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9. ABSTRACT (Health R&D) Effective family planning programs have not been established in many developing countries. As a consequence, most developing countries which have accomplished some lowering of morbidity and mortality have experienced population growth along with reductions of per capita income. In recognition of this, attempts have been made to integrate family planning programs with basic health service programs. This thesis evaluated the attempts of the Gbaja Family Health Project in Lagos, Nigeria, to provide integrated preventive and curative child health services along with family planning motivation, counseling, and referral services. The Gbaja Clinic opened in October, 1967, with nurses providing primary care of children under five years of age. Almost three years later, the following impacts can be demonstrated: Preventive and curative services are well integrated, with approximately 50 percent of the registered children fully immunized. Project children are healthier than the population from which they were selected as measured by weight and arm circumference. Their mothers are more motivated towards family planning than mothers of a control group surveyed. However, acknowledging the large gap between motivation and practice, the next step should be to integrate the provision of family planning services within the clinic, and then, after a suitable period, evaluate the impact.		
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THE GBAJA FAMILY HEALTH NURSE PROJECT
LAGOS, NIGERIA, 1967 - 1970:
an examination of its family planning impact

by

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THESIS

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of The Johns Hopkins University in conformity
with the requirements for the degree of

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Abstract

In many developing countries of the world, effective family planning programs have not been established. High mortality and morbidity rates along with lack of health services are often cited as having a much greater priority than family planning. However, most developing countries which have accomplished some lowering of morbidity and mortality have experienced burgeoning population growth with concomitant reduction of per capita income.

Recognizing this, there have been attempts to integrate family planning programs into basic health services. This thesis evaluates the attempts of the Gbaja Family Health Nurse Project in Lagos, Nigeria, to provide integrated preventive and curative child health services along with family planning motivation, counselling, and referral.

Initially, the development of the medical care system to its current state is presented, along with a consideration of the poor child health services and high child mortality. Innovations for improved child health care in rural Nigeria, the work of David Morley at Ilesha in conjunction with the Wesley Guild Hospital, are summarized.

The Gbaja Family Health Nurse Project Clinic opened on October 10, 1967, with nurses providing primary care of children under five years of age. By the time of this evaluation two years and eight months later, impact in the following areas could be demonstrated: a) preventive and curative services were well integrated, with approximately 50% of the registered children fully immunized; b) Project children were healthier than the population from which they had been selected, as measured by attained weight and arm circumference; and c) their

mothers were more motivated towards family planning than mothers of the control group.

In terms of the model which states that provision of improved child health services and the resulting improvements in child survival will result in increased motivation of mothers to plan their families, the Project was a success. However, acknowledging the tremendous gap between motivation and practice, the next steps should be to integrate the provision of family planning services within the clinic and then after a suitable period of time to evaluate the impact.

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CHAPTER I.

INTRODUCTION

In the past several years it has been argued that family planning programs should be coupled with the provision of maternal and child health services in developing countries. The basic premise upon which this contention is based is that improved child survivorship (health in a basic sense) will reduce the number of pregnancies necessary for a mother to achieve her desired family size, and that this should then develop motivation for the mother to seek help in child spacing (pregnancy prevention). Further, having the advice, and ultimately the service, provided by the same workers who are protecting the health of the children should increase acceptance and utilization of family planning methods.

The Gbaja Family Health Nurse Project in Lagos, Nigeria, was established to provide an innovative demonstration of child care and integrated family planning activities within a single unit in an urban setting in a developing country. In September, 1969, the author went to Lagos to evaluate the accomplishments, particularly the family planning impact, of the project. Begun in October, 1967, the project was approaching a critical period, for money from the original funding sources would soon run out, and it would be necessary to seek further support. Unfortunately, no evaluation of the project had ever been completed. Although several studies had progressed through data collection, most of these materials were unavailable to the author at that time. Therefore it was necessary to design the evaluation without the aid of baseline data or of results of other studies.

Because of the brief period of operation of the project clinic (slightly over two and a half years), and because of deficiencies in numbers of staff, in follow-through by the original project director, and in maintenance of a clear view of some of the original objectives of the project, family planning impact cannot be expected to be dramatic. Nevertheless, by examining systematically through cross-sectional studies several aspects of the clinical and motivational accomplishments of the project, it is possible to derive an estimate of trends, and of future potential in family planning.

Three aspects of the work of the project were studied; the clinical curative and preventive services provided to the children; the health of project children compared with controls; and the knowledge, attitudes, and practice of family planning of project mothers compared with controls. The results of these investigations are presented here, as they pertain to the interrelationship between family planning impact and the provision of child health services.

CHAPTER II.

BACKGROUND

An Overview of Medicine in Nigeria

In order to place the child health situation in Nigeria in perspective, it is necessary to review briefly the development of medical services in the country. Present long before the introduction of Western Medicine were the indigenous or traditional practitioners, called, in general terms, medicine men, soothsayers, and herbalists (Adeniyi-Jones, 1963). Among the Yoruba of southwestern Nigeria, three groups of traditional native doctors are recognized - diviners (baba-lawo), herbalists (baba-ologun or adahunse), and shrine priests (baba-orlorisa or onimale) - along with a fourth, combination group - diviner-herbalists (Ademuwagun, 1969). Although many of them apparently view the incursion of Western medical practitioners as a threat to their existence, some now have incorporated the use of modern drugs into their practice.

Missionary penetration of Nigeria dates from the first Niger Expedition in 1841, although there had been previous unsuccessful attempts to establish Christian missions in the country (Ajayi, 1965). Although the missionaries were responsible for establishing the first dispensary in the country (Ajayi, 1965) and the first hospital (Adeniyi-Jones, 1963), "the most powerful factor of change introduced by these early missionaries was Western education," (Crowder, 1966) which led to wealth, to power, to status, and eventually to the emergence of the first African elite. Whereas at the beginning of missionary activities,

the emphasis was on rudimentary health care of Christian converts and of the missionaries themselves, by the end of the Nineteenth Century, much more effort was directed toward hospitals, both for general patient care and for training institutions (Ajayi, 1965). In 1967, the missions were shown to be providing 30% of the hospitals with 18% of the doctors, 15% of the dental centers with 16% of the dentists, 17% of the maternity homes, and 9% of the dispensaries in Nigeria (Owen, 1967).

British interest in Nigeria, especially in commercial ventures dates from 1852 when the effectiveness of quinine against malaria was proven in Nigeria. "By 1878 there were four major companies trading along the Niger," (Crowder, 1966) and in the years that followed, there were many changing alliances between trading groups which came principally from Britain, France and Germany. Medical care provided by these groups was primarily for the expatriates, but some of the native workers were also cared for, though not necessarily their dependents. In 1967, the industrial contribution to the medical care system amounted only to about 4% of the total (Owen, 1967).

The use of a military expedition as a punitive force in 1892 ushered in a new era of British control and the eventual establishment of boundaries for Nigeria (Crowder, 1966). The medical services of the British Army served primarily as the basis for the establishment of the Colonial Government medical service:

"As the Army got integrated with the Colonial Government, Government offered to treat the local civil servants, and their relatives, and by stages, the local population around the government stations. This service grew eventually into the Colonial Medical Service, which was obliged to give free medical treatment to the Army and the Colonial Service Officers. Treatment of the local population was, from the beginning, incidental to this obligation which Government had to its officials

in the first instance." (Nigeria Medical Association, 1966).

An important contribution by the Colonial Medical Services was the establishment of a sanitary service responsible for basic environmental sanitary control. Unfortunately, this most often functioned only in the vicinity of Army Barracks, and governmental, commercial, and residential areas where less than 10% of the population lived. Likewise, in the capital city headquarters, curative and preventive service responsibilities were combined. However, in the towns and rural areas, medical officers and other health workers spent all or most of their time in providing curative services (Adeniyi-Jones, 1963).

When in 1946 a development plan for health services was written to cover the years 1946 - 1956, the importance of clinical and preventive medicine was emphasized:

"Permanent improvement in a nation's health cannot be secured by clinical medicine alone. There must be a steady advance in all factors which contribute towards healthy life, good water supplies, housing, sanitation, nutrition, and conditions of work...these development proposals are confined to training of staff, the expansion of the hospital and dispensary services, and the provision of field units for an aggressive campaign of clinical and preventive medicine. While the emphasis must be placed on rural medicine an efficient hospital and dispensary system will always be necessary. The early development of these services is essential in order to win the confidence of the public. Without this, preventive medicine cannot be successful...The expansion of medical services will not of itself achieve permanent improvement in the general health of the population, unless it is based on a sure foundation of environmental hygiene." (Nigeria Medical Association, 1966).

Although these statements emphasize the importance both of curative and of preventive services, they do not call for the integration of the two. Instead, the plan calls for rather marked expansion of the hospital and dispensary facilities, and for the establishment of

eighteen separate mobile epidemic units to deal promptly with serious outbreaks of infectious diseases.

The first National Health Plan of the relatively newly independent Federation of Nigeria, written in 1962 for the period 1962 - 68, states, "the medical and health Development Programme is aimed at establishing over a period of years, a fully integrated curative and preventive service, operating throughout the region." (Federation of Nigeria, 1962). However, it immediately proceeds to outline the extensive development of hospitals, and to a much lesser extent Rural Health Centers. The sole statement which further relates their intent with regard to preventive services certainly gives no impression either of strengthening them, or of integrating them with curative services: "While this vertical curative structure is being built up, special programmes for the control of endemic and epidemic diseases, particularly sleeping sickness, leprosy, yaws, malaria and cerebro-spinal meningitis, will continue to operate in association with W.H.O. and UNICEF" (Federation of Nigeria, 1962).

The Nigeria Medical Association in its report on health programmes (1966) never squarely faces the question of integrating curative and preventive services. The physicians are much more concerned about their roles in governmental service and in the acceptance of private practice as "the cornerstone of our national health service."

Thus, up to 1966, there was virtually no recognition in national policy overviews of the health care infrastructure which should be developed in order to reach a population which is 84 - 85% rural (Federal Republic of Nigeria, 1968b; Agency for International

Development, 1970). With the creation of the 12 states in 1967, the Federal Government transferred direct responsibility for health to the states, retaining "such national functions as the maintenance of standards of practice in medical and allied professions, training of health personnel, health legislation, advisory and inspectorate services, medical certification, laboratory and chemistry services, and communicable diseases control" (Federal Republic of Nigeria, 1970).

There has never been a complete compilation of functioning health facilities and of active health personnel in Nigeria. However, J.S. Owen (1967) compiled the following figures on facilities from a variety of sources while he was at the University of Ibadan:

General Hospitals	245
Special Hospitals	89
Health Centers	126
Medical Field Units	13
Dental Centers	40
Maternity Homes and Centers	1129
Dispensaries and Dressing Stations	2000

Upon perusal of registers of medical and allied personnel, particularly Republic of Nigeria Gazettes and Nursing Council lists, he arrived at the following estimates of personnel,

Medical Practitioners	1978	(December 1965)
Dental Practitioners	72	(December 1965)
Veterinary Surgeons	77	(December 1964)
Pharmacists	618	(December 1964)
Nurses - General	10,806	(April 1967)
Community	589	(February 1967)
Mental	195	(April 1967)
Public Health (Health Sisters)	93	(March 1967)
Midwives - Grade I	4,952	(March 1967)
Grade II	6,072	(March 1967)

These figures should be considered in relationship to Nigerian population estimates of about 50 million for that time, given that the

figures from the 1953 census are considered low and that those from the 1963 census are high (Caldwell & Okonjo, 1968).

Finally, all of the foregoing figures on personnel and facilities should be viewed in terms of the small amount of money spent for health. Wennen (1969) has estimated that the former regional governments spent the following per head of population:

North	3/-	(\$0.42)
West	4/-	(\$0.56)
East	5/-	(\$0.70)
Federal Territory	40/-	(\$5.60)

These estimates, of course, do not include contributions by local governments, by voluntary agencies, and by the people themselves. However, probably only the latter source of the three adds substantially to the figures above. Apparently a large part of the population seeks the help of the various kinds of native practitioners relatively frequently, especially in rural areas where western medicine is less available than in the urban centers. The services and medications provided by these practitioners are expensive. It has been estimated that in Lagos in 1962 people spent at least as much on native medicines as did the Federal Government on the provision of health services (Wright, personal communication). To this should be added an appreciable amount spent by the population on patent medicines, injections, and other non-prescribed preparations recommended by chemists in the various privately owned pharmacies and drug houses. In addition, the contribution of the medical missions, particularly in rural areas through their hospitals and clinics, not indicated in the figures above, should be mentioned.

