.
Col. Juarez
México D.F., México
tel: (52 5) 553-7110

- 010 Drs. Homero Martínez & Juan Calva**
Instituto Nacional de la Nutrición
(INN)
División de Nutrición de la
Comunidad
Calle Vasco de Quiroga 15
Delegación Tlalpan
14000 México D.F., México
tel: (52 5) 573-1200
fax: (52 5) 655-1076
- 013 Dr. Gbolahan Oni**
Department of Epidemiology and
Community Health
Faculty of Health Sciences
University of Ilorin, P.M.B. 1515
Ilorin, Nigeria
- 014 Dr. Nongluk Tunyavanich**
Faculty of Social Sciences
Mahidol University
25/25 Puthamoltol 4, Salaya 73170
Nakornpathom
Thailand
tel: (66 2) 441-9329
fax: (66 2) 441-9738
- 015 Dr. Mandhana Pradipasen**
Department of Nutrition
Mahidol University
Faculty of Public Health
420/1 Rajvithi Road, Phyathai
Bangkok 10400
Thailand
tel: (66 2) 245-5521, 246-4284
fax: (66 2) 246-4284, 246-7765
- 016 Dr. Makane Kane**
Organisme de Recherches sur
l'Alimentation et la
Nutrition Africaines (ORANA)
39 Avenue Pasteur
B.P. 2089
Dakar, Senegal
- 018 Major General Iftikhar A. Malik**
129 Hali Road
Westridge-I
Rawalpindi, Pakistan
tel: (92 51) 474-949, 860-203
telex: 54289 PULSEPK
- 019 Dr. Sumitr Sutra**
Faculty of Medicine, Khon Kaen
University
123 Friendship Road
Khon Kaen, 4002
Thailand
tel/fax: (66 43) 242-691
- 020 Dr. Sungkom Jongpiputvanich**
Department of Pediatrics and
Unit of Clinical Epidemiology
Faculty of Medicine
Chulalongkorn University
Bangkok 10500, Thailand
tel: (66 2) 564-396
fax: (66 2) 564-511
- 022 Dr. Alex Papilaya**
Faculty of Public Health
Center for Child Survival (CCS)
University of Indonesia
Depok, West Java
Indonesia
tel: (62 21) 727-0037,
727-0014 (CCS)
fax: (62 21) 727-0153
telex: 796 61676
- 023 see 003**
- 024 Dr. Elba Miranda**
Department of Microbiology
Division of Parasitology
Universidad Peruana Cayetano
Heredia
Apartado 5045
Lima, Perú
tel: (51 14) 815-772, 819112
fax: (51 14) 824-291, 824-541
- 025 Dr. Ekanem E. Ekanem**
Department of Community Health
College of Medicine
University of Lagos
Lagos, Nigeria
tel: (234 1) 801-509, ext. 2293
- 026 Dr. Wandee Varavithya**
Mahidol University
#2 Prannok Road
Bangkok Noi
Bangkok 10700, Thailand
tel: (66 2) 245-6068, 201-1446,
201-1060
fax: (66 2) 246-2123

