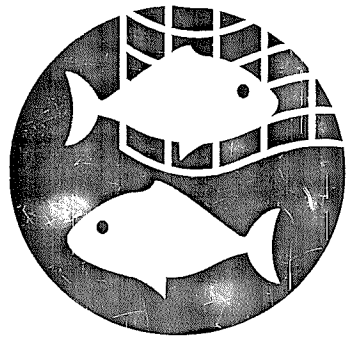
ISSN: 119-1449
Nigerian-German Kainji Lake Fisheries Promotion Project
Technical Report Series 3.

THE NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN, KAINJI LAKE COMMUNITIES, NIGERIA

A BASELINE SURVEY

by F. A. Adu

Nigerian-German (GTZ)
Kainji Lake Fisheries
Promotion Project



November, 1996

ISBN 978-037-002-1

New Bussa
Niger State
Nigeria

ISSN: 1119-1449
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Acknowledgements

Many thanks go to all the communities involved, particularly the district heads, mothers and children, for their co-operation, to the data collection team, comprising Ibrahim Yaro, Hauwa Idris, Shehu B. Issa, Aminat Wara, Ismaila Ishiaku, Fati Aliyu, A. S.Kasali, Hasiyat Daudu and Ishiaku Issah, to Bunmi Oyediran for the data entry, and to Marina Mdaihli, Project Adviser, Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project for her support in all stages of the survey. Thanks also to the Lafia PHC project for logistic support.

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Abbreviations

BCG	*Bacille Calmette Guerin*
BMI	Body Mass Index
DHS	Demographic and Health Surveys
DPT	Diphtheria Pertussis Tetanus
FAO	Food and Agriculture Organisation, United Nations
FOS	Federal Office of Statistics
GTZ	*Deutsche Gesellschaft fuer Technische Zusammenarbeit mbH*
IEC	Information Education Communication
KLFPP	Kainji Lake Fisheries Promotion Project
LBW	Low Birth Weight
LG	Local Government
NCHS	National Centre for Health Statistics (United States of America)
NIFFR	National Institute for Freshwater Fisheries Research
ORS	Oral Rehydration Solution
PEM	Protein Energy Malnutrition
PHC	Primary Health Care
SD	Standard Deviation
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Childrens Emergency Fund
WHO	World Health Organisation

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Abstract

This survey was carried out to provide the Kainji Lake Fisheries Promotion Project (KLFPP), whose overall goal is the improvement of the standard of living of fishing communities around Kainji Lake and an increase in the availability of fish to consumers, with nutritional status baseline data for long-term monitoring and evaluation of the overall project goal.

In a cross-sectional survey, baseline anthropometric data was collected from 768 children aged 3 - 60 months in 389 fisherfolk households around the southern sector of Kainji Lake, Nigeria. In addition, data was collected on the nutritional status and fertility of the mothers, vaccination coverage of children and child survival indicators. For control purposes, 576 children and 292 mothers from non-fishing households around Kainji Lake were likewise covered by the survey.

A standardised questionnaire was used to collect relevant information, while anthropometric measurements were made using appropriate equipment. Data compilation and analysis was carried out with DATAEASE® and EPI-INFO® software, using NCHS reference data for the analysis of anthropometric measurements.

The prevalence of stunted children in fishing households was high at 40%, while the prevalence of wasted and underweight children was likewise high at 10 % and 29 % respectively. Children from non-fishing households had a marginally lower prevalence of stunting, wasting and underweight with 37 %, 7 % and 25 % respectively, although these differences were not statistically significant. Considering the fact that the survey was carried out during a period of relative food abundance, the prevalence of wasting and underweight children is likely to be much higher during periods of food shortage. The prevalence of stunting, wasting and underweight was relatively high for children aged 3 to 23 months, suggesting an increased risk of malnutrition during this period, most likely associated with inadequate weaning practices.

The prevalence of malnourishment amongst women of child-bearing age was relatively high, irrespective of occupation of the household, with an average of 11 % undernourished and 6 % wasted.

Vaccination coverage was very low while infant and child mortality were extremely high with about 1 in 5 children dying before its fifth birthday.

Based on the ethical obligation to maximise the potential benefits of the survey, recommendations for activities to improve community nutrition and health were made for communication to relevant authorities.

1 Introduction

1.1 Kainji Lake Fisheries Promotion Project

The Kainji dam, constructed along the River Niger between 1964 and 1969, primarily for the purpose of hydro-electric power generation, resulted in the formation of the largest man-made lake in the country which is also one of the major sources of freshwater fish in Nigeria. Kainji lake has a surface area of 1270 km2 and approximately 250 rural communities of varying sizes located around it. Total population of these communities is approximated at 250,000 persons. More than half of the population belongs to the Hausa ethnic group, while other major ethnic groups are Lopawa, Gungawa and Nupe[1].

Together with the National Institute for Freshwater Fisheries Research (NIFFR) New Bussa, the Federal Department of Fisheries, and the State Fisheries Departments of Niger and Kebbi states, as the relevant authorities involved in various technical aspects of fishing and research activities on Kainji Lake, the German Ministry for Economic Co-operation, through its executing agency German Technical Aid (GTZ), initiated the Nigerian-German Kainji Lake Fisheries Promotion Project (KLFPP). The project, which commenced in 1993, has as its overall goal the improvement of the standard of living of fishing communities around Kainji Lake and an increase in the availability of fish to consumers. In order to achieve this goal, the project aims at increasing the quality and quantity of fish production of Kainji Lake on a sustainable basis.

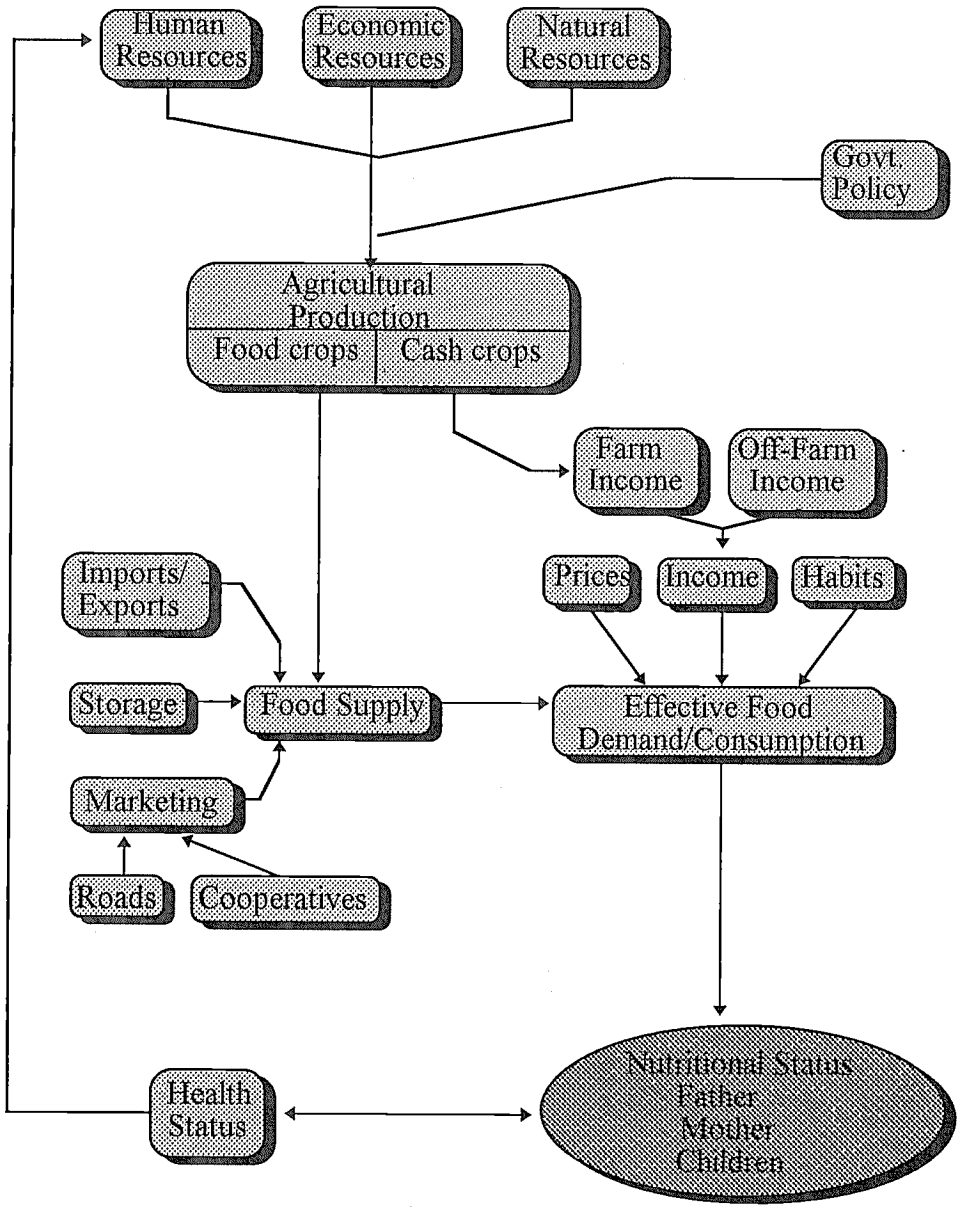
1.2 Nutritional aspects of rural development

The nutritional status of children has been repeatedly recommended and internationally accepted as a reliable indicator of the standard of living of a population. The use of anthropometric indicators is based on the extensively observed phenomena that a growing child who lacks an adequate intake of food and is repeatedly ill, does not have the body height corresponding to its genetic potential. Furthermore, inadequate food availability, basic education, income, delivery of health care services, housing and environmental conditions have proven to be underlying causes of inadequate food intake and repeated episodes of diseases. As a result, communities that are not able to satisfy their basic needs adequately generate higher proportions of individuals with inadequate anthropometric indices[2].