Child Health in Nigeria in Perspective

After this overview of the mix of money, facilities, and personnel available in the health sector which largely is concentrated in urban areas, it is necessary now to place in perspective the health situation of Nigerian children. From the 1963 Census figures (Federal Republic of Nigeria, 1968a) for all of Nigeria, 43.1% of the population of 55,670,055 was under 15 years of age. There were over 9.5 million children (17.2% of the population) under five, the age range with which this paper is primarily concerned. Most of these children were located in rural areas, since the country was only about 16% urban (Federal Republic of Nigeria, 1968b), and since in the urban areas children of these ages made up only about 14% of the population.

It is extremely difficult to obtain reliable estimates of vital rates in Nigeria where only rudimentary and incomplete registrations of vital events are carried out, and even these in only a few localities. At the conclusion of her chapter on fertility in Nigeria, Van De Walle states, "the reader deserves some apologies for having been led through a forest of qualifications and reservations. The purpose was to demonstrate how little information exists on the population of Nigeria, and that no amount of ingenuity can yield reliable results where so little is available" (Brass, et al., 1968).

Nevertheless, estimates of the order of magnitude of vital rates for Nigeria will serve to characterize the health status of its people:

- a. birth rate estimates vary from 42.4/1000 to 56.2/1000;
however, the value of 50/1000 would appear to be reasonable
(Agency for International Development, 1970; Federal

Republic of Nigeria, 1968b).

- b. crude death rates of from 6.75/1000 to 26.9/1000 are recorded. The lowest rates are from Lagos and should be considered least representative of the country as a whole considering the costs associated with death certification and with burial, and that many bodies are transported to "home" villages for burial. Perhaps the best estimate is in the range of 22-26/1000 (Agency for International Development, 1970).
- c. population growth rate thus becomes 2.2-2.6% per year. In Lagos, in 1967, with its high birth rate and low death rate estimates, the rate of population growth would have been 4.9% per year, a strikingly high value (Williams, 1967).
- d. age specific death rates for children under five years of age range widely, depending largely upon the type of study done. The values shown in Table I are most representative, indicating infant mortality of up to nearly 30% and under five mortality of over 57% in one rural location. These high results from Ilesha are probably the most reliable of those shown in the table, since they were taken by a study team who remained in the community over a long period of time (Morley, 1963), and not merely from sample surveys or from groups non-representative of the general population (Darby and Endozien, 1967).

Table 1.
Mortality Rates of Children under Five,
Estimates from Various Sources, Nigeria,

1957-1965
(rates per 1000)

Source of Data	Age		
	0 - 1	1 - 4	Total 0 - 4
General ^a	-- ^e	--	227
Lagos (Infant Welfare Clinic) ^a	--	--	227
Rural Demographic Survey ^b	178	52	230
Nutrition Survey ^a	--	--	263 - 456
Ilesha ^c	295	277	572
Pankshin ^d	--	--	540

- a). Darby and Edozien, 1967
b). Federal Republic of Nigeria, 1968b.
c). Morley, 1959
d). Collis, Demia, and Omololu, 1962
e). --indicates data not available.

In addition to the use of vital rates, examination of the frequency distribution of causes of death of children under five serves to indicate the mix of major health problems affecting them. In Table 2, eight of the nine commonest causes which account for 70% or more of child deaths are infectious diseases, the sole exception being malnutrition. As Morley (1959, 1963) points out, most of these diseases or conditions which cause deaths in young children are preventable. With proper immunization and prophylaxis, smallpox, pertussis, tetanus, measles (and with it its complications), tuberculosis, and malaria could all be prevented. Malnutrition, particularly protein calorie malnutrition and marasmus, can be eliminated by making only modest changes in nutritional practices using locally available foods, without incurring increased costs. The remaining two entities, diarrhoeal diseases and pneumonia, must be treated, and here, early and effective treatment would eliminate many of the deaths.

In the foregoing statement, the importance of malnutrition inadvertently is minimized. Mild or moderate malnutrition is so widespread that it underlies and therefore affects the outcome of most illnesses in children in developing countries. Being marginally nourished, the child may be more susceptible to infection, may be thrown into severe marasmus or kwashiorkor by an infection, or may be affected much more severely, even to the point of dying, with a normally mild common disease of childhood. Thus, there is an interdependence of nutritional disorders and infectious diseases that must not be minimized (Scrimshaw, et al., 1968).

The health condition of young children can be improved significantly with application of currently available knowledge and methods.

Table 2.
Mortality Distribution of Children under
Five Years of Age, by Cause, from Two Sources,
Nigeria, 1957-1966.

Cause of Death	Source of Data (figures in per cent)	
	Ilesha ^a	University College Hospital, Ibadan ^b
Diarrhoeal Disease	12	10.5
Pneumonia	12	8.7
Malnutrition & Marasmus	12	13.0
Malaria	8	13.4
Pertussis	8	0.5
Measles (complications of)	8	17.3
Tuberculosis	5	3.3
Smallpox	5	0.0 ^c
Tetanus	-- ^d	9.4
Other	(30)	(23.9)

a). Morley, 1959

b). Hendrickse, 1967

c). all smallpox cases referred to Infectious Diseases Hospital

d). --indicates data not available

Rural Innovation in Child Care

What has been done to meet the challenge of poor child health, especially in the rural areas where the lack of health resources of all types, people, facilities, and money, is greatest? Cicely Williams (1955) in a paper on the organization of child health services in developing countries presented an excellent rationale for proceeding. She noted that Western medicine had developed standard methods of child care, but emphasized that whereas some attributes of Western medicine can be exported to developing countries essentially unchanged, this does not apply to child health services. The system in England is remarkably effective, if somewhat clumsy and unnecessarily expensive; however, "it is this need for adaptation that is largely responsible for delaying the institution of maternal and child health services in the newly developing countries." Doctors cannot be expected to see all or most of the children, but midwives, auxiliaries, and even herbalists might be trained and utilized. Adequate hospital facilities for investigation, treatment and supervision of the seriously ill children are necessary, but will be in short supply in the foreseeable future. It is the quality and not the quantity of hospital care that is important, particularly initially in gaining the faith and confidence of the parents regarding the efficacy of nonindigenous medicine. The network of child health centers should be considered as outposts of (or at least have relatively easy access to) the hospital. The following are the principles upon which Cicely Williams considered should be built child health services in developing countries:

- a. Consider the needs of the people, not the patterns of

other countries.

- b. Care for the mother as well as the child, realizing the close interrelation of maternal and child health.
- c. Care for sick children and well children in the same center, utilizing the same personnel, so that as confidence is gained in the services, an increasingly greater proportion of the activity of the center will be in supervision of well children.
- d. Home visiting is an essential part of the service.
- e. Malnutrition problems are among the most urgent.
- f. Interrelate the hospital and the out-patient/child care clinical network.

At the 6th International Congress of Nutrition, a Pre-school Protection-Programme was outlined to solve the nutritional problem (and sickness problem) of the pre-school child, under five years, in developing countries (Jelliffe, 1963). Among the several long-term recommendations to provide a lasting solution to the problem, primarily related to agricultural and nutritional endeavors were the three following:

- "(8). Health services for mothers and children should be extended and improved.
- (9). Immunization programmes against the infectious diseases of childhood, the reduction of the parasite load, and improvement of environmental sanitation and especially water supplies should form an integral part of the P.P.P.
- (10). Governments should, at the earliest opportunity, consider the promotion of a programme of planned parenthood. Improved nutrition reduces the mortality rate of pre-school children. When parents have reasonable confidence in the survival of their children, they are more likely to consider

limiting their family size."

In 1956, Morley (1963, 1966a) began a medical service in rural Western Nigeria designed to meet the needs of children under five years of age. At Wesley Guild Hospital, a well-based missionary hospital in Ilesha, he established an out-patient clinic designed to combat the principle diseases and to reduce mortality. The objectives of the clinic are:

- i. The regular supervision of all children up to the age of five.
- ii. The prevention of malnutrition, malaria, pertussis, smallpox, tuberculosis, and....measles.
- iii. The provision of simple acceptable treatment for diarrhoea, pneumonia, and common skin conditions."
(Morley, 1963)

However, these three objectives are to be considered as a unity, since the whole practice of the clinic is to integrate prevention with cure.

Several constraints affect the development of such a child care clinic. Medical services for children in Nigeria must, by law, be provided without charge. Therefore, they must be economical and effective or they are not likely to be adopted by the government. Especially in rural areas, doctors are few, but nurses and midwives are more plentiful. Therefore available (or potentially available) manpower categories should be utilized maximally. Again, particularly in rural areas, logistical considerations may become significant. Local availability of medical care is important to people in remote villages, particularly early in the course of an illness when simple remedies are most effective. Better health supervision could conceivably have prevented even the incidence of the illness and obviated the need for cure. Further, transportation, communications, and availability of equipment

and of higher level facilities for care of the seriously ill must be considered. Local customs and priorities also come into play. Before embarking on the development of a child care scheme, child rearing customs, beliefs, and practices must be understood; preference for one sex over the other may be active.

Finally, a constraint which is not considered by Morley should also be emphasized. The current and the future demographic situation in the community is extremely important. The primary reason for instituting child care clinics in the community is the high rate of morbidity and mortality of the children. If an effective program will decrease the under-five death rate from 572/1000 to 194/1000 (as demonstrated by Morley, 1963, between 1957 and 1962 in Imesi Ile), there will be 378/1000 more survivors annually than in the past. Unless provision is made to decrease fertility rates, to provide child spacing or family planning advice and service, the rate of population growth stands to increase markedly. In most rural areas, with marginal availability of food and other resources, this population increase would be counterproductive.

What innovations or adaptations (per Williams' plea of 1955) were made by Morley in his under-five clinic? The following is a summary of the operation and advantages of the under-five clinic (Morley, 1966 a):

- a. Primary patient care is the responsibility of the nurse. She can handle all but the occasional gravely ill or especially perplexing child whom she will refer to the doctor. For the rest either the mothers primarily need explanation and advice which the nurse is best qualified

to give and which the mother is more likely to follow than preemptory commands of the doctor, or the children need evaluation and basic treatment for common conditions, or immunizations. The primary patient care worker need not be a nurse by Western standards, but can be a midwife, or community health worker, or auxiliary nursing aid who has been given some additional specialized training in under-fives care.

- b. Patient education is accomplished at least in three levels. General health education talks are given to groups of mothers as they wait, covering a wide range of topics including feeding, weaning, hygiene, immunizations, convulsions, fevers, diarrhoeas, malaria (and even child spacing). Secondly, mothers are taught by the nurse as their child is being seen, often covering again much of the information made available in the general health talks, but having more impact, since it now applies to their primary concern: their child. The third form is intermediate between the two already mentioned. Mothers with their children are called in groups to the nurses' desks so that while one mother is being instructed, the whole group can benefit from what they overhear. In this way the nurse instructs several mothers simultaneously.
- c. Integration of preventive and curative services is facilitated by the facts that there is no attempt to segregate the non-communicably sick children from

the well children, and that mothers are encouraged to bring all eligible children (all under-fives) to the clinic with them. Thus, when one child is treated for fever, another sibling may be given a BCG or polio immunization, or the mother may be encouraged to continue to breast feed the child which she is carrying on her back, or to begin supplemental feedings. Success in integration of the two types of service may result from the efforts of the staff to push prevention in a clinic viewed by the patients as curative.

- d. Efficiency of clinic operation is measured by the patients in terms of the length of time that must be spent in the clinic waiting for treatment. Most mothers are unwilling to take a child to a clinic, wasting a whole day as is necessary in most government clinics, when she should be keeping house, trading, growing food, and caring for her children. Requiring the patient to see only a few health workers at the clinic responsible for all aspects of her visit, instead of many single-purpose workers, saves time, allows continuity of care, and encourages mothers to return. In addition, efficiency is increased if the clinic is open at least six days per week, so that treatment can be sought early in an illness, and followed adequately.
- e. Records systems should be simple, efficient, and easily

retrievable. The weight chart/under-fives card, protected by a polyethylene envelope is kept by the mother. This eliminates the need to file and find clinic-kept records, and makes the patient's records available to other health workers in an emergency or when the clinic is closed. Diagnostic and treatment cards are also kept in this envelope. The clinic need keep only a card for those patients ultimately referred to the doctor as well as whatever records are required for census and reporting purposes.