- 030 Dr. Gerald Keusch**
Division of Geographic Medicine
Tufts University School of Medicine
and New England Medical Center
15 Kneeland Street
Boston, MA 02111
tel: (617) 636 7001
fax: (617) 636 5292
e-mail: gtk@es.nemc.org
- 031 Dr. Pedro Alarcón**
Instituto de Investigación Nutricional
Avenida de la Universidad
Apartado 18-0191
Lima, Perú
tel: (51 14) 369-123
fax: (51 14) 367-671
- 032 Dr. Tippan Navawongs**
Faculty of Social Sciences and
Humanities
Mahidol University
25/25 Puthamoltol 4, Salaya 73170
Nakornpathom, Thailand
tel: (66 2) 441-9329
fax: (66 2) 441-9738
- 033 Dr. Arunee Sabchareon**
Faculty of Tropical Medicine
Mahidol University
420/6 Rajvithi Rd.
Bangkok 10400, Thailand
tel: (66 2) 245-7550, 245-7197
fax: (66 2) 246-8340
- 034 Dr. Asma Islam**
ICDDR,B
P.O. Box 128
Dhaka 1000, Bangladesh
tel: (880 2) 600-17078
- 035 Dr. Majid Molla**
Faculty of Medicine
Department of Pediatrics
Kuwait University
P.O. Box 24923
Safat 13110, Kuwait
tel: (965) 531-2300
fax: (965) 531-8454
- 036 Dr. Fozia Qureshi**
Community Health Sciences and
Paediatrics
Aga Khan University
Stadium Road, PO Box 3500
Karachi 74800, Pakistan
tel: (92 21) 493-0051
fax: (92 21) 493-4294
- 037 see 005**
- 038 Dr. Vincent Orinda**
Department of Paediatrics and Child
Health
University of Nairobi
Kenyatta National Hospital
P.O. Box 30588
Nairobi, Kenya
tel: (254 2) 334-800, ext. 2650
fax: (254 2) 330-170
- 039 Drs. N.M Mirza and W.M. Macharia**
Department of Paediatrics and Child
Health
University of Nairobi
Kenyatta National Hospital
P.O. Box 30588
Nairobi, Kenya
tel: (254 2) 334-800, ext. 2650
fax: (254 2) 330-170
- 040 Dr. D. M. Njai**
Department of Paediatrics and Child
Health
University of Nairobi
Kenyatta National Hospital
P.O. Box 30588
Nairobi, Kenya
tel: (254 2) 334-800, ext. 2650
fax: (254 2) 330-170
- 042 Dr. Boonsong Nilkaew**
Faculty of Education
Chiang Mai University
Chiang Mai, Thailand
tel: (66 53) 221-2834
fax: (66 53) 221-283
- 043 Dr. Sarlito Wirawan Sarwono**
Departemen Pendidikan Dan
Kebudayaan
Universitas Indonesia
Fakultas Psikologi
Kampus Baru di Depok
Depok, Jawa Barat, Indonesia
tel: (62 21) 727-0004, 727-0005

- 044 Dr. Lusia Gani**
Atma Jaya University
Jalan Jenderal Sudirman 49A
Jakarta Selatan
Indonesia
tel: (62 21) 570-3306, ext. 139
(Atma Jaya University, Urban
Health Study Group
[PKSKP])
(62 21) 660-612-730
(Atma Jaya Hospital)
(62 21) 573-1982
(Atma Jaya Foundation)
fax: (62 21) 573-4352
telex: 46024 (public)
- 045 Dr. A.A. Gde Muninjaya**
Faculty of Medicine
Udayana University
Denpasar, Bali
Indonesia
tel: (62 361) 26-346; 23-791, ext.
136 (Udayana University)
fax: (62 361) 26-021
telex: 35105 Attn: UPLEKFKUNUD
DENPASAR
- 046 Dr. Nurhayati Prihartono**
Department of Epidemiology
Faculty of Public Health
University of Indonesia
Kampus UI Depok,
Depok 16424, Jawa Barat
Indonesia
tel: (62 21) 727-0037
fax: (62 21) 727-0153
- 047 Dr. Hendarmin Aulia**
Fakultas Kedokteran
Universitas Sriwijaya
Komplek F.K. UNSRI
Jalan Mayor Mahidin, Km 3.5
Jalan Jenderal Sudirman
Palembang 30126
Indonesia
tel: (62 711) 354-088
fax: (62 711) 312-602
- 048 Dr. Piyarat Butraporn**
Department of Tropical Medicine
Mahidol University
420/6 Rajvithi Road
Bangkok 10400, Thailand
- 049 see 010**
- 053 Dr. Nancy Pardede**
Fakultas Kedokteran
Universitas Sriwijaya
Komplek F.K. UNSRI
Jalan Mayor Mahidin, Km 3.5
Jalan Jenderal Sudirman
Palembang 30126
Indonesia
tel: (62 711) 354-088, ext. 226
fax: (62 711) 312-602, 22-342
- 056 Professor Paul N. Nkwi**
Department of Sociology
University of Yaoundé
BP 1862 Yaoundé, Cameroon
tel: (237) 222-714
fax: (237) 221-873
e-mail: paul_nkwi_nchoji@
cam.healthnet.cam
- 057 see 018**
- 058 see 022**
- 059 see 022**
- 060 see 022**
- 062 Dr. Sabarinah Prasetyo**
Faculty of Public Health
University of Indonesia
Kampus UI, Depok 16424
Indonesia
- 063 Dr. Zeba Rasmussen**
Aga Khan Health Service
Domiyal Link Road
Gilgit, Northern Areas, 15100
Pakistan
tel: (92) 572-2929, 572-2669,
572-3980
fax: (92) 572-2559,
(92 21) 493-4294
- 064 Dr. U.A. Igun**
Department of Sociology and
Anthropology
University of Maiduguri
P.M.B. 1069
Maiduguri, Borno State
Nigeria
tel: (234 76) 232-537