Indicators such as the level of income or of production alone, as are commonly used by various national and international institutions, do not suffice for making similar deductions, but improvements in these and in other sectors, as are being carried out by KLFPP can have impacts on the nutritional status, the level of which gives a more comprehensive and in depth picture of the overall standard of living.

The nutritional status of a population is influenced by a wide variety of factors which are all interdependent and directly or indirectly affect one another (Fig. 1)*

Fig. 1: Simplified model of factors affecting the nutritional status in a rural community



* see also Annex 6, pg. 37 for a hypothetical causal model of a nutritional situation

Factors affecting the nutritional status are found at the national level, and range through the regional, local, and household levels to the individual level. Programmes at any of these levels can affect the nutritional status, particularly that of children, who are among the most vulnerable of population groups. Positive effects of various programmes on the nutritional situation of a target group should not be assumed to occur automatically. The economic and social conditions of a region can change with no real impact on nutrition. Or even worse, the most well-intended development plans can have a negative effect on the nutrition of vulnerable groups[3]. For example, programmes which aim at increasing (agricultural) productivity, expanding marketing facilities, increasing income or developing infrastructure may reach all these goals but may not have a positive impact on the nutritional status, especially of young children, if certain factors are not taken into consideration. Examples of questions that need to be asked are:

- If the increase in agricultural production is in the sector of cash crops, does this affect the production and availability of food crops?
- Who receives the increase in income and what is it likely to be used for?
- What are the local customs as regards the sharing of food within a family?

Therefore, nutritional aspects need to be considered in the planning, implementation, monitoring and evaluation of rural development projects, particularly if the project in question is not directly aimed at an improvement of the nutritional situation, but may nevertheless have an impact on nutrition, as is the case with KLFPP. The project should be evaluated as to whether its impact on the nutritional situation is positive, neutral or negative. To this end, baseline data on the nutritional status of the target population has to be collected.

1.3 Survey purpose and objectives

Purpose of the survey was to provide baseline data for long-term monitoring and evaluation of the overall project goal which is the improvement of the standard of living of the fishing communities around Kainji Lake.

Besides the collection of baseline data on the nutritional status of pre-school children and women in the project area, data on fertility and child survival was also collected, to serve as proxy indicators of the standard of living.

1.4 Review of previous nutritional surveys

A health survey[4] carried out in 1983 presents some of the earliest available records of anthropometric data and nutritional status of communities, including pre-school children, around Kainji Lake. However, due to the relatively small sample size of pre-school children (n=71) and the type of standards and indices used in the interpretation of anthropometric measurements, it would be misleading to draw comparisons to other studies with larger sample sizes and other standards or indices.

A more recent study[1] carried out in 1995 examined the nutritional habits and the food consumption pattern of communities around Kainji Lake and the possible impact of planned KLFPP activities on the nutrition situation of target communities, particularly in respect of consumption of small fish. Results on nutrition of infants and young children showed almost universal breastfeeding and the virtual absence of the use of infant formulas or dried milk products. However, the traditional and widely used weaning food of sorghum, millet, maize or rice porridge was found to be of very low caloric value (30 -35 kcal/100 ml). The point and period prevalence of diarrhoea amongst children of fishermen was high at 40.3 % and 60.1 % respectively. Corresponding figures for children of non-fishermen stood at 26.4 % and 48.0 %.

A nutrition survey[5] carried out in June/July 1996 and covering Borgu L G, which is one of the L G's bordering on the western shore of Kainji Lake, provides the most recent local anthropometric data. The prevalence of stunted children in Borgu L G was 43 % (including 17 % severely), while the prevalence of wasted and underweight children was extremely high at 26 % (incl. 13 % severely) and 56 % (incl. 23 % severely) respectively. It must be noted however that this survey was carried out during the planting/pre-harvest season when food shortage in the area is usually at its peak[1,5] and subsequently, wasting and underweight are likely to be at their highest. The risk of protein-energy-malnutrition (PEM) appeared to be highest for infants during the weaning period i.e. age 4 to 18 months and for children in their third year of life (24 to 35 months), as a result of the birth of the next child. Apart from the prevalence and distribution of chronic and acute malnutrition, the survey report also provides

information on nutrition habits, nutrition knowledge and relevant socio-economic data of the population as well as on point and period prevalence of specific diseases affecting pre-school children.

On the national level, the most recent quantitative information available on the nutritional status derives from a survey carried out in 1990 by the Federal Office of Statistics[6] and showed 43.0 % of children below the age of five years to be stunted (including 22.0 % severely), 9.1 % to be wasted (include. 1.8 % severely) and 35.7% to be underweight (incl. 12% severely). However, large regional differences in the prevalence of the various forms of malnutrition were observed, with higher prevalence in the northern regions and amongst rural dwellers.

2 Methodology

2.1 Study design

Nutritional status of a representative cross-sectional sample of fisherfolk children between 3 and 60 months of age was determined through anthropometric measurements of weight and height as related to age, using appropriate equipment.

A standardised questionnaire was used to collect information on occupation of head of household, fertility patterns, child survival, visual signs of malnourishment and vaccination status of children.

Taking an expected underweight prevalence of approximately 40 % amongst children aged 3-60 months in the survey area, based on previous national and regional figures [6], the number of children to be measured was calculated as follows [2]:

$$n = \frac{4 \times p \times (100-p)}{25}$$

n = number of children

p = expected prevalence

$$n = \frac{4 \times 40 \times (60)}{25} = 384$$

Tolerated sampling error and confidence level for this number of children lie at 5 % and 95 % respectively [7].

As cluster sampling was used, the calculated number of children to be measured was multiplied by a design factor of 2.

$$384 \times 2 = 768 \text{ children}$$

An average of 2 children below the age of five years was to be expected per household* around Kainji Lake[1]. Thus, total number of fisherfolk households to be sampled in the project area in order to cover the required number of children for anthropometric measurements was:

768/2 = 384 households (fishing)

For control purposes, data was likewise collected from children with comparable demographic and socio-economic characteristics who however lived in households within the project area that were not directly influenced by project activities i.e. children of non-fisherfolk** . This enables follow-up studies to control for any external factors other than project activities which may have had an impact on the nutritional situation of the population as a whole, irrespective of occupation e.g. climatic conditions and which may either counteract or enhance project activities and effects.

For the control group, a design factor of 1.5 was used.

384 x 1.5 = 576 children

in

576/2 = 288 households (non-fishing)

Total number of children sampled was 768 + 576 = 1344 children.

* a household is defined as all persons for whom meals are prepared using the same cooking facilities.

** non-fisherfolk is defined as those (head of) households whose main occupation is not fishing.

2.2 Sample selection

The lake was divided into two sectors, northern and southern, which are fairly homogenous as regards demographic and socio-economic characteristics. For logistical reasons the southern sector was chosen for sample selection. Of the 120 villages in the southern sector, 50 (approx. 40 %)were on the western shore while 70 (approx. 60 %) were on the eastern shore of the lake. Altogether, 56 villages were randomly selected by ballot, with 22 on the western and 34 on the eastern shore, reflecting the distribution density along the two shores.

In each village selected, an average of 24 children was sampled. A daily tally was taken to ensure that on the whole, about 60 % of children were selected from fishing households and about 40 % from non-fishing households, reflective of the proportion of each group in the total sample of children.