- f. Medicines are dispensed by the nurse at the time the mother and patient are seen, from supplies on her table. Instructions can be given and emphasized by the nurse who has diagnosed the need for the medicines. Liquids which can be made up by the gallon, are dispensed into glass bottles which the mothers are responsible for bringing to the clinic. Tablets are issued in envelopes containing only a limited number so that no harm can come to the child even if all tablets are taken at the same time.

Much of what has been outlined above grew out of the continuing experience with the clinic at Ilesha, with the additional input of information from a five year (and continuing) longitudinal study of children from the remote village of Imesi Ile which began in 1957, and from the operation of a similar clinic in that village from 1962 (Morley, 1959, 1963, 1966a, 1966b, 1967, 1968a, 1968b, 1970; Morley

et al., 1963; Morley, Bicknell, and Woodland, 1968; Morley, Woodland, et al., 1968; Martin, et al., 1964).

That the clinic is effective is undeniable. However, the problem in the early 1960's was to gain governmental acceptance and support so that additional clinics of this type could be proliferated and reach many more of the children of Nigeria.

CHAPTER III.

THE GBAJA FAMILY HEALTH NURSE PROJECT

Establishing the Clinic

The under-fives clinic concept had to be adapted and established as a demonstration project both for the provision of services and for the evaluation of the end results in the urban setting of the capital city of Nigeria. An effective and innovative program for improving child health, functioning in close proximity to the seat of the Federal government in Lagos, would be much more likely than the rural clinic to draw the notice of policy makers. Furthermore, if it were to be shown that these innovations could be applied nationwide both economically and effectively, utilizing largely available manpower, then these comprehensive mother and child care clinics could form the basis of the health infrastructure for Nigeria.

Thus it was that in 1964 Prof. R.D. Wright, then Head of the Department of Community Health of the College of Medicine of the University of Lagos and Professor of International Health at the Johns Hopkins University School of Hygiene and Public Health, with the encouragement of Nigeria's first pediatrician, Prof. W.R.F. Collis, Director of the Lagos Institute of Child Health, began to work on establishing such a project. Almost two years were spent in investigation of feasibility and in establishing a legal basis for the project (see Appendices A, B, and C throughout this chapter). The principal investigator for the project was selected in 1966 with the understanding that he would spend one year associated with Dr. Morley

at Ilesha, and then would establish the functioning project in 1967. During this year further negotiations with several organizations were carried out for facilities, staff, and financial or material support (see Appendix C). Space for the clinic was made available in a pre-existing facility, the Gbaja Street Dispensary, a part of the Surulere Health Center devoted exclusively to maternal and child care but located a half mile from the Center. The Dispensary was currently being used by the Federal Ministry of Health for sick-child care, and the Lagos City Council Health Department for well baby care, for nutrition clinics, and for its domiciliary midwifery service. The Ministry of Health agreed to supply all of its regularly stocked medications to the project, with the understanding that the Project clinic would be caring for patients normally seen by the Ministry, and within the constraint that medical care of children is to be supplied free of charge.

Basic equipment for the clinic, including benches, tables and cabinets were provided by the College of Medicine. A roof for the waiting area was provided through funds available to the Department of Community Health. The pre-school health records were provided free initially by Glaxo-Allenburys (Nigeria) Ltd. and later by the Nestle Company.

Originally, all staff members were borrowed from other institutions. The Principal Investigator was supported by a National Institutes of Health Fellowship from the United States; the Sister in charge of the evaluation team was a member of the Department of Community Health; another Sister (the clinical co-director) and a Senior Health Visitor were borrowed from the Lagos City Council; the pediatrician was a

member of the Department of Pediatrics of the Lagos University Teaching Hospital. As funding for the project became available from the United States Agency for International Development, first by carrying over Department of Community Health grant money, and later by inclusion of the project under a pre-existing grant to The Johns Hopkins University Department of International Health, the staff was increased to include support personnel for the clinic, and interviewers (see Appendices B and C). Several of the support personnel were brought from Ilesha by the Principal Investigator upon his return to Lagos.

During August, 1967, before the Gbaja Family Health Nurse Project (GFHNP) clinic opened, the two sisters, the Senior Health Visitor, and the pediatrician mentioned above all went to Ilesha to observe that clinic in operation and to orient to the concept of the under-fives clinic.

In September, final arrangements were made for opening; meetings were held to introduce other workers at the Gbaja Street Dispensary to the purpose and projected activities of the Project clinic; and background information, basic forms, and a preliminary draft of the clinic manual were prepared.

On October 10, 1967, the Gbaja Family Health Nurse Project officially began accepting patients. Sister Tinubu, a Senior Health Sister and clinical co-director of the Project saw the first patients.

In the following sections of this Chapter are outlined patient selection and the clinical organization, staffing and operation. A discussion of the clinical accomplishments of the project will be found in Chapter V.

Selection and Orientation of Project Patients

Since the Project clinic was established for demonstration and evaluation purposes, patient selection was planned carefully in order to obtain a study group randomly selected from among the controls. The control group would be the children and their mothers attending the Ministry of Health sick-children's clinic at the Gbaja Street Dispensary. The Project patients were selected from among them by the following process: Early each clinic morning the number of new patients to be enrolled by the Project was determined, based in part on the number of old patients returning to be serviced and on the current size of the staff. Early, the daily target was 25 new patients; however, later this figure dropped considerably, with long periods when no new patients were taken being blamed on the severe shortage of staff. At the same time, an approximate count of the numbers of patients waiting to be seen in the MOH clinic registration lines (both for old patients, and for those newly registering) was made. Since not all patients came to the MOH clinic at the hour it opened, many arriving mid-morning to about noon, it was felt that the Project should reflect this fact, and include the potentially slightly different population it might represent. Therefore, only about two-thirds to three-fourths of the desired new patients were selected initially each morning, the others being selected closer to noon. Once the number of new patients to be selected by the Project and the number of patients present at the MOH clinic were known, determination could be made of the proportion of MOH patients to be accepted into the Project clinic. Immediately, the Project staff would approach each nth patient in the MOH lines, offering them the opportunity to become patients in the Project.

That all children under five in that family would be eligible for care in the clinic, and would be encouraged to attend, was emphasized. If for some reason, the patient (or their mother) refused to join the Project clinic, then the patient immediately behind in the line was offered the opportunity. Very few patients refused selection. Subsequent selections the same day, whether of the remainder of the original quota, or of additional patients which could be handled that day, were carried out in the same manner.

Thus, the patient population within the Gbaja Family Health Nurse Project clinic, having been selected randomly from the population attending the MOH clinic, should be representative of it and directly comparable to it. The only differences between the two clinic populations which may be found after subsequent study should be those resulting from the differences in the activities of the clinics themselves and in the services provided. It is upon this premise that the Project clinic patients were selected, and that the MOH patients served as controls in all studies.

Once a group of new patients had been selected, they were ushered to a special area of the waiting room for orientation. The purpose of the clinic - to improve existing child health services by caring for both sick and well children - was presented, as were the requirements for mothers bringing children to the clinic:

1. Birth Certificate - (need be brought only once) important as verification of birth date for establishing the clinic number and exact age, and, as well, ensuring that the child was registered with the Lagos (or other) City Council.

Note: all of the following must be brought to the clinic every

visit, a separate set for each child.

2. Medical Record Card - (sold to the patient's mother for sixpence) the Pre-School Health Card (Appendix I), in its plastic envelope, serves as the only complete record of the child's health, saves time at the clinic since no other records need to be searched, and provides valuable information to medical workers when the GFHNP clinic is closed and the child must be seen at another medical facility as an emergency, or upon referral to a hospital.
3. Two plastic bags - one for clean napkins (diapers), and the other for dirty ones.
4. Two standard 4 oz. medicine bottles - these must be clear glass, clean, and have tight-fitting caps, preferably plastic. Although the medications are free, the bottles for liquid medications cannot be provided by the clinic. Having the bottles before seeing the sister saves time, since she dispenses the medications at the time she sees the child; however, the bottles may not be used on every visit.
5. Feeding utensils - for the toddler, cup and spoon; for the baby, two cups, two spoons, a plastic bowl, and a bottle of Milton (hypochlorite solution for sterilizing the utensils). The clinic does not allow the use of feeding bottles, primarily because of the problems of cleaning them adequately; nor does it condone the practice of force feeding.

They were then shown how the clinic operated from day to day for returning patients.

Staffing, Organization, and Clinic Operation

At the time that the Project began to function, the staff was small, with an evaluation team consisting of the Principal Investigator, a Senior Health Sister, and two interviewers; and a clinical team which had a consultant pediatrician, two primary patient care personnel (a Senior Health Sister and a Senior Health Visitor), and a Community Nurse. The evaluation team, with the exception of the Principal Investigator who left Lagos in April, 1968, remained the same throughout. The clinical team was quickly expanded to include clinic assistants, a sweeper, a practical nurse, and an additional Community Nurse. Although there were some variations in numbers of clinical personnel, the basic complement remained fairly stable. By June, 1970, most of the current employees had been working with the project for more than two years. Unfortunately, at no time during the Project was full staffing achieved at levels which had been planned. The greatest deficit was of primary patient care personnel (the Family Health Nurses), the focal point of the Project. Never were there more than four, and usually two or three, when six was considered the number necessary for best utilization of the other personnel and of the consulting pediatrician. Further comments about staffing would be inappropriate without outlining the organization of the clinic and the various kinds of jobs to be done.

Perhaps the best presentation of the clinical activities of the project can be made by following a typical child, sick with fever, through a clinic visit. In this way the various aspects of the clinical organization, duties of each type of employee, and innovations used in the clinic can be discussed.

During the night our patient, a child of 18 months of age, was irritable and cried repeatedly. Although the night was hot, his mother noticed that he would not take the breast or supplemental food and that he seemed feverish. Therefore, early in the morning she gathered together her sick son, his G.F.H.N.P. clinic card, two medicine bottles, plastic bags, nappies, and a feeding cup and spoon and set out the four miles from Igbobi to the clinic. The decision to go to the clinic had been painful, for it meant that she would not be able to spend the day trading in order to earn enough to feed her and the two children. When she had reached the main road after trekking a mile on muddy footpaths from the village, she pondered for some time before deciding to spend three pence to ride the next two miles in a hot and crowded kia-kia bus. When, at 7:30 AM, after the final mile had been covered and she arrived at the clinic, she found that the Sister was passing through the assembled mothers checking for the most seriously ill children. When the Sister saw the feverish boy, she not only gave them a Red Cross which would give him priority when it came time to treat the children, but also instructed her to take the child to the water tap and to bathe him to bring down the temperature (although the actual temperature was not taken with a thermometer). This system of the Family Health Nurse screening the children before the clinic began its morning's activities, and giving a Red Cross tag to the mother was utilized from the beginning. The Red Cross entitled the mother to sit in the first one or two rows of the waiting room, so that her child would be seen first, irrespective of the order in which they had arrived at the clinic. All other patients were seen in the order of their arrival. Keeping track of the order in which patients appeared in the clinic was

accomplished simply by having them deposit their clinic record in a specially designed box.

In the waiting area were sections for mothers who were bringing their children for immunizations, or for follow-up injections in a prescribed series, and for children who had contagious diseases like measles and chicken pox, as well as for those requiring medical evaluation.

As soon as the mother determined that the child's temperature had been brought down, she went to the table in the front, where two clinical assistants weighed and measured him. The clinical assistants were primary school leavers trained in task-oriented functions. They recorded this information on the growth chart portion of the clinical record, the Pre-School Health Card. Mother and child then sat and awaited the health talk.

At eight o'clock, the Sister called for the attention of the mothers assembled in the waiting area. First in Yoruba and then in English, she called for volunteers to explain what they understood by child spacing and family planning. As various interpretations were given, the rest of the mothers cheered or booed the speaker, many offering other ideas and beliefs. Then mothers were asked to describe the various methods which they had either heard about or used to prevent getting pregnant. After the interest and participation of the mothers had reached a peak, the Sister gave a more formal discussion of the purpose of child spacing; advantages of smaller family size for the husband, the wife, and the children; methods which can be used by the female and by the male; and where to go in order to obtain help in practicing family planning, emphasizing that the GFHNP clinic staff would be happy to provide them with referral slips to a Family

Planning Clinic.

This was one of the Health Education Talks given daily by the clinic staff, immediately before they began seeing patients. The talks on a variety of topics including, "what makes a healthy baby?", immunization, "If your child has fever....convulsion....diarrhea", and family planning are presented in Yoruba, the language of most of the patients, and in English, to encompass most of the others who generally know some Pidgin. Audience participation is encouraged, with many sessions becoming extremely noisy and emotional.