- 068 Dr. Arturo Gastañaduy**
International Research Program
Department of Psychology
School of Medicine
Louisiana State University
1542 Tulane Avenue
New Orleans, LA 70112
- 069 Dr. Mario Bronfman**
Consejo Nacional de Prevención y
Control de Sida
Dirección de Investigación
Av. Insurgentes Sur #1397 2nd Piso
Col. Insurgentes
CP 03920 Mixoac
México D.F., México
- 070 Dr. Razi Suangkupon Siregar**
Health Research and Development
Section
Faculty of Medicine
Syiah Kuala University
Darussalam, Banda Aceh 23111
Indonesia
tel: (62 651) 32-053
- 071 Dr. Adenike O. Grange**
Department of Paediatrics
College of Medicine
University of Lagos Teaching Hospital
P.M.B. 12003
Lagos, Nigeria
tel: (234 1) 801-500, ext. 1490
fax: (234 1) 837-630
- 073 see 026**
- 076 see 009**
- 078 Dr. Samuel Nurko**
GI and Nutrition Department
Children's Hospital
300 Longwood Ave.
Boston, MA 02115
tel: (617) 735-6058
fax: (617) 735-6059
pager: (617) 735-6369, ext. 0846
- 079 Dr. Irene Maulén-Radován**
Instituto Nacional de Pediatría
de México
Insurgentes Sur 3700-C
CP 04530 Tlalpan
México, D.F., México
tel: (52 5) 541-2260,
606-0002, ext. 152
fax: (52 5) 666-0787
- 080 Dr. Budiono Santoso**
Department of Clinical Pharmacology
Gadjah Mada University
Faculty of Medicine
Sekip, Yogyakarta 55281
Indonesia
tel: (62 274) 88-688, ext. 579
fax: (62 274) 61-196
- 081 Dr. Ratna Djuwita Hatma**
Fakultas Kesehatan Masyarakat
Universitas Indonesia, Kampus Baru
Depok, Jawa Barat
Indonesia
tel: (62 21) 727-0037,
727-0014 (CCS), 799-5117
- 082 Dr. Delia Haustein**
Asociación Benéfica PRISMA
Av. Los Artes No. 360
San Borja
Apartado Postal 410098
Lima, Perú
tel: (51 14) 756-263
fax: (51 14) 755-610
- 083 see 033**
- 084 see 019**
- 085 Dr. Oratai Rauyajin**
Health and Medical Social Science
Program
Faculty of Social Sciences and
Humanities
Mahidol University
25/25 Puthamoltol 4, Salaya 73170
Nakornpathom, Thailand
tel: (66 2) 441-9324
fax: (66 2) 433-7083
(66 2) 441-9738 (Social
Science/Humanities)
- 086 Dr. Jesús Bulux**
CeSIAM
Hospital de Ojos y Oidos
"Dr. Rodolfo Robles V."
Diagonal 21 y 19 Calle, Zona 11
Guatemala, Guatemala 01011
tel: (502 2) 730-953
fax: (502 2) 733-906
- 087 see 026**