2.3 Questionnaire design

The questionnaire was written in English and translated into Hausa and back into English and carefully reviewed to eliminate any misinterpretations. This exercise was jointly carried out by all enumerators involved in the data collection. A pre-test of the questionnaire was carried out for a total of 18 children and 10 mothers, based on which some minor readjustments were made.

2.4 Equipment and measurements

The following equipment was used for making the required measurements:

- a Salters spring scale, 235-6S 25 kg Model, calibrated from 0 - 25 kg in 100 g subdivisions for the children's weight. The children were suspended in specially made cotton shorts.

- a standard bathroom scale, measuring up to 120 kg, calibrated in 1 kg subdivisions for the mothers weight.

- a height/length measuring board* with moveable headpiece, measuring up to 120 cm, calibrated in 1mm subdivisions, for measuring children's height/length.

- a measuring stick with moveable headpiece and attached measuring tape of up to 2m, calibrated in 1mm sub-divisions, for measuring mothers height.

As four sets of measuring apparatus were used, these were regularly calibrated individually and against each other to prevent errors due to incompatible settings.

2.5 Training of survey staff

The enumerators were trained* and supervised to ensure that correct procedures for sample selection were carried out, the questionnaire was administered properly, and measurements were made and recorded according to standard procedure.

2.6 Data collection and analysis

Data collection was carried out in two phases. The first phase was carried out from base camps located in Warra (eastern shore, 16 villages), and Shagunu (western shore, 13 villages) by the author and four teams each consisting of one female enumerator and one male enumerator. The second phase covered the other 27 selected villages on both shores with the four teams returning to New Bussa on a daily basis. Co-operation of mothers and the communities in general was very good, enhanced by the prior informative visits to the various (sub-) district heads. In most villages, only female enumerators were allowed to enter the compounds, in line with local custom and religion.

Questionnaires were edited in the field by the author to enable correction of any errors before submission for data entry into computer, which was done using a specially designed DATAEASE® entry programme.

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* made locally following intructions given in FAO manual [7]
* see Annex 4, pg. 35 for Training Workshop Programme

Subsequent to data entry, a 100 percent computer edit was carried out to cross-check for incorrect data collection and erroneous data entry. Corrections were made by referring to the original questionnaires. A 100 percent verification of the entered data was carried out.

Data analysis was also done with a specially designed DATAEASE® analysis programme. The anthropometric measurements were analysed using reference values of the NCHS reference population, which were incorporated in the database. The NCHS reference population has been adopted by WHO as the international anthropometric reference. The US children measured for this reference population are assumed to be well nourished , and the NCHS is an easily accessible well documented anthropometric database. Studies of children from socio-economically better-off children in developing countries, regardless of ethnic group, show that anthropometric measurements, including height, are similar to those of children from developed countries[8]. It is therefore reasonable to use the NCHS data as a reference population for analysing anthropometric data from developing countries. Furthermore, the use of a reference population does not imply that the population is a standard or goal which all other populations should attempt to attain but rather, a point of reference to which other populations can be compared [9,10].
Significance testing was done using the EPI-INFO® statistics programme.

2.7 Ethical considerations

It is an established fact that children between the ages of 3 and 60 months are most vulnerable to nutritional deprivations, due to their rapid growth rate and dependence on other members of the family. The nutritional status of a community is thus best reflected by the nutritional status of the children in this age group. Apart from serving as baseline data for monitoring and evaluation of project impact, the results were also used to make recommendations for appropriate intervention strategies towards improvement of the nutritional and health situation by the relevant authorities, to the benefit of the communities involved in the study.

Several issues were considered as specified below:

- informed consent was sought through communication with community representatives and on an individual level as applicable, with accompanying clarification on purpose and nature of the study and benefits intended to result from the study. Each (sub-) district head was visited some days prior to data collection, to ask for permission and assistance for carrying out the interviews.

- utmost care was taken not to transgress local values and norms as they apply to the sampled individuals and the communities as a whole. It was, for example, generally forbidden by religion for mothers to be visited by male enumerators. Such interviews were always carried out by or in the presence of female interviewers.

- confidentiality of data was ensured through proper training of survey personnel and handling of collected information.

3 Results

A total of 681 households (389 fishing, 292 non-fishing) were visited and data was collected from 1,344 children (768 from fishing, 576 from non-fishing households) and 681 mothers. The gender and age group distribution of the children is presented below.

Table 1: Gender and age group distribution of sample children, Kainji Lake area, 1996

	Gender				Age group (months)									
	male		female		3-11		12-23		24-35		36-47		48-60	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Fishing	389	51	379	49	154	20	144	19	122	16	164	21	184	24
Non-fishing	297	52	279	48	114	20	106	18	98	17	107	19	151	26

3.1 Nutritional status of children

This section presents the nutritional status of pre-school children, which reflects the nutritional situation of the communities as a whole. The indices and cut-off points for the estimation of nutritional status are as follows:

Weight for height, which reflects the level of nutritional wasting. Wasting occurs when a child's weight for height falls below what is expected of a child of the same length or height when compared to the reference population. Children with a value below - 2 s.d.* (i.e. below approximately. 82 % of the standard weight for height) are considered to be wasted, while those below - 3 s.d. (approx. 73 %) are severely wasted. Wasting infers acute undernutrition and causes include current inadequate food intake, incorrect feeding practices, infection or a combination of these factors. It is sensitive to short-term factors such as seasonal food availability or disease prevalence.

* -2 s.d. = minus 2 standard deviations, a statistical cut-off point.

Height for age, which reflects the level of nutritional stunting. Stunting is indicated by low height for age and results in a failure of achieving the expected stature as compared to a child of the same age in the reference population. Children with a value below - 2 s.d. (i.e. below 92 % of the standard height for age) are considered to be stunted (severe stunting below - 3 s.d., approx. 88%). Stunting is an indicator of chronic undernutrition and is associated with a number of long term factors such as chronic insufficient protein energy intake, frequent infection, sustained incorrect feeding practices and low socio-economic family status.

Weight for age, which determines the level of undernourishment (underweight) and can be considered as a combination of nutritional stunting and wasting. A value of below - 2 s.d. (i.e. below approximately 79 % of the standard weight for age) infers that the child is underweight, while a child below -3 s.d. (i.e. below approximately 69 %) is severely underweight. Weight for age data are used in the child health charts for individual growth monitoring of children.

The presented figures and tables are discussed later in Section 4.

Figure 2: Proportion of malnourished children by age group, fishing households, Kainji Lake area, 1996

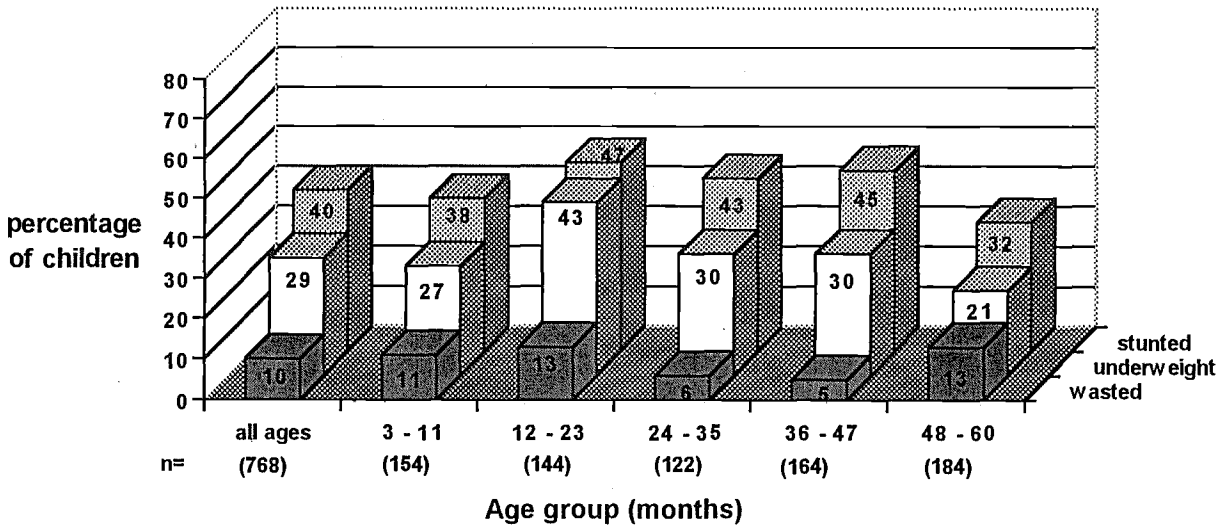


Figure 3: Proportion of malnourished children by age group, non-fishing households, Kainji Lake area, 1996