Immediately after the talk, Sister Tinubu, who had seen the child who now had fever on previous clinic visits, called him and his mother, and about four other patients to her cubicle. On their way, they were stopped by the Exit Clerk, a Community Nurse stationed at the entrance to the examining rooms, and asked to show that they had those items required by the clinic. Particularly important were the two glass medicine bottles which were checked for the presence of well-fitting caps. This was done to save time, since the Family Health Nurse (FHN) would dispense medicines if necessary, and would require the bottle in the cubicle. Without these bottles, the mother would be required to leave the cubicle, search for a trader with an appropriate bottle, bargain for the price, and return to the examining area for the medication.

With everything in order, she proceeded to a waiting bench in the examining cubicle with the other four mothers and their children. Since she was not the first to have her child seen, she heard the discussion by the FHN of the proper treatment of diarrhea, and saw the mother chastized for bottle-feeding a four-month old child.

When it was her turn, she told about her son's restlessness and fever while his temperature was taken. The FHN then listened to his chest with a stethoscope, and asked questions about breathing, complaints of throat or ear pain, and bowel habits. She determined that now an hour after sponging, the child still had fever, and that the most likely source was the ears, which after careful questioning the mother did remember had run a little. At this point the FHN had the option of treating the condition herself or of referring the child to the consultant pediatrician. Because antibiotics would be necessary in the treatment of an ear infection the Pediatrician was called to the cubicle to examine the child, to confirm the diagnosis, and to prescribe treatment. This he did in the presence of the FHN in the cubicle. Although the child appeared somewhat pale, he did not request that a hemoglobin level be determined. This test, and simple dip-stick urine determinations were done in the clinic by the Community Nurses, while other laboratory tests and X-rays were done for the Project at the Randle Avenue Health Center a half-mile away. Upon being consulted, the pediatrician could opt to treat a patient or to refer him to the Lagos University Teaching Hospital. Prescribed treatment of the otitis media in this case consisted of aspirin tablets for the fever, multivitamines for the general nutritional state, mist tussis for cough, and a series of injections of penicillin for five days. The two kinds of tablets had been prepackaged (aspirin by 12's, multivitamines by 21's) in envelopes available at the FHN's table, while the mist tussis was already in 4-oz. bottles, for which the mother exchanged one of her two empty ones. Labels had been affixed, requiring the FHN simply to fill in the amount and the frequency of the dosage. For the penicillin,

the mother had to proceed to the injection/immunization room, where a Community Nurse performed these services.

On the way to obtain the injection, the mother was stopped again by the Exit Clerk in order to determine whether or not she had completed her clinic visit, and had complied with all written orders. Seeing that she had yet to receive the child's penicillin injection, the Exit Clerk sent her on for this, but reminded her to stop there again for final instructions before leaving.

Within fifteen minutes the injection was given, and arrangements were made for the mother to return with the child for the next two days to the clinic. For the fourth injection, they would have to take a special slip to the Bandle Avenue Health Center, since the Project clinic was closed on Sunday; however, they could return to the Project clinic for the last injection. For the visits during which the child would be receiving the injections (as well as for any visit made by a well child solely for immunizations) the clinic routine would be brief. The mother could come directly to the immunization/injection area, and soon thereafter be on her way. Immunizations available every day the clinic was open were triple antigen and polio. BCG was given two days a week; measles and smallpox, only once a month. It was hoped that in the near future the measles vaccine would be available on a daily or twice weekly basis.

After receiving the penicillin, mother and child were stopped briefly by the Practical Nurse at the Heaf testing and BCG table. When she examined the child's record, she noted that he had been given a Heaf test in the past, but had never returned for it to be read. However, due to the severity of the present illness, she did not apply

another test, but did emphasize that it should be done later in the course of the child's treatment as he was improving. If the child were doing well enough, it could be applied on the third visit and read on the fifth.

Everything having been completed, the mother made her final stop at the Exit Clerk's desk. This time, the Clerk checked to be certain that the mother knew the instructions for returning, and for the medications which she had been given. In addition, she pulled the 3 x 5 inch file card which was the only clinic record of the patient and recorded the date of the visit. On the card was a record of the date of each clinic visit, and of the immunization status of the child. Other appropriate entries were made on the daily census sheet.

It was now about 10 o'clock as the mother and child started for home.

Project Evaluation

Evaluation of the project was planned from the beginning. A Senior Health Sister and two interviewers, who made up the working evaluation team, along with the Principal Investigator began planning the first evaluative study from the time that the clinic opened. The purpose of the study was to establish the safety of primary child care by nurses. This was done by selecting patients as they were first seen in the GFHNP clinic, and controls as they were being seen by the MOH physicians, and subsequently ascertaining their status, at home, 48-hours later. An interview schedule was administered in order to establish primary symptoms/diagnosis, medications prescribed and administered, other medical help sought, and the then-current health status of the child.

Approximately 400 children were followed-up in each of the study

and the control groups between April and October, 1968. Preliminary results showed that no children had died in either of the two groups. Further analysis has not been accomplished although the data are now completely coded and on punch cards.

When the project had been running for a year, a brief study with no control group was conducted late in 1968 in order to determine the current status of the first 100 patients registered by the clinic. None were reported dead; however, after extensive efforts to trace all 100, only 60 were found (see Appendix C). Although this may seem a high loss rate due to migration, it is not unreasonable since in Nigeria people retain close ties with their village of origin, often going to Lagos for only temporary periods.

Subsequently, no other evaluation studies were conducted by the evaluation team until February, 1970, at which time they began a pre-trial of an interview schedule for a planned long-term evaluation of the Project. The populations to be sampled in this study were those which made up the study groups in the 48-hour evaluation two years before. At the same time, plans for clinical evaluation of the children found for this study were being made. The subject's mother was to be interviewed at home, and then was to bring the child to the clinic for determination of nutritional and developmental status. After five months, only 166 of the nearly 200 children sought were found and their mothers interviewed. Again, most of the loss is due to migration, either to other areas of Lagos or back to the home village. This does, however, emphasize the difficulty of undertaking a long-term prospective study in an urban center like Lagos which most people view as only a temporary home. Of these, only a fraction were

evaluated clinically. Some of the results of this study are presented later in this thesis, as they relate to child growth, and to the mother's attitudes toward the clinic, child care, family size, and family planning.

Other studies were conducted by individuals and groups associated with the clinic, independent of the project's evaluation team. A basic outline of these studies is included in the Chronology of the Project (Appendix C). Results of three interrelated studies conducted by the author between January and June, 1970, will be found in Chapters V, VI and VII, of this thesis.

The reason for the cut-off date of June 14, 1970, for studies of the Project reported here is that on that date support from the United States Agency for International Development ceased and with it, the affiliation of the Department of International Health of Johns Hopkins University.

CHAPTER IV.

OBJECTIVES OF THIS THESIS

During the past decade emphasis has been placed on world-wide population problems. In order to develop effective national family planning programs in developing countries, arguments have been presented in favor of uniting family planning with maternal and child health services (Taylor, 1968). As child health and survival are improved, mothers should be motivated increasingly to seek means of limiting family size. Certainly no program having a goal of producing strong and healthy children should be undertaken without at the same time allowing mothers or families the choice of whether or not to have additional children. This is particularly important in developing countries where a marked increase in child survival would produce severe strains on the economy, especially in the realms of food availability, housing, and education; on the mothers and families; and on the society in general.

The Gbaja Family Health Nurse Project was funded by the United States Agency for International Development between October 10, 1967, and June 14, 1970, in order to demonstrate the relationship between improved child care and acceptance of family planning in Lagos, Nigeria. The stated goals of the project were:

1. to provide for six days per week combined preventive and curative child health services to a representative sample of children attending the Gbaja Street Dispensary,
2. to provide health education, and family planning counselling and referrals to the mothers of these children,

3. to demonstrate innovative, economical, and efficient ways of delivering the above services, including the use of nurses for primary child care,
4. to measure the costs and results of these services,
5. to train house officers, medical students, health sisters, nurse midwives, and ancillary health personnel in a team approach to child health care.
6. to carry out research on a) the delivery of effective maternal and child health care with combined family planning services on a mass basis, and b) the interactions between improved child health and maternal acceptance of family planning services (Tinubu and Cunningham, 1969).

The broad objective of this thesis is to determine the family planning impact of the Gbaja Family Health Nurse Project developed during the nearly three years prior to June, 1970. Unfortunately no direct measure of this impact is available, in part because the project itself provided only family planning consultation and referrals, but did not provide services. In addition, data on referrals made and on follow-up by referred mothers attending the various family planning clinics could not be obtained, since no mechanism had been established by the Family Planning Council of Nigeria to do this in its clinics, and because the system in the Family Health Clinic at the College of Medicine of the University of Lagos broke down. Therefore, indirect methods must be utilized.

Since no end-point data are available on contraceptive use, those factors which theoretically should motivate mothers to eventual

adoption of family planning methods were investigated. Only when adequate preventive and curative services are provided and children are indeed healthier should the mother begin to realize that increased family size is inevitable unless she actively seeks change. Further, she must be educated about the methods of family planning, about their availability, cost and effectiveness, and about the advantages of their use in controlling pregnancies and family size. Only then is it likely that she would adopt family planning.

The three areas selected for study can be seen in the model of the interactions of project functions on children and mothers (Figure 1):

1. Preventive and curative services are presented in Chapter V as part of the discussion of clinical accomplishments of the Project. The specific objective of this section is to obtain a measure of the integration of preventive with curative services by the Project clinic.
2. A measure of improved health is inferred from growth curves in Chapter VI. Because of the direct relationship to nutritional status and infections, growth parameters, in particular body weight, provide indices of child health. The specific objective of this study is to determine differences in health status between three groups of Lagos children: GFHNP patients, MOH patients, and a random sample representative of metropolitan Lagos.
3. Motivation of mothers is presented in Chapter VII which covers family planning accomplishments. From application

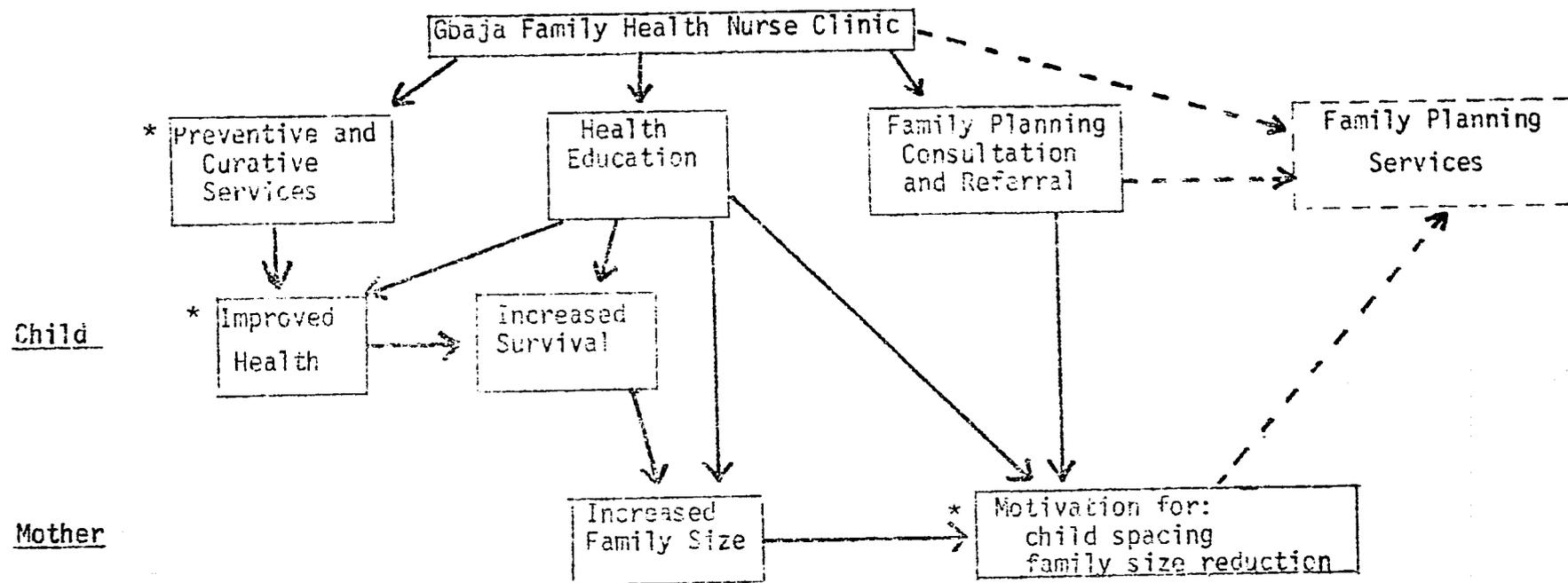


Figure 1. Model of interactions of the Gbaja Family Health Nurse Project with children and their mothers. Note that Family Planning Services were not provided by the Project, thus these relationships are shown by interrupted lines.

