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THE NUTRITIONAL SITUATION
IN SIERRA LEONE

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THE NUTRITIONAL SITUATION IN SIERRA LEONE*

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THE NUTRITIONAL SITUATION IN SIERRA LEONE

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ABSTRACT

This paper presents information, data and beliefs compiled since 1974 about the nutritional status and food behavior of Sierra Leoneans, particularly those residing in the rural areas. Most available data describe the nutritional status and food behavior of children under 5 years of age. Some data describe the nutritional status of pregnant and lactating women. Little information is available for the remaining groups of the population.

No original data were collected. However, members of the team observed village conditions and interviewed professionals concerned with food and nutrition problems in Sierra Leone.

Malnutrition in children under 5 years old has been identified as the major nutritional problem in Sierra Leone. About 30 percent of the children are underweight. This condition is not evenly distributed throughout the country and children thrive in the same villages where undernutrition occurs. The effects of several socio-economic, demographic and cultural factors on the frequency of malnutrition are discussed. Malnutrition appears more prevalent and severe in rural than in urban areas.

It is reasonable to assume that if children are not receiving adequate calories their intake of other nutrients is marginal. However, only a high incidence of anemia has been reported and not all of that can be attributed to low dietary intake of iron.

It appears that the nutritional status of children under 5 years has changed little since 1964. It is important to note that despite inflation and reported changes in food availability the nutritional situation has not worsened.

There is little information about the nutritional status of school aged children. The data do not describe an important nutrition problem. It does appear that children are growing at an adequate rate.

It is generally believed that pregnant women are at nutritional risk. Generally the women do not eat enough food. It is not clear whether it is the availability of food or one or more other reasons that affects the food intake of pregnant women. For instance, the effect that taboos have on the food consumption of pregnant women is uncertain. It may be assumed that pregnant and lactating women who consume only one meal per day are most at nutritional risk.

It is suggested that lack of calories is the primary nutritional problem among working adults, particularly in the rural areas. The extent of inadequate food consumption and its effect on productivity has not been studied in Sierra Leone. Obesity, however, does exist in both urban and rural areas. The available data suggest that problems of malnutrition are greater in the rural than in urban areas.

Some believe that an inadequate supply of essential nutrients is the major nutritional problem. Others believe it is lack of nutrition education that is the critical problem.

Preface

This paper constitutes the initial stage of a study of the effects of economic policy on the consumption behavior and household nutrient intake levels of rural households in Sierra Leone. The research is being conducted by Professor Victor E. Smith of the Department of Economics, Michigan State University, and is being financed under Contract No. AID/DSAN-C-0008 with the United States Agency for International Development. (US AID). It will make use of data collected in Sierra Leone during 1974-5 by the Rural Employment Research Project at Njala University College, Sierra Leone, and financed by a contract (AID/csd 3625) between the United States Agency for International Development and Michigan State University, and by the Rockefeller Foundation.

Many persons assisted in the gathering and compilation of the food and nutrition information available about the people of Sierra Leone. We appreciated their cooperation and interest. Especially noteworthy was the assistance of Norman Sheldon, Agricultural Development Officer, US AID; Nancy Minett, Assistant Country Director, CARE; Gladys Carrol, Nutritionist, Sierra Leone Ministry of Health; Ibi May-Parker, Bank of Sierra Leone; and the Sierra Leone villagers. Still others who graciously cooperated by giving their time, ideas and materials are listed in Appendix A.

1. INTRODUCTION

Several reports describing the nutritional status and food behavior of the people of Sierra Leone, particularly children from birth to 5 years of age, were completed in the late 1960s and early 1970s. Di Giacoma [1973], Thomas [1972] and Whitby [1968] reviewed data collected by other researchers; Blankhart [1967] reported original data and Thompson-Clewry [1972b] reported both. It appears that the nutritional situation of the people has changed little since those reports although the kind and quantity of available food has changed.

In early 1978 a National Nutrition Survey was conducted by the Ministry of Health (MOH) in cooperation with the University of California at Los Angeles (UCLA). The data from that survey confirm the description of malnutrition among children under five years old presented in other reports and in interviews with government officials and health professionals. The purpose of this report is to review information, data and beliefs compiled since 1974 about the nutritional status and food behavior of Sierra Leoneans and to use that information to define those groups, particularly in the rural population, who are nutritionally most at risk.

The available nutrition and food behavior data have been organized in this report according to the subjects under discussion: children under 5 years of age; children 5 to 18 years old, excluding pregnant and lactating adolescents; pregnant and lactating women; and adults including the elderly. As one might anticipate most available data describe the nutritional status and food behavior of children under 5 years of age. Some data are available describing the nutritional status of pregnant and lactating women. Little information is available for the remaining groups of the population.

2. METHODS

The research team, composed of an economist and a nutritionist, met with professionals in Italy and Ghana before arriving in Sierra Leone. In Rome, it met with professionals at the Food and Agriculture Organization (FAO) who were knowledgeable about food consumption and the nutritional status of people in West African countries. The team also reviewed written materials available from the FAO staff and library. The team then briefly stopped in Accra, Ghana, to meet with professionals at U.S.AID, the FAO Regional Office for Africa, and the Institute of Food Research to obtain further background information.

In Sierra Leone the team, either jointly or individually, met with about 60 professionals concerned with nutritional problems to discuss food consumption patterns, nutrition, and related subjects. The complete list of informants is included in Appendix A. The research team also reviewed pertinent reports and papers available at Njala University College; Fourah Bay College; The Connaught Hospital Medical Library; The Sierra Leone Government Book Store; The United Nations Development Program (UNDP) Reading Room; and The Institute of Education, University of Sierra Leone. The bibliography compiled has over 100 citations.

During part of the visit the members of the team worked separately. The economist consulted with Sierra Leoneans who had taken part in the collection of data on food production and expenditure that is to be used in further investigations. He also worked with some of the original data. The nutritionist took village trips, visiting the Northern, Southern, and Eastern Provinces as well as the Western Area and Freetown to observe such nutrition programs as the Under Fives clinics (static and mobile),

antenatal clinics, the nutrition rehabilitation center in Segbwema, cultural factors such as household food preparation and consumption patterns, and environmental factors (i.e., sources of water) which may affect the health and nutritional status of the rural population. The field trips were taken with health personnel or clinic teams from The Catholic Relief Services (CRS), from CARE (Mrs. Lovett Savage, community development worker) and from the Ministry of Health, Sierra Leone (Mrs. Gladys Carrol, nutritionist). The nutritionist also aided the Assistant Country Director for CARE (Mrs. Nancy Minett) in compiling food behavior and food consumption data collected in rural villages from August, 1977 through May, 1978. The nutritionist also spent time in rural and urban marketplaces observing the variety of food available, portions and prices. The nutritionist was often accompanied by a Sierra Leonean to assist in identification of foods and description of their use in the diet or meal pattern.

All available materials were reviewed and the following report was prepared from information collected from interviews, written materials, and participant-observation experiences. The report provides background information on the nutritional status of the rural people of Sierra Leone and their food behavior. It also includes a review of data defining the nutritionally-at-risk populations in the rural areas. Emphasis is given to data collected in the rural areas and reported since 1974.

3. NUTRITIONAL STATUS: CHILDREN UNDER FIVE YEARS OLD

Most efforts to document the nutritional status of Sierra Leoneans have been directed at rural and urban children from birth to five years of age. Tables 3.1, 3.2, 3.3 include summaries of the data available describing the incidence of kwashiorkor, marasmus and other nutrition-related problems of children under five years. Appendix B includes the reported opinions held by nutritionists, medical and other professionals working in health care or agriculture about the incidence of malnutrition in children under five years of age.

Generally, malnutrition has been identified as the major nutritional problem in Sierra Leone. The problem is most often seen in children less than five years of age. As Table 3.1 depicts, about 30 percent of the children in Sierra Leone are underweight [Ministry of Health (MOH) and UCLA, 1978; Minett, 1978a]. It appears that the nutritional status of children has neither improved nor deteriorated in the years since Blankhart [1964] documented that about 25 percent of the children measured were underweight. It is important to note that the incidence of underweight is not evenly distributed throughout the country. The Catholic Relief Services (CRS) have begun a growth surveillance program [Bobbieri, 1978] and report that between 16 and 56 percent of children in various villages are underweight. The detailed data from the CRS program needed to understand the distribution of the underweight problem are not yet available.

It is important to note that within the villages where underweight children are found other children do thrive. The nutritionist's observations at Under Fives clinics, cursory review of the growth surveillance Master

TABLE 3.1
INCIDENCE OF UNDERNUTRITION IN SIERRA LEONEAN CHILDREN, BIRTH-FIVE YEARS OLD:
SURVEY AND SURVEILLANCE DATA, 1964-1978

Condition	Date	Percent	Standard	Subjects	Source	Reference
Chronic undernutrition	1978	24.2	90% Ht/Age ^a	4,890 rural and urban children, 3-59 months old	National Nutrition Survey	Ministry of Health and UCLA, 1978
Acute undernutrition	1978	3.0	80% Wt/Ht ^a			
Underweight	1978	30.5	80% Wt/Age ^a			
Underweight	1976-1978	33.5 ^b	80% Wt/Age ^a	4,185 rural children, birth-59 mos. 880 children 969 children 986 children 1,350 children	CARE Nutrition Program	Minett, 1978a
	May 1978	37.4	80% Wt/Age ^a			
	Oct. 1977	35.3	80% Wt/Age ^a			
	April 1977	44.6	80% Wt/Age ^a			
	Sept. 1976	17.0	80% Wt/Age ^a			
Underweight	1976-1978	25.0	80% Wt/Age ^a	1,176 urban children	CARE Nutrition Program	Minett, 1978a
Underweight	1978	16-56	80% Wt/Age ^c	Children under 5 attending 10 mobile and 50 static clinics throughout the country	Catholic Relief Services Nutrition Surveillance	Barbieri, 1978
Undernourished	1964	25.0	Not reported	1,450 children 3-5 months old	National Nutrition Survey	Blankhart, 1964
Severely undernourished	1964	5.7				

^aNational Academy of Sciences Growth Standards, 1974.

^bWeighted average of four following cases.

^cHarvard Growth Standards.

TABLE 3.2
 INCIDENCE OF UNDERNUTRITION IN SIERRA LEONEAN CHILDREN, BIRTH-FIVE YEARS OLD:
 CLINIC AND HOSPITAL RECORDS, 1970-1978

Condition	Year	Percent	Number	Subjects/Source	Place	Reference
Protein-calorie malnutrition and kwashiorkor	1977-78	--	200	Admissions	Nutrition Rehabilitation Unit, Segbwema	King and Momoh, 1977
Protein-calorie malnutrition and kwashiorkor	1976	--	168	Admissions	Nutrition Rehabilitation Unit, Segbwema	King and Momoh, 1977
Protein-calorie malnutrition and kwashiorkor	1975	--	142	Admissions	Nutrition Rehabilitation Unit, Segbwema	King and Momoh, 1977
Protein-calorie malnutrition and kwashiorkor	1974	--	84	Admissions	Nutrition Rehabilitation Unit, Segbwema	King and Momoh, 1977
Malnutrition	1977	15.0	--	New pediatric referrals	Serabu Hospital	Kelly, 1978
Malnutrition	1977	1.5	--	Old pediatric referrals	Serabu Hospital	Kelly, 1978
Marasmus	1977	3.0	--	Pediatric admissions	Serabu Hospital	Kelly, 1978
Kwashiorkor	1977	3.0	--	Pediatric admissions	Serabu Hospital	Kelly, 1978
Protein-calorie malnutrition and marasmus	1976	13.3	-	140,900 visits to Maternal and Child Health Clinics	Sierra Leone	Williams, 1977
Protein-calorie malnutrition and marasmus	1976	--	117	Admissions	Children's Hospital, Freetown	Williams, 1977
Marasmus	1976	--	135	Admissions	Children's Hospital, Freetown	Williams, 1977
Marasmus	1976	3.2	--	Old cases, diagnoses	Under Fives Clinics, Sierra Leone	Williams, 1977
Marasmus	1976	4.4	--	New cases, diagnoses	Under Fives Clinics, Sierra Leone	Williams, 1977
Kwashiorkor	1976	--	134	Admissions	Children's Hospital, Freetown	Williams, 1977
Kwashiorkor	1976	1.6	--	Old cases, diagnoses	Under Fives Clinics, Sierra Leone	Williams, 1977
Kwashiorkor	1976	2.7	--	New cases, diagnoses	Under Fives Clinics, Sierra Leone	Williams, 1977
Protein-calorie malnutrition	1970-72	19.7	--	Pediatric admissions	Nixon Memorial Hospital, Segbwema	Adey, 1975
Subnutrition	1970-72	5.4	--	Pediatric admissions	Nixon Memorial Hospital, Segbwema	Adey, 1975
Marasmus	1970-72	10.4	--	Pediatric admissions	Nixon Memorial Hospital, Segbwema	Adey, 1975
Kwashiorkor	1970-72	3.9	--	Pediatric admissions	Nixon Memorial Hospital, Segbwema	Adey, 1975

TABLE 3.3
 INCIDENCE OF OTHER NUTRITION-RELATED PROBLEMS IN SIERRA LEONEAN
 CHILDREN, BIRTH-FIVE YEARS OLD

Condition	Year	Percent	Standard	Subjects	Source	Reference
Anemia	1978	52.8	10.0g/100ml hemoglobin	1,006 children, 6-24 mos.	National Nutrition Survey	Ministry of Health and UCLA, 1978
	1978	63.9	11.0g/100ml hemoglobin	1,006 children, 25-59 mos.	National Nutrition Survey	Ministry of Health and UCLA, 1978
	1977	10.0	Primary diagnosis	Pediatric patients, Serabu	Serabu Hospital 1977 Report	Kelly, 1978
	1977	9.0	Primary diagnosis	3,592 visits to Under Fives Clinic, Serabu	Serabu Hospital 1977 Report	Kelly, 1978
	1976	8.7	--	140,000 children attending Maternal and Child Health Clinics	Maternal and Child Health Statistics	Williams, 1977
	1964	10.0	--	Children	National Nutrition Survey	Blankhart, 1967
Scurvy	1973	Reported	--	Children	Observation	Robin-Coker, 1973

Charts (see sample in Appendix D) from CRS and review of weight-for-age data from CARE [Minett, 1978a] support this observation. Table 3.4 presents data from CARE surveys that show that between 9 and 20 percent of the children measured were over the 100th percentile in weight for age and between 42 and 64 percent of the children in selected villages were over the 80th percentile. This indicates, by United States standards, acceptable weight-for-age. Since well nourished children are found throughout the country, it is important to examine more closely the under-five population to determine which of those children are most at nutritional risk.

TABLE 3.4
PERCENTAGE OF RURAL CHILDREN IN SELECTED VILLAGES OVER 80 PERCENT
NAS^a WEIGHT-FOR-AGE STANDARD

Percent	Date	Standard
45 18	May, 1978	80-100% Wt/Age, NAS, 1974 100+% Wt/Age, NAS, 1974
44 20	October, 1977	80-100% Wt/Age, NAS, 1974 100+% Wt/Age, NAS, 1974
47 9	April, 1977	80-100% Wt/Age, NAS, 1974 100+% Wt/Age, NAS, 1974
27 15	September, 1976	80-100% Wt/Age, NAS, 1974 100+% Wt/Age, NAS, 1974

SOURCE: Data from CARE Nutrition Program [Minett, 1978a]

^aNational Academy of Sciences Growth Standards

3.1 Those Most at Nutritional Risk

Although no study has been conducted to determine which socio-economic, demographic, and cultural factors predict increased risk of malnutrition to children in Sierra Leone under five years of age, analysis of available data and professional opinions indicates that the age of the child; the season of the year; the geographic location of the residence; the presence of an adult male in the household; the presence of a mother and her ability to breast feed; the choice of feeding an infant by hand, cup and spoon, or bottle, and beliefs about infant feeding are variables to be considered. In addition, such economic variables as household income, food prices, type of farming, and the proportion of food purchased from the market may be important factors to be understood before describing the at-risk population under 5 years of age.

3.1.1 Age

Most cases of kwashiorkor are diagnosed in children 12-59 months old. Several workers believe the peak age for kwashiorkor in Sierra Leone is 18 months. The average age of patients admitted to the Nixon Memorial Hospital Nutrition Rehabilitation Unit, Segbwema, is 18 months.

While most cases of marasmus are also seen in children between 12 and 59 months of age, many cases are noted in children 6-12 months old. Protein-calorie malnutrition is seen in children 6-59 months old, with the most crucial period being 9-23 months. It is not clear from the available data (Table 3.2) whether the incidence of protein-calorie malnutrition and kwashiorkor is on the rise or relatively stable. It

can be assumed, however, that the frequency of malnutrition is not on the decline. Age in itself is not a predictor of malnutrition, but must be studied in relation to infant feeding practices, particularly weaning practices (see Section 3.2).

3.1.2 Season of the Year

It is universally believed in Sierra Leone that malnutrition is more severe in the rainy season or "hungry months," in particular during the May-August period, than during the rest of the year. No survey data have been collected to document this assumption. Surveillance of weight-for-age now being conducted by CARE and CRS will soon provide data on weight fluctuations of children throughout the year. Some weight-for-age data collected at different times in 1976-78 by CARE appear to support the contention that children are most at risk from malnutrition during the rainy season, but caution is necessary when reviewing weight-for-age data collected in clinics.

The nutritionist's discussions with clinic workers throughout the Southern and Eastern Provinces often dealt with the severity of malnutrition observed by them during the rainy season. All clinic workers noted that attendance at clinics was always reduced during August because of bad roads, rain, and, in 1978, the lack of availability of food commodities that usually are distributed through the clinics. As a result, clinic workers suggested that only the very ill children are brought to the clinics during August. It would be expected, then, that the mean weight-for-age figure collected for a community would be lower at that time than at other times in the year since these data

are usually collected at the clinics. Survey workers would need to go from home to home in the villages to collect data on weight that would truly characterize the nutritional situation throughout the rainy season and throughout the year.

3.1.3 Location

Most experts believe the malnutrition problem is most severe in the rural areas but some hasten to add that the urban malnutrition problem is growing. The National Nutrition Survey [MOH and UCLA, 1978] shows "chronic underweight" and "underweight" conditions to be more severe in the rural than urban areas.¹ CARE data for 1976-78 also indicate that rural malnutrition is more prevalent and severe than urban malnutrition. (Table 3.1).

As noted earlier, the rate of malnutrition is not consistent throughout the country. One might then expect variation in nutritional status by region. However, data collected in the CARE Nutrition Program [Minett, 1978a] show no specific pattern of malnutrition due to regional location. Where seasonal variation did occur such as in Panguma and Mobai (Table 3.5) it appears likely that the shift in incidence of underweight was due to such events as the government's opening of the diamond mines to private miners and to civil disturbances which restricted travel, even to people's own farms. Minett [1978e] reported that Segbwema and Kenema were not affected by either event and their incidence of undernourished children was constant from season to season. The seasonal differences in the incidence of underweight children between Panguma and Mobai on the one hand and Segbwema and Kenema on the other cannot

¹A copy of the National Nutrition Survey questionnaire is included in Appendix E.

solely be attributed to the area of the country but are related to other factors as well.