- 088 Dr. Bruno Benavides**
 Instituto de Investigación Nutricional
 (IIN)
 Av. La Universidad s/n - La Molina
 Apartado 18-0191
 Lima 18, Perú
 tel: (51 14) 369-123
 fax: (51 14) 367-671
- 089 Dr. Carmen Marín**
 Asociación Benéfica PRISMA
 Av. Los Artes No. 360
 San Borja
 Apartado Postal 410098
 Lima, Perú
 tel: (51 14) 756-263
 fax: (51 14) 755-610
- 090 Dr. Fernando Diaz**
 Asociación Benéfica PRISMA
 Av. Los Artes No. 360
 San Borja
 Apartado Postal 410098
 Lima, Perú
 tel: (51 14) 756-263
 fax: (51 14) 755-610
- 091 see 046**
- 092 see 045**
- 093 see 015**
- 094 Dr. Onofre Muñoz**
 Instituto Mexicano del Seguro Social
 Torre de la Academia
 4to piso, Jefatura de Investigación
 Centro Médico Nacional IMSS
 Avda. Cuauhtemoc 330
 Colonia Doctores
 México D.F., México 06725
 tel: (52 5) 761-0747, 588-7807
 fax: (52 5) 761-0952
- 095 Dr. Javier Torres**
 Instituto Mexicano del Seguro Social
 Torre de la Academia
 4to piso, Jefatura de Investigación
 Centro Médico Nacional IMSS
 Avda. Cuauhtemoc 330
 Colonia Doctores
 México D.F., México 06725
 tel: (52 5) 761-0930
 fax: (52 5) 761-0952
- 096 see 031**
- 097 Dr. B.M. Afolabi**
 National Institute for Medical
 Research
 Federal Ministry of Science and
 Technology
 Edmond Crescent
 P.M.B. 2013, Yaba
 Lagos, Nigeria
 tel: (234 1) 861-732
- 098 Dr. José Ramiro Cruz**
 Pan American Health Organization
 525 23rd Street, N.W.
 Washington, DC 20037
 tel: (202) 861-3230
 fax: (202) 861-2648
- 099 Dr. Susana Molina**
 CeSSIAM
 Hospital de Ojos y Oídos
 "Dr. Rodolfo Robles V."
 Diagonal 21 y 19 Calle, Zona 11
 Guatemala, Guatemala 01011
 tel: (502 2) 730-375
 fax: (502 2) 733-906
- 100 See 025**
- 101 Dr. Rusdi Ismail**
 Fakultas Kedokteran
 Universitas Sriwijaya
 Komplek F.K. UNSRI
 Jalan Mayor Mahidin, Km 3.5
 Jalan Jenderal Sudirman
 Palembang 30126
 Indonesia
 tel: (62 711) 356-157
 fax: (62 711) 354-087
- 102 Dr. Yati Soenarto**
 Faculty of Medicine
 Gadjah Mada University
 Clinical Epidemiology and Biostatistics
 Unit
 Dr. Sardjito's General Hospital
 Yogyakarta, 55281
 Indonesia
 tel: (62 274) 63-388;
 87-333, ext. 340
 fax: (62 274) 63-388, 61-19

- 103 Dr. Hernani**
Sub-Directorate for Control of
Diarrheal Diseases
Directorate General for CDC&EH,
MOH, Indonesia
P.O. Box 223
Jl. Percetakan Negara No. 29
Jakarta, 10560
Indonesia
tel: (62 21) 417-608;
417-420, ext 9930
fax: (62 21) 420-7807
- 104 Dr. Patricia Paredes**
101 East Mount Royal Avenue, #502
Baltimore, MD 21202
e-mail: pparedes@
welchlink.welch.jhu.edu
- 105 see 048**
- 106 see 044**
- 107 Dr. Kamenga Munkolenkole**
Project SIDA
Department of Public Health
Kinshasa, Zaire
fax: (243) 122-1850
- 108 see 010**
- 109 Dr. Fernando Sempértegui**
Corporación Ecuatoriana de
Biotecnología
El Bosque, Pasaje D N.50
P.O. Box 60
Sucursal 16 CEQ.
Quito, Ecuador
tel: (593 2) 528-690
fax: (432-269)
- 119 Dr. Mary Penny**
Instituto de Investigación Nutricional
(IIN)
Av. La Universidad s/n - La Molina
Apartado 18-0191
Lima 18, Perú
tel: (51 14) 369-123
fax: (51 14) 367-671
e-mail: mpenny@inn.sld.pe
- 120 Dr. José García Aranda**
Departamento de Investigaciones
Nutricionales
Hospital Infantil de México
Federico Gomez
Dr. Márquez 162, Colonia Doctores
México D.F. 06720 México
tel: (5 25) 761-7563
fax: (5 25) 761-0333
- 121 see 035**
- 123 see 071**
- 124 Dr. O. Sodeinde**
Department of Paediatrics
University College Hospital
University of Ibadan
P.M.B. 5116, Ademowo
Ibadan, Nigeria
tel: (234 2) 400-010, ext. 2420
fax: (234 2) 413-545, 417-135
- 125 Dr. Anita Davies-Adetugbo**
Department of Community Health
Obafemi Awolowo University
Ile-Ife, Osun State
Nigeria
tel: (234 36) 232-332
fax: (234 36) 233-134
- 126 Dr. A.C. Uwaegbute**
Department of Home Science and
Nutrition
University of Nigeria, Nsukka
Nsukka, Enugu State
Nigeria
tel: (234 42) 77-199, ext. 52
- 127 Dr. Henrietta Ene-Obong**
Department of Home Science and
Nutrition
University of Nigeria, Nsukka
Nsukka, Enugu State
Nigeria
tel: (234 42) 771-991, 71-920
- 128 Mrs. Florence C. Asobie**
Department of Political Science
University of Nigeria, Nsukka
Nsukka, Enugu State
Nigeria
tel: (234 42) 770-694