* = studied, results presented in thesis.

of a knowledge, attitudes, and practice survey of GFHNP and MOH mothers, these two groups are compared with regard to knowledge of and reported practice with family planning methods, to actual present and desired future family size and composition, to understanding of child survival chances, and to various demographic variables.

Finally, results from the study of these three areas are brought together in order to derive an indication of the family planning impact of the Project in the past, and of its potential for the future.

CHAPTER V.

CLINICAL ACCOMPLISHMENTS: The Integration of
Preventive and Curative Services.

Before considering changes in the health and survivorship of children and subsequently changes in attitudes toward family planning by mothers, it is necessary to establish whether or not the Gbaja Family Health Nurse Project clinic provided enough services, quantitatively and qualitatively, to be a potential agent of change. Perhaps the most important aspect of the GFHNP clinic was the objective of providing comprehensive child care. Basic to this is the integration into a single child health service of classical "well child" care, preventive medicine, with "sick child" care, curative medicine. From an examination of various GFHNP clinic records, including census sheets and individual health charts, the mix of services of these two types can be determined.

Materials and Methods

Three sets of records were used by the GFHNP clinic: 1) daily census sheets which were synthesized into monthly reports; 2) clinic-kept cards; and 3) patient-kept charts. Each of these included different information and a different emphasis. A discussion of the features of each of these records follows, as does an introduction to their use in evaluating the services provided by the clinic.

- 1) Monthly reports were of two types, the most useful one summarized the clinic activities for the month (Appendix D), while the other simply totalled the numbers of pre-packaged medications dispensed each month (Appendix E).

Since all medications dispensed by the Family Health Nurses were prepackaged, tablets by a specific number in an envelope (e.g. Aspirin, 12 tablets, Chloroquine, 4 tablets, and Multivitamines, 21 tablets) and liquids in four-ounce glass bottles containing either two ounces (e.g. Chloral Hydrate) or four ounces (e.g. Calomine, and Mist Kaolinmorphine), the latter report provided a record of the numbers of patients given the various medications. The clinical activity summary provided information on attendance; disposition of patients seen, including laboratory tests; preventive services, including immunizations and health education activities; and a break-down of attendance by sex and age. Copies of both of these sets of records were made available to the author, covering the total period of clinic activity under consideration from October, 1967, through 14 June, 1970.

- 2) Clinic-kept cards were also of two types. One was filled in at the time that a patient initially registered with the clinic, and included information on name, address, date of birth, sex, date of first visit, and clinic number (Appendix F). This card was rarely referred to again, even to correct addresses. The other card was the only clinic-kept record of its service activities on an individual patient basis (Appendix G), containing, on the front, a record of immunization status, by date of each

specific immunization, and on the back, a record of each visit, by date. These cards were to be utilized on each visit of the child to the clinic, but, unfortunately, not each visit was stamped on the back, since someone, early in the history of the clinic had decided that visits for supervised feeding of malnourished children, and return visits to complete immunization series need not be recorded. All of these record cards were available to the author. Information from all of these records on all patients who had ever registered between October 10, 1967, and May 18, 1970, was abstracted using a form developed by the author and reproduced in Appendix H. All work with the records had to be accomplished during times when the clinic was not operating. When all 8138 records had been abstracted, and the many duplications of cards in the clinic record files corrected, data were punched onto cards at the Department of Community Health of the College of Medicine of the University of Lagos.

- 3) Mother-kept charts form the best source of information on the total clinical experience of the child; however, these records are irretrievable if the child does not come in to the clinic. These records consist of a Pre-School Health Card (Appendix I), originally printed for the clinic by Glaxo-Allenbury, Ltd., of Nigeria, and later in the form illustrated by Nestle', Ltd., of Nigeria; and medical history/progress cards, (Appendix J), all of which were provided in a protective plastic envelope.

Since it was known that this was the only record which contained records of all clinic visits by the child, and in order to check up on the accuracy and completeness of recording of the immunization status information of the clinic-kept record, the author collected and abstracted information from 500 of these mother-kept charts. During June, 1970, charts of random children were selected from among those of all children attending during each day, as they were being processed at the weighing table. The only stipulation placed on selection was that the child must have been registered in the clinic before May 18, 1970, the last date through which the clinic-kept card survey was complete. The only modification of the code sheet (Appendix H) was the inclusion in one previously unused column of the following information on the kinds of visits included in the total:

- 1 - medical and immunization visits only
- 2 - includes an injection series
- 3 - includes nutrition clinic visits
- 4 - includes both injection series and nutrition clinic visits

This was done in order to help to elucidate expected differences in information about visits as recorded on the two sets of clinical records. It was known that while all medical and immunization visits were

to be recorded, no visits for follow-up injections in a prescribed series and no nutrition clinic attendances were recorded on the clinic-kept cards, although they were indicated on the mother-kept records.

After these records had been punched, and all punched cards had been transferred to tape and transported to Baltimore for analysis, 491 of the 500 mother-kept records could be matched with their counterparts from the 2138 patient clinic-kept record abstract. These matched records as well as the clinic-kept abstracts in total were subjected to identical cross-tabulations so that they could be compared.

Results

Since so many disparate lines of investigation have been involved in ascertaining a reasonable picture of the accomplishments of the clinic, for the most part only the single best estimate of the results will be presented here. However, in several areas, where there is no clear-cut "best estimate", and in other areas where there is only fragmentary information, the comparative picture will be discussed. All figures refer to clinic accomplishments over the period from October 10, 1967, to June 14, 1970, unless the date of May 18, 1970, is stated.

During the period of operation of the GFHNP clinic under evaluation, 8265 patients were registered. Of those, 75% were children selected in a random manner from the population attending the (Lagos State) Ministry of Health sick-childrens' clinic in the same Gbaja Street Dispensary building; while the remaining 25% were siblings of patients. Only five patients lived further than 12 miles from the clinic; however, the average distance the rest lived from it was 2.96 miles. Table 3 shows

Table 3

Distribution of Patients Registered in the Gbaja Family Health Nurse Project Clinic, and of Patient Visits, by Distance of Home from the Clinic, 1967 - 1970.

Distance (miles)	Patients Registered ^a (percent)	Patient _b Visits (percent)
1	31.5	36.5
2	4.8	5.1
3	10.3	9.6
4	40.5	37.9
5	10.4	9.1
6	1.4	1.0
7	0.1	0.1
8	0.6	0.6
11	0.4	0.2
Total	100.0	100.1

a. Average distance of home from clinic is 2.96 miles.

b. Average distance travelled per visit to clinic is 2.85 miles.

the percentage distribution of individual patients registered by distance from clinic, and of total visits by distance from clinic. Note that there is very little difference in the two distributions, (not significant by Chi-square test of the two distributions) but that a slight tendency for people living closer to the clinic to utilize it more often is apparent. Most of the patients come from Surulere, the residential area of Lagos in which the clinic is located, or from Mushin, an adjacent extremely densely populated and very poor section outside of the City of Lagos.

There was a slight male dominance in the numbers of children registered, males representing 51.6%. Approximately this same proportion held true in an analysis of several thousand visits. The following tabulation by age and sex, shows the percentages of each sex represented in the three age categories:

Age (years)	Sex Distribution (percent)	
	Males	Females
under 1	52	48
1 to 2	51	49
2 to 5	54	46
Average	52	48

The distribution by sex of visits is the same as that of patients registered.

Age distribution of patients attending the clinic was likewise determined from the records of several thousand visits, and showed the resulting distribution:

Sex	Age Distribution (figures in percent)		
	under 1 year	1 to 2 years	2 to 5 years
Male	41	28	31
Female	40	30	30
Average	40	29	31

Thus can be seen the area of emphasis of the clinical activities. Almost 70% of the patients attending are under two years of age, with more than half of these being under the age of one.

It is extremely difficult to determine the total number of patient visits. Monthly records indicate nearly 125,000 visits; however, the total visits indicated on the clinical records of the 8138 patients abstracted was only about 54,000. The discrepancy is explained to a large extent by the realization that an unexpectedly large number of visits are not recorded on the clinic-kept card, particularly, if they fall into the categories already mentioned of nutrition clinic visits, or of follow-up injection series visits. From the survey of mother-kept cards, it was possible to determine the number of clinic-kept records which might be erroneous, i.e. not have all visits recorded. The following tabulation indicates the percent of patients having only immunization and medical visits; having these plus at least one injection series; having medical, immunization, and at least one nutrition clinic visit; or having medical, immunization, injection series and nutrition clinic visits (each category being mutually exclusive):

Visit Mix as recorded on mother-kept cards	Distribution (percent)
a. medical and immunization only	8.4
b. includes injection series visits	57.0
c. includes nutrition clinic visits	3.6
d. includes injection series and nutrition clinic visits	31.0
Total	100.0

Thus, although all clinic-kept records record most of the medical care and immunization visits, they indicate fewer than the actual number of visits for over 90% of patients who came in for additional injection and nutrition clinic visits.

From the comparative study of the matched records of the 491 clinic- and mother-kept cards, it was possible to adjust the total estimated visits to within about 8% of the monthly record total (or to about 115,000 visits). Likewise, the estimates of average numbers of visits per patient are variable. However, the monthly record average of 15.1 visits and the adjusted records survey average of 13.9 are relatively close. There is no reason to select one figure over the other in either case.

From records of the first and of the last visit dates, it is possible to obtain an impression of the active clinic population. From Table 4 it can be seen that over 50% of children registered during a year-long period (periods II and III) drop out before the end of that period. In fact, 62.5% of the patients who registered in Periods I and II and who had over 15 months to return after April 1, 1959, never returned. Another drop-out rate, not derived from the table, is that 29.7% of the children registered in the GFHNP clinic were not seen again

Table 4

Distribution of Gbaja Family Health Nurse Project Clinic Registrants by Period of First Visit and of Last Visit, 1967 - 1970

Period of First Visit ^a	Period of Last Visit ^a				Total
	I	II	III	IV	
I	1192(46.2)	537(22.8)	575(22.3)	224(8.7)	2578(100.0)
II		1617(56.7)	892(31.3)	343(12.0)	2852(100.0)
III			1390(59.5)	941(40.3)	2331(100.0)
IV				371(100.0)	370(100.0)
Total	1192	2204	2857	1878	8132

a. Periods of visits are as follows:

- I - October 10, 1967, to March 31, 1968.
- II - April 1, 1968 to March 31, 1969.
- III - April 1, 1969 to March 31, 1970.
- IV - April 1, 1970 to May 18, 1970

after four weeks from the time of registration. Many of them had only one visit, while others received treatment for an acute condition and never returned.

One further consideration of visits is by reason for visit and by personnel attending. The following distribution shows the percentage of reasons for patient visits, from the monthly records:

<u>Reason for Visit</u>	<u>Percent of Visits</u>
a. Medical care	58
by nurse only	(92)
by nurse with doctor	(.8)
b. Injection only	31
c. Immunization only	11

This is not to say that immunizations were not given to many children who actually came in for curative services; they were. In fact, since "immunization only" visits would account for just over half of the visits during which children were immunized, the remaining 12,000 visits during which they were immunized must have been made originally for curative services.

With regard to curative services, consistently throughout the period of operation of the clinic between 1967 and 1970 an average of more than two medications (range 2.05 to 2.23) were given per visit for medical care purposes. Generally one liquid medication (range 0.72 to 1.07) and one in tablet form (range 1.03 to 1.36) were given, with only about one in ten given specifics or topicals (range .093 to 0.143).

The average child made nearly three (2.96) visits during which an immunization was given. Since, as often as possible, more than one

immunization was given, this is compatible with the further statistic that each child received an average of 4.7 immunizations and 1.2 Heaf tests. Immunizations most often given together were Triple Antigen (DPT) and oral polio, the children receiving an average of 2.0 Triple Antigen and 1.7 polio immunizations.