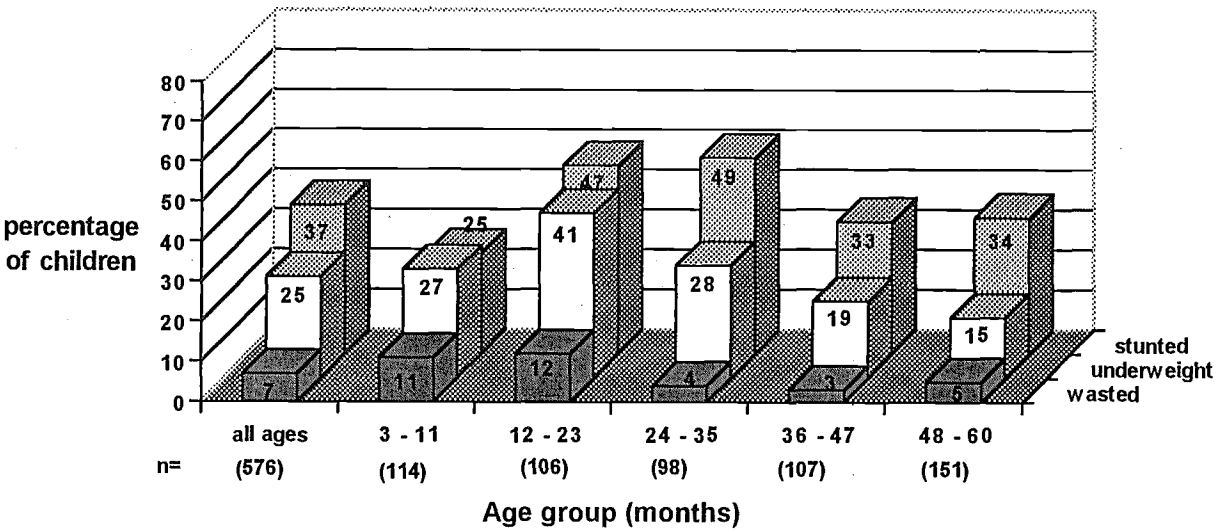


Figure 4: Proportion of malnourished children by gender, fishing households Kainji Lake area, 1996

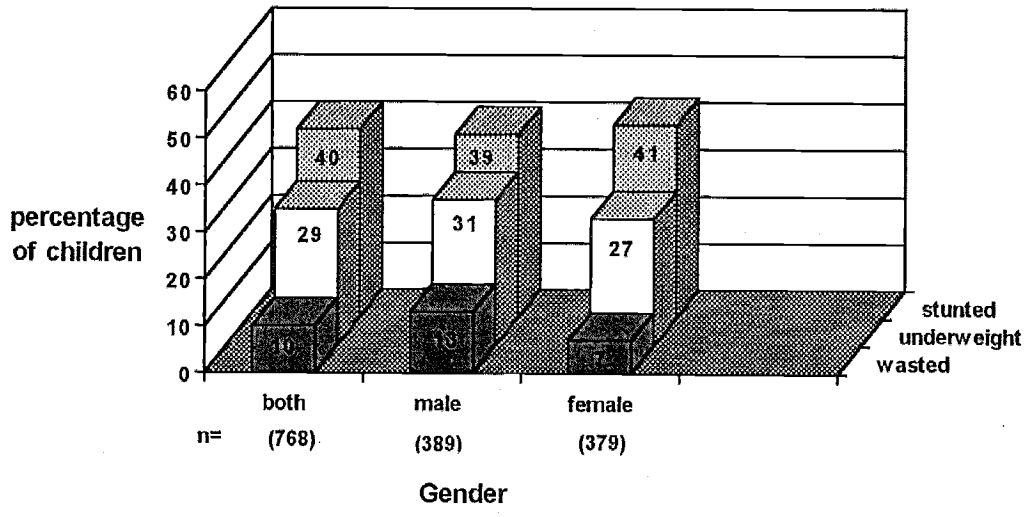


Figure 5: Proportion of malnourished children by gender, non-fishing households Kainji Lake area, 1996

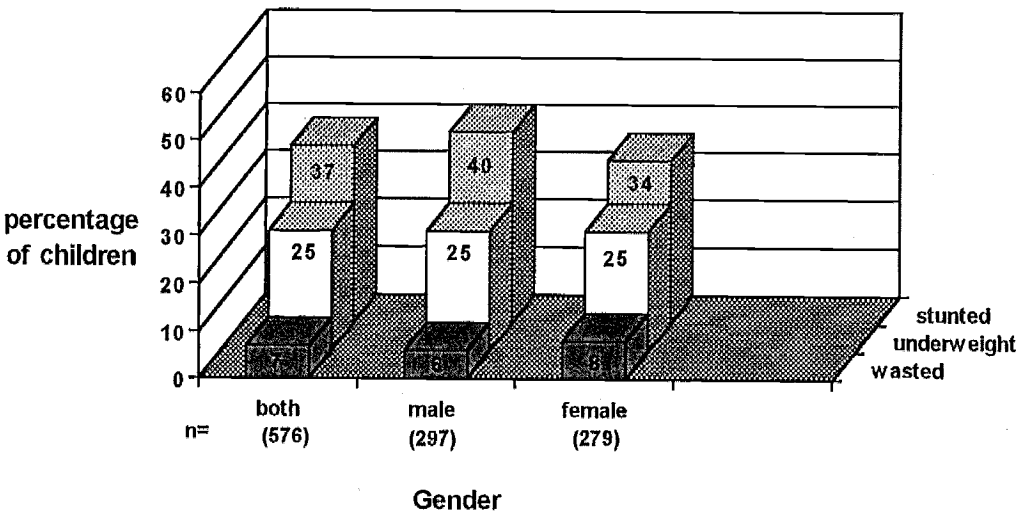


Figure 6: Mean weight by age of children, fishing households, Kainji Lake area, 1996

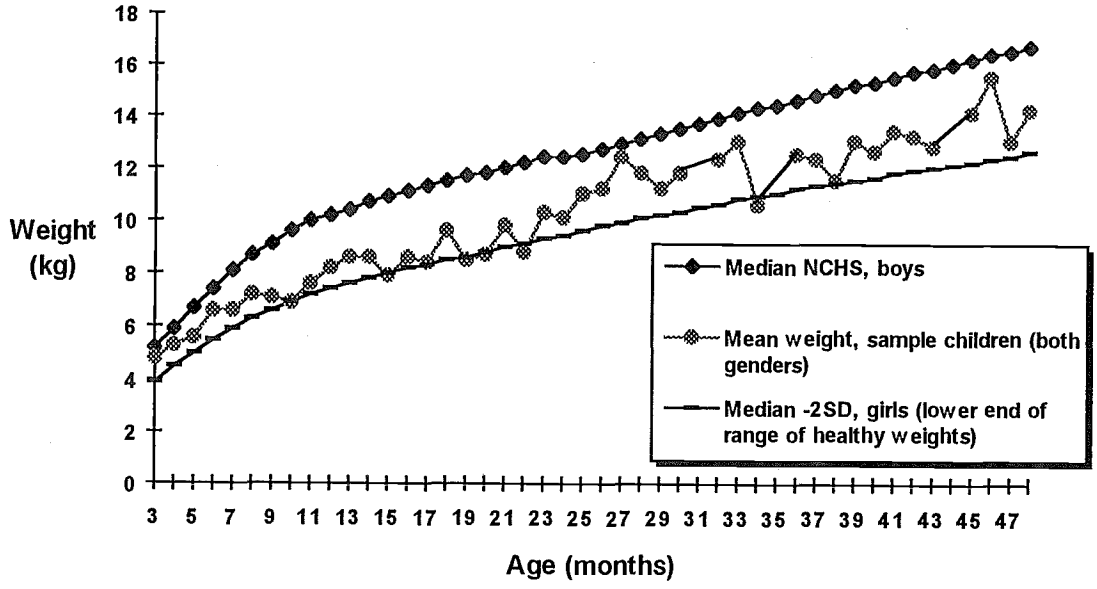


Figure 7: Mean weight by age of children, non-fishing households, Kainji Lake area, 1996