- 129 Dr. George Akpede**
Department of Paediatrics
College of Medical Science
University of Maiduguri
P.M.B. 1069
Maiduguri, Borno State
Nigeria
tel: (234 76) 232-300
fax: (234 76) 232-537, 234-3702
- 130 Dr. K.F. Ogbuagu**
Department of Community Medicine
College of Health Sciences
University Teaching Hospital
Nnamdi Azikiwe University
Nnewi, Anambra State
Nigeria
tel: (234 42) 460-124
- 131 Dr. B. Folasade Iyun**
Department of Geography
University of Ibadan
Ibadan, Nigeria
tel: (234 2) 400-550, ext 174
- 132 Dr. C.L. Obi**
School of Medicine
University of Zimbabwe
P.O.B. A178
Avondale
Harare, Zimbabwe
- 133 Dr. Musa K. Jinadu**
Department of Community Health
College of Health Sciences
Obafemi Awolowo University
Ile-Ife, Osun State
Nigeria
- 134 Professor A.M. Yakubu**
Department of Paediatrics
Ahmadu Bello University Teaching
Hospital
Zaria, Nigeria
tel: (234 69) 32-271, ext. 31
- 135 Dr. Oladimeji Oladepo**
African Regional Health Education
Centre
Department of Preventative and
Social Medicine
College of Medicine
University of Ibadan
Ibadan, Oyo State
Nigeria
tel: (234 2) 400-010, ext. 3505
- 136 Dr. O.O. Omotade**
Institute of Child Health
College of Medicine
University of Ibadan
Ibadan, Oyo State
Nigeria
tel: (234 2) 241-1081
- 137 Dr. Jinmi Adisa**
Department of Political Science
University of Ibadan
Ibadan, Oyo State
Nigeria
- 138 Dr. S. Ogoh Alubo**
Department of Sociology
University of Jos
P.M.B. 2084
Jos, Nigeria
tel: (234 73) 55-930
- 140 see 064**
- 159 Professor Dedy Seri**
Maître de Recherche
Institut d’Ethno-Sociologie
Université Nationale de Côte d’Ivoire
22 BP 1246
Abidjan - 22, Côte d’Ivoire
tel: (225) 434-054
fax: (225) 443-531
- 160 Dr. Raymond Dogoré**
Institut National de Santé Publique
Service d’Epidemiologie
BP V47
Abidjan 08, Côte d’Ivoire
tel: (225) 433-780
- 161 see 056**
- 162 Mr. Moussa Traoré and
Professor Marguerite Timité-
Konan**
Institut National de Santé Publique
BP V 47
Abidjan, Côte d’Ivoire
tel: (225) 224-404, ext. 220
- 163 Dr. Leonard Mbam Mbam**
Public Health Provincial Delegation
Adamaoua
P.O. Box 137
Ngaoundere, Cameroon
tel: (237) 251-301
fax: (237) 251-273

- 164 Dr. Francisca Monebenimp**
Center for Clinical Epidemiology and
Biostatistics
University of Pennsylvania
Nursing Education Building
420 Service Drive
Philadelphia, PA 19104-6095
- 165 Dr. Ambroise Tebi**
Institut National de Santé Publique
BP V47
Abidjan 08, Côte d'Ivoire
tel: (225) 224-404,
ext. 290 or 292
- 167 see 104**
- 173 Dr. Edwin A. Afari**
Noguchi Memorial Institute for
Medical Research
University of Ghana
P.O. Box 25
Legon, Ghana
tel: (233 21) 775-374
fax: (233 21) 774-482
e-mail: noguchi@gha.healthnet.gha
- 175 Dr. G.K. Amofah**
Regional Health Administration
P.O. Box 1908
Kumasi, Ghana
tel: (233 51) 37-43
- 176 Ms. Sarah Malm**
Dangme West Research Station
P.O. Box 1, Dodowa
Accra, Ghana
- 177 see 119**
- 178 Dr. Ricardo Cañizares**
U. Católica Santiago de Guayaquil
Av. Carlos Julio Arosemana Km. 1 1/2
Vía Daule
Guayaquil, Ecuador
tel: (593 4) 210-572
fax: (593 4) 200-071
e-mail: rcanizar@ucsg.edu.ec
- 179 Dr. Alberto Narvaez**
Ministerio de Salud Pública
Buenos Aires #340 y Juan Larrea
Quito, Ecuador
tel: (593 2) 566-197, 521-677
fax: (593 2) 502-222
modem: (593 2) 566-197
- 180 Dr. Germán Creamer**
FLACSO - Sede Ecuador
Ulpiano Paez 118 y Patria
Quito, Ecuador
tel: (593 2) 231-806, 528-200,
542-714, 232-101
fax: (593 2) 566-139
e-mail: creamer@fl.ecx.ec
- 181 see 002**
- 184 Dr. Juan Rivera**
Instituto Nacional de Salud Pública
Av. Universidad 655, CP 62508
Cuernavaca, Morelos
México
tel/fax: (52 73) 112-219, ext. 2210
- 188 Dr. Francisco Chew**
Instituto de Nutrición de Centro
América y Panama (INCAP)
Carretera Roosevelt, Zona 11
Apartado 1188
Guatemala, Guatemala
tel: (502 2) 723-762, 723-767,
715-655, 715-658
fax: (502 2) 736-529
e-mail: fchew@uvg.edu.gt
- 196 Dr. Elsa Chea-Woo**
Pediatric Department
Universidad Peruana Cayetano
Heredia
Av. Honorio Delgado 430
Apartado Postal 4314
Lima 100, Perú
tel/fax: (51 14) 824-291
e-mail: allanos@upch.edu.pe
- C001 Dr. Luis Segura**
Asociación Benéfica PRISMA
Av. Los Artes No. 360
San Borja
Apartado Postal 410098
Lima, Perú
tel: (51 14) 756-263
fax: (51 14) 755-610
- C002 Dr. Guillermo Madico**
Asociación Benéfica PRISMA
Av. Los Artes No. 360
San Borja
Apartado Postal 410098
Lima, Perú
tel: (51 14) 756-263
fax: (51 14) 755-610