In general, the recording of immunizations and of immunization status was reasonably accurate. For the Triple Antigen, measles, and polio, differences in recording between the mother-kept and the clinic-kept cards were not significant when tested by a Chi-square test for goodness of fit on the two distributions in each case. For smallpox and for BCG vaccinations, differences were extremely significant, with marked under-reporting of the status on the clinic-kept records.

A high percentage of the Triple Antigen and of the polio immunizations represented the second and the third of the series. If follow-up was complete, ideally the distribution would show 33% of the immunizations in each category. For the GFHNP clinic the following was the case:

<u>Immunization</u>	<u>Percent</u>
Triple Antigen	100
Number 1	42
Number 2	29
Number 3	23
Booster	6
Polio	100
Number 1	47
Number 2	30
Number 3	21
Booster	2

Finally, with regard to immunizations, what percentage of the 8265 GFHNP children had achieved complete or partial immunization status? From Table 5, it can be seen that 46.4% of the children had received complete Triple antigen, and 35.9% complete polio series. Reasons for lower levels of measles and for less than 100% coverage of BCG and smallpox will be presented in the discussion.

Discussion and Summary

In general there is no doubt that the GFHNP clinic successfully integrated preventive and curative services. This is shown by the fact that many children who came initially for curative services left with an immunization when its administration was not contraindicated by the severity of the illness. In addition approximately 11% of the total visits to the clinic were for the purposes of immunization alone, to continue or complete series begun earlier.

Particularly important are several considerations based on Table 5. There is no integrated governmental preventive and curative child health service in Lagos. The Lagos State Ministry of Health is responsible for sick children and gives no preventive services, whereas the Lagos City Council Public Health Department Child Welfare Clinics (LCC/CWC) provide well-baby care and preventive services while taking care only of very minor illness of the children. This lack of a comprehensive child care system outside of the GFHNP clinic makes comparisons difficult. However, in order to gain some measure of the effectiveness of the provision of preventive services by the GFHNP clinic, data from the 1967 through 1969 LCC Medical Officer of Health reports (Williams, 1967, 1968, 1969) were tabulated. The only comparable figures available are for Triple Antigen

Table 5
 Distribution of Percent of Patients Attending the
 Gbaja Family Health Nurse Project Clinic and the
 Lagos City Council Child Welfare Clinics Who
 Received Various Immunizations, Lagos, 1967-1970

Immunization or Test	Percent of Patients Immunized or Tested	
	GFHNP	LCC/CWC ^a
Triple Antigen No. 1	82.6	42.5
Triple Antigen No. 2	57.1	33.3
Triple Antigen No. 3	46.4	30.0
Triple Antigen Booster	11.7	2.8
BCG vaccination	50.6	---- ^b
Post-BCG Heaf Test	40.7	8.6
Polio No. 1	80.6	c
Polio No. 2	51.8	c
Polio No. 3	35.9	c
Polio Booster	3.1	c
Measles	7.8	----
Smallpox	37.5	----

a. Synthesized from Williams, 1967, 1968, 1969.

b. ----indicates data not available in useable form.

c. Polio not given by LCC/CWC until last five months of 1969, therefore, no reasonable comparisons can be made.

(diphtheria, pertussis, and tetanus), and for post-BCG Heaf Tests. In both cases, the rates for GFHNP children are much higher than for the Child Welfare Clinic children. For polio, the immunization rates among the GFHNP children are almost as high as for Triple Antigen (58.1% had complete Triple Antigen series, and 32.0% complete polio series) in spite of the fact that patients were charged for the polio immunizations, since the vaccine was not supplied by the government. Subsequently, and possibly in part due to the success of the GFHNP clinic with it, the LCC/CWC in August, 1969, began to offer polio, at a cost of 2/6d (35 cents) per immunization.

Rates of BCG vaccination should be 100%, since the vaccination is required in order to obtain a birth certificate. However, although all GFHNP patients presented birth certificates, not all had been vaccinated with BCG. The rate of 50.6% represents a mixture of children given BCG for the first time, and of those revaccinated because they had no conversion after their initial vaccination. It in no way represents all who had been vaccinated at some time in their life. A similar problem presents with smallpox and measles vaccinations, except that these were not given by the GFHNP clinic. They could be given only by government vaccinators, once a month, as they came to the Gbaja Street Dispensary. The relatively low rates result from the fact that the GFHNP clinic was operated on the premise that all necessary vaccinations should be available each time the patient visited, not just once a month, or even once a week.

There is no doubt that the record system is not ideal. The problem with lack of recording of all visits on the clinic-kept card could easily be rectified. A greater problem, the lack of the clinic-kept cards to

show reasons for visits, also can be easily rectified. By using a simple numerical code of the type used in the 48-Hour Evaluation Study (Appendix K), and by recording the number of the category corresponding to the chief reason for the clinic visit (along with the date of the visit) on the reverse side of the clinic-kept card, much additional information would be available. Particularly important from an evaluation standpoint, would be the capability of determining changes in morbidity patterns of the patients. Currently no morbidity pattern can be established.

The large loss of patients after only one or few visits is lamentable. However, it was impossible within the constraints of the Project to develop a large enough staff for home visiting. Therefore, only those mothers who were strongly motivated or whose children were dramatically improved returned regularly.

In conclusion, the following major points have been made:

- 1) Preventive and curative services have been reasonably well integrated in the Gbaja Family Health Nurse Project Clinic, with a higher proportion of preventive services provided than even in the Child Welfare Clinics.
- 2) Better records could be kept, without inordinately increasing the amount of work of the GFHNP personnel. Much more information on the characteristics of the Clinic clientele and of changes over time would then be available.
- 3) Capability for follow-up of defaulting patients, whether for lack of attendance or for treatment

and immunization, should be included in the GFHNP clinic. Community orientation and outreach are essential to the provision of comprehensive child health services.

CHAPTER VI

GROWTH: A Measure of Improved Child Health

Growth parameters are being used increasingly in many countries as indices of nutritional status and of the state of health of children. Although there are many possible parameters, the single anthropomorphic measurement having the greatest application throughout the world and particularly in developing countries is that of body weight (see Appendix I for a discussion of the use of weight curves as indices of health). It is the purpose of this chapter of the thesis to investigate the effect of the Gbaja Family Health Nurse Project clinic on the health of the children served as compared to two control groups of children. By evaluating differences in the state of health of project children and of non-project children from among whom the GFHNP patients were selected, an estimate of the impact of the project on improving child health can be made. Without significant improvement in child health, positive effects on the attitude of their mothers cannot be expected (as per the model, Figure 1).

Review of Child Health Studies and Reference Standards (Table 6.)

The earliest published report on growth of Nigerian infants or children appeared only about 15 years ago (Nicol, 1956). The state of health and of nutrition of children aged 5 to 16 years from various parts of rural northern Nigeria (Kanuri, Shuwa, Camberri, and Otukwang) was compared with that of children of educated families of southern Nigerian derivation (Ibo and Yoruba) living in Kaduna. Assessment was made on the basis of height, weight, food intake, total

Table 6.

Summary of Published Studies on Growth, Nutrition,
or Health of Nigerian Children, 1956 - 1970.

Year	Author(s)	Type of Population Studied	Number Sampled
1956	Nicol	Northern Nigeria: peasant rural and educated urban offspring 6 to 16 years old	976 measured 163 clinical
1959	Watt	Lagos Welfare Clinics under 1 year old	1000 birthweights 500 measurements
	Ecoma	Eastern Nigeria rural under 1 year old	approx. 250
1962	Collis, Dema, Omololu	Ilesha, Western Nigeria rural birth to 8 years old	approx. 120
	Collis, Dema, Lesi	Pankshin, Northern Nigeria birth to 8 years old	250 measured 25 clinical
	Cuthbertson and Morley	Ilesha, Western Nigeria rural birth to 5 years old	not stated
1963	Dema	(a) scattered samples 1 to 8 years old	not stated
1964	Gilles	Akufo, Western Nigeria rural birth to 8 years old	140 measured
1965	Edozien	(a) "elite" Ibadan children birth to 11 years old	611 measurements

Table 6 (continued)

Year	Author(s)	Type of Population Studied	Number Sampled
		(b) Osegare, Western Nigeria rural birth to 11 years old	
1966	Rea	Three socioeconomic levels Lagos, birth to 5 years old	150 measured
1967	Dema, Gurney, Olayeni	Ilesha Nutrition Project rural 2 to 10 years old	334 measured
	Darby and Edozien	Nutrition Survey, National birth to 13 years old	432 studied
	Janes	"elite" Ibadan children birth to 4 years	approx. 100 per sample
1968	Morley	(a, b) Growth chart papers	not stated
	Morley, Woodland, <u>et al.</u>	Imesi, Western Nigeria rural birth to 5 years old	approx. 400
	Morley, Bicknell, Woodland	Imesi, Western Nigeria rural birth to 5 years old	104 studied
1969	Cunningham	Western Nigeria rural, 2 villages birth to 5 years old	approx. 2000
1970	Janes	"elite" - follow-up birth to 7 years old	under 200 per sample
	Morley	Growth chart paper	not stated

plasma proteins, erythrocyte sedimentation rate and the Ide test for yaws and syphilis. The heights and weights of over one hundred of each sex in each group were compared with both American and English standards. The Kanuri/Shuwa and the Ibo/Yoruba children most closely approached the Western standards, while the others fell far below.

In 1959, two papers appeared, both reporting on birth weights and on growth in the first year of life (Ecoma, 1959; Watt, 1959). Ecoma reports on a cross-sectional study of 446 Ibo children from Nsukka Division, Eastern Nigeria in comparison with a United Kingdom standard. From an average birth weight of 6 lb. 4 oz., the children fell far short of their British counterparts. Data for the cross-sectional study by Watt were obtained from official record books of various Child Welfare Clinics in Lagos, with 1000 birth weights, and 500 weights at each 3, 6, 9, and 12 months being reported and compared to those of British babies. Birth weight was 6 lb. 12 oz. Growth as measured by weight gain at the age of three months was close to that of the British children, but fell off dramatically from that point to age one year.

Reports of two detailed nutrition surveys appeared in 1962. The first reported on the ecology of child health and nutrition from a Village Survey, Ilesha Area, Western Region, supported by the Rockefeller Research Scheme (Collis, Dema, and Omololu, 1962). The extensive report contains information on environment, population, resources and on surveys of diet and medical status. Growth data are presented in the form of heights and weights of an unspecified number of children from birth to eight years by sex, taken cross-sectionally, as compared to a then unpublished "optimal" Nigerian standard from

the University of Ibadan. Average measurements of village children were significantly below those of the well-off Ibadan children.

The other report was of a transverse survey of health and nutrition in Pankshin Division, Northern Region (Collis, Dema, and Lesi, 1962). Heights and weights of 250 children between one and eight years of age, taken cross-sectionally, were again compared with the "optimum" African (Ibadan) and, as well, the Ilesha children reported in the previous study. Pankshin children fall between the two reference groups in both measurement categories.

Cuthbertson and Morley (1962) in their presentation of a health and weight chart to be used in the care of children under five reported indirectly the results of a five year longitudinal child health study of 400 children under five years of age in Ilesha. In developing their graph for the chart, they utilized a combination of their observations and those from Watt (1959) for their lower reference line. For the upper line they used mean weights of English children which were stated to compare favorably with the unpublished observations of Collis from Ibadan "elite" children. Thus, Ilesha village averages for both sexes combined can be obtained from the smoothed curve on the chart.

Dema (1963) at a conference on Health Education in West Africa presented a paper on nutrition which included a graph depicting weight:height ratios of children between one and eight years of age from various Nigerian populations. Included in the graph are results of a study conducted in four villages in the Eastern Region reported originally in another paper by Dema (1963b) which is unavailable to this author. The graph shows the Ibadan "optimum" children at the

top of the weight:height distribution, the Eastern Region children at the bottom, and the Ilesha and Pankshin children in differing intermediate positions.

The village of Akufo, near Ibadan, underwent intensive research in the early 1960's. In a presentation of the study Gilles (1964) graphically illustrates the height and weight curves of 140 children between one and eight years of age representing 70 households, along with the "optimum" Nigerian children from Ibadan and the Pankshin and the Ilesha children. The Akufo children are generally parallel to but below the Pankshin children in height and weight (well below the "optimum"). They are smaller than the Ilesha children until about four years of age when they overtake them and subsequently remain larger, however, no statistical tests of differences were applied.