TABLE 3.5
VARIATION IN NUTRITIONAL STATUS OF CHILDREN
UNDER FIVE YEARS IN PANGUMA AND MOBAI

Location and Date	Percentage of Children in Percent of Standard Weight-for-Age Categories		
	<u><60%</u>	<u>60-80%</u>	<u>100+%</u>
Panguma			
April, 1977	5.0	46.0	8.0
September, 1976	1.5	16.0	32.5
Mobai			
October, 1977	2.0	--	23.0
April, 1977	4.0	--	6.0
September, 1976	1.5	--	17.5

SOURCE: Data from CARE Nutrition Program [Minett, 1978a]

Data from the 1978 National Nutrition Survey show small differences in the percent of 6-59 month old children underweight by area: South (34 percent), East (27 percent), and North (32 percent). CARE data, principally collected in the Southern and Eastern Provinces, show some difference in the incidence of underweight conditions due to location. However, sufficient data are not available at this time to determine whether or not location is a significant factor for describing malnutrition or groups that might be at nutritional risk. It is hoped that surveillance data being collected in all three provinces by the Catholic Relief Services will provide an answer to this question.

Barbieri [1978] suggested that a "chiefdom effect" might be more important than the regional effect in the prevention of malnutrition. For example, it has been reported that the chief in Tonkoli orders his people to go to the Under Fives clinics while the leaders in Manbolo show disinterest in health care. At the clinics instructions on child care and feeding are given as well as inoculations. It would be expected that attendance at clinics would generally improve the nutritional status of those attending.

Again it is important to compare the recent information with pre-1974 data. While the overall incidence of malnutrition did not change from 1964 to 1978, perhaps there has been a shift in its distribution. Blankhart's [1967] work documented variation by region. Malnutrition ranged from 10 to 65 percent of the children measured throughout the country. The average incidence seemed higher in the Eastern Province (30 percent) with the Northern Province following (25 percent) and then the Southern Province (9 percent). However, as one would expect, villages within a province showed marked variation in the incidence of malnutrition. It is not clear whether the food and nutrition situation in the Northern Province has improved, while in the Southern Province it has become more difficult in the last 11 years. Changes in available food supply, employment, and political decisions must be reviewed to understand these data better.

Some professionals suggest that malnutrition in children is more prevalent in the mining areas and the cash-cropping (coffee and cocoa) areas. They suggest that where mixed cropping has been replaced by cultivation of a single cash crop the available food supply has been

reduced in variety and quantity, which affects the nutritional quality of the diet. The health professionals suggest, also, that any increased income is not used to improve the diet of the people, and in some cases does not even maintain the quality of the diet consumed prior to cash cropping or mining. It is observed that children under five years suffer the most from this situation. While this argument was offered many times, and this researcher made observations that would support the argument, again no quantitative data are available to support it. It is important to study the availability of food to families engaged in single cropping and those in mixed cropping systems to determine whether the possible nutrient pool is similar.

It is not, perhaps, location as much as type of employment, the attitude of the tribal authority, the educational level of the parents in various areas of the country or the size of the household unit that affects the availability of an adequate food supply to the children.

3.1.4 Household Composition

Data are not available to describe the effect of household composition on the availability of food to and therefore the nutritional status of children under five years of age. Professional fieldworkers in Sierra Leone suggest that all children of households headed by a female should be considered nutritionally at risk. Hamilton [1977] found that 11.0 percent of rural households were headed by women.

Children in households where the mother has died should also be considered at risk. Clinic workers sometimes describe children suffering from malnutrition as having "granny disease." Likewise it has been

reported that in some villages when the mother dies the infant is ignored and left to die. Some suggest that twins and triplets should also be considered nutritionally at risk since sufficient food, especially breastmilk, may not be available to nourish the children. Fieldworkers describe a high incidence of multiple births in Sierra Leone; however, no official statistics on the occurrence of such births were available.

Although the direct effect of household composition on the nutritional status of children in Sierra Leone is not known, it is important to consider household size. Hamilton [1977] has presented statistics on rural household composition. Households ranged in size from 3.9 to 12.4 members. There was variation in household composition by province. The mean household sizes were 10.2, 8.7, 7.2, and 6.5 respectively for the Eastern, Northern, and Southern Provinces and the Western Area. These figures are slightly higher than those reported by Thompson-Clewry in 1972a. She noted that households ranged from four to ten members and that there did not appear to be a variation in household size from the Southern to the Eastern Provinces. It would be useful to know the availability of food to households of various sizes in the different provinces of the country to determine whether the child at nutritional risk is from a large or small household.

Hamilton [1977] provided other information about the rural household composition. Thirty-eight percent of the population was under 15 years old and 11 percent over 55. Productive adults (15-55 years) constituted 51 percent. Almost all (95 percent) of the productive adults were involved in agricultural activities. Males comprised 49 percent of the total population.

Data describing household size, occupation and sex of the household head, presence of the father, and number of wives were collected during the 1978 National Nutrition Survey [MOH and UCLA, 1978]. Analyses of these data relative to nutritional status are not available yet.

Parenting styles may be important in preventing malnutrition in children. Recent nutrition literature includes several papers describing the "positive deviant," a child who has good nutritional status and health primarily due to parenting styles. Although good statistics are unavailable, many parents customarily send, lend, or give their children away to live with other families to work or to go to school [Thompson-Clewry, 1967]. The effect of this custom on the nutritional status of the child is not known. It may be important to find out how prevalent the custom is, at what age children are sent away and generally how the culture treats children outside of their maternal home.

Also, many women go to their mother's home to deliver the baby and remain there until the child can walk (about 12 months). Most field-workers believe that this practice is beneficial to the health of both the mother and infant since the women generally breast feed infants under these conditions and learn to care for infants. This would suggest, then, that the infant living in its paternal home during the first 12 months of its life may be at nutritional risk, perhaps because the mother may cease breast feeding in order to resume sexual activity. She may also share the protein foods with the male first. Again no statistics are available.

3.2 Feeding Pattern: Breast Feeding and Weaning

It is generally believed that most rural families eat one or two meals per day. It is also generally believed that lactating women breast feed on demand. The meal pattern for children less than five years of age in Sierra Leone has not been determined. The CARE survey conducted in August, 1977 (192 children under five years of age in the Southern and Eastern Provinces) found 1 percent of the children from 4-24 months of age eating 1 meal/day, 10 percent eating 2 meals, 42 percent eating 3 meals, and 46 percent eating 4 meals (Table 3.6). Data collected in March, 1978 in the Northern, Southern and Eastern provinces (n = 201) found 0, 6, and 92 percent eating one, two and three meals/day, respectively. These data are from a 24-hour dietary recall offered by the mother or caretaker. Observation by this researcher would indicate that rural children over 12 months "snack" throughout the day; however, no estimates of the quantity or frequency of snacking are available. The pattern of meals for the well-nourished and the underweight child in Sierra Leone has not been established.

It is also believed by some that lack of knowledge of proper weaning foods and infant feeding practices rather than lack of food are the real causes of malnutrition in children under five years of age in Sierra Leone. Again, only limited data are available. Most health clinic workers report that women breast feed children up to 24 months. Health workers encourage breast feeding to 18 months and introduction of other food at 4 months. During the National Nutrition Survey [MOH and UCLA, 1978] it was found that 96 percent of the mothers were breast feeding

TABLE 3.6
REPORTED MEAL PATTERNS IN SIERRA LEONE

Study	Year	Sample	Percentage of Sample				Region	Reference
			1 meal	2 meals	3 meals	4 meals		
National Nutrition Survey	1978	Mothers	^a *	*	*	*		
		Children	*	*	*	*		
National Training Center Survey	1977	260 Rural Households	58	40	2	--	All Sierra Leone	Hamilton, 1977
			--	75	--	--	Northern Province	
			--	12	--	--	Southern Province	
CARE Nutrition Program	1977-78	202 pregnant or lactating mothers	5	50	37	8	Southern & Eastern Provinces	Minett, 1978a
		250 pregnant or lactating mothers	10	45	44	--		
		100 pregnant or lactating mothers	19	68	15	--	Northern Province	
		192 children, 4-24 mos.	1	10	42	46	Southern & Eastern Provinces	Minett, 1978a
		201 children, 4-24 mos.	0	6	92	--	Southern, Eastern, & Northern Provinces	
Voluntary Social Welfare workers	1972	30 women	40	47	3	--	Eastern Province	Thompson-Clewry, 1972
		57 women	14	52	16	--	Southern Province	
		107 women	25	50	12	--	Sierra Leone	
Voluntary Social Welfare workers	1966	203 women	28	58	6	--	Southern Province	Thompson-Clewry, 1966

^aAsterisks indicate data not available at time of this writing.

and 71 percent were still breast feeding at 12-24 months. Minett [1978a] found 84 percent of the mothers interviewed were breast feeding their babies. Thompson-Clewry [1972a] found most of her sample still breast feeding their babies at 18-24 months. No data, however, are available that describe the quantity of breast milk available to the infant nor the quality and quantity of other food supplements provided.

3.3 Causes of Malnutrition

3.3.1 Supplementation and Weaning Practices

Throughout the developing world poor supplementation and weaning practices often result in a malnourished child. Many professionals believe that the mother's lack of knowledge is the major factor in underfeeding children. Hamilton [1977] reported that 97 percent of the mothers with children under five years of age gave the children food in addition to breast milk. Most (72 percent) reported feeding children rice, cassava, or bread; 23 percent reported fruits; and 6 percent reported milk, meat, or fish.

Little information more recent than 1974 is available about the weaning practices of Sierra Leoneans. What follows is for background purposes. Thompson-Clewry [1965] noted that women began pap feeding between 3 and 6 months, but usually at 6 months. The most common paps were made from cassava, corn flour, custard rice, or ogi.¹ Some were made with added milk. Some mothers reported adding rice and sauce to the child's diet at 9-12 months and fish and meat at 15-18 months. Soft-boiled rice and palm oil were sometimes given while breast feeding.

¹Corn pap.

continued [Thompson-Clewry, 1965]. Clinic workers suggest that the child not breast-fed for at least one year is at nutritional risk.

The production of Bennimix baby food is a project of the Ministry of Social Welfare of the government of Sierra Leone, but to date the infant food has been produced only in small quantities. Bennimix is a mixed weaning food based on local foods and similar to an indigenous food mixture produced in some communities. It includes benniseed (sesame), black eyed beans (cowpeas), rice, sugar, and vitamin mix [Thomas, 1978]. Many professionals suggest that increased availability of this local weaning mix would improve the nutritional status of children in Sierra Leone. Hamilton [1977] reported that less than 10 percent of the mothers interviewed had ever used Bennimix and 45 percent of the mothers had never heard of the food (whether commercially or home produced). The literature describing the effectiveness of local weaning food mixtures in other countries is mixed. The probability of Bennimix making an impact on the nutritional status of Sierra Leonean children appears small at this time.

Since malnutrition generally occurs with weaning, it is important to view the food intake of children. Again, specific data are not available linking the food intake of the children with their nutritional status. Twenty-four-hour dietary recalls were completed for children 4-24 months old in August, 1977 (192 children in the Southern and Eastern Provinces) and in March-April, 1978 (100 children in the Northern Province) [Minett, 1978a]. Four fruits, 9 vegetables, 13 protein foods, and 19 miscellaneous foods were reported. The foods most commonly given

to the children included: breast milk (84 percent), red palm oil (51 percent), rice pap (48 percent), rice (41 percent), fish (40 percent), onions (26 percent), pepper and groundnut (22 percent each), powdered milk (17 percent) and potato leaf (16 percent).

The children were fed fruit more often in March-April than in August. Children in the Northern Province received less of fruit, pepper, fish, rice, groundnut, benniseed, oil, and Maggi cubes¹ less frequently than children in the Southern and Eastern Provinces.

The foods available to the children were compared with those available to the mothers. The children consumed pepper, cassava and cassava leaves, onions, potato leaves, fish, rice, oil, and Maggi cubes significantly less often ($p \leq .05$) than the mothers.

They also consumed groundnuts and beans less frequently. The children consumed rice pap, powdered milk, and benniseed significantly more often ($p \leq .05$). Mothers consumed limes, pineapples, okra, jackato,² concho beans, bulgur, tea, kola nuts, coconut, akara,³ foofoo,⁴ and palm wine, none of which were given to the children. The children's diets included breast milk, powdered milk, Bennimix, baby food, egg, corn flour, custard pudding, plantain pap, and foofoo pap which were not eaten by mothers.

Foods that support the growth and development of infants are included in the diet of at least some infants in Sierra Leone. It is, then probably the quantity of these items in the diet that affects the

¹ Bouillon cubes.

² A form of eggplant, also known as bitter tomato.

³ Fried bean balls.

⁴ Grated and pounded fermented cassava.

nutritional status of children. It is not clear from these data whether children do not receive more of the weaning foods because of ignorance of good feeding practices or lack of food supply.

Again, quantitative data describing food intake for children are not available for recent years. Noel's study is cited for background purposes. Noel [1967] measured the food intake of four weaned children in Serabu. The two main staples in the children's diets were rice and cassava. One of the children approached a 1,000 calorie daily intake; the rest consumed fewer calories which suggests that inadequate food was being consumed by children after weaning. The complete report of this study was not available.

In recent years multinational corporations and their promotion of infant formulae and foods in developing countries have been attacked and blamed for infant malnutrition and death. At this time, misuse of infant formula does not appear to be a problem in the rural areas of Sierra Leone.

3.3.2 Taboos

Many workers suggest that food taboos keep mothers from feeding infants available foods. Scott [1978b] has tabulated the food taboos existing in Sierra Leone. For children under one year of age she listed two taboos on eggs, one on fish, milk and meat, three on fruits and four on miscellaneous foods. For children aged one year to puberty, one taboo on eggs, two on fish, six on meat, four on fruits, one on starchy roots, one on honey, and seven on miscellaneous foods were listed.

Professionals [Greene, 1978; Carol, 1978; Scott, 1978b; Minett, 1978e; Savage, 1978; Ford, 1978; Barbieri, 1978], do not agree with one another on the strength of the taboos and their effect on the nutritional status of children. Some suggest that the strength of taboos varies by region and is greatest in the Southern and Eastern Provinces. Most information on taboos is second hand. Women who have been sworn to secrecy about the teachings in their societies do not readily provide the information about taboos sought by interviewers.

Some professionals believe education and exposure to outside influences are quickly breaking down food taboos. Others suggest the taboos are as strong today as ever and do affect the feeding practices of children. The observations of this researcher suggest that the strength of the taboo might be related to the availability of food supply. Few food taboos affect adult males (except those reported to increase sexual potency). Most taboos affect small children (who also reportedly are fed last) and exclude protein (expensive) foods. It appears, however, that as the food increases in availability (and males get all the food they desire) the strength of the taboo against feeding children specific foods weakens.

In summary, it is not clear then that the existence of taboos affects the nutritional status of Sierra Leonean children.

3.3.3 Other Causes

Whether or not taboos are still important determinants of food consumption behavior, the state of knowledge or opinion concerning foods does affect the extent to which available foods are used effectively.

Several health workers [Greene, 1978; Carrol, 1978; Minett, 1978e; Kuyembeh, 1978] suggest that it is a lack of nutritional knowledge, not available food supply, that leads to malnutrition in children.

Others suggest that the increase in one-crop farming and inflation during recent years have changed the availability of food [Siaffa, 1973; Ford, 1978]. Joe [1976] suggests that mining has affected food production for several reasons including theft, destruction of land, non-rehabilitation of lakes, and youth's preference for mining and tailoring over farming. No data to compare expenditures for food for infants in the past to the present are available.

Several attempts to obtain food expenditure data have been made with only limited success [Carrol, 1976; MOH and UCLA, 1978; Thomas, 1973a; Thompson-Clewry, 1966]. Household expenditure data collected in 1974-5 by the African Rural Employment Program of Njala University College and Michigan State University are now being analyzed as part of the US AID-sponsored project under which this report has been written.

Williams [1977] notes that "basic foods are becoming increasingly expensive and sometimes unavailable in the market." She recommends that the Ministry of Agriculture help to see that basic foodstuffs are available in the market place at a reasonable price and give encouragement to the establishment and maintenance of kitchen gardens. Economic variables such as household income, the proportion of food purchased from the market, type of farming, or the prices of food or other goods are certainly important, but little information is available in Sierra Leone

about the relationships of these factors to the incidence of nutritional problems. Their possible significance should not be overlooked.

3.4 Other Nutritional Problems

While the underweight condition of children receives the most attention from health professionals other nutritional conditions may be occurring. It is reasonable to assume that if children are not receiving adequate calories their intake of other nutrients is also marginal. Data describing the incidences of anemia are available (Table 3.3). However it is not clear in what percentage of the cases the condition would be improved merely by increasing the dietary intake of iron.

No other frank nutrient deficiency diseases have been reported in children less than 5 years old.

3.5 Summary

Malnutrition in children less than five years in age has been identified as the major nutritional problem in Sierra Leone. While the incidence of underweight children varies from 16-56 percent, it is not clear what factors are responsible for the malnutrition. Malnourished and well-fed children are found in the same villages.

A National Nutrition Survey was conducted in 1978. Two monitoring systems (CARE and Catholic Relief Services) are organized to provide on-going weight-for-age data on children.

The age of the children, location of the household, household composition, season of the year, and feeding pattern for children are

factors discussed that could affect the nutritional status of children under five years of age. No conclusions can be drawn from the data available.

It appears that the percentage of children underweight for their age has changed little since 1964. Perhaps it is important to note that despite inflation and the reported changing availability of food the nutritional situation has not worsened.

While it is not possible to document which children under five years of age are most likely to be at nutritional risk, observations suggest the following groups: (1) children living in rural areas; (2) all children of women without a husband and without a kinship group; (3) children less than one year old who are not breast fed or whose mother has died; (4) twins or triplets, and (5) children in rural households where the productive members participate in mining or one-crop farming. The children appear to be most susceptible to malnutrition between 9 and 23 months of age.

4. NUTRITIONAL STATUS: CHILDREN FIVE YEARS AND OLDER, EXCLUDING PREGNANT TEENAGERS

In March, 1977, a survey of children in Classes I, II, and III in Bombali District was conducted by the Catholic Relief Services. Table 4.1 shows that between 10 and 17 percent of the children are underweight for their age. A published description of this survey is not available. Generally, more urban than rural students (Table 4.2) are underweight. It is important to note that between 14 and 20 percent of the students weighed are at the 100th percentile. This is about the same percentage of children at the 100th percentile as for children under 5 (Table 3.4).