C003 see 089

P002 Dr. Aga Jan
District Headquarters Hospital
Gilgit, Northern Areas, 15100
Pakistan
tel: (92) 572-2929

P003 Professor Mushtaq Khan
Children's Hospital
Pakistan Institute of Medical Sciences
G-8/3, Islamabad, Pakistan
tel: (92 51) 853-142;
857-061, ext. 2216

P004 Professor Abdul Waheed
Department of Paediatrics
Allama Iqbal Medical College &
Services Hospital
Lahore, Pakistan
tel: (92 42) 488-351, 481-542,
758-8361

P005 Professor Zeenat Isani
National Institute of Child Health
Rafiqi Shaheed Road
Karachi, 75510, Pakistan
tel: (92 21) 520-03451, 527-173

P006 Dr. Abdul Tawab Khan
King Edward Medical College
Mayo Hospital
Lahore, Pakistan
tel: (92 42) 356-987, 417-492
fax: (92 42) 571-0725

P007 Dr. S.Q. Nizami
Department of Paediatrics
The Aga Khan University Hospital
P.O. Box 3500
Stadium Road
Karachi 74800, Pakistan
tel: (92 21) 493-0051, 527-371
fax: (92 21) 493-4294

P008 Professor Sajid Maqbool
Department of Paediatrics
Shaikh Zayed Hospital
Lahore 54600, Pakistan
tel: (92 42) 837-962

P009 Professor A. Ghaffar Billoo
Department of Paediatrics
Dow Medical College & Civil Hospital
M.A. Jinnah Road,
Karachi, Pakistan
tel: (92 21) 772-9506;
772-9719, ext. 2478

P010 Dr. D.S. Akram
Department of Paediatrics
Dow Medical College & Civil Hospital
M.A. Jinnah Road
Karachi, Pakistan
tel: (92 21) 776-4534, 538-687

P011 see P010

P012 see P005

P014 Dr. M.Z. Malik Kundi
Paediatrics Department
Rawalpindi General Hospital
Rawalpindi, Pakistan
tel: (92 51) 847-761, 844-055,
844-584

P015 Dr. Nosheen Javaid
Department of Preventive Paediatrics
Allama Iqbal Medical College &
Services Hospital
Lahore, Pakistan
tel: (92 42) 418-351, 418-352,
758-8361

P016 Dr. Mahmuda Mubasher
College of Community Medicine
6 Birdwood Road
Lahore, Pakistan
tel: (92 42) 486-395, 855-392,
758-6285
fax: (92 42) 223-97492

P018 Dr. Salma Badruddin
Department of Medicine &
Community Health Sciences
Aga Khan University
Stadium Road, P.O. Box 3500
Karachi 74800, Pakistan
tel: (92 21) 493-0051
fax: (92 21) 493-4294

P019 Professor Fehmida Jalil
Department of Paediatrics
King Edward Medical College
Mayo Hospital
Lahore, Pakistan
tel: (92 42) 300-11412, 723-3509
fax: (92 42) 233-509