Finally, in 1965, the first report presenting the "optimum" Nigerian children's data appeared (Edozien, 1965a). The "optimum" group consisted of children of medical students, Nigerian staff of the University of Ibadan and University College Hospital, and senior civil servants. Height and weight measurement data are presented in tabular form on boys and girls separately and combined, whereas graphic representation is of combined data only. Data were derived from a combined transverse and longitudinal growth study of 200 children over a period of two years, with an average of 55 individuals measured per annual age category (31 for males, 25 for females). No references are made to other Nigerian values or to non-Nigerian standards in this paper. However, another paper published at the same time (Edozien, 1965b) uses the "optimum" values for comparison with those of 350 children from a small village near Ibadan. This,

too, was a combined transverse and longitudinal study of the children from birth to twelve years of age; however, the number of measurements in each age category is not stated. The village children are smaller than the reference children from birth onward, with growth retardation most marked between ages three and seven years.

A comparative study of three groups from different socioeconomic strata in Lagos was reported by Rea (1966). He studied approximately 50 children each from a housing estate (high socioeconomic group), from a re-housing estate (middle to low socioeconomic group), and from a Lagos "slum". The housing estate children approached the "optimum" Ibadan group in growth; the re-housing estate children were intermediate between the "optimum" and the Ilesha village children, and the "slum" children were very similar to the Ilesha children.

In 1967 the first of two further reports on the "élite" Nigerian children from Ibadan appeared (Janes, 1967). The study design with regard to physical growth measurements on a mixed longitudinal basis, progress in obtaining a projected sample of 200 measurements in each age category (every three months from birth to three years, then every six months to seven years of age), and the data collected from 1962 to 1966 were presented. In addition to the "élite" children being studied to provide an "optimal" growth reference, a group of children from a traditional market area in the old town center of Ibadan (Oje) are being studied as representative of the lowest "social class". Results to 1966 extended only to four years of age and indicated that the "élite" group children's means were superior to British levels of Tanner, *et al.* (1966), but that those from the Oje group were markedly lower from three months of age onward, with

increasing divergence below the British mean of Tanner. A further report covering the advances in the period 1966 to 1968 presents curves from earlier data (1962-66), adds curves based on the re-calculation of means over the longer period (1962-68), and now shows means for the children up to age seven (curves for 3 1/2 to 7 years)(Janes, 1970). The latter curves parallel the Tanner curve, "elites" near but above and Oje children far below. The re-calculated means and curves with the additional 1966-68 data are each displaced slightly above their previous levels, although they have changed little relative to the standard of Tanner. Height and weight velocity data are also shown, along with correlates of mother's with children's height at stated ages. The study continues.

A progress report was given on the Ilesha Applied Nutrition Project at a 1967 Health and Nutrition Conference in Zaria (Dema, et al., 1967). This Rockefeller Foundation funded project grew from the 1961 baseline survey (Collis, Dema, and Omololu, 1962) providing substantial community development, medical, and agricultural input into two agriculturally contrasting villages. Scattergrams of height and weight for age values of an unknown number of children or measurements are presented, along with straight-line regression approximations of the growth curves (supported by the calculation of correlation coefficients significant at 1% for age, weight, and height). It is noted that there were no demonstrable differences between sexes or communities in average heights or weights. No comparisons of the regression lines with other standards are made.

As part of a nutrition survey of Nigeria conducted in 1965, height and weight data were collected on samples of children from

various areas of the country (Darby and Edozien, 1967). Both Iowa and Harvard growth charts were used for graphic representation of the data from this cross-sectional survey. General conclusions of the study include: at birth, Nigerian infants average nearly as large as North American children; Nigerian infants thrive for only the first few months, soon beginning to fall far below the North American norms; regional variations occur, possibly related in part to genetic factors; definite improvement is seen in children from higher socio-economic groups, and where better medical care is available. In fact, as the authors point out, "all of these observations confirm the results of many (cross-sectional and) longitudinal studies which have been made previously in Nigeria", and are summarized in this literature review. No reference to previous nutritional studies in Nigeria, by citation, is made.

In 1968, after a lapse of several years, the height and weight data from Imesi Ile, upon which the Morley health and weight chart was based in part, was published (Morley, Woodland, *et al.*, 1968). Length and weight measurements were taken in longitudinal sample of children numbering between 343 at birth and 249 at five years of age, during the period of 1957 to 1963. Data are presented in tabular form by sex with medians and percentiles, and in graphic form, comparing Imesi Ile boys with Tanner's London boys. In addition, a comparison by sex separately and with sexes combined is made between Imesi children and twelve other groups reported from West Africa. Similarity is noted between the initial Imesi Ile values and those of children from other rural areas, making the data (and therefore the "norms" on the weight charts) representative of West African

village children generally. Correspondence between urban "optimum" groups in Nigeria with British values is noted, as is the fact that median Imesi values fall near the tenth percentile of British boys in both height and weight. Another paper from Imesi Ile presents the results of a study of factors influencing growth in the first year of life in an attempt to identify risk factors which might be utilized as "indicators for special care" (Morley, Bicknell, and Woodland, 1968). They note that children who were well below the norm at six months of age tend to remain small, maintaining their relative weight position at least to age five years. Important risk factors are considered to be: low maternal weight; birth order over 7; death of a parent or a broken marriage; deaths of more than four siblings; low birth weight (under 5 1/2 pounds); twinning (or other multiple birth); failure to gain at least 1 pound per month in months 1 through 9 and 1/2 pound per month from 10 through 18 months; breast feeding difficulties; and an episode of measles, whooping cough, or repeated diarrhea under age six months. In addition, three other papers have appeared subsequently discussing the health and weight chart's use in developing countries (Morley, 1968b), its use in prevention of protein-calorie malnutrition (Morley, 1968a), and its use in nutrition education in rural societies (Morley, 1970).

In 1969, in a paper reporting on a comparative study of child care in two villages near Ilesha, weight for age distributions of boys and girls separately from the two villages are presented (Cunningham, 1969). Here two populations are compared by demonstrating differences in the distribution of their weights as expressed in percent of the mean of a reference standard (Harvard values), rather

than differences in median or mean values.

In the foregoing review of growth study reports from Nigeria, standards or reference values have been mentioned several times. These standards fall into two basic groups: other Nigerian studies, particularly of upper socio-economic groups or "élites" which establish "optimal" values (which themselves are compared to the next group of standards); and so-called Western standards. The best of the Nigerian "optimum" studies are those of Edozien (1965a) and Janes (1967, 1970), and to a lesser extent of Collis, et al (1962).

There are basically two sources of Western standards, British and American, both of which have the same disadvantages for use as "norms" for African children. Western standards are derived from rather homogeneous populations of children, from lower-middle "blue-collar" classes, or from middle to upper class socioeconomically, and having largely northern European ancestry. As was shown by Janes (1970) particularly, "élite" Nigerian children can meet, and indeed exceed, British children. However, the gap between Nigerian "élites" and village children in weight attainment is indicative of the gap which exists in other realms also (socioeconomic class, education, food availability, etc.). The advantage of the use of Western standards is that they are widely known and can serve as references for international comparisons, as well as for national changes over time.

The American standards used were derived either a) from a longitudinal study carried out from about 1920 to 1950 by the Harvard School of Public Health and the Childrens' Medical Center, Boston, on Boston children from birth to five years of age, or b) from another longitudinal study carried out over a similar period of more than 30

years from about 1920 by the Iowa Child Research Station of the State University of Iowa, on Iowa City children from birth to 18 years of age. Unfortunately most people using the reports, or the charts derived from these studies (Harvard School of Public Health, Boston charts, or Iowa Child Welfare Research Station charts) do not acknowledge that data from the two studies have been combined in part. The Iowa charts and the papers by Boyd (1948), and by Stuart and Meredith (1946) use only Iowa data. The Boston or Harvard charts and the often-quoted standards presented by Stuart and Stevenson (1959) actually represent the Harvard data alone for only the first five years of life, and then borrow heavily from Iowa data for the remaining years to maturity. Thus, it might be as well to talk of an American standard, if indeed the minor variations under the age of five between the two studies could be resolved.

The British standards are much more disparate. no published report is available concerning the Middlesex County Council School Record Cards used by Nicol (1956); Gore and Palmer (1949) developed height and weight standards from a cross-sectional study of London preschool children; Ellis (1959) reports cross-sectional data from personal unpublished records of a Dr. J. Thompson; Acheson, et al. (1955) report on growth parameters in the first five years of life determined in the Oxford Child Health Survey, from which has come several other published reports of various aspects; and Tanner, et al. (1966) present the newest, and perhaps the most popular British growth work in terms of acceptance and international use, derived from on-going longitudinal studies of London children.

Although this brief review of comparative growth standards by

no means exhausts the list of possibles, it does indicate the large variety of studies used for international reference, and perhaps points out the need for some single uniform standard for international comparison.

Materials and Methods

In order to carry out this study, measurements of three growth parameters were taken of children sampled from three populations in Lagos. A brief description first of the populations sampled, and then of the measurements taken follows:

Populations Sampled:

- 1) Gbaja Family Health Nurse Project Clinic children (GFHNP) were measured as they came to attend the clinic during the period from May 1, 1970, through July 10, 1970. Since measurements are taken routinely of these children each time they attend the clinic, only three stipulations were made with respect to sampling this population:
 - a) they were all to be under 61 months of age and to have their birth dates recorded (which was done simply by recording the clinic number which was based upon date of birth);
 - b) they were all to be taken into the study as they appeared at the clinic, but none were to be included more than once; and
 - c) they were all to have been registered in the Project prior to May 18, 1970, (the date through which all records had been abstracted for the evaluation of clinic accomplishments) but no other attempt was made to stipulate the length of

experience with the Project Clinic. Although it was hoped that measurements could be obtained on 1000 children from this group, not that many different children attended the clinic during this study period. Ultimately 420 boys and 379 girls (799 children) comprise the sample.

- 2) Ministry of Health Sick Childrens' Clinic patients (MOH) form the population from which the GFHNP patients or their siblings were originally selected. Since the MOH clinic was held in the same Gbaja Street Dispensary building as the GFHNP clinic, and since the GFHNP patients were originally randomly selected from this group, it was felt that any differences between the two populations should reflect the effects of the Project. Regarding the sampling of this population there were several problems: a) measurements were not routinely taken of children in this clinic, thus no standardized technique or equipment was available; b) the clinic had long lines, large attendances, and patients appearing for care any time from 7:00 AM to 1:00 PM; c) no dates of birth (and thus ages) of children were known accurately, and d) no individualized clinic numbers had been assigned to aid in elimination of duplication. Therefore, the following was stipulated: a) for purposes of standard measurement all children were to be brought to the GFHNP clinic area at times

when they would not interfere inordinately with the Project clinic flow; b) a group of patients en masse was to be taken from any of the long lines waiting at any point of progress through the clinic; c) samples were to be taken at various times in the day to obtain a reasonable cross-section of the patients; d) duplication of children in the sample was to be avoided, and e) birth dates were to be determined to the nearest month as accurately as possible. Although the author was assured that over 1000 children had been measured, ultimately the sample was comprised of 489 boys and 461 girls (950 children).

- 3) Metropolitan Lagos children (Lagos) form a random sample of children from the whole metropolitan area. The approximately 390 boys and 385 girls (775 children, though somewhat less for each measurement, since occasional values are missing) represent a random sample of approximately 0.3% of Lagos children. Originally Dr. Robert Morgan of the Department of Community Health of the College of Medicine of the University of Lagos developed a 1% random sample of Lagos households composed of 30 areas (or blocks) of uniform size selected randomly from a grid placed over the total land area of the Lagos metropolitan area. The sample was supposed to contain a cross-section of all socioeconomic groups, living conditions, population densities etc., and has been used for demographic and population dynamics surveys

(Morgan, 1968, 1969a, 1969b), and for a mass media study (Simpson, et al., 1969). Subsequently, while conducting nutrition studies Dr. W.O. Gbajumo of the Institute of Child Health of the University of Lagos selected at random one third (10) of the areas for a household nutrition survey (Gbajumo and Olaniyan, 1970). All children under five in all households in the ten blocks were measured in their homes by Dr. Gbajumo's interviewers, and a copy of the data kindly turned over to the author for use in these comparisons. The greatest problem with this population was the lack of known birth dates and thus the necessity for estimation of ages. An advantage in having the Lagos children for comparison with the other two groups is that these children represent a broad mix of the medically aware and unaware, of the healthy and the ill, of the treated and untreated, and of those using Western versus native medicine.