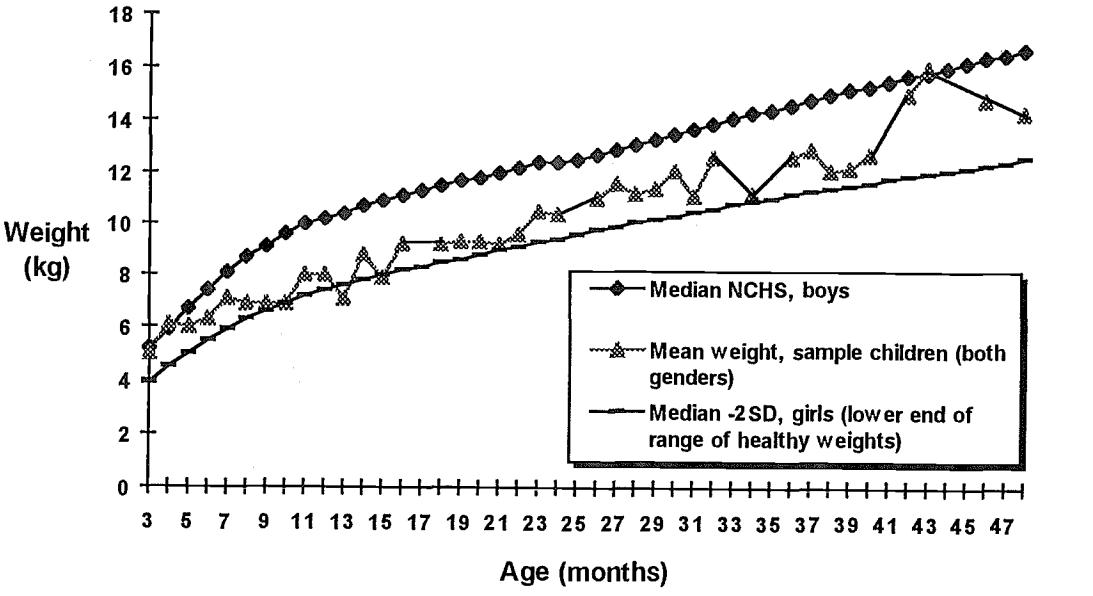


Figure 8: Weight for height curve of children, fishing households, Kainji Lake area, 1996, in comparison to the NCHS standard

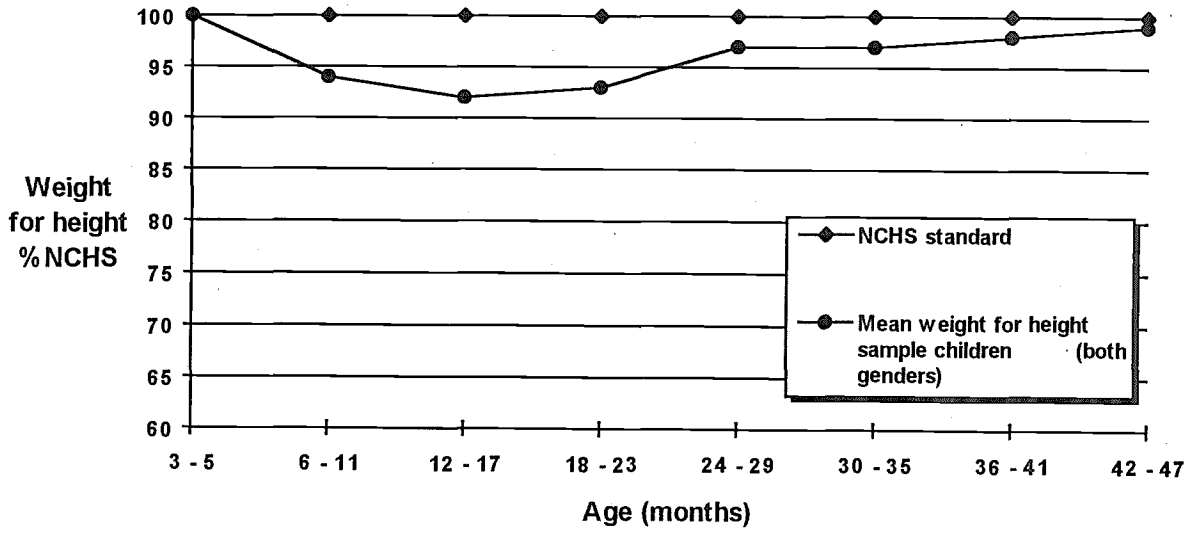


Figure 9: Weight for height curve of children, non-fishing households, Kainji Lake area, 1996, in comparison to the NCHS standard

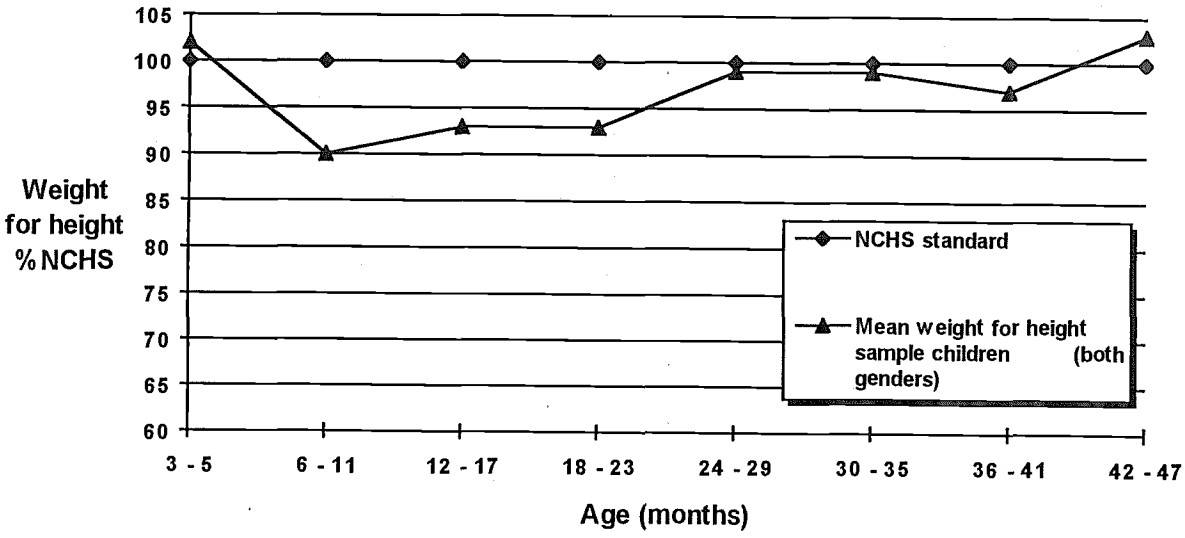


Figure 10: Height for age curve of children, fishing households, Kainji Lake area, 1996, in comparison to the NCHS standard

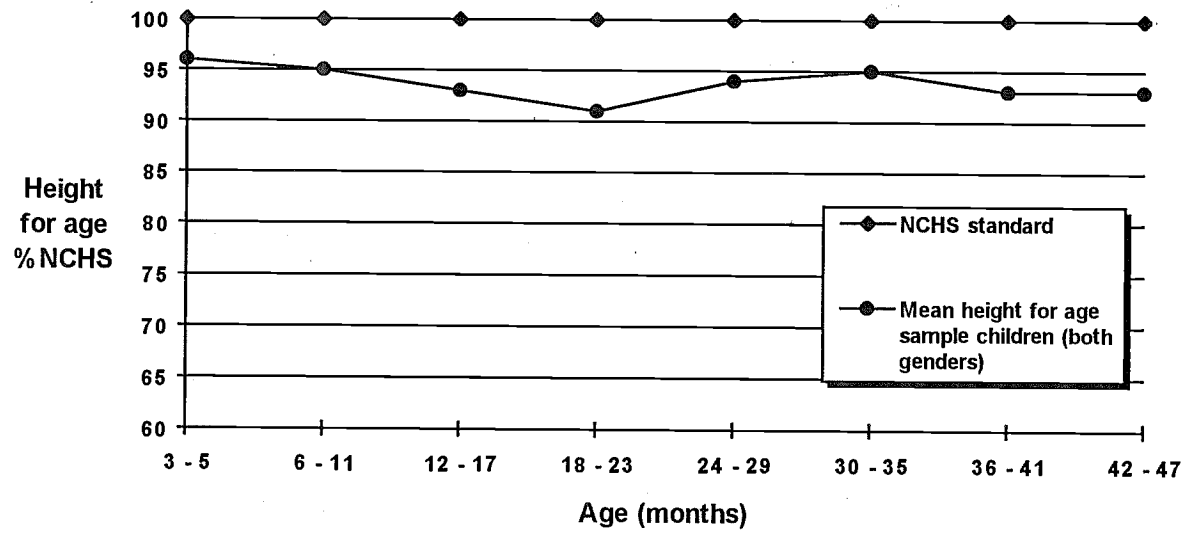


Figure 11: Height for age curve of children, non-fishing households, Kainji Lake area, 1996, in comparison to the NCHS standard