TABLE 4.1
DESCRIPTION OF NUTRITIONAL STATUS OF SIERRA LEONEAN CHILDREN FIVE YEARS AND OLDER,
EXCLUDING PREGNANT TEENAGERS

Condition	Date	Percent	Standard	Subjects	Place	Source	Reference
Low Weight for age	1977						
Class I urban		17	80% Wt/Age, Harvard	958 Class I students	Bombali District	Catholic Relief	Barbieri, 1978
Class I rural		13	80% Wt/Age, Harvard	1035 Class I students			
Class II urban		17	80% Wt/Age, Harvard	788 Class II students			
Class II rural		10	80% Wt/Age, Harvard	759 Class II students			
Class III urban		16	80% Wt/Age, Harvard	859 Class III students			
Class III rural		12	80% Wt/Age, Harvard	796 Class III students			
Average low weight for age for all children except boys 8 yrs. old and girls 11-15 years old	1965	--	London school children weights and heights for age	140 school children			Thompson-Clewry, Undated a
Malnutrition	1964	Observed problem		school age children	Sierra Leone	National Nutrition Survey	Blankhart, 1967
Angular stomatitis	March 1965	19.7 girls 19.1 boys	Visual diagnosis Visual diagnosis	502 school age children	Moyamba Schools		Thompson-Clewry, Undated b
	Oct. 1965	13.9 girls 18.4 boys	Visual diagnosis Visual diagnosis	502 school age children	Moyamba Schools		
Slow growth, low weight, low height	1966	--	London school children		Northern/Southern Provinces		Thompson-Clewry, 1972 b
Goiter	1954	16.7	Visual diagnosis		Kono		Wilson, et.al., 1954
Anemia	1970	--	3.0-19.0 g hemoglobin	688 children	Njala Health Center Statistics		di Giacoma, 1973
	1970	--	3.0-18.0 g hemoglobin	1853 children	Njala Health Center Statistics		di Giacoma, 1973

TABLE 4.2
WEIGHT-FOR-AGE CLASSIFICATION FOR STUDENTS
IN BOMBALI DISTRICT

Class	Location	Number	Percentile, NAS ^a Growth Standards									
			<60	60	65	70	75	80	85	90	95	100
I	Urban	958	--	<1	1	1	2	12	26	25	18	15
	Rural	1035	<1	--	1	1	3	7	19	24	16	20
II	Urban	788	1	1	1	1	2	11	23	24	22	14
	Rural	759	--	<1	--	<1	2	6	21	25	18	18
III	Urban	859	<1	<1	<1	1	3	9	24	22	26	14
	Rural	796	--	--	<1	<1	2	8	21	21	28	15
Total	Urban	2605	<1	<1	<1	1	2	11	24	24	22	14
	Rural	2590	<1	<1	<1	<1	2	7	20	23	19	20

SOURCE: Catholic Relief Services unpublished data.

^aNational Academy of Sciences

Unfortunately, there are no published data describing the nutritional status of school-age children more recent than the data collected by Thompson-Clewry in 1965, 1967, and 1971. She reports that these children from the Southern province were low in weight for their age when compared with London school children and their weight for age, weight for stature, and stature for age.

In Appendix F the data from Thompson-Clewry's work have been plotted on the 1976 U.S. National Center for Health Statistics Growth Charts. In stature for age, the boys all fall below the 50th percentile. Most are between the 5th and 25th percentiles. The girls also fall below the 50th percentile with most falling between the 10th and 25th percentiles.

Table 4.1 also lists data (all prior to 1974) describing the incidence of angular stomatitis, goiter and anemia. Robin-Coker [1973] observed early signs of scurvy in school-age children near the end of the dry season.

The limited data do not describe an important nutritional problem in the school-age population. It is important to note, however, that the CARE school feeding program was terminated in 1977. The effect of the school feeding program on the nutritional status of children and now the effect of its termination are not known. Minett [1978e] suggested that the CARE program really was not reaching the population at risk nutritionally and therefore she believes that the termination of the program will not have an effect on the nutritional status of school-age children. CARE reported feeding less than 50 percent of the school children for 280 days per year.

4.1 School Attendance

It is important also to recognize that even the limited data collected from children attending school probably are not representative of the nutritional status of all children less than 18 years old. Although no data support the hypothesis, presumably children attending school are taller for their age than those not attending school, since only families with some resources can send children to school. Finch [1976] studied school leavers from Kissy. Students reported lack of money to buy food as a reason for dropping out of school.

What proportion of the rural school-age population might be in school is indicated by data collected by Hamilton [1977] from 260 rural households. Among 523 children 5-14 years in age, 74 percent had never attended school. Variation by region was noted. In the Western Area, 69 percent of the children were enrolled while in the Eastern, Southern, and Northern Provinces 35, 28 and 10 percent, respectively, were enrolled in school.

Among the 1,360 persons more than 15 years old, he found that 93 percent had never attended school. Of the 7 percent who had some schooling, the maximum levels were as follows: attended primary school, 4 percent; attended secondary school, 2 percent; completed secondary school, 0.4 percent. Marked variation by region was noted. In the Western Area 16 percent had no schooling. In the Southern, Eastern, and Northern provinces no schooling was had by 91, 95, and 99 percent, respectively.

4.2 Meal Pattern

Again, no current information is available on the food patterns of children. The following is presented as background information only. Robin-Coker [1973] suggested that school-age children are less susceptible to the influence of food taboos and ignorance about nutrition and health than children under five years of age. Nonetheless, Thompson-Clewry [1972b] pointed out that malnutrition among school-age children can result from lack of knowledge about nutrition on the part of the parents. She also maintained [1967] that the belief that only adults should eat meat and other heavy foods is not restricted to poverty-stricken or illiterate populations in Sierra Leone.

Thompson-Clewry [1972b] reported that 60 percent of the school children interviewed had boiled cassava and palm oil as breakfast, 20 percent had tea or coffee and bread, and 20 percent had no breakfast. Many children reported having no meal at midday and a supper of rice and stew or rice and sauce.

In other work Thompson-Clewry [Undated (a) and (b)] noted that the school child's diet includes cassava, rice and yams, all served with a sauce of palm oil, green leafy vegetables, and fish or meat.

In the rural areas all children are fed from a common plate or pot. The true effect of this practice on the quantity of food available and thus the nutrient intake of children is not known.

4.3 Summary

In the 5-18 year old category, the data available do not make it possible to define a nutritional problem for males and non-pregnant females, in general, nor to describe a group that may be at particular nutritional risk. Some people believe that this group takes in a low number of calories although the CRS growth data from one district would indicate that the children are growing at an adequate rate. It is not clear whether children that are in school and those not in school have similar nutritional intakes.

5. NUTRITIONAL STATUS: PREGNANT AND LACTATING WOMEN

The available information from the National Nutrition Survey suggests that pregnant women are at nutritional risk because they are underweight, anemic, and have vitamin deficiencies. While the complete report is not available at this time, the survey [MOH and UCLA, 1978] is to provide an estimate of the nutritional status of young children and their mothers. Hemoglobin tests were completed on a subsample of pregnant women. In addition, some dietary information was obtained. Some data on weight and the incidence of anemia, avitaminosis and goiter are also available from other sources (Table 5.1).

Carrol [1976] reported that pregnant women do not eat enough food. A normal weight gain in pregnancy is 12.5 kg but frequently cases of weight gains of only 4-6 kg are seen in health clinics. Most health professionals suggest that malnutrition among pregnant and lactating women is the second major nutritional problem in Sierra Leone.

TABLE 5.1
DESCRIPTION OF NUTRITIONAL PROBLEMS OF PREGNANT AND LACTATING WOMEN

Condition	Year	Percent/ Prevalence	Standard	Subjects	Source	Reference
Underweight	1978	*	Heights, arm circumference	3724 pregnant women	National Nutrition Survey	Ministry of Health and UCLA, 1978
		*	Tricep skinfold	3234 pregnant women	National Nutrition Survey	Ministry of Health and UCLA, 1978
Underweight	1978	Most	Weight gain in pregnancy	Women attending ante-natal clinics of Maternal and Child Health Division (MCH), Ministry of Health	Health workers' observations	Kolasa, field notes, 1978
Underweight	1976	Many	4-6 kg weight gain in pregnancy	Women attending maternal and child health clinics	Reported observation	Carrol, 1976
Underweight	1976	Many	--	Women attending maternal and child health clinics	Annual MCH Report	Williams, 1977
Anemia	1978	*	Hemoglobin	Pregnant women	National Nutrition Survey	Ministry of Health and UCLA, 1978
Anemia	1978	60-70 (estimated)	Hemoglobin	Pregnant women	Medical observation	Banya, 1978
Anemia	1976	16	--	63,165 visits to ante-natal clinics, MCH	Annual MCH report	Williams, 1977
Anemia	1972	45 (estimated)	--	--	Reported observation	Thomas, H. M., 1972
Anemia	1972	40 (estimated)	Hemoglobin values 20-30%	---	Reported observation	Thompson-Clewry, 1972b
Anemia	1970-1971	46.8	Mean hemoglobin 10.5 ± 2.0	Pregnant women	Njala antenatal clinics	di Giacoma, 1973
Anemia	1970	Many	--	--	Reported observation	May and McLellan, 1970 and Blankhart, 1967

TABLE 5.1--Continued

Condition	Year	Percent/ Prevalence	Standard	Subjects	Source	Reference
Avitaminosis and vitamin deficiencies	1976	2.5	--	Pregnant women in ante- natal clinics with diseases associated with pregnancy (63,165 visits)	Annual MCH Report	Williams, 1977
Avitaminosis	1976	18.3	--	Pregnant women in ante- natal clinics with diseases not associated with pregnancy	Annual MCH Report	Williams, 1977
Ariboflavinosis	1970 1972	-- --	-- --	Pregnant women	Reported observation	Thomas, H. M., 1972; May and McLellan, 1970; Blankhart, 1967
Goiter	1978	--	--	Pregnant women in Northern Province	Reported observation	Carrol, 1978; Thomas, H. M., 1978, 1972; May and McLellan, 1970
Goiter	1964	90	--	Pregnant women in Kono	Nutrition Survey	Blankhart, 1967

*Data not available at time of this writing.

5.1 Food Intake

Twenty-four-hour dietary recalls were completed by 202 pregnant or lactating mothers in the Southern and Eastern Provinces in August, 1977; 250 were interviewed in those provinces in April-May, 1978; and 100 were interviewed in the Northern province during May, 1978 [Minett, 1978a]. These women reported consuming 6 different fruits, 11 different vegetables, 13 protein foods and 21 other food items. The foods consumed by most women in all three groups were: rice (by 94.6 percent of the women), oil (by 94 percent), fish (by 89 percent), pepper (by 88%), cassava (by 70%), onions (by 67%), water (by 47%), potato leaf (by 46%), cassava leaf (by 41%), and groundnut (by 36%). More than 9 percent of the respondents made no report of fruit consumption.

Likewise the April-May consumption of foods in the Southern and Eastern Provinces was compared with that for August. Bananas, oranges, pawpaw, pepper, potato leaf, beans, onions, salt, chicken and Maggi cubes were consumed by more women ($p \leq .05$) in April than in August. Meat stew, cassava, bushmeat and water were more often ($p \leq .05$) reported as consumed in August than in April. Generally, consumption of cassava leaf, beans, and Maggi cubes was reported more often in the Southern and Eastern Provinces than in the Northern Province, but consumption of groundnuts was more often reported in the North.

Foods contributing to the nutritional status of pregnant and lactating women are consumed. Data describing the actual quantities consumed are not available and therefore it is not clear whether the available food supply is the limiting factor in determining food and nutrient intake. From the data available it is not clear whether location of residence is an important factor in contributing to nutritional status.

5.2. Meal Pattern

Several researchers have documented the meal pattern followed by villagers in Sierra Leone (Table 3.6, page 18). Most villagers in a recent survey interviewed (58 percent) reported eating 1 meal on the day before the interview. Some (40 percent) had 2 meals and few had 3 meals (2 percent). A regional variation in meal pattern was seen. In the Northern Province, 75 percent of the villagers reported 2 meals while only 12 percent of the Southern Province villagers reported eating 2 meals per day [Hamilton, 1977].

Of the pregnant and lactating women studied in the Southern and Eastern Provinces [Minett, 1978a] 5-10 percent reported eating 1 meal per day, 31-45 percent 2 meals per day and 37-44 percent 3 meals per day. In the Northern Province the meal pattern was similar with 19 percent eating 1 meal per day, 68 percent eating 2 meals and 15 percent eating 3 meals (Table 3.6).

While the nutritional status of women following the various meal patterns is not known it is reasonable to suggest that those eating only one meal a day (and not snacking) may be most at nutritional risk.

5.3 Food Taboos

It is reported that the food intake of pregnant and lactating women, like that of infants, is limited by food taboos that may have a detrimental effect on their nutritional status. Just as with the infants, it is not clear how important taboos are in determining the food intake of pregnant or lactating women.

The commonly reported taboos are against eating eggs (reputed to cause sterility), meat, fish, and soybeans [Scott, 1978]. Williams [1967] reported that pregnant women were forbidden to eat bananas, oranges, garden eggs,¹ pineapple, groundnuts, plaintains and oranges. Hamilton [1977] asked what food pregnant women should eat. The woman answered fish, meat, eggs, milk, chicken, and beans. Hamilton concludes that taboos against the consumption of those foods by pregnant women are not generally observed in the village. Only a few women (five percent) reported that eggs should not be eaten; two percent reported that fish were undesirable and one percent beans. The discussion of the strength of the food taboos for children under 5 years of age (page 23) also applies here.

5.4 Other Nutrition Related Problems

Again it can be assumed that if the total caloric intake of pregnant and lactating women is low the intake of other nutrients is also marginal. Recent data on anemia are available (Table 5.1). How much of this anemia is caused by dietary inadequacy is not known. Avitaminosis and goiter also have been observed. The true incidence of these conditions and the description of people at risk from these conditions is not known.

5.5 Summary

Pregnant and lactating women in Sierra Leone are considered at nutritional risk. Data to support this statement are forthcoming from the National Nutrition Survey [MOH and UCLA, 1978].

It may be assumed that pregnant and lactating women who consume only one meal per day are most at nutritional risk. Much of the discussion about the children from birth to five years of age who are most at nutritional risk is probably appropriate here in view of the lack of information about pregnant and lactating women.

6. NUTRITIONAL STATUS: ADULT POPULATION

Table 6.1 summarizes the nutritional problems observed for adults in Sierra Leone. The data to support these observations are limited. It has been frequently suggested that a lack of total calories is the primary nutritional problem among working adults, particularly in the rural areas. Asare and Thompson-Clewry [1967] suggested that most adults in the working class are undernourished because the total amount of food is inadequate. They also suggested that the educated class is malnourished because of a "wrong balance of nutrients." Thompson-Clewry [1972b] suggested that laborers and farmers adapt to a low level of vitality and do not realize that they are underfed. The extent of inadequate food consumption and its effect on productivity have not been studied.

Steckle [1966], however, reported that the diet of "Sierra Leoneans is normally adequate for the adult population but would not be sufficient for those needing additional supplies of body building foods." Whether this observation holds true in 1970 is not known.

All predictions of estimated caloric needs exceed the estimates of available calories in Sierra Leone. This indicates that malnutrition might

TABLE 6.1
DESCRIPTION OF NUTRITIONAL PROBLEMS OF ADULTS IN SIERRA LEONE

Condition	Prevalence	Standard	Place	Source	Reference
Lack of calories	Generally	Observation	Throughout Sierra Leone	Carrol, 1978; Greene, 1978; Thomas, H. M., 1978; Siaffa, 1973; Thompson-Clewry, 1972b	--
Lack of calories	Generally 2,100 kcal/person day available	Estimated need 2,200 kcal		--	Confidential governmental source, 1978
Lack of Calories	Very prevalent among elderly	Observation	Throughout Sierra Leone	Banya, 1978	--
Lack of calories	Generally 2,248 kcal available	2300 Kcal required	--	--	FAO, 1977
Lack of calories	Generally 2,055 kcal available	2300 Kcal required	1965-66 Sierra Leone	--	di Giacoma, 1973
Lack of calories	8% Western Province 27% Eastern Province 10% Southern Province	Problems perceived by voluntary social welfare leaders	--	--	Thompson-Clewry, 1972c
Lack of calories	Generally 2,117 kcal available	--	--	--	May and McLellan, 1970
Lack of calories	Generally 2,158 kcal/person/day available	Estimate	Throughout Sierra Leone	Blankhart, 1967	--
Anemia	10.0% 2,062 adults 3,758 adults	<4.8 g hemoglobin 3.5-19.0 g hemoglobin 3.4-19.5 g	Serabu Hospital Njala Health Center Njala Health Center	Primary diagnosis records Primary diagnosis records Primary diagnosis records	Kelly, 1978 di Giacoma, 1973 di Giacoma, 1973
Hypertension	Increasing	--	--	Banya, 1978; Thomas, H. M., 1978; Carrol, 1978	--
	3%	--	Serabu, 1977	--	Kelly, 1978
Diabetes	1%	--	--	Banya, 1978; Carrol, 1978	Kelly, 1978
Goiter	Less than 1% prevalence in North	--	--	National Nutrition Survey, 1964	Blankhart, 1967

be a problem. It is important to note, however, that obesity is a condition seen in both the urban and rural areas of the country, although more often in the urban areas. While some of the populations are underfed others are overfed.

The 1978 National Nutrition Survey may provide more data on the nutritional status of nonpregnant adult women. It is widely assumed that most adult women are anemic. The information concerning the incidence of goiter in adult women is outdated. Some fieldworkers suggest that goiter is still prevalent in the Northern Province while others observe the problem to be minimal. No data are available to describe this situation. The National Nutrition Survey did not include observations of goiter. Some health professionals suggest that the incidence of both hypertension and diabetes is increasing in both urban and rural areas. Again, no data to support these observations are available.

6.1 Caloric Intake

Table 6.1 presents opinions and data on the caloric intake of adults in Sierra Leone. Unfortunately the figures are estimates and do not identify those adults who are most prone to insufficient calories. It has also been reported that adults in agrarian societies may lose more than 2 Kg of body weight in preharvest or hungry time [Sai, 1974]. Data in support of this statement are not available.

In an attempt to define an adult population at nutritional risk it is important to examine dietary intake and available food supply, seasonal and geographic variations in food intake, and the effects of religious restrictions and income on food expenditures.

In some cultures the elderly constitute a group at nutritional risk. It is not clear what age parameters should be used to define the elderly in Sierra Leone and there are no data on the food consumption behavior or nutritional status of this group there.

6.2 Dietary Intake And Food Supply

As noted earlier, some believe there is an inadequate supply of essential nutrients in Sierra Leone while others believe that lack of nutrition education, not lack of food, is the major problem related to nutrition. Since obesity is a problem lack of education and not lack of an adequate food supply is a problem for some Sierra Leoneans.