Measurements Taken:

- 1) Length/height measurements of the GFHRP and of the MOH children were made in a uniform manner. Children under 30 to 36 months or under about 30 to 34 inches in length were measured supine on a measuring board constructed out of wood with a vertical upright headboard and a sliding vertical footboard, and having two measuring sticks incorporated into the base (one on each lateral margin). The child was positioned

with the head against the headboard, auricular opening and eye on a vertical line, legs straight. The footboard was placed firmly against the flat bottom surface of the feet and a reading taken when the footboard transected the same value on both measuring scales (thus, was perpendicular to the long axis of the child). Older or larger children were measured, without shoes, standing on a Detecto scales which was outfitted with a vertical height scale with a sliding headpiece. They were not placed against a wall for the vertical measurement. The Lagos children were measured over a measuring stick supine if small or standing if larger. Since these latter measurements were made in the homes, and not always under Dr. Gbajumo's control, there is no guarantee of uniformity of method. All length/height measurements were originally taken in inches to the nearest quarter of an inch, and subsequently transformed into centimeters to the nearest tenth for purposes of analysis.

- 2) Weight measurements made of the GFHNP and of the MOH children likewise were uniform. The smaller children were weighed on a double pan beam balance which had a plastic basket for the child on one pan and a set of weights which were placed on the other.

All children were weighed nude by the same clinical aide who was familiar with the scales and accurate in the addition of the weights. Larger children were weighed nude on an upright Detecto double beam balance scales by the same employee. Both scales were balanced at least once each day, before weighing activities began. All weights were recorded in pounds and ounces to the nearest half-ounce and subsequently transformed into kilograms to the nearest tenth. The Lagos children were all weighed in their homes on portable bathroom-type scales and weights recorded to the nearest quarter-pound. Small children who could not stand, and larger children who were uncooperative were held by the mother or an interviewer on the scales, and then the weight of the person holding the child subtracted. Although more than one scales was used, all were checked against one another and found to be uniform.

- 3) Arm circumference measurements were made in a uniform manner among the GFHNP and the MOH children, but despite all cajolery by the author, not in a manner consistent with that described by Jelliffe (1966) and in several papers presented in Jelliffe and Jelliffe (1969). Rather than either a broad flexible steel tape or a broad fiber-core plastic tape, a narrow flexible steel tape was used, with the tendency to overly compress the

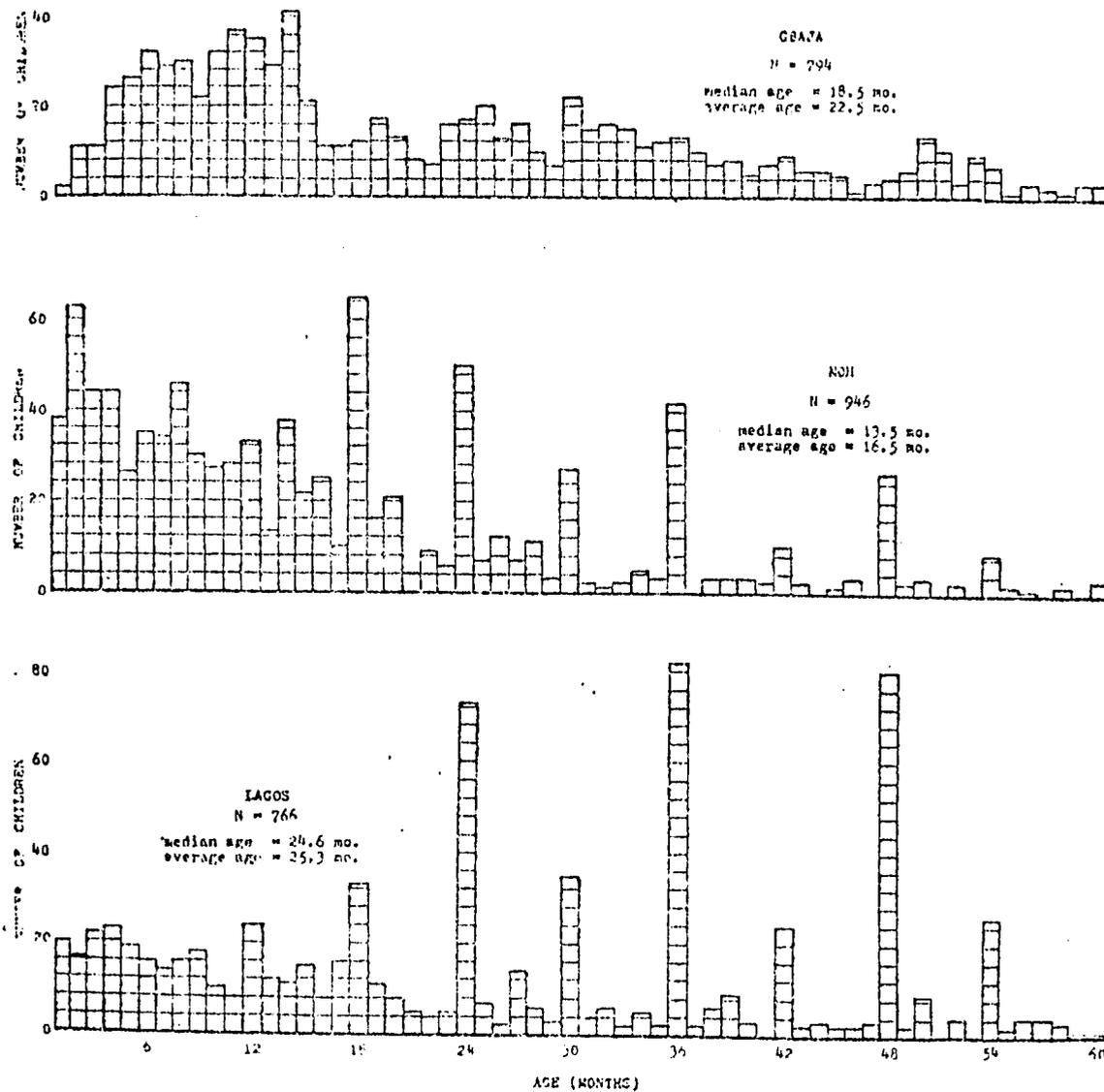
soft tissues. This resulted in values which are in no way comparable with the standards quoted above or with measurements obtained from Lagos children by Dr. Gbajumo's group, since Lagos children were measured with broad flexible plastic tapes. As a result only a basic comparison can be made of the relative value results from the GFHNP and the MOH samples.

Results

An interesting feature of the sample distributions of children selected for this study is graphically illustrated in Figure 2. Irrespective of differences in the median and average ages of the three groups, there are striking differences in the character of the distribution pattern which can be accounted for on the basis of whether the actual birth date was or was not known. The GFHNP sample with known birth dates demonstrates the relatively even distribution pattern (though skewed to the younger ages) which would be expected, with nearly equal numbers of children represented in virtually all age categories. Both other samples demonstrate a grouping effect, most pronounced from age 24 months onwards. For these two sample groups only reputed age was available, there being generally no verification possible from birth certificates or from other records. The slightly smaller representation on the graph of the MOH group at ages 36 and 48 months as compared to the Lagos group despite larger numbers in the former group is probably accounted for by the fact that the MOH group is particularly heavily skewed to the younger ages,

Figure 2.

Distributions of Children as Measured in
Growth Study by Group and Age, Lagos, 1970.



and not that statements of age are more accurately made by their mothers. Although both sexes are grouped in the figure, the same general picture also holds true both for the males and for the females separately. There is no way to guess in which direction the bias of the grouping effect works, since no study of this phenomenon has been carried out in this society. The possibility of a relatively strong bias exists if ages are reported to the last attained year (or half-year, etc.) rather than to the nearest age designation, i.e. when a 46 month old child would be reported as 3 or 3 1/2 but not 4 years old. However, lack of such information should not invalidate the comparisons made here between these three groups.

Since comparison of arm circumference data from all three groups is impossible, a brief mention of the differences between the GFHNP and the MOH groups should be made before progressing to the height and weight data. Arm circumference measurements for age were ranked by their position in the classification of Jelliffe (1966), in terms of range of percent or of actual percent of standard:

(values in percent of standard)

	GFHNP	MOH
median	70 - 80	60 - 70
average	78	74

Only the relative positions of the two groups and the fact that the GFHNP group was measurably closer to the standard, and thus better nourished, are of importance. Due to the problem with the manner in which the measurements were taken, no inference about absolute nutritional status nor direct application of the standards could be attempted. Average differences in actual measurements in centimeters range from

approximately 0.4 cm under 6 months of age to 0.8 cm at age 5 years.

Height for age and weight for age data were ranked by sex according to their position on the Harvard School of Public Health, Boston, Standards (Stuart and Stevenson, 1959). The ranking was accomplished according to the following scheme:

Percentile of Boston distribution	Rank
above 97th	1
between 90th and 97th	2
between 75th and 90th	3
between 50th and 75th	4
between 25th and 50th	5
between 10th and 25th	6
between 3rd and 10th	7
under 3rd	8

These rankings were then distributed into 13 age categories, and the resulting distributions examined by group for the presence of sexual dimorphism. None was found for weight data, and none had been expected. However, for the height distributions the situation was not as clear-cut, for dimorphism was not demonstrated in the MOH population, was present at a level of significance of between .01 and .02 (by a t-test of differences applied to the 13 age categories) in the Lagos population, and at a level of between .02 and .05 in the GFHNP population. Theoretically, there should be no sexual dimorphism demonstrable, since the height for age values were ranked against a sex-specific standard which should eliminate the sexual differences in the actual height distributions. There is no ready explanation for

this phenomenon with regard to sexual dimorphism of the heights. Its presence confounds attempts subsequently to interpret differences, by sex separately and particularly with sexes combined, between heights of the three groups. In fact, since height measurements are relatively less responsive to early or to mild changes in nutritional status than weights, and since the weights showed no sexual dimorphism which could interfere with intergroup comparisons, only the weights were analyzed with regard to significance of differences between the groups.

For the intergroup weight comparisons, differences in percent distributions of individuals in either Rank 8 or in Ranks 7 and 8 were analyzed. Rank 8 contains all individuals under the 3rd percentile of the Harvard School of Public Health, Boston, distribution and is approximately equivalent to a level of 75 percent and below of the Boston mean value. Combined Ranks 7 and 8 contain all individuals beneath the 10th percentile of the Boston means. Only individuals distributed in these low ranges were taken, since the means of the distributions of weights of all three groups each fell near the 10th percentile. Since the purpose of this evaluation is to examine the populations for improved child health, minimization of undernutrition as reflected by a relative paucity of children in the lowest weight for age ranks can adequately reflect this. Notice in Table 7 that differences between the GFHNP patients and the children in both other groups is significant at greater than .01, while the MOH and the Lagos populations show essentially no differences. Thus, there are significantly fewer poorly nourished children attending the GFHNP clinic than are found attending the MOH clinic or than are found in

Table 7

Intergroup Comparisons of Proportions of Children
below Specific Percentiles of Boston Standard Weight
for Age, Lagos, 1970.

Group	Percent of Children under 3rd Percentile	Significance ^b	Percent of Children under 10th Percentile	Significance
GFHNP	24.56	.01 > t > .001	44.88	t < .001
MOH	40.48		58.50	
GFHNP	24.56	.01 > t > .001	44.88	.01 > t > .001
Lagos	38.58		57.67	
MOH	40.48	N.S. ^c	58.50	N.S.
Lagos	38.58		57.67	

a. average of distributions for 13 age categories for each group

b. by t-test of differences, 13 age categories, df = 12

c. N.S. = Not Significant

the general Lagos metropolitan area population. Although the table shows only tests on sexes combined, results are virtually the same for each sex taken individually.

Basic height and weight measurement data were then analyzed. Measurements were arranged in chronological order by sex and by age, grouped in order that a large enough number of observations were available in each age range, then means and standard deviations calculated. No significant differences could be demonstrated between the three groups for either the height or the weight data handled in this manner. However, for the weight data only, and not for the height data, graphic representation of the resultant distribution curves shows consistent differences (Figure 3). Notice that except in the first six months of life, no curve closely approximates that of the Boston mean. The GFHNP mean curve from the age of four months remains superior to both the MOH and the Lagos mean curves which cross one another a total of three times, the Lagos children ultimately being inferior in attained weight at five years of age. The curves shown in figure 3 represent average means for the males and females combined, however, essentially no difference in relative position of the curves was noted for either sex when graphed separately.

Discussion and Summary

The purpose of this chapter was to determine whether improvement in the health status of the GFHNP children above that of a general sample of metropolitan Lagos children, and particularly above that of MOH children from among whom Project patients were originally selected, could be demonstrated. The method used was to compare the