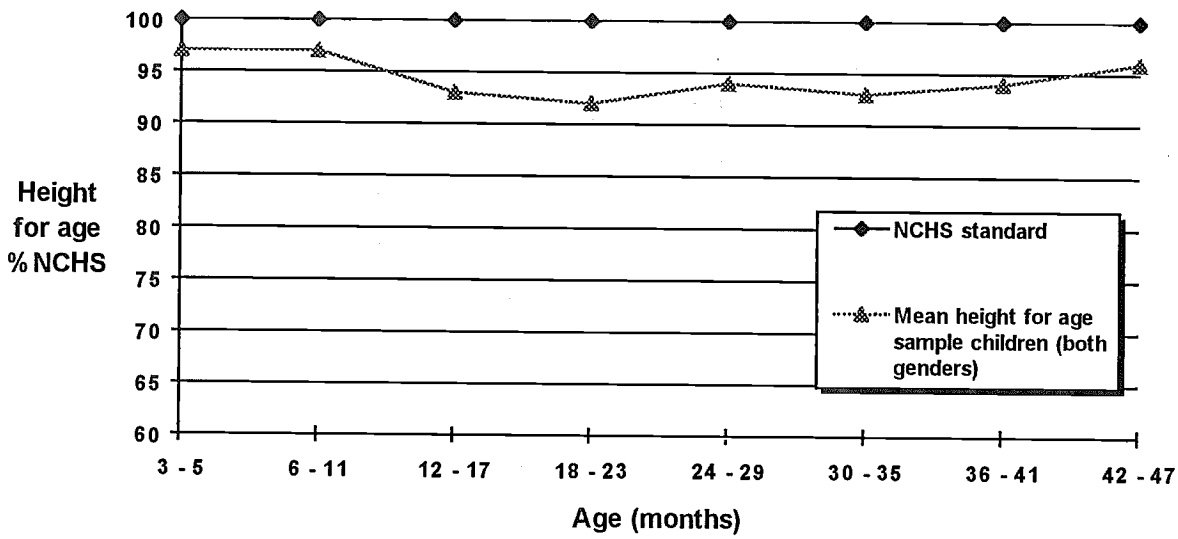


Figure 12: Weight for age curve of children, fishing households, Kainji Lake area, 1996, in comparison to the NCHS standard

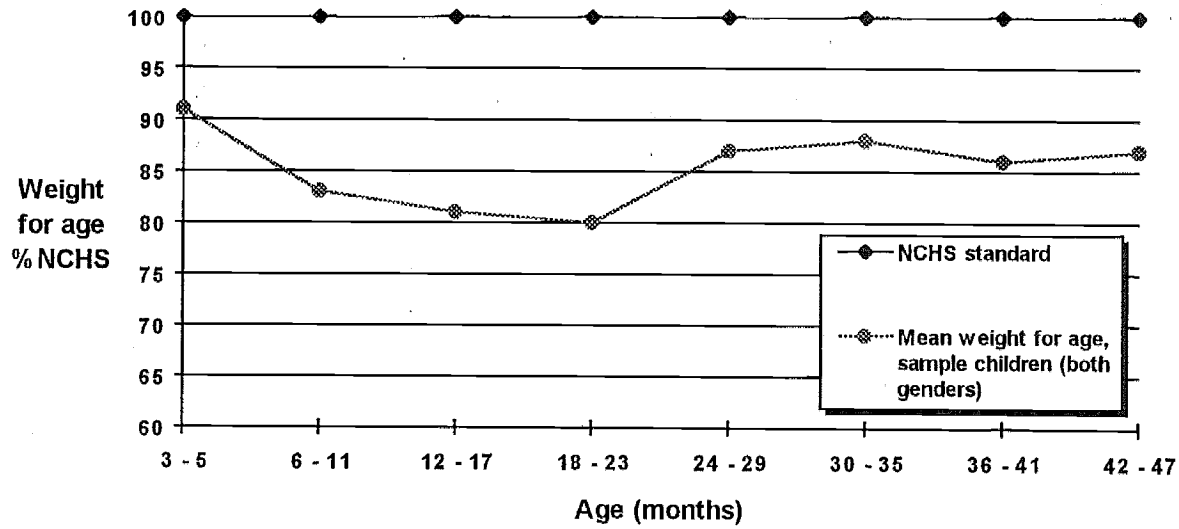
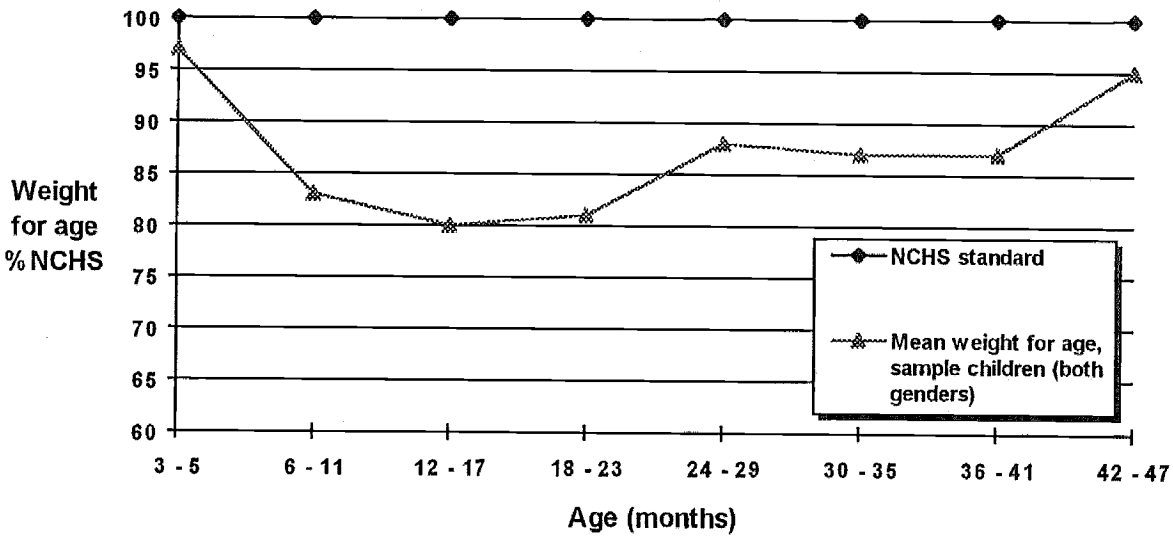


Figure 13: Weight for age curve of children, non-fishing households, Kainji Lake area, 1996,

in comparison to the NCHS standard



3.2 Nutritional status of women of child bearing age

The body mass index (BMI)* was used to asses the nutritional status of women of child bearing age. A BMI of less than 18.5 kg/m^2 infers undernourishment. Other anthropometric cut-off points frequently used for women are 145 cm for stunting (height) and 45 kg for wasting (weight), values below which a satisfactory pregnancy outcome may be at risk.

Table 2: Anthropometric data of women of child bearing age, Kainji Lake area, 1996

	BMI < 18.5 kg/m^2		Height < 145 cm		Weight < 45 kg		Mean BMI	Mean Height	Mean Weight
	(n)	(%)	(n)	(%)	(n)	(%)			
Fishing	40	10	3	1	26	7	21.3 ± 2.6	158.58 ± 6.08	53.63 ± 7.32
Non-fishing	34	12	0	0	15	5	21.5 ± 2.7	159.79 ± 5.90	54.91 ± 7.55

3.3 Vaccination coverage of children

The child health card, which should usually be given to children seen in government health centres, is meant for recording information on the child's vaccination record as well as other important data such as the child's birth weight, growth rate and major periods of illness during the first five years of life. It also gives instructions to mother's on how to prepare an oral rehydration solution (ORS) to counteract the effects of diarrhoea in children.

Figures of the overall and age-group specific percentage of children fully vaccinated** could not be calculated for the sample, as too few children possessed a record of vaccination i.e. child health chart (Tab. 3) to allow for relevant statistical analysis.

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* BMI = Weight (kg)/[Height (m)]^2

** to be considered as fully vaccinated, a child should have received the following vaccinations by 12 months of age: BCG, measles and three doses each of DPT and polio.

Table 3: Distribution of children by availability of child health card, Kainji Lake area, 1996

	Health card available					
	yes		no		lost	
	(n)	(%)	(n)	(%)	(n)	(%)
Fishing	23	3	738	96	7	1
Non-fishing	31	5	536	93	9	2

The BCG vaccination, which leaves an easily recognisable scar on the upper arm was used as proxy indicator of vaccination coverage. Comparative data for Borgu L.G. showed 64 % of all pre-school children as having the BCG scar, and 15 % of children being fully immunised.