- P020 Dr. Shahid Mahmood**
Department of Community Medicine
Allama Iqbal Medical College
Canal Bank
Lahore 20, Pakistan
tel: (92 42) 586-928
fax: (92 42) 571-0725
- P021 Dr. Waqar Hussain**
Department of Paediatrics
Shaikh Zayed Hospital
Lahore 54600, Pakistan
tel: (92 42) 864-255;
586-5731, ext. 281
- P022 Professor M. A. Arif**
National Institute of Child Health
Rafiqi Shaheed Road
Karachi 75510, Pakistan
tel: (92 21) 520-03469
- P023 Dr. Tasleem Akhtar**
PMRC Research Center
Khyber Medical College
Peshawar, Pakistan
tel: (92 521) 41-395
- P024 Dr. Mary Taj**
Pediatric Hematology and Oncology
Room L 2110 Women's
University of Michigan
1500 E. Medical Center Drive
Ann Arbor, MI
- P025 Dr. Aisha Mehnaz**
Department of Paediatrics
Dow Medical College & Civil Hospital
M.A. Jinnah Road
Karachi, Pakistan
tel: (92 21) 772-9719;
772-9506, ext 2478
- P026 Dr. Ume Kulsoom**
MCH Department
College of Community Medicine
6 Birdwood Road
Lahore, Pakistan
tel: (92 42) 486-395, 855-392,
758-6226
fax: (92 42) 223-974
- P027 see 018**
- P028 Dr. Humayun Asghar**
Virology Department
National Institute for Health
Islamabad, Pakistan
tel: (92 51) 240-861, 240-492,
240-530
fax: (92 51) 820-797
- P029 Dr. Rafat Hussain**
Department of Medicine &
Community Health Sciences
Aga Khan University
Stadium Road, P.O. Box 3500
Karachi 74800, Pakistan
tel: (92 21) 493-0051, ext. 2510
- P030 Dr. Parvez I. Paracha**
Department of Nutrition
NWFP Agriculture University
P.O. Box 981, Peshawar University
Peshawar, Pakistan
tel: (92 521) 40-230;
40-239, ext. 329
fax: (92 521) 41-035
- P031 Professor Abdus Salam Toor**
University of the Punjab
Department of Sociology
Quaid-E-Azam Campus
Lahore, Pakistan
tel: (92 42) 863-981, 337-109
- P032 Dr. Imran Iqbal**
Department of Paediatric Medicine
Nishtar Hospital
Multan, Pakistan
tel: (92 61) 408-7377
fax: (92 61) 51-311
- P033 see 063**
- P034 Dr. Shamim Qazi**
Department of Paediatrics
The Children's Hospital
Pakistan Institute of Medical Sciences
G-8/3, Islamabad, Pakistan
tel: (92 51) 857-061, ext. 2216
fax: (92 51) 254-559
e-mail: saqazi@infolink.net.pk
- P035 see 005**

Appendix B: Personnel

Principal investigator

Richard Cash, M.D., M.P.H., was one of the original developers of oral rehydration therapy at the Cholera Research Laboratory in Bangladesh. He has developed diarrheal disease treatment centers and conducted research on cholera vaccines and vitamin A deficiency. As Principal Investigator of the ADDR Project, he coordinates the scientific agenda and the management of the Project.

Technical staff

Jonathan Harrington, Ph.D., Project Editor, worked with ADDR researchers in developing manuscripts for publication. (He left the Project in July.)

Fitzroy Henry, Ph.D., Project Epidemiological Scientist, was the Regional Advisor for Africa based in Ibadan, Nigeria. He worked extensively on many tropical diseases, food and nutrition planning, and environmental sanitation policy. He administered ADDR grants in Nigeria and Ghana and provided technical assistance to these projects. (He left the Project in February.)

Patricia Hibberd, M.D., Ph.D., Project Scientist, provides technical assistance with scientific design and analysis of a wide variety of research studies. She is an advisor in the design of multicenter clinical trials and observation studies. She also assists with manuscript development and performs data analysis for the Project.

Theo Lippeveld, M.D., M.P.H., has been acting Co-Director of the ADDR Project since August 1995. He is temporarily ensuring programmatic and administrative management

of the Project, particularly with reference to the research to policy linkage workshop.

Jonathon Simon, M.P.H., is Co-Director of the ADDR Project. He served as the Project Resident Advisor in Islamabad, Pakistan from June 1992 to June 1994. He was the ADDR Project Manager from 1987 to 1991. His responsibilities include scientific and programmatic management, and administrative oversight of the Project. He also has lead responsibility for relations with USAID/Washington.