The daily food pattern (Table 3.6, page 18) was described by Hamilton [1977]. The meal pattern varies throughout the country. One meal per day is the average pattern of 58 percent of the residents. Two meals are consumed by 40% of the people. However, 75% of those in the North and 12 percent of those in the South ate two meals each day.

Again some dated information is presented here for background purposes. Thomas [1973] suggested that most people eat two meals of rice and plasas¹ each day. Thompson-Clewry [1966] noted that rice was the most important foodstuff consumed daily and contributed 88 percent of the caloric intake. Di Giacoma [1973] noted that 75-80 percent of the calories came from cereals and roots.

Thomas [1973] reported that the average protein intake per day was 50 g with 82 percent of that from plant sources. There is no evidence that the mix of essential amino acids is incomplete. However, Thomas recommended an intake of 60 g of protein per day.

¹A sauce made with a variety of greens, palm oil, peppers and other vegetables.

Chakravarti [1978] suggested that geographic location and population density might affect the nutrient intake in a locality. No data are available although all professionals note that meat is consumed almost daily in the Northern Province and that millet is used more in the North than in the other provinces. Also, fish is more available along the sea-coast and therefore consumed more often than inland where it is sold in the smoked or frozen state. The actual quantities consumed and their nutrient contribution are not available.

Thompson-Clewry [1972b] reported that there was very little difference in dietary patterns throughout the country, although it is clear that those in the cities and the mining areas must rely on the market for their food supply.

More recently, Hamilton [1977] also was interested in the variation among diets in the rural areas. He found that when "existing nutritional practices of the rural sample were compared with an urban sample there were no differences except that urban households ate more fish and meat than rural households."

6.3 Role of the Kitchen Garden

Some fieldworkers have expressed concern that kitchen gardens are not as prevalent as they once were. In part they attribute this to the shift to single cropping. This could affect the availability of a variety of food stuffs and ultimately the nutrient intake of the population. Thompson-Clewry [1966] reported that most (69 percent) of the social welfare voluntary leaders maintained home or kitchen gardens. These gardens included green leafy vegetables, garden eggs, pepper, okra, and some fruit trees (citrus and banana). It is not known how prevalent the kitchen garden is now.

6.4 Foods Available and Nutritional Content

Several publications describe the foods available in Sierra Leone and the relative nutritional contributions made by these foods [Thompson-Clewy, 1971a; Thomas, 1972; Carroll, 1975; Helms, 1973; May and McLellan, 1970; Minnett, 1978a; O'Reilly-Wright, 1964; Owolabi, 1976.

Pamphlets describing nutritionally adequate meals have been distributed in Sierra Leone [Thompson-Clewy, 1967, 1971a, 1971b, 1972b, 1972c, 1976, 1977, Undated c, Undated d]. One meal pattern suggested was as

follows: Breakfast: ogi with sugar and milk
sweet potato chips
fried small fish
tomato
tea

Midday: rice and palaver sauce¹

Snack: orange, banana fritters or akar

Dinner: boiled yam
fish soup

The following sections represent a compilation of printed recommendations concerning foods available in Sierra Leone and their nutritional contributions:

¹This sauce, which contains fish such as dried bonga (sometimes meat), is prepared from plant leaves such as bitter cassava, crane-crane, sorrel, sesame and spinach, plus palm oil, salt, pepper, and melon and other seeds [Thomas, 1972].

Foods and dishes valuable for their carbohydrate content include: yam, cocoyam, plantain, foofoo, guinea corn, millet, corn, rice, wheat flour, bread, sweet potato, sugar, beans, banana, gari,¹ ogi, couscous, pap, cornmeal, breadfruit, cassava, sugar cane, honey, biscuits, rice bread, cakes, sweets, akara, green leafy vegetables (cassava, sorrel, okra, potato, yam) olele,² soursop,³ paw paw, pineapple, avocado pear, grapefruit, banana, dates, guava, mango, plantain, carrots, lettuce, pepper, cucumber, cabbage, tomato, crane-crane, and palaver sauce/plasas.

Foods and dishes valuable for their fat content include:⁴ palm oil, palm kernel oil, coconut oil, groundnut oil, egusi, butter, margarine, pork bacon, cheese, benniseed, lard, avocado, mackerel, herring, pollock, mullet, palaver sauce/plasas and olele.

Animal foods and dishes valuable for their protein content include beef, bush meat, goat, sheep, pork, snails, shrimps, crabs, milk powder, whole milk, evaporated milk, cheese, eggs, fish (bonga, mackerel, herring, pollock, mullet, snapper, grouper), chicken, duck, turkey, guinea fowl, squirrels, rats, frogs, morkey, palm weevil, termites, snakes, dried caterpillars, palaver sauce/plasas, and olele.

Plant foods and dishes valuable for their protein content include beans, peas, groundnuts, benniseed, ogiri,⁵ green leafy vegetables, bread, rice, corn, cashew nuts, sunflower seeds, pumpkin seed, egusi, palaver sauce/plasas, and olele.

Foods and dishes valuable for their contribution of riboflavin include milk, cheese, ice cream, meat, liver, fish, poultry, egg, olele, and palaver sauce/plasas.

Food and dishes valuable for thiamine include beef, fish, poultry, pork, eggs, bread, cereal, parboiled rice, dried beans and peas, groundnuts, olele, and palaver sauce/plasas.

Foods and dishes valuable for their iron content include: liver, beef, chicken, eggs, dried beans, peas, green leafy vegetables, prunes, raisins, breads, cereals, okra, plantain, palaver sauce/plasas, and olele.

¹ Grated dried cassava.

² Bean pudding.

³ Annona Muricata--a succulent pear-like fruit.

⁴ Melon seeds.

⁵ Benniseed in a fermented form.

Foods and dishes valuable for their vitamin A content include liver, egg yolks, dark green vegetables, tomato, paw paw, mangoes, pumpkin,¹ fortified margarine, cream, cheese, red palm oil, palaver sauces/plasas, and olele.

Perusal of these lists of foods may give one the impression that a great variety of foods is available for consumption in Sierra Leone. Although this may be true, it does not follow that the diet of the ordinary household is in fact a varied one. Many of the foods in these lists may be available only in the city and some of them only to well-to-do families. Some of the foods listed are imported. Other foods, although widely available throughout the country, may be so expensive or so rare that they appear in the diet of an individual household only in very small amounts or at infrequent intervals.

Rice is the most important single food in the diet. Talking with the villagers made it obvious that rice was the favorite food as well as a daily necessity. The use of parboiled rice has been beneficial in the prevention of beriberi. However, women are seeking ways to reduce the two to four hours spent daily in the washing, pounding, and cooking of rice. As roads are improved, traveling "rice polishers" visit the villages. Should parboiling become less common and the practice of polishing rice become widespread it could have a detrimental effect on the nutritional status of the population because of the loss of thiamin that would result.

Cassava is viewed as a food to be eaten when rice is not available. Foofoo is consumed in many households on Wednesday, Saturday and Sunday. When determining the nutrient contribution of a meal it is important to understand the complete meal of which foofoo is only one component, remembering that calories seem to be the important deficiency throughout the population.

¹Squash gourd (Curcubita pepo).

It is often said that August is the worst month of the "hungry season." On one day in August, 1978 the following foods were available in the market:

egusi, tomatoes, green and purple egg plant, dried okra, ogiri, crane-crane, bitter leaves, sorrel, jackato, water bitters, plums, cassava leaves, concho beans, soursop, dark rice, white rice, pepper--fresh and dried, groundnut, foofoo, beans, Maggi cubes, pigs' feet, sugar-cane, couscous, berry, okra greens, coconut oil, red palm oil, carola,¹ cutting grass, onions, groundnut oil, sweet potato leaves, kola nuts, pumpkin, fish (fresh and dried), cabbage, okra, potatoes, cassava, sweet potatoes, bananas, plantain, chicken, avocados, pears, tomato puree, pig skin, cucumbers, eggs, sugar, salt, tinned milk, dried beans, corn on the cob, guavas, limes, ginger, and groundnut balls.

It is doubtful that urban dwellers able to purchase food in such a market would experience the caloric deficiencies characteristic of the "hungry season," unless, indeed, the prices of important foods were unusually high. However, for rural families that produce large portions of their own food, the hungry season may be another matter. When their own food stores run low, attempts to supplement them by purchases from the market may be severely limited by the lack of available cash. Moreover, the small markets in which many rural households trade are likely to be limited in the range of foods available, with most of their stock consisting of items obtained locally. Clearly, more information is needed concerning this matter.

6.5 Religious Restrictions

Hamilton [1977] reports that 82 percent of the rural population is Muslim. Muslims prohibit the consumption of pork. This restriction does not appear to affect the nutritional status of the adult population.

¹A fruit.

The Feast of Ramadan is preceded by 30 days of fasting. Although some suggest that this may have detrimental effect on the nutritional status of the population, this researcher would not concur. Because of the rites and rituals surrounding the meal that breaks the fast each evening, it appears that some people actually have a larger food intake during the fasting period. Villagers do report that the prices of specific foods rise because of their use in Ramadan feasts.

Muslims also are prohibited from ingesting alcohol. To the extent that this prohibition is followed it may have a beneficial or neutral effect on the household's nutritional status since cash is not spent on alcoholic beverages. In many areas the nutritional status of the household is compromised when cash is spent or food traded for alcoholic beverages.

Among non-Muslims, beer, alcohol and palm wine play a significant role in the diet of some people. A closer study of the quantities produced and consumed and their effect on nutritional status is needed.

6.6 Income

Only limited and dated data describing food expenditures have been reported by students of nutrition. Most nutrition surveys find this information difficult to obtain accurately. Thomas [1972] reported that in 1951 low-income households spent 21 percent of their income on rice while higher income groups spent 11 percent. He reported that as income rose the percentage of total expenditures devoted to dried bonga (fish), rice, tobacco, palm oil and wine decreased. Expenditures for meat, bread, groundnut oil, butter, tomato puree, fresh fruit, sugar, imported tinned

milk, soft drinks and alcohol increased. Thomas [1973] noted that the average amount of money spent on food in the city of Bo was 77¢ per day. Women reported purchasing rice, foofoo, pepper, onions, beans, green leaves, palm oil, salt, okra, tomatoes, Maggi cubes, groundnuts, meat, ogiri, garden eggs, and pumpkin.

Much information about household expenditure patterns is available from the household expenditure surveys conducted by the Central Statistics Office of the Government of Sierra Leone. The first general purpose household survey was conducted between 1966 and 1970, first in the Western Area, then in the urban portions of the three provinces, and finally in the rural areas of the provinces. Information is available on expenditures on fourteen groups of foods by geographic area, income group, household size, and season of the year. Considerable information is also available concerning many individual foods.

Summary descriptions of household expenditure patterns for food may be found in the following publications from the Central Statistics Office:

Household Survey of the Western Area [Undated], pp. 3-6, 8-10.

Household Survey of the Northern Province: Urban Areas [1971b], pp. 4-9.

Household Survey of the Southern Province: Urban Areas [1971c], pp. 3-6.

Household Survey of the Eastern Province: Urban Areas [1971a], pp. 4-10.

Household Survey of the Rural Areas of the Provinces [1972], pp. 4-6.

Another household expenditure survey was done in 1976 [Rhodes, 1978], but the report of this survey has not yet been published.

While these surveys provide much information about food expenditures and quantities purchased, the data that have been collected do not permit estimation of nutrient intake levels for individual households, so it is impossible to examine the relationship between nutrient intake and either income or levels and patterns of food expenditure. For an adequate understanding of the determinants of malnutrition it is essential that these relationships be thoroughly understood. Within the next few years the Central Statistics Office plans to conduct a nutrition-consumption survey which will help to fill this gap [Rhodes, 1978].

The most recent published data on food expenditures are derived from an integrated survey of rural households conducted in 1974-75 by the Rural Employment Research Project at Njala University College. The value of food produced by the household is included in total expenditure. For the country as whole, 48 percent of total household "expenditure" on consumption consisted of the value of goods produced by the household. (Practically all of these were food products.) Food expenditures represented 70.0 percent of all consumption expenditure. Rice alone accounted for 39.4 percent of all consumption expenditure; cereals and root crops constituted 8.2 percent, palm oil 7.5 percent, and fish 8.4 percent. [King and Byerlee, 1977, pp. 16, 20-22].

Food budget shares classified by level of household expenditure can be found in King [1977, pp. 33-34]. In the households whose total expenditures fell within the second to seventh deciles of the expenditure distribution the average percentage spent on rice ranged from 40.0 to 45.9 percent.

Data from the same survey of rural households are now being analyzed (under the direction of Victor E. Smith, Economics Department, Michigan State University) to determine the quantities of foods consumed in rural households.

6.7 Summary

It is difficult with the available data to determine the nutritional problems of the adult population. While some suggest that lack of calories is a problem the data do not conclusively demonstrate the point. It does appear, however that nutritional problems occur throughout the population.

7. EVALUATION OF RESEARCH

Data exist describing the nutritional conditions and food behavior of children from birth through 5 years of age and of pregnant and lactating women. While the information available is not complete, it provides a useful base.

The unanswered questions are the same ones that occur in all nutrition field research. They are questions of cause and effect, relationships of behavior, the role of knowledge about nutrition in determining the actions individuals take in relation to food, and the intra-family distribution of food and its effect on children's growth. These and other questions must be answered, not only for Sierra Leone but for all nations.

It is difficult to define the groups most at nutritional risk when there are no data. That is the case for most of the age groups in Sierra Leone. Some attention to describing the nutritional status of the population and monitoring that status should be considered.

One can assume that the population does not have sufficient calories to operate at optimal level. Again the questions to be answered apply to more countries than Sierra Leone. What are the ramifications of marginal intake loads for calories, protein, carbohydrates, vitamins, minerals and water?

Also, the increasing incidence of obesity and hypertension must not be ignored. The research question is one of balance. At what point is a population group in nutrient balance and how can the group be kept there? What is optimal nutrition and how is it achieved?

The effects of migration--within the rural setting and from a rural to an urban setting--are not addressed in the literature available. The effects of migration on nutritional and health status generally are not well known.

Generally, then, the questions that need to be answered about Sierra Leone also need to be answered for many countries. In Sierra Leone plans to examine some of these issues are already under way. Appendix C contains a list of research activities either planned or in progress in the summer of 1978.

8. OVERVIEW

Several reviews of the nutritional status and food behavior of people in Sierra Leone were prepared in the late 1960s and early 1970s. These reviews have been quoted in other works about Sierra Leone and therefore there are numerous papers, all reporting limited data. In 1978 a National Nutrition Survey was conducted by the Ministry of Health in cooperation with UCLA. This survey will provide an estimate of the nutritional status

of young children and their mothers and attempts to derive an indication of the general nutritional status of the entire population. Only preliminary results are available but those data seem to confirm earlier observations describing the nutritional status of children and pregnant women as the most important nutritional problems in Sierra Leone.

As one would anticipate, most available data on food behavior and nutritional status describe the situation for children under five years old and pregnant and lactating women, since these are generally the primary recipients of health care. Little is known about the food behavior and nutritional status of the other age groups in Sierra Leone. Tables summarizing the available information are included in this report. It can be suggested that both overnutrition (obesity, hypertension) and undernutrition (underweight, marginal intake of nutrients, anemia) exist in both rural and urban areas among all age groups.

The available data suggest that the problems of malnutrition are greater in the rural than in the urban areas (although the urban problem is growing). It also can be suggested that little change in the nutritional status of the population has occurred in the last 20 years. The prospects for changes in the available food supply in the future are great. It is not known how these changes will affect the availability of nutrients and ultimately the nutritional status of the population. It appears at this time that the availability of calories to the population is the key issue.

APPENDICES

APPENDIX A

INTERVIEWS/PERSONAL COMMUNICATIONS ABOUT NUTRITION AND
FOOD CONSUMPTION IN SIERRA LEONE

July 24 - September 3, 1978

- Banya, Dr. S. Minister of Development, Freetown, Sierra Leone; formerly at Nixon Memorial Methodist Hospital, Segbwema, Sierra Leone.
- Barbieri, Lawrence. Program Assistant, Catholic Relief Services, East St., Freetown, Sierra Leone.
- Beghin, Ivan, Dr. Consultant to FAO, Rome. Formerly Director, Nutrition Unit, INCAP, Guatemala City, Guatemala.
- Benjamin, E.C. Director, Central Statistics Office, Freetown, Sierra Leone.
- Bustrillos, Nina. Home Economist, FAO, Rome.
- Campbell, Elizabeth. Nutritionist, Food Policy and Nutrition Division, FAO, Rome.
- Carrol, Gladys. Nutritionist, Ministry of Health, Freetown, Sierra Leone.
- Cate, Mary. Peace Corps Volunteer, Segbwema, Sierra Leone.
- Clay, William D. School of Human Nutrition, UCLA, Los Angeles, California.
- de Grange, Matron. Supervisor of Maternal & Child Health, Catholic Relief Services, Freetown, Sierra Leone.
- Dovlo, Florence. Senior Research Officer, Economics & Consumption Division. Food Research Institute, Accra, Ghana.
- Ford, R.O. Senior Officer, Ministry of Social Welfare, Freetown, Sierra Leone.
- Greene, (Thompson-Clewry), Pamela. Nutritionist-Home Economist, University of Sierra Leone, Senior Research Fellow, Institute of Education, P. O. Box 414, Freetown, Sierra Leone.
- Halbert, H.B. Resident Officer, United Nations Development Program, Freetown, Sierra Leone.
- Hillary, Sister. Serabu Hospital, Serabu, Sierra Leone.
- Huddleston, Robert. US AID. Freetown, Sierra Leone.

- Idusogie, E.O. Regional Food Policy and Nutrition Officer. FAO, Regional Office for Africa, Accra, Ghana.
- Jarman, Timothy. Minister of Agriculture, Belmont, 13 Upper High Street Thame Oxfordshire, OX93HL England. (Consultant to Produce Marketing Board of Sierra Leone).
- Johnson, Jennifer. Head Woman, Salina, Sierra Leone.
- Kelly, James. Former Director, Catholic Relief Services, Freetown.
- Kuyembeh, Peter J. Permanent Secretary, Ministry of Development, Freetown, Sierra Leone.
- Lappia, J. Ph.D. Candidate at University of Wisconsin, Njala, Sierra Leone.
- Lebbe, Marie. Social Welfare worker, Moyamba, Sierra Leone.
- Marshall, Lynn. Director (new), Catholic Relief Services, Freetown, Sierra Leone.
- Martin, R. Population Officer, US AID, Accra, Ghana.
- Mason, John. Nutrition Officer, Food Policy and Nutrition Division, FAO, Rome.
- May-Parker, Ibi. Bank of Sierra Leone, Freetown, Sierra Leone.
- May-Parker, Judith. Lecturer, Department of Education, Fourah Bay College, Freetown, Sierra Leone.
- McCloud, Mr. Program Officer, United Nations Development Program, Freetown Sierra Leone.
- McNaughton, Jeannie. Senior Officer, Nutritionist, Food Policy and Nutrition Division, Rome, Italy.
- Metcalf, Peter. Deputy Resident Officer, United Nations Development Program, Freetown, Sierra Leone.
- Minett, Nancy. Assistant Country Director, CARE, Freetown, Sierra Leone.
- Momoh, Thomas. Nurse in Charge of Nutrition Rehabilitation Unit at Nixon Memorial Methodist Hospital, Segbwema.
- Ottenberg, Simon. Anthropologist, University of Washington, Seattle.