Table 4: Distribution of children by presence of BCG scar, Kainji Lake area, 1996

	BCG scar present			
	yes		no	
	(n)	(%)	(n)	(%)
Fishing	146	19	622	81
Non-fishing	109	19	467	81

3.4 Fertility and infant/child mortality indicators

Almost all deliveries by interviewed mothers took place at home (99 % for both fishing and non-fishing households), with only 1 % of deliveries carried out in government health centres. Reliable official records of infant/child* deaths were not readily available. Consequently, calculation of the birth and infant/child mortality rates by conventional methods was not possible. As such, the figures presented below serve as proxy indicators of fertility and child mortality.

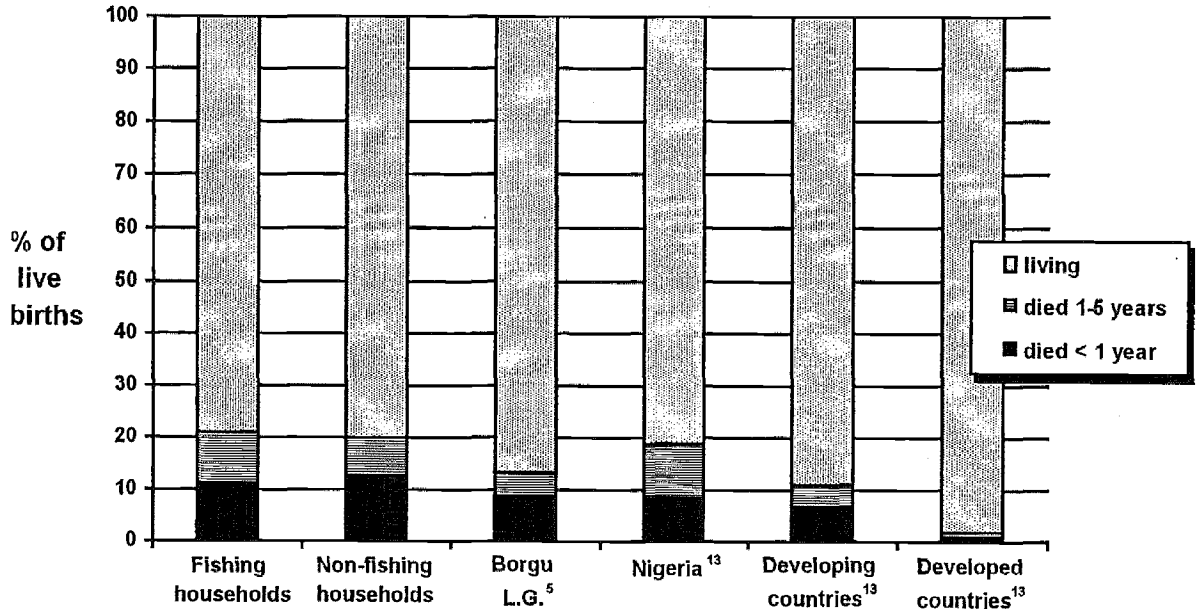
* Infant defined as under one year of age; child defined as under five years of age.

Table 5: Fertility indicators of women of child bearing age, Kainji Lake area, 1996

	Age[a] (years)			Age[b] (years) first delivery			Number of children delivered[c]		
	Average	min.	max.	Average	min.	max.	Average	min.	max.
Fishing	26.3 ± 6.7	17	42	17.2 ± 1.9	13	20	4.7 ± 2.7	1	16
Non-fishing	28.3 ± 7.1	17	40	19.3 ± 3.3	13	28	5.1 ± 2.8	1	15

Note: [a] n = 38 mothers (fishing), 17 mothers (non-fishing) who knew/stated age
[b] n = 34 mothers (fishing), 15 mothers (non-fishing) who knew/stated age at first delivery
[c] n = 389 mothers (fishing), 292 mothers (non-fishing) who gave relevant information

Figure 14: Infant/child mortality indicators, Kainji Lake area, 1996, in comparison with local, national and regional data



4 Discussion and conclusions

Taking into account that precise records of age were not available for most children, with a tendency to slight age overreporting in similar studies[5], the results of the survey indicate a high overall prevalence of stunted and a high prevalence of wasted and underweight pre-school children of fisherfolk, going by international standards. Considering the fact that the survey was carried out during the harvest season, when food shortage in the area tends to be minimal[1], the prevalence of wasted and underweight children is most likely to be much higher during peak periods of food shortage, due to acute loss of weight. The very high prevalence of stunting shows that chronic malnutrition is also a widespread problem.

Children from non-fishing households had a marginally lower overall prevalence of stunting, wasting and underweight, although these differences were not statistically significant.

Table 6: Prevalence of malnourished children, Kainji Lake area, 1996, in comparison with national and local figures

	% children			
	Fishing households	Non-fishing households	National 1990	Borgu L. G. 1996[a]
Wasted (- 2 s.d.)	10	7	9.1	26
(- 3 s.d.)	6	2	1.8	13
Stunted (- 2 s.d.)	40	37	43.0	43
(- 3 s.d.)	14	11	22.0	17
Underweight(- 2 s.d.)	29	25	35.7	56
(- 3 s.d.)	11	7	12.0	23

[a] prevalence of wasting and underweight extremely high as survey was conducted at peak of food shortage period.

The distribution of the various malnutrition parameters by age group (Figs.2 and 3) shows that children aged 3-11 months and 12-23 months generally had the highest prevalence of stunting, wasting and underweight. This indicates an early onset of malnourishment, probably due to incorrect weaning practices, including low nutrient

value of weaning foods and bacterial contamination of foods, as determined by earlier surveys[1]. Unlike for older children, prevalence of wasting and underweight may remain high for younger age groups even during times of relatively good food availability, as the younger children are totally dependent on other members of the family for their daily food intake.

When plotted on a growth chart (Fig. 6) whose upper line represents the median weights of a healthy population and whose lower line represents the lower end of the range of healthy weights, the mean weight curve of fisherfolk children by age, which at 3 months is just below the upper line, indicating satisfactory growth, begins to transverse towards the lower line, which it touches at the age of 10 months. Up till the age of 24 months, the curve stays close to the lower line. The age at which the growth curve begins to transverse the space between the upper and the lower line coincides with the beginning of the weaning period. Also for the entire period of weaning, usually between 4 to 18 months, the curve stays close to the lower line, at several points even falling below it, clearly indicating this as a period of increased risk of malnutrition.
As from 24 months of age, the mean weight by age curve moves slightly upwards, indicating a small degree of improvement, although more points are still found closer to the lower line than to the upper line, despite relatively minimal food shortage.

The pattern is similar for the growth curve of children from non-fishing households (Fig. 7)

Figures 12 and 13 present the same data in a slightly varied form by plotting the mean weight for a given age group as a percentage of the NCHS standard. A similar trend can be observed, with the mean, lying above 90 % for age 3-5 months dropping to 80 % at age 18-23 months, before rising to and stabilising at between 85 to 90 % for subsequent age groups for children of fisherfolk. The trend is the same for children from non-fishing households.

The prevalence of undernourished and wasted women in Kainji Lake area was relatively high when compared to data from Borgu L.G.(4 % undernourished and 2 % wasted)[5] and may be another factor responsible for the high prevalence of malnourishment amongst infants, as the nutritional status of the mother during pregnancy and after birth ultimately affects the nutritional status of infants. During the gestation period, the foetus is totally dependent on the mother for its nutrient supply and deficiencies during this period may affect the optimal development of the foetus, resulting in intrauterine growth retardation and low birth weight (LBW). Further, the quality and quantity of breastmilk can be affected by the nutritional status of the mother[11,12].

The average age of mothers at first delivery was lower for women from fishing households than for those from non-fishing households. For both groups, some mothers were as young as 13 years at first delivery. Childbearing at such an early age increases the risk of complications during pregnancy and childbirth. Further, as practically all deliveries take place at home, complications that would require urgent medical attention may not be presented to suitably qualified personnel at the appropriate time, with dire consequences for mother and child.

Vaccination coverage of children appeared to be extremely low, with identical levels for children from fishing and non-fishing households (Tab. 4). Low vaccination coverage, consequently resulting in high morbidity rates, and coupled with a high prevalence of malnutrition ultimately leads to high infant and child mortality rates, as was observed for both categories of children (Fig.14). About 1 in 5 children in the area dies before reaching its fifth birthday, a saddening situation which likewise exists on a national level. Only a few countries in the world, such as Niger, Angola, Sierra Leone, Mozambique and Afghanistan have higher child mortality rates[13].