Johannes Sommerfeld, Ph.D., M.P.H., Project Social Scientist, administers ADDR grants in the African country portfolios and in Indonesia and provides Cambridge-based support for the Pakistan portfolio. He provides technical support to a number of social science-related projects in these portfolios. He also plays a major role in the design of capacity building indicators and the Project's self-evaluation.

James Trostle, Ph.D., M.P.H., Project Social Scientist, provided technical support primarily to ADDR studies in Latin America. He was responsible for most medication-related studies funded by the Project, and for the cholera and micronutrient portfolios. He played a major role in Project activities regarding research capacity building. He also coordinated Project efforts to study the effects of research on policy, and to evaluate the Project's outcomes. (He left the Project in June.)

Administrative staff

Aubrey Emory, B.A., Staff Assistant, administered the Africa and ARI grants portfolios, Project travel, and publications. (She left the Project in July.)

Claudia Johnson, B.A., M.A., M.Ed., Grants Administrator, is responsible for grants and financial administration.

Deirdre Pierotti, B.A., M.A., Staff Assistant, coordinates scientific workshops, confer-

ences, and travel; administers grants; and creates Project presentation materials.

Wendy Rivenburgh, B.A., Staff Assistant, coordinates publications and communications activities for the Project.

Carolyn Wood, B.A., Staff Assistant, administered the Latin America, micronutrient, and cholera grants portfolios, and Project workshops and conferences. (She left the Project in July.)

Collaborating Institutions

New England Medical Center

Davidson Hamer, M.D., Project Scientist, provides technical support to ADDR projects in Latin America. He is responsible for most of the studies in the cholera and micronutrient portfolios as well as the development of scientific reviews that will guide future ADDR biomedical/clinical research efforts. He also provides clinical reviews of ADDR studies and manuscripts.

Gerald Keusch, M.D., Professor of Medicine and Chief of the Department of Geographic

Medicine and Infectious Diseases, coordinates technical assistance to the ADDR Project by members of his department, as well as providing technical assistance to ADDR investigators in Guatemala and Pakistan.

Johns Hopkins University

Robert E. Black, M.D., M.P.H., Professor and Chairman, Department of International Health at the Johns Hopkins University School of Hygiene and Public Health, provides technical advice and coordinates the ADDR-related activities of his department.

Abbreviations and Acronyms

ADDR	Applied Diarrheal Disease Research Project	INSP	Institut National de Santé Publique (Côte d'Ivoire)
AFCODD	African Conference on Diarrhoeal Diseases	LGA	local government authority
AIDS	acquired immune deficiency syndrome	KEMRI	Kenyan Medical Research Institute
ARCH	Applied Research on Child Health Project	MOH	Ministry of Health
ARI	acute respiratory infection	NGO	non-governmental organization
CDD	Control of Diarrheal Disease	NICH	National Institute of Child Health (Pakistan)
CCS	Center for Child Survival, University of Indonesia	NIMR	National Institute for Medical Research (Nigeria)
CeSSIAM	Center for Studies of Sensory Impairment, Aging, and Metabolism (Guatemala)	NIPA	National Institute for Public Administration (Pakistan)
CEAS	Centro de Estudios y Asesoría en Salud (Ecuador)	ORANA	Organisme de Recherches sur l'Alimentation et la Nutrition Africaines
FLACSO	Facultad Latinoamericana de Ciencias Sociales (Ecuador)	ORS	oral rehydration solution
HIID	Harvard Institute for International Development	ORT	oral rehydration therapy
HIV	human immunodeficiency virus	PAHO	Pan American Health Organization
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh	PIMS	Pakistan Institute of Medical Sciences
IIN	Instituto de Investigación Nutricional (Peru)	PMRC	Pakistan Medical Research Council
IITA	International Institute of Tropical Agriculture (Nigeria)	PRISMA	Proyectos en Informatica Salud Medicina y Agricultura (Peru)
IMSS	Instituto Mexicano del Seguro Social	SESA	Santé de l'Enfant de Sud et de l'Adamoua (Cameroon)
INCAP	Institute of Nutrition of Central America and Panama (Guatemala)	SSS	salt-sugar solution
INCLEN	International Clinical Epidemiology Network	UNICEF	United Nations International Children's Emergency Fund
INN	Instituto Nacional de la Nutrición (Mexico)	USAID	United States Agency for International Development
INRUD	International Network for Rational Use of Drugs	WHO	World Health Organization