- Pratt, Nina. Professor of Chemistry, Fourah Bay University College, Freetown, Sierra Leone.
- Quartey-Papafio, E. Sierra Leone Project Director, FAO, Rome, Italy.
- Reusse, E. Marketing Advisor, FAO, Rome, Italy.
- Rhodes, Kingston. Head, Household Surveys, Central Statistics Office, Freetown, Sierra Leone.
- Rinehart, Loretta. Anthropologist, University of Toronto.
- Samura, Manso E. District Officer, Moyamba, Sierra Leone.
- Savage, Lovette. Community Development Worker, CARE, Freetown, Sierra Leone.
- Scott, Sylvetta. Nutritionist, Ministry of Health, Freetown, Sierra Leone.
- Sebastian, Mrs. Lecturer, Home Economics, Child Development and Public Health, Njala University College, Njala, Sierra Leone.
- Shears, David. Ministry of Housing and Country Planning, New England, Sierra Leone.
- Sheldon, Norman. Agricultural Development Officer, US AID, Freetown, Sierra Leone.
- Smith, A. Lecturer, Physics. Njala University College, Njala, Sierra Leone.
- Spencer, Dunstan. West African Rice Development Association. E.J. Roye Memorial Building, P.O. Box 1019, Monrovia, Liberia.
- Thomas, Darlinda. Sociologist. Ministry of Education, Bo, Sierra Leone.
- Thomas, H. Malema. Manager, Bennimix Project, Bo, Sierra Leone.
- Thomas, Mike E.R. Animal Production Health Officer. FAO, Accra, Ghana.
- Tommy, Joseph. Chairman, Department of Agricultural Economics and Extension, Njala College, University of Sierra Leone, Njala, Sierra Leone.
- Towner, Doris. Supervisor of Catholic Relief Services Nutrition Program in the Southern and Eastern Provinces, Bo, Sierra Leone.
- Tuboku-Metzger, Sister. Senior Health Sister, Office of Principal Medical Officer, Bo, Sierra Leone.

Tucker, Elizabeth. Social Development Specialist, Ministry of Education,
Bo, Sierra Leone.

Williams, Belmont. Deputy Chief Medical Officer, Ministry of Health,
Freetown, Sierra Leone.

Williams, Percy. Director, Peace Corps, Freetown, Sierra Leone.

Wood, Evelyn. State Department Intern, Freetown, Sierra Leone.

Yaciuk, Gordon. Program Officer, Post Production Systems, Agricultural
Food and Nutrition Sciences Division, International Development
Research Center, Dakar, Senegal.

APPENDIX B

PROFESSIONAL OPINIONS AND REPORTS DESCRIBING NUTRITIONAL PROBLEMS
OF CHILDREN UNDER 5 YEARS OF AGE IN SIERRA LEONE

Description	Source	Date
<u>I. Malnutrition</u>		
Kwashiorkor and marasmus are the principal malnutrition problems of children 6 months - 3 years old	Thomas, H. Malema	1978
Protein-calorie malnutrition is a problem in children 2-5 years old	Banya, S. S.	1978
Percent of children classified as chronically underweight increases from 10.6% at 3-5 months to 30.5% at 48-59 months	Ministry of Health and UCLA	1978
Percent of children underweight increases from 13.8% at 3-5 months; is between 37.5% and 41.5% from 9-23 months; and remains 23.5%-28.2% from 24-59 months	Ministry of Health and UCLA	1978
Acute undernutrition seen at 9-11 months is 6%; at 12-14 months is 9.3%	Ministry of Health and UCLA	1978
There has been little change in the incidence of malnutrition in rural areas for the last 23 years; availability of protein is a problem	Hillary, Sister	1978
Main nutritional problem is protein-calorie malnutrition--underweight and chronic underweight; problems are more severe in rural areas	Ministry of Health and UCLA	1978
50% of the hospital admissions of children are due to malnutrition	Williams, Belmont	1977
Nutrition problem among children has changed little in the last 10 years	Carrol, Gladys	1978
Malnutrition is a greater problem in the rural areas than in urban areas	Carrol, Gladys	1978
Malnutrition exists among children because they do not get enough food	Ford, R. O.	1978
Malnutrition is a problem among young babies	Kuyembeh, Peter	1978
Protein-calorie malnutrition is the most common disease in children 1-5 years old who attend the MCH Under Fives clinic	Williams, Belmont	1977
Marasmus and kwashiorkor are important factors in child mortality	Truswell, A. S.	1976

Description	Source	Date
Possibly 99% of Sierra Leone children are afflicted by subnutrition sometime in their life	Adey, C.	1975
Malnutrition exists in children 0-6 months old only if they are not breastfed	Robin-Coker, D. J. O.	1973
Peak incidence of kwashiorkor and marasmus is between 6-24 months	Robin-Coker, D. J. O.	1973
Protein-calorie malnutrition is a major nutritional problem among children; kwashiorkor increases in rainy season	Thompson-Clewry, P.	1972a
Kwashiorkor is a problem from 6-12 months of age	Wilkinson, J. L.	1967
48% of yearly kwashiorkor admissions were May-August	Wilkinson, J. L.	1967
Incidence of marasmus high in first year; decreases after 24 months	Wilkinson, J. L.	1967
Incidence of marasmus highest in May-August	Wilkinson, J. L.	1967
Protein-calorie malnutrition in the form of kwashiorkor and marasmus, among children six months to four or five years, is one of Sierra Leone's three major nutritional problems	Whitby, Pauline	1968
Large numbers of children do not have enough food to eat	Thompson-Clewry, P.	Undated
Peak severity of kwashiorkor is 9-18 months	Wilkinson, J. L.	1967
Malnutrition is most evidenced in rainy seasons	Wilkinson, J. L.	1967
Malnutrition among children is a major factor in mortality and morbidity	Carter, F. S.	1961
<u>II. Anemia</u>		
Anemia is more prevalent in areas outside of Freetown (more than half of all children tested)	Ministry of Health	1978
60-70% of the children have low hemoglobins	Banya, S. S.	1978
Anemia is a problem in children	Greene, Pamela Ministry of Health and UCLA	1978 1978
	Williams, Belmont	1977
	Truswell, A. S.	1976
	Thomas, H. Malena	1972
	Whitby, Pauline	1968

APPENDIX C

PROJECTS AND PAPERS PLANNED OR IN PROGRESS

Catholic Relief Services Freetown	Collection of data on nutritional status at mobile and static clinics; plotting them on growth charts copyrighted by Dr. C. Capone, Box 48932, Nairobi. Have data from the north for 9 months and from the south for 2 months.
Florence Dovlo, FAO Accra, Ghana	Report on food habits in Sierra Leone. Proposals for nutrition education policies.
Donald B. Hamilton, Darlinda Thomas and Elizabeth Tucker	Development of training center for community development workers which includes some education on nutrition.
Institute of Education, University of Sierra Leone Mrs. Pamela Greene (Thomson-Clewry)	Development of teaching charts for energy foods, protective foods and body-building foods. School lunch program in 3 schools in Brookfield. Preparation of 4 books: Nutrition--grades 1-4 Nutrition--grades 5-7 Nutrition for secondary school Home economics for secondary school Revision of <u>Food, Nutrition and Health in Sierra Leone</u> , expanding the section on child health and nutrition. Survey of home economics education in schools in Sierra Leone.
International Labor Office, Addis Ababa, for UN Development Program, Sierra Leone	Report to government of Sierra Leone on a strategy for increasing employment, equity and satisfaction of basic needs in Sierra Leone (confidential draft).
Kingston Rhodes and N. K. Chakravarti Central Statistics Office Freetown	Nutrition and Food Consumption Survey
Nancy Minett CARE, Freetown	Field test of Health and Nutrition Education Project entitled "Developing Small Talks."
Thomas Momon, Nurse and Isabel King, M.D. Nixon Memorial Methodist Hospital	Comprehensive report on Nutrition Rehabilitation Unit at Nixon Memorial Methodist Hospital, Segbwema.
Norman Sheldon, US AID Sierra Leone	Adaptive Crop Research and Extension (ACRE): The original idea encompassed nutrition and home economics but the final proposal excluded a direct focus on nutrition. The focus is on the farm family and food crop production--possible foods (primarily indigenous crops) are cassava, upland rice, maize, sweet potatoes, pulses (cowpeas and groundnuts), vegetables (okra, onion, chili pepper, tomato).
Sierra Leone Ministry of Health and UCLA	Sierra Leone National Nutrition Survey.
H. Malema Thomas Manager, Bennimix Project	Paper on Bennimix for International Nutrition Meeting, Brazil, August 1978. Expansion of production of benniseed mix.
Gordon Yacuik International Development Research Center, Senegal	In the planning stage: storage for cowpeas. Searching for a place in anglophone and francophone Africa to do a study of the relationship between nutritional well-being and worker productivity.

APPENDIX D

GROWTH SURVEILLANCE MASTER CHART USED BY THE
CATHOLIC RELIEF SERVICES

APPENDIX F

SIERRA LEONE NATIONAL NUTRITION SURVEY QUESTIONNAIRE

I.D. INFORMATION		District (1-2)	Ec. Area (3)	Child Number (4-6)	Village (7)	Team (8-9)	Child I.D. (10-11)	Household (12-13)	Family 1st Other (14)	Child Name (15)			
CHILD AGE INFORMATION		Date Interview (16-21)	Month	Day	Year	Source Birth Date (33)	Birth Record (31)	Calendar (32)	Stated (33)	Other (34)	Birth Date (35)	Birth Place (36)	Person Interviewed (38)
HOUSEHOLD INFORMATION 1		Name Head household	Sex HH head (37)	Occupation HH Head (38)	Father Absent Without Contribution (39)								
HOUSEHOLD INFORMATION 2		Father Deid (40)	Number of wives (41)	Household Size (42-43)	Source of Water (44)	Distance (45)	Household Food Money Paid (46-48) Leone						
OTHER (49)		Child Care (50)	Mother's Tote (51)	Mother Present (52-53)	Mother Reads English/Other (54)	Mother Pregnant (55)	Number Live Births (56-58)						
BREASTFEEDING		No. Times Breastfed (59)	Mother Currently Breastfeeding (60)	No. Times Other Milk Yesterday (61)	Other Milk Given by (62)	Currently Receiving Food Other Than Milk (63)							
MEASUREMENTS 1		Mother Height (64)	Child Height/Length (65)	Child Leg (21) Oedema (66)	Child Weight (67)	Child extremely thin (68)							
MEASUREMENTS 2		Mother Arm Circumference (69)	Mother Fatfold (70)	Child Arm Circumference (71)	Child Fatfold (72)								
PARASITES		Malaria smear (73)	Malaria Test (74)	Stool sample given (75)	Parasites (76-81)								
BLOOD TESTS		Blood taken Unopette (77)	Child's Haemoglobin (78)	Measles test (79)									

Distric	Sub. Area	Site Number	Village	Town	Child ID	Household	Family 1st Owner	Child Name
(1-2)	(3)	(4-6)	(7)	(8-9)	(10-11)	(12-13)	(14)	Sex <input type="checkbox"/> M <input type="checkbox"/> F (15)
Does mother breast-feed on demand?		Does mother breast-feed at night only?		Is mother employed outside the household?		If powdered milk given, how many days does the pound of powdered milk last?		
(17) <input type="checkbox"/> yes <input type="checkbox"/> no		(18) <input type="checkbox"/> yes <input type="checkbox"/> no		(19) <input type="checkbox"/> yes <input type="checkbox"/> no		YEARS _____ MONTHS _____ DAYS _____ (20-21)		

What foods do you give this child when he (she) has diarrhea?	How many meals were prepared for family yesterday?	How many times was this child fed yesterday, not including milk?
(22-23)	(26) 1 <input type="checkbox"/> none 2 <input type="checkbox"/> one 3 <input type="checkbox"/> two 4 <input type="checkbox"/> three +	(27) 1 <input type="checkbox"/> none 2 <input type="checkbox"/> one 3 <input type="checkbox"/> two 4 <input type="checkbox"/> three 5 <input type="checkbox"/> four 6 <input type="checkbox"/> five +

"Please tell me everything the child ate yesterday, including herbs and very small quantities of food." Mark boxes when answers are given.

"Yesterday the only foods this child ate were (read the foods checked), is that correct?"

"Please tell me every food the family ate yesterday." "Yesterday the only foods this family ate were (read the foods checked), is that correct? Check to see if some foods eaten only by child or only by family. Clarify to be certain of correct response."

CHILD	FAMILY	FOOD	COMMENTS (NAME)
(28)	(53)	Commercial Mixing Food / GRS - GARS	COMMENTS ON DIFFERENCES
(29)	(54)	Fofo Fof/Cassava	
(30)	(55)	Cassava Grind/Gent	
(31)	(56)	Yam/Coco Yam/Chinese Yam/Sweet Potato	
(32)	(57)	Rice/Rice Flour	
(33)	(58)	Wheat Bread/Wheat Flour	
(34)	(59)	Bulrush Millet/Guinea Corn/Sorghum/Fundi	
(35)	(60)	Maize/ Corn	
(36)	(61)	Breadfruit	
(37)	(62)	Plantain	
(38)	(63)	Legumes/Broad Bean/Blackeyed Bean	COMMENTS ON DIFFERENCES
(39)	(64)	Benniser/Egini/Groundnuts/Kanya/Melon Seeds/Egusi	
(40)	(65)	Beef/Goat/Sheep/Pork/Bush Meat	
(41)	(66)	Chicken/Poultry	
(42)	(67)	Salt Water Fish	
(43)	(68)	Fresh Water Fish	
(44)	(69)	Eggs	
(45)	(70)	Fresh Milk/Tinned Milk/Powdered Milk	
(46)	(71)	Yoghurt/Curd/boormilk	
(47)	(72)	Dark Green Leafy Vegetables	
(48)	(73)	Fruits	COMMENTS ON DIFFERENCES
(49)	(74)	Palm Oil	
(50)	(75)	Groundnut Oil/Coconut Oil/Lard/Palmnut oil	
(51)	(76)	Margarine/Butter	
(52)	(77)	Sugar/Sweetener	1. Yes 2. No (78)

APPENDIX F

WEIGHT FOR AGE, WEIGHT FOR STATURE, AND STATURE FOR AGE DATA
FOR CERTAIN SCHOOL CHILDREN IN SIERRA LEONE, PLOTTED
ON U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
GROWTH CHARTS

Data collected by Thompson-Clewry [1972b]
in Moyamba (1965), Kambia (1967) and
Njala (1971)

FIGURE P.1
MEAN WEIGHTS AND HEIGHTS FOR 97 GIRLS, 5 1/2 - 9 1/2 YEARS OLD
ATTENDING SCHOOL IN MOYAMBA DURING MARCH, 1965
WEIGHT FOR STATURE

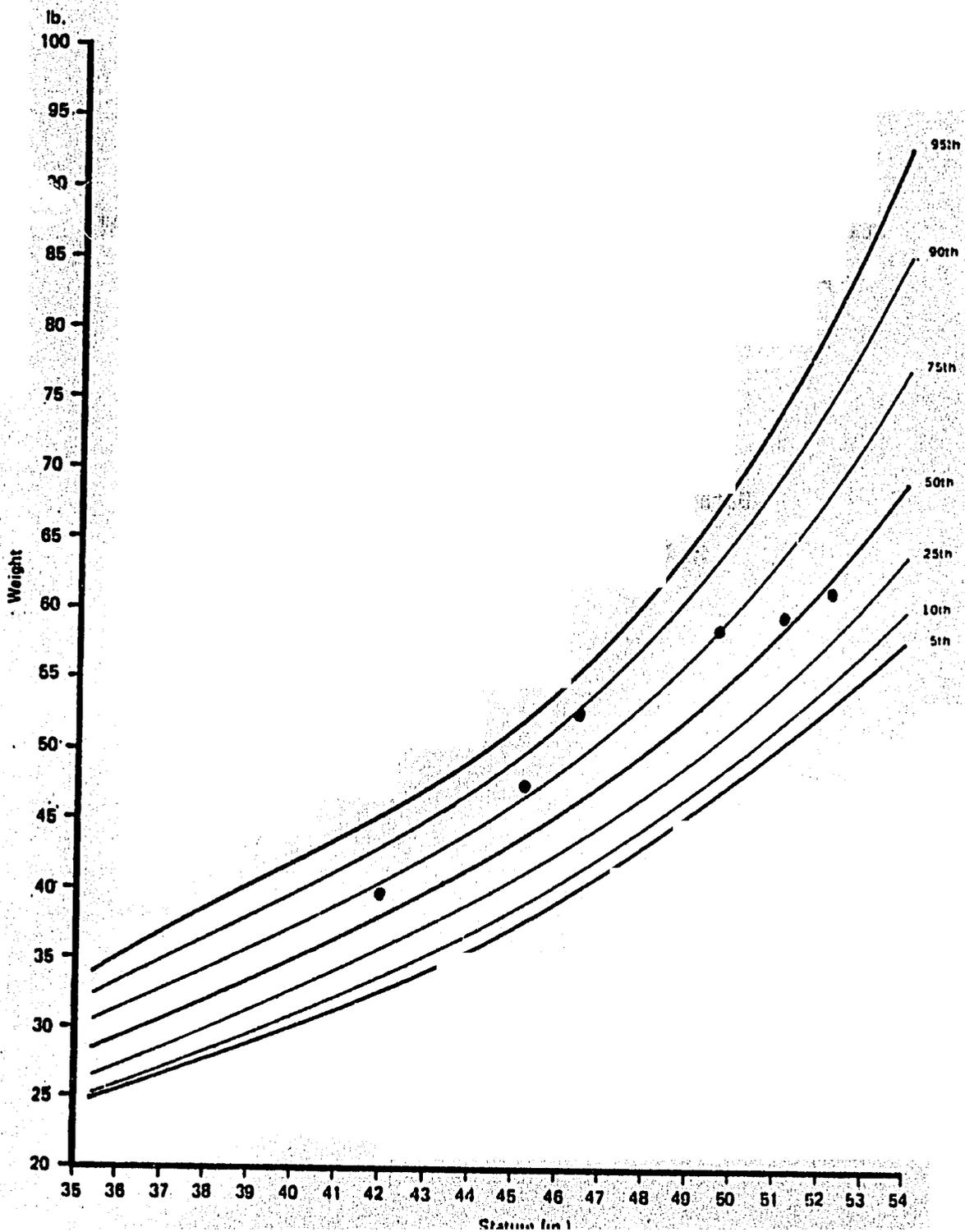


FIGURE F.2
 MEAN WEIGHTS FOR 238 GIRLS, 5 1/2 - 17 1/2 YEARS OLD,
 ATTENDING SCHOOL IN NOYANBA DURING MARCH, 1965
 WEIGHT FOR AGE

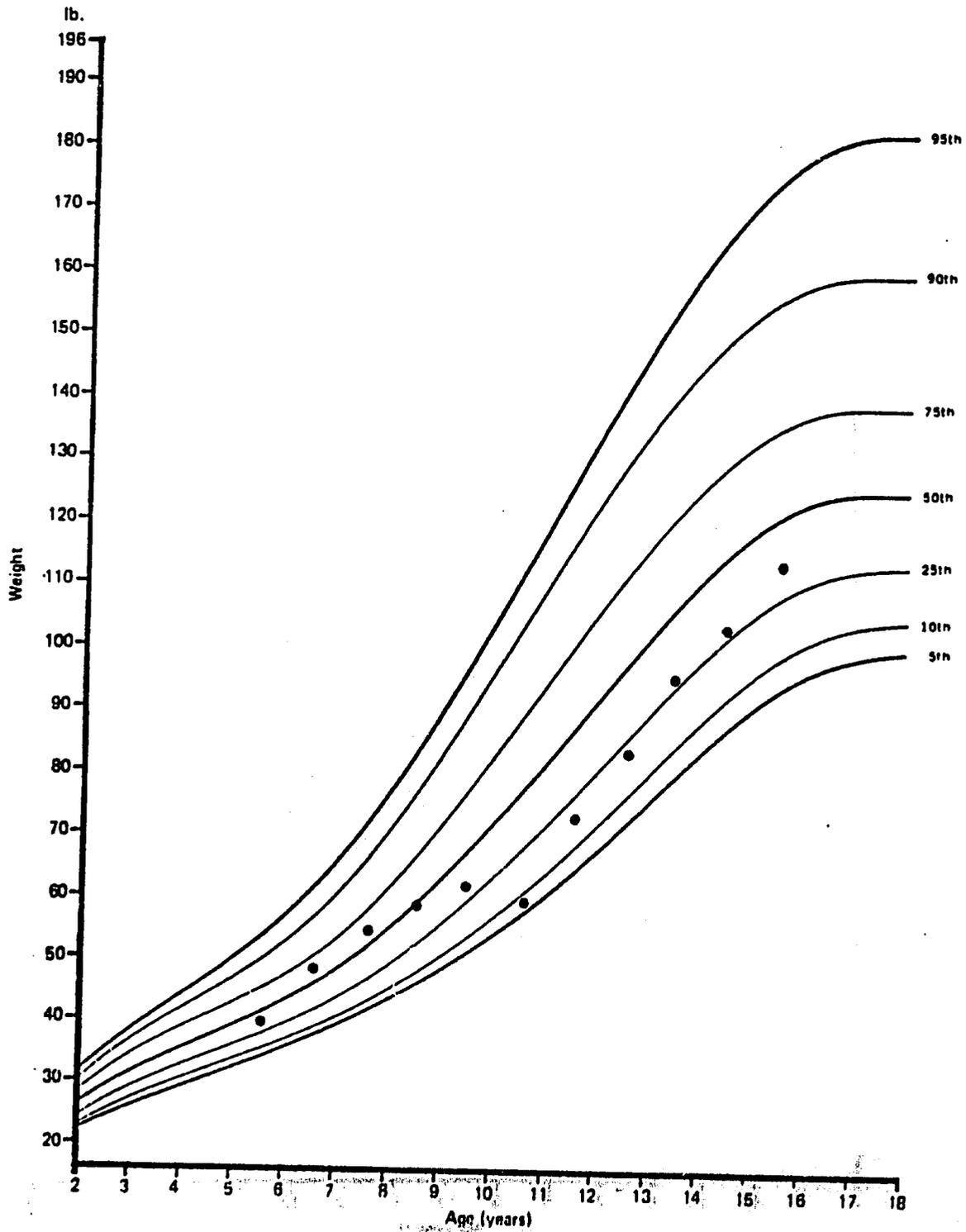


FIGURE F.3
 MEAN WEIGHTS FOR 544 GIRLS, 5 1/2 - 17 1/2 YEARS OLD,
 ATTENDING SCHOOL IN MOYAMBA, OCTOBER, 1965
 WEIGHT FOR AGE

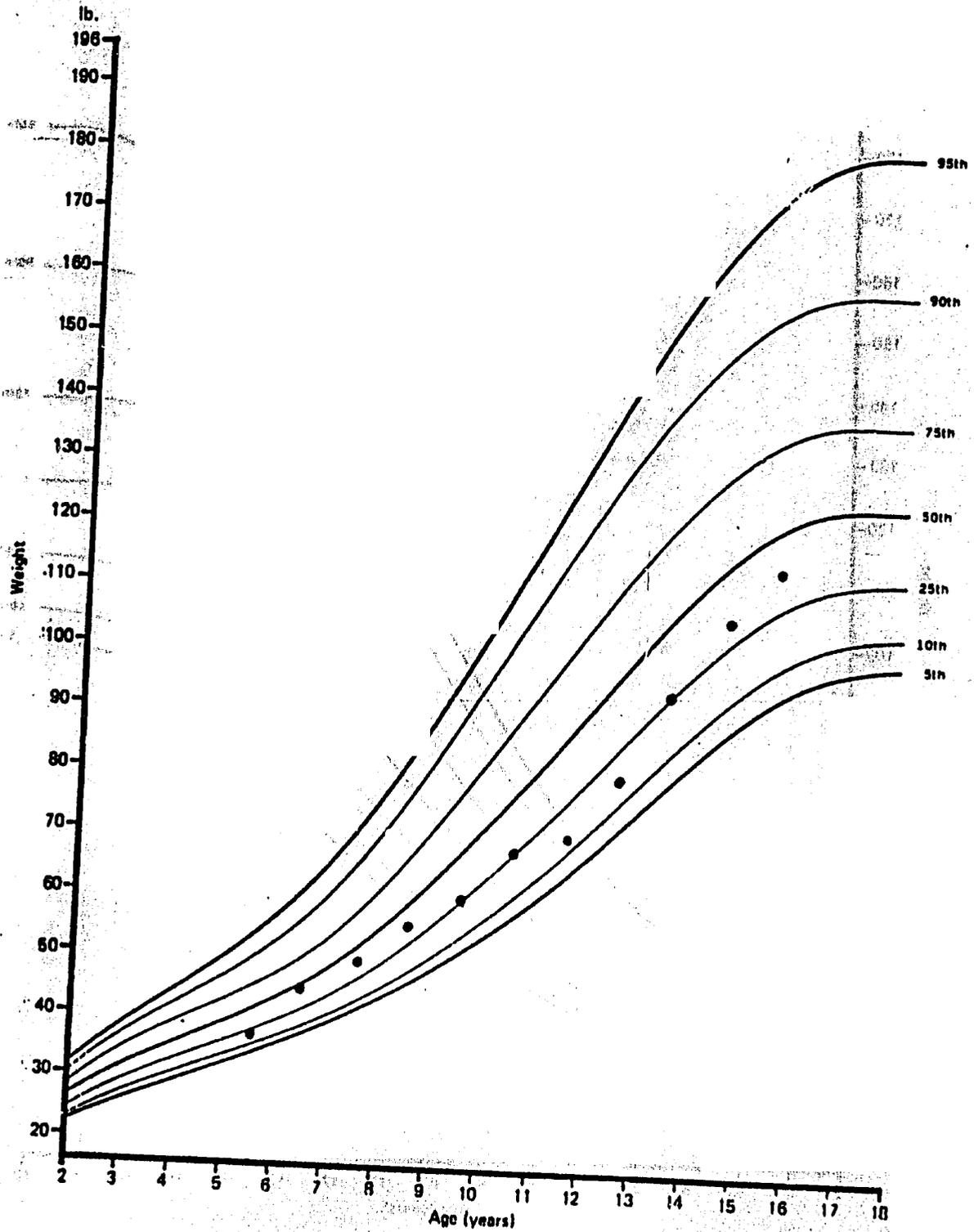


FIGURE F.4
MEAN WEIGHTS AND HEIGHTS FOR 181 GIRLS, 5 1/2 - 9 1/2 YEARS OLD,
ATTENDING SCHOOL IN MOYAMBA DURING OCTOBER, 1965
WEIGHT FOR STATURE

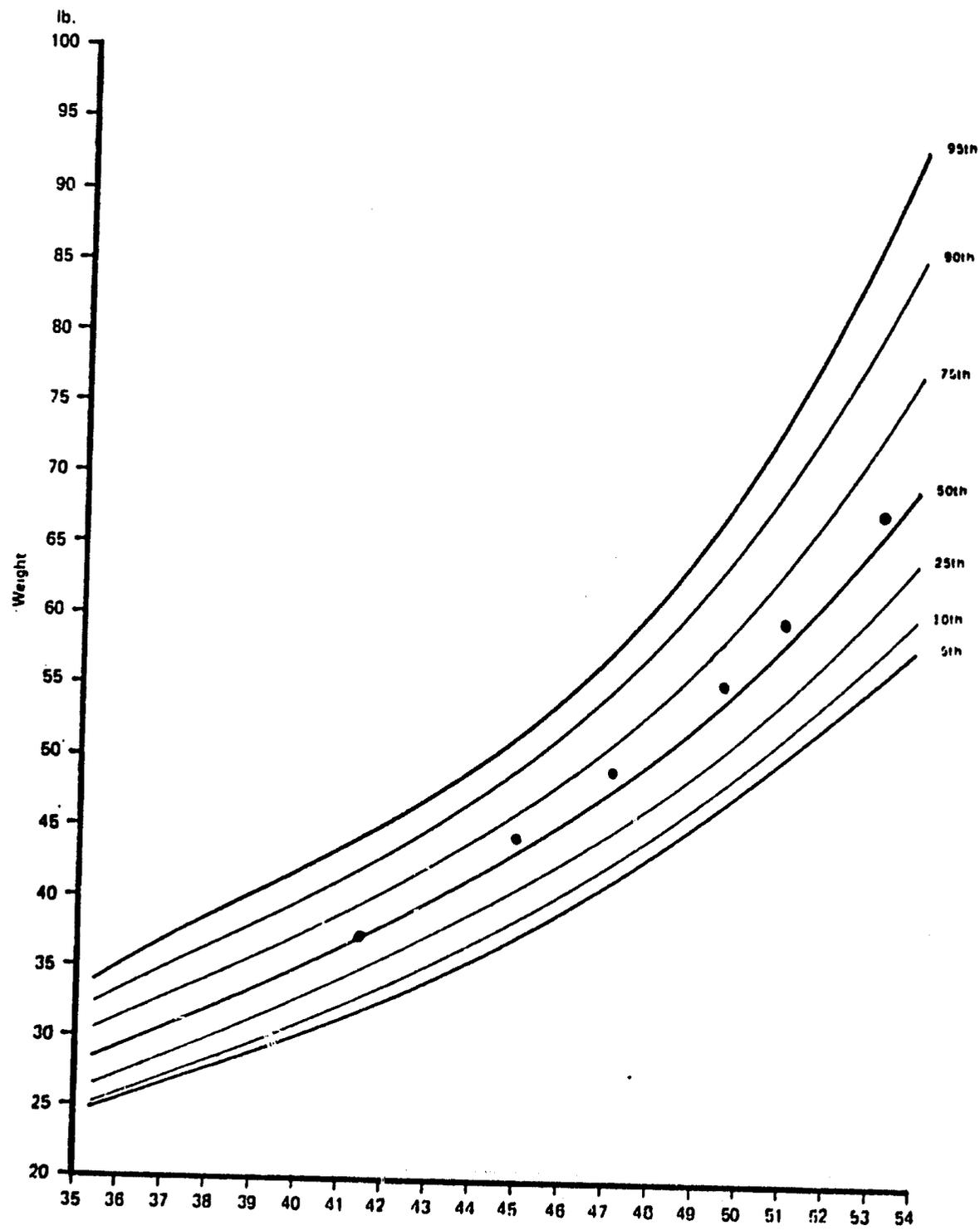


FIGURE F.5
MEAN HEIGHTS FOR 544 GIRLS, 5 1/2 - 17 1/2 YEARS OLD,
ATTENDING SCHOOL IN MOYAMBA, OCTOBER, 1965
STATURE FOR AGE

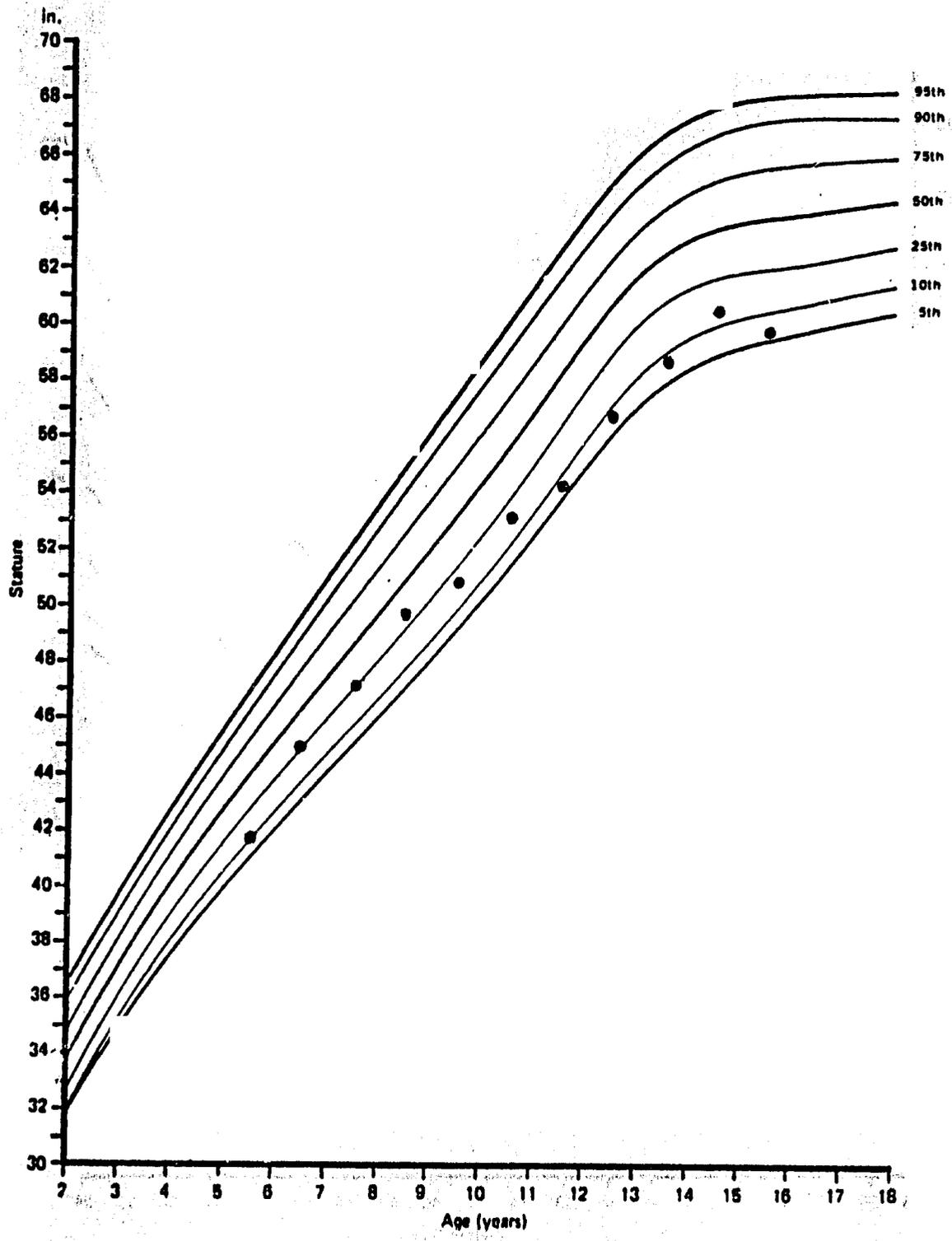


FIGURE F.6
 MEAN WEIGHTS FOR 188 GIRLS, 5 1/2 - 14 1/2 YEARS OLD,
 ATTENDING SCHOOL IN KAMBIA, 1967 AND 80 GIRLS,
 5 1/2 - 14 1/2 YEARS OLD, ATTENDING
 SCHOOL IN NJALA, 1971

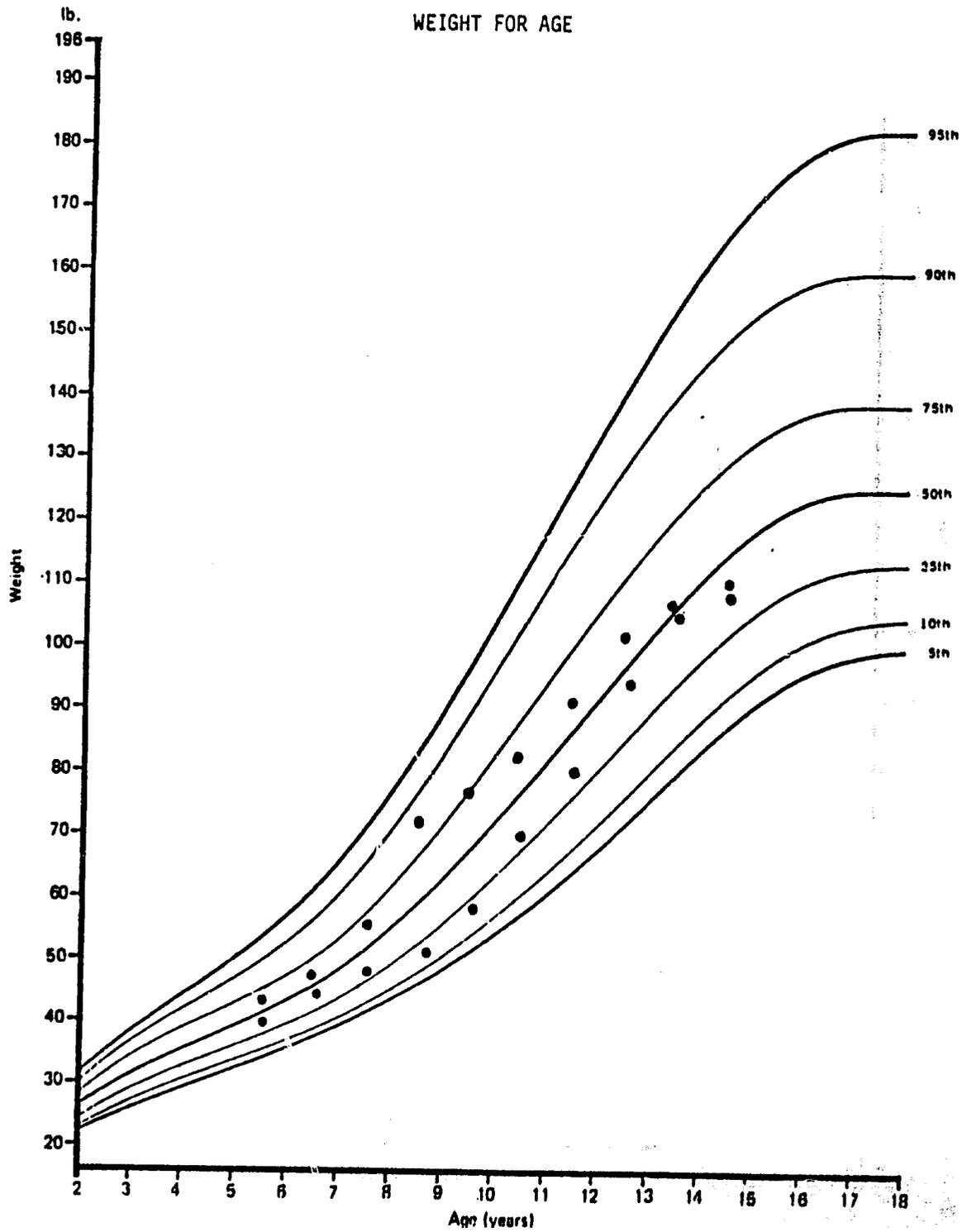


FIGURE P.1
MEAN WEIGHTS AND HEIGHTS FOR 122 GIRLS, 5 1/2 - 9 1/2 YEARS OLD,
ATTENDING SCHOOL IN KAMBIA, 1967 AND 42 GIRLS, 5 1/2 - 9 1/2
YEARS OLD ATTENDING SCHOOL IN NJALA, 1971

WEIGHT FOR STATURE

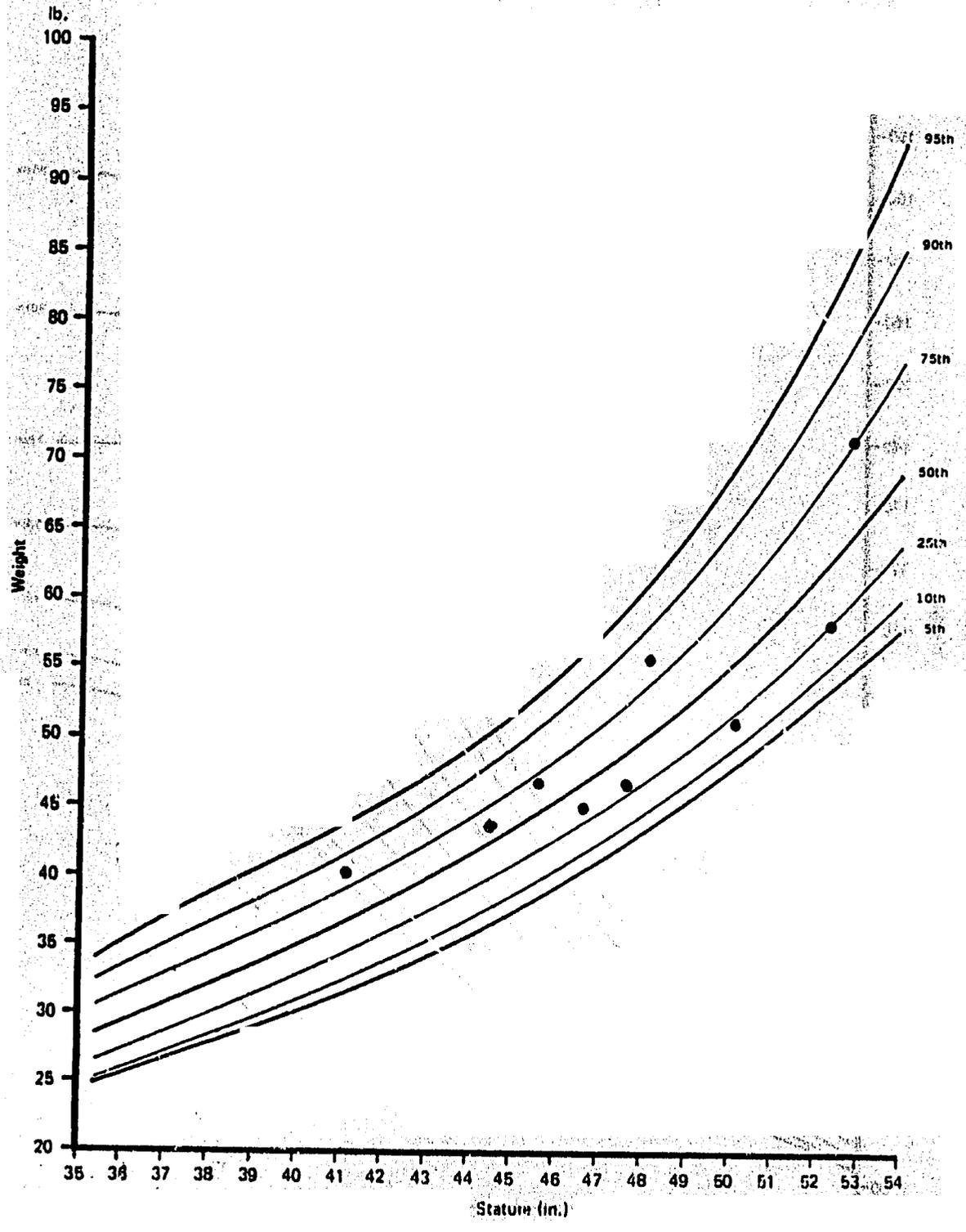


FIGURE F.8

MEAN HEIGHTS FOR 188 GIRLS, 5 1/2 - 14 1/2 YEARS OLD,
ATTENDING SCHOOL IN KAMBIA, 1967 AND 80 GIRLS,
5 1/2 - 14 1/2 YEARS OLD ATTENDING SCHOOL
IN NJALA, 1971

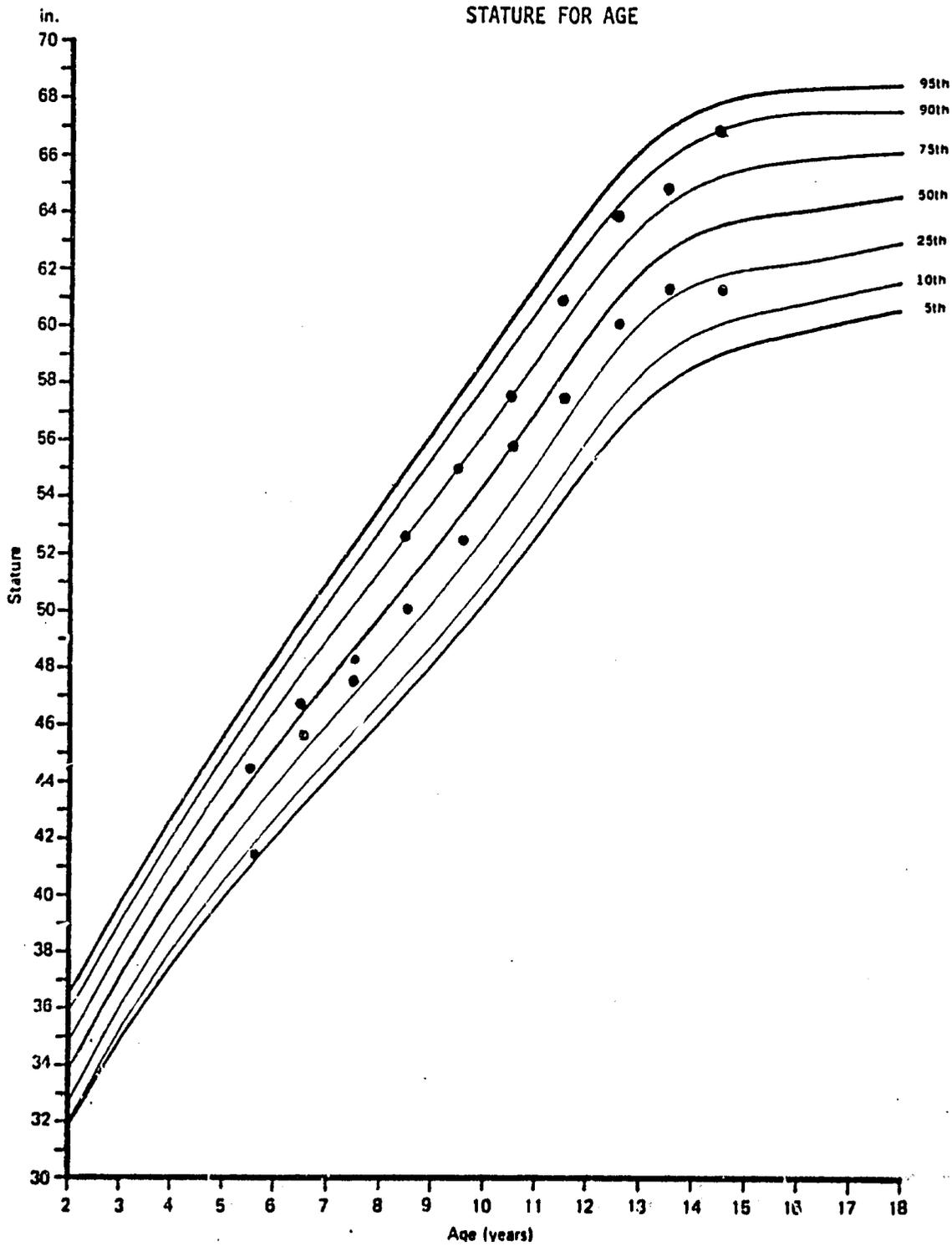


FIGURE F.9
MEAN HEIGHTS FOR 238 GIRLS, 5 1/2 - 17 1/2 YEARS OLD,
ATTENDING SCHOOLS IN MOYAMBA, MARCH, 1965
STATURE FOR AGE

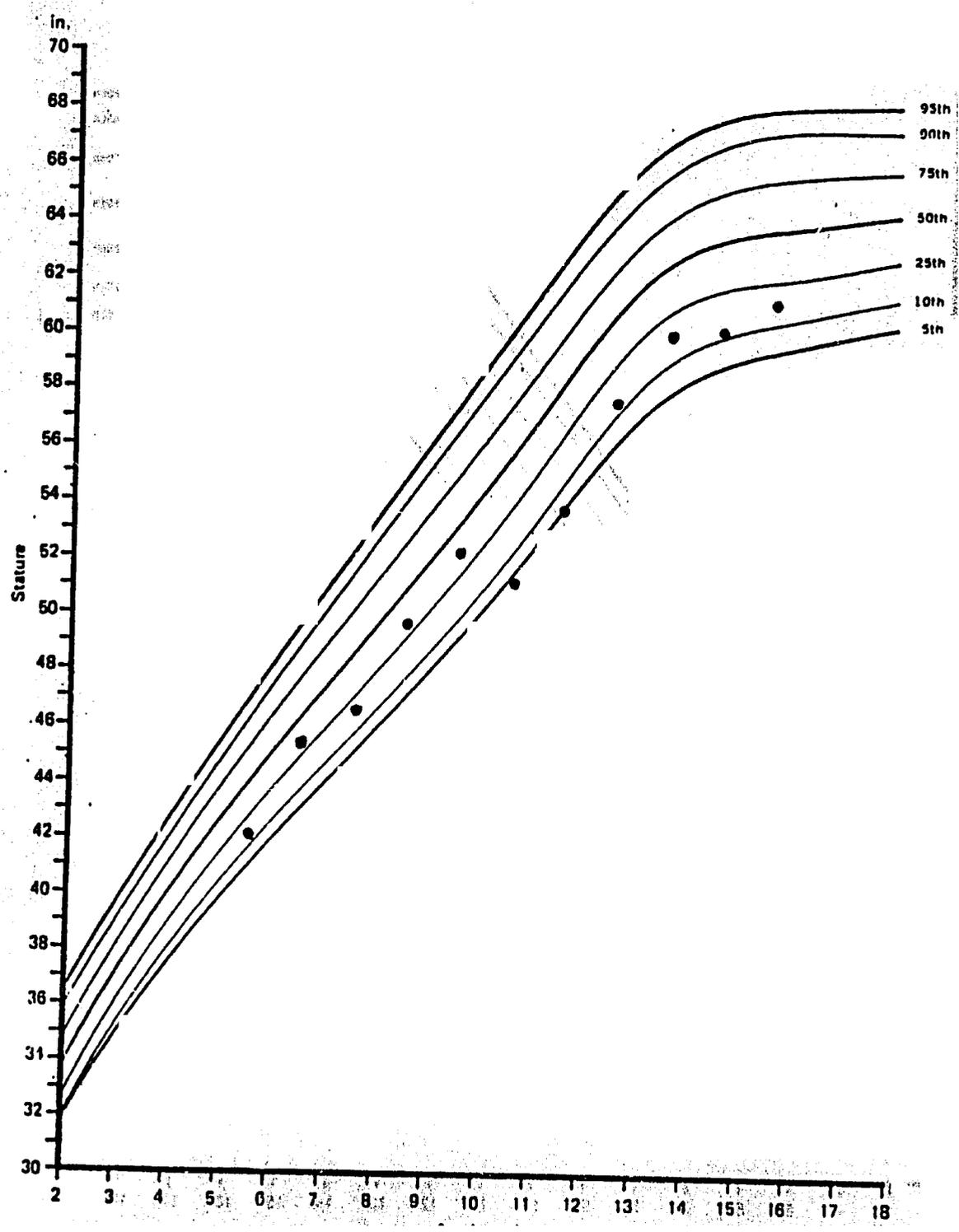


FIGURE F.10
MEAN WEIGHTS FOR 263 BOYS, 5 1/2 - 19 1/2 YEARS OLD,
ATTENDING SCHOOL IN MOYAMBA, OCTOBER, 1965
WEIGHT FOR AGE

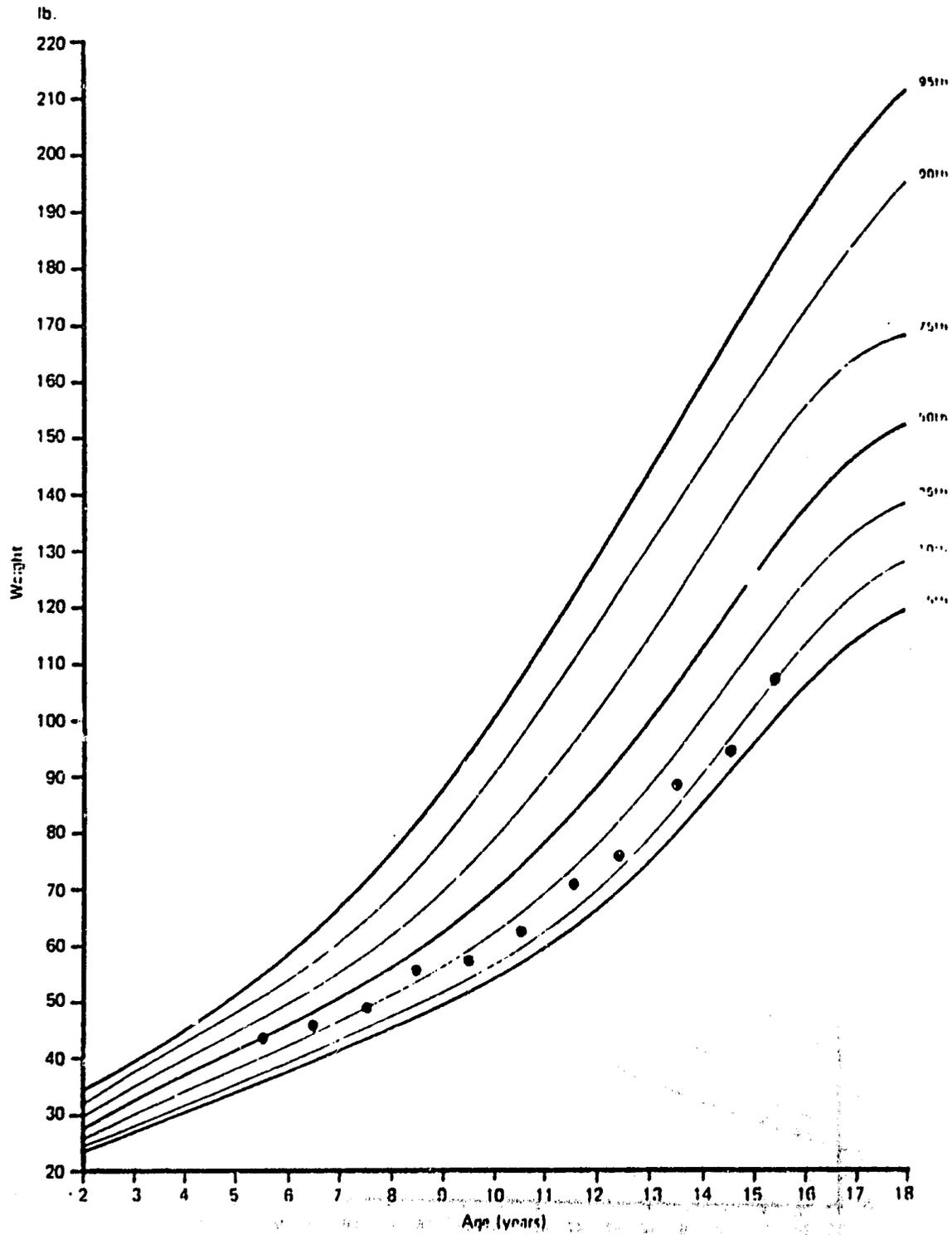


FIGURE F.11
 MEAN WEIGHTS AND HEIGHTS FOR 121 BOYS ATTENDING SCHOOL
 IN MOYAMBA, OCTOBER, 1965
 WEIGHT FOR STATURE

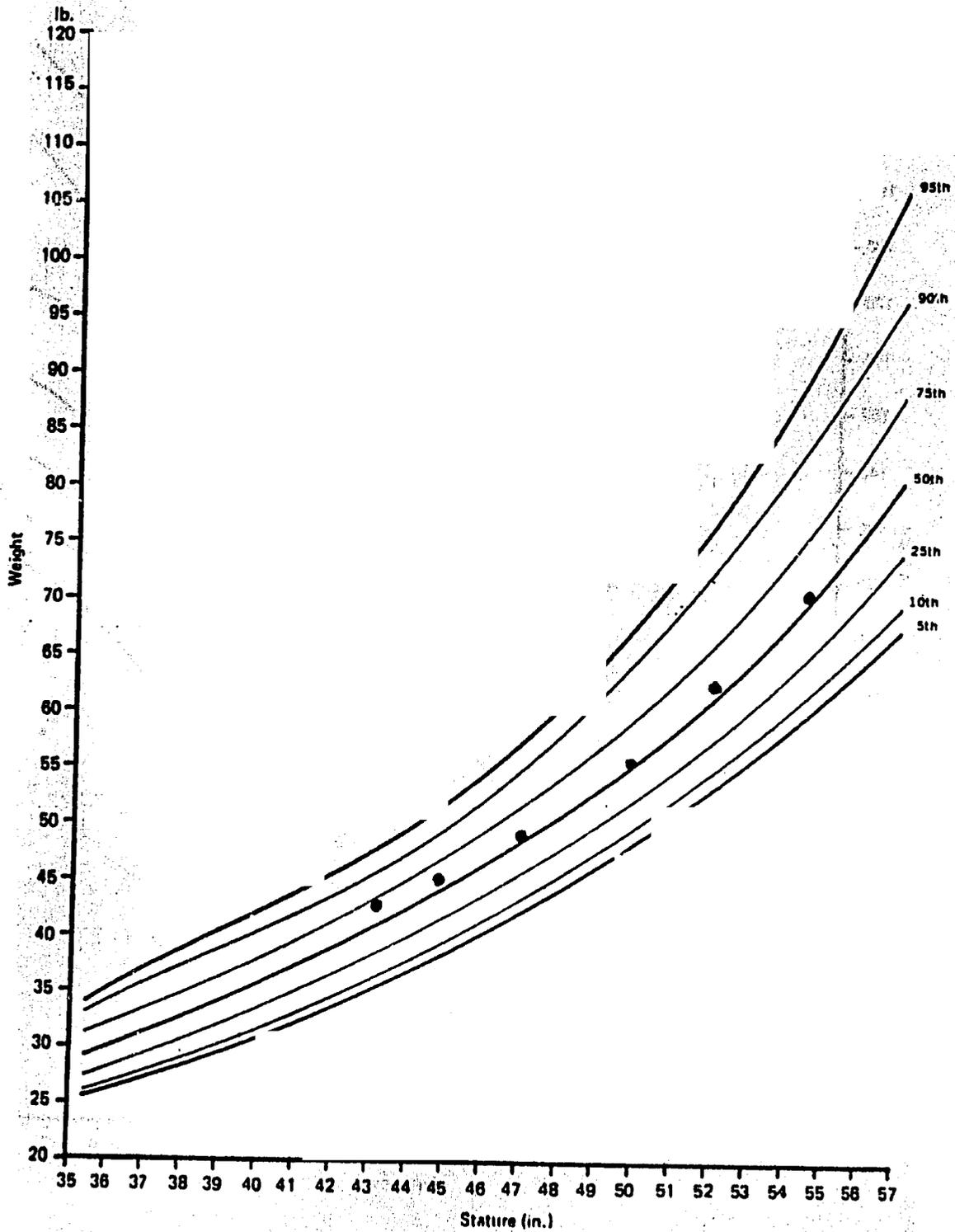


FIGURE F.12
MEAN HEIGHTS FOR 262 BOYS, 5 1/2 - 17 1/2 YEARS OLD,
ATTENDING SCHOOL IN MOYAMBA, OCTOBER, 1965
STATURE FOR AGE

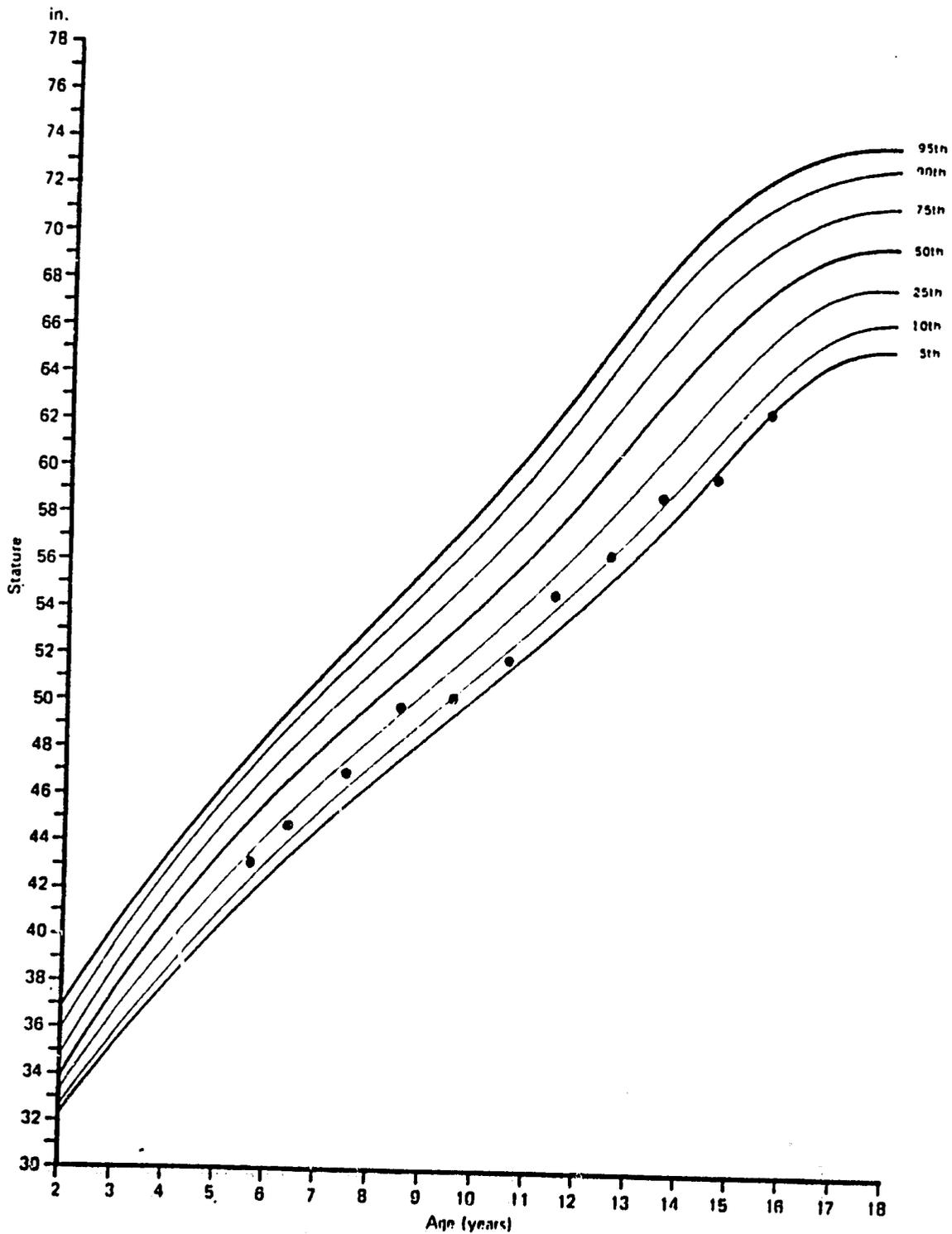


FIGURE 1.13
MEAN WEIGHTS FOR 594 BOYS, 5 1/2 - 16 1/2 YEARS OLD,
ATTENDING SCHOOL IN KAMBIA, 1976 and 133 BOYS,
5 1/2 - 15 1/2 YEARS OLD, ATTENDING
SCHOOL IN NJALA, 1971

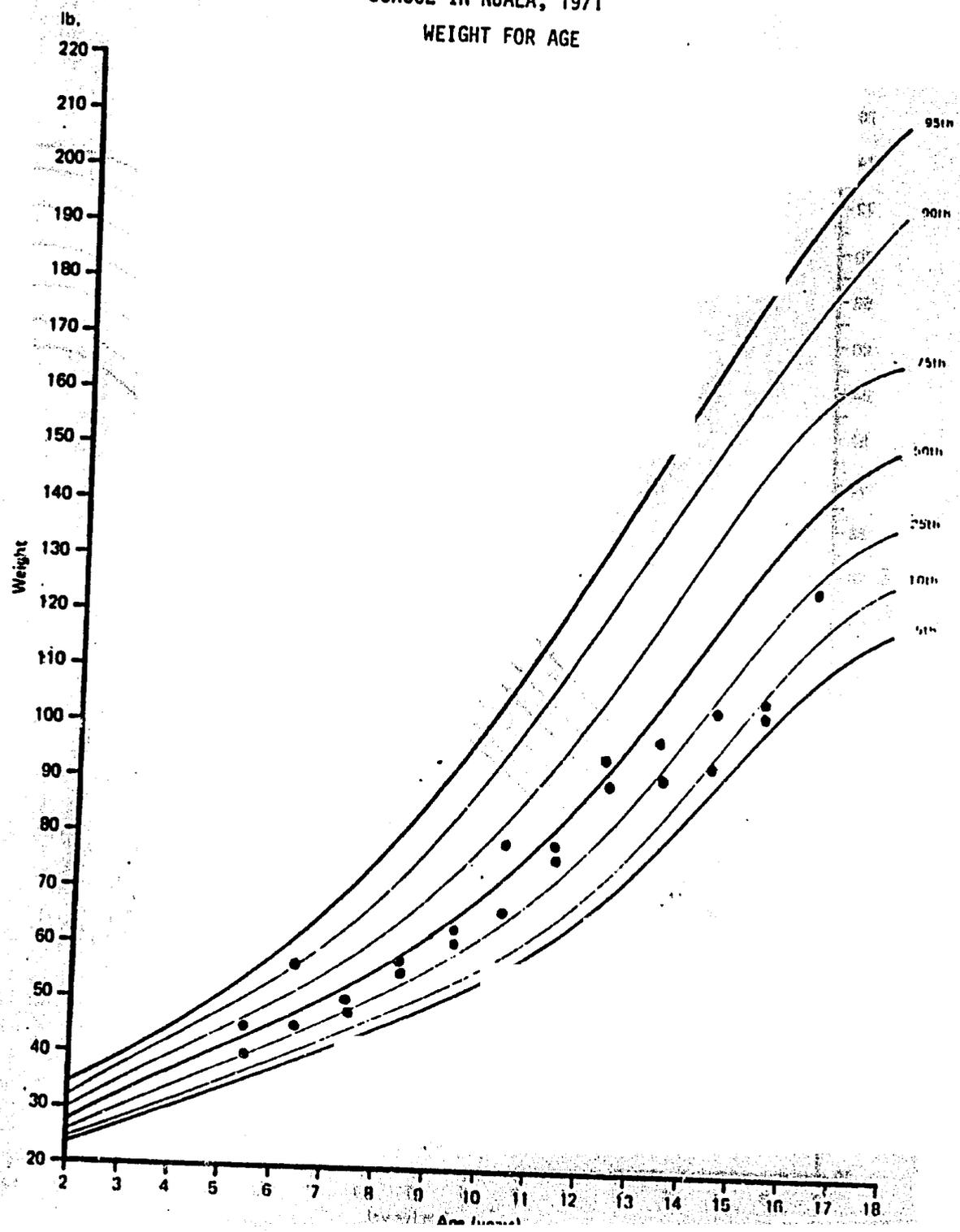


FIGURE F.14
MEAN HEIGHTS FOR 594 BOYS, 5 1/2 - 16 1/2 YEARS OLD,
ATTENDING SCHOOL IN KAMBIA, 1976 and 133 BOYS,
5 1/2 - 15 1/2 YEARS OLD, ATTENDING
SCHOOL IN NJALA, 1971
STATURE FOR AGE

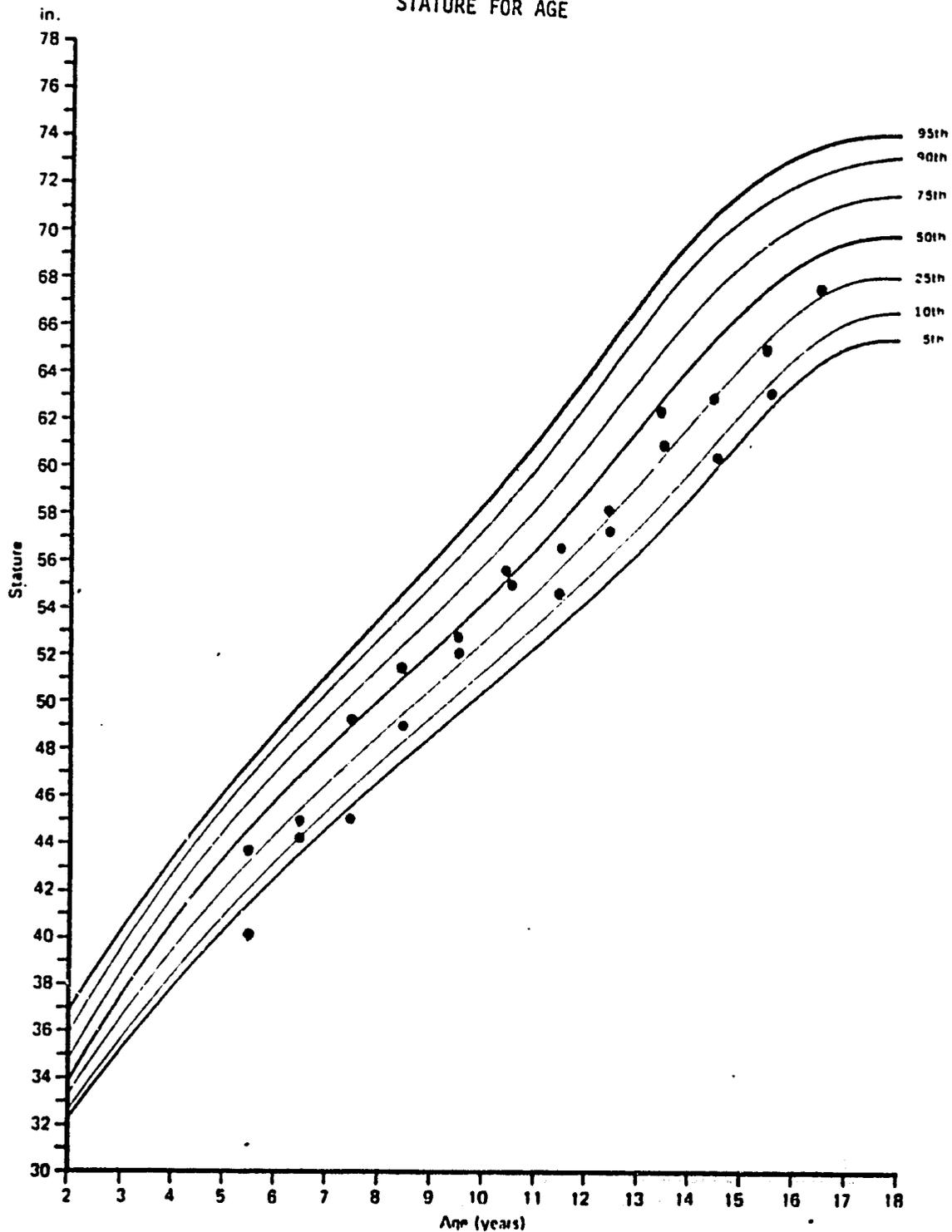
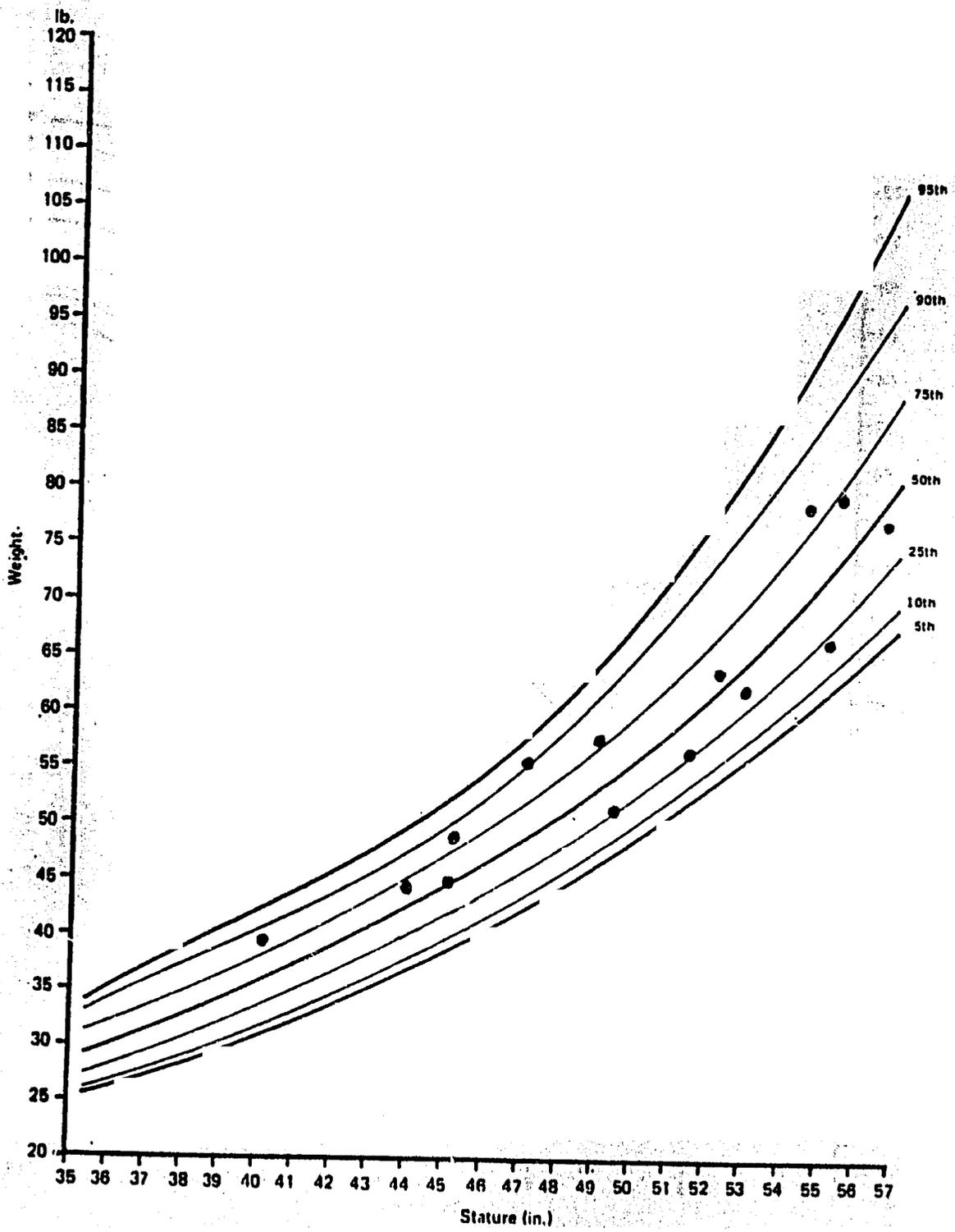


FIGURE F.19
MEAN WEIGHTS AND HEIGHTS FOR 475 BOYS, 5 1/2 - 11 1/2 YEARS OLD,
ATTENDING SCHOOL IN KAMBIA, 1967 AND 83 BOYS, 5 1/2 - 11 1/2
YEARS OLD, ATTENDING SCHOOL IN NJALA, 1971.
WEIGHT FOR STATURE



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