5 Recommendations

This survey was carried out primarily to obtain baseline data for long-term monitoring and evaluation of the project goal, and consequently, the assessment, rather than a causal analysis of the nutritional situation was the main focus of the survey. Further, it is acknowledged that the KLFPP is not a self-standing nutrition project directly targeted at an improvement of the nutritional and health situation of the Kainji Lake communities.

However, drawing on findings of other recent nutrition and health-related surveys in the area and based on the ethical obligation to maximize potential benefits of the survey beyond sole use of the data for project monitoring purposes, the following recommendations as to the nutritional and health needs of the communities involved are made, such that these recommendations could be communicated to the appropriate health authorities and be applied for public health measures to improve community health:

- ☐Promotion of nutritional and health information through appropriate IEC activities, in health centres, women's and men's groups and schools. Particular focus should be given to the following aspects:
  - Nutrition during pregnancy and lactation
  - Colostrum feeding
  - Weaning practices including timely introduction of weaning foods and composition of weaning foods.
  - Prevention of kwashiorkor, advantages of frequent fruit consumption, ORS
- ☐Development and propagation of appropriate weaning food mixes, using the locally available and affordable ingredients and additives. Additives to be given particular attention are fishmeal, groundnutpaste and oil.

☐Promotion of growth monitoring through:

- Education of mothers on the correct interpretation of the growth chart and its relevance
- Distribution of sufficient quantities of child health charts at health centre level and at household level
- Regular growth monitoring sessions, both static and mobile

☐Improvement of vaccination coverage through:

- Procurement and distribution of adequate quantities and quality of vaccines to health centres
- Adequate monitoring and evaluation of vaccination activities

☐Promotion of reproductive health information with special focus on:

- Problems and risks of early childbearing and motherhood
- Advantages of family planning

☐Support of operational research at community level into the following areas:

- Causes of household food insecurity and appropriate intervention measures
- Follow-up nutritional status survey in 3 to 5 years

In concluding, it is recommended that the project should, within the given possibilities, raise the awareness of policy-makers at different levels and in various relevant sectors as to the magnitude and underlying causes of malnutrition. Many causative factors can be found in the area of socio-economic infrastructures such as the provision of health services, good roads, education opportunities and water supply. A continuing lack of such basic infrastructures will perpetuate poverty which is the root cause of nutrition and health problems. While the implementation of the recommendations made above and interventions as are being carried out by KLFPP tackle specific elements of the causative complex, sustainable improvement of the standard of living in general and of the nutrition and health situation in particular is endangered without a change in the socio-economic structure and inequality of resource distribution.

6 References

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Annex 1 Questionnaire

Kainji Lake Fisheries Promotion Project

Baseline Nutrition Survey,

MOTHERS QUESTIONNAIRE

Time start:.....

1. Village number ___ ___

2. Mother number ___ ___ ___

3. Enumerator Number ___ ___ ___

4. Date of Survey ___ ___/___ ___/___ ___

5. What is the main occupation of the head of the household

1) fishing 2) non-fishing ___

6. How old are you now (years) ___ ___

X) don't know X) no answer

7. How old were you when you delivered your first child (years) ___ ___

X) don't know X) no answer

8. Are you presently pregnant _____

1) yes 2) no 3) no answer

9. How many babies have you delivered to date. ___ ___

10. Liveborn ___ ___

11. now living ___ ___

12. now dead ___ ___

13. of dead, < 1 year ___ ___
14. 1-5 years ___ ___
15. > 5 years ___ ___

16. Stillborn ___ ___

X) no answer

17. How many of your children were born at:

Home ___ ___
Government Health Centre ___ ___
Private Health Centre ___ ___
Mission ___ ___
Other ___ ___

18. Weight of the mother (kg) ___ ___ ___

19. Height of the mother (cm) ___ ___ ___

Kainji Lake Fisheries Promotion Project

Baseline Nutrition Survey,

CHILDRENS (3 - 60 months) QUESTIONNAIRE

1. Child number (refer to mothers number) ___ ___ ___/ __

2. What is the gender of the child

1) male 2) female __

3a. How old is this child (months) *(record as stated by mother)* ____

FOR DATA ENTRY ENTER THIS FIGURE ONLY IF CALCULATION (see 3b) IS NOT AVAILABLE

Observation: Date of birth, if known __ __/__ __/__ __

3b. *Calculation:* Age of child (months)

3c. *Observation:* 1) Date of birth known
2) Date of birth not known __

3d. *Calculation:* Age as stated by mother - Age as calculated (3a- 3b) __ __

4. Weight of the child (kg) __ __.__

5. Height of the child (cm) __ __ __.__

6. Observation: Does the child show signs of:

6a.	extreme wasting	1) yes	2) no	__
6b.	irritability	1) yes	2) no	__
6c.	old persons face	1) yes	2) no	__
6d.	oedema (legs, arms, face)	1) yes	2) no	__
6e.	apathy	1) yes	2) no	__
6f.	moon face	1) yes	2) no	__
6g.	sparse, brownish hair	1) yes	2) no	__

7. Does the child have a Child Health Card

1) yes 2) no 3) lost __

8. Have all the required immunisations been carried out (see Child Health Card)

Type of vaccine	Age to be given	carried out
BCG	at birth	
Oral polio	6 weeks	
	10 weeks	
	14 weeks	
DPT	6 weeks	
	10 weeks	
	14 weeks	
Measles	9 months	

1) yes
2) no
3) no observation possible
4) not applicable

Observation: Time finished:.....

Kainji Lake, Northern Nigeria.

Showing the distribution of fishing villages

P O. Box 306. New Bussa
Niger State. Nigeria

4. 30 W

10.30 N

North

Pasatulu
Komala
Romo
Kasabu
Ikum
Gungu Sarki
T. Dauda
Hikiya
T. Samiiia
Rofia
Kade
T. Dutse
Tetaku
Faransawa
Sasami
Hangoro
Nwaia
Tunga Liman
Agrowa
Haman Ango
Danlaso
T. Umaru Hakimi
T. Husseni
Mainasara
Kwata Haru
Ujiji
Ukondo
Shekare
Kanzibawa
Samai
Kuku Bawa
Duga Baban Gida
Duga Hasaya
Inka
Idiri Hamidu
Duga
Suleiman
Jaba
Akare
Umora
Jeda
Sani Bendu
Hagariya
Hahuta (1)
Hahuta (2)
Hai Kudin Koyi
T. Alh. Ayuba
Yauri Sabuwa
Goro Guru
Faransawa
Loko Bunzawa
Surawa
T. Alh. Nda
Cangon Gafara
Gungun Haje
Kango
Kaiwa
Gungu Kewa
Kuku Uku
Audu Gungu
Haidukija
Haikasuwa
Dan Kalla
T.Alh Gado
Sule
Zariawa
Sambo
Yelawa
Adamu
Kusoro
Kurmin Kaya
Garba
Dawu
Kwaiawa
Asarada
Maiofo
Wuchi
Lopa
Machin Kaya
Hanu
Malale
Gunugu Dorina
Gudu Tanko
T. Aliyu
T. Shaibu
Bagaruwa
T. Ango
Loco Bagawa
Tunga Ibrahim
Dan Gumba
Kuta
Magoro
T. Hupawa
T. Kodata
T. Alh Sallu
T. Bagudu
T. Alh Danababa
T. Maiyaki
Garafini Maiyaki
Yuna
Tada
Monai
Hazana
Kwata Wara 1
Kwata Wara 2
Bakin Dam 1
Bakin dam 2
Musawa
Zabarumawa
Bargana
Gyendunawa
Haigaji
Dutsa
Bukadubu
Lahagan
Haigogari
T. Kokoli
Ahmadu
Gendawa (2)
Bagudo
Shehule
Dorowa
Tunga Mai Gero
Tunga Booka
Tunga Alhaji Bawa
Tunga Alhaji Gado
Tunga Leda
Shagunu
Tunga Dogo
Amboshidi 1
T. Baia
Bunzawa
Haman Maisago
Umaru Masaje
Tunga Sani
Sabon Yumu
Maje
Amboshidi 2
Gwanda
Dendi
Saidu Haiyan
Maiam
Hairakumi
Haijaka Bakwai
Kwanga
Tsamiya
Lopawa
T. Sule
Sani Awaye
Nailo
Kuka
Gwanda
T. Garba Misali
Yakuba
Wakili Sadoro
Saidu Bisaia
Gado
Libata
Tunga Hailam Hassan
Tunga Alhaji Jeda
Tunga Hailam Umoru Loko Zabarimawa
Tunga Kaakail
Tunga Dan- Amma
Tunga Jibo
Gidan Hailam Musa Zabarimawa
Tunga Usman Zabarimawa
Tunga Hailam Garba
Tunga Baoro
Gari Maiwundi
Tunga Alhaji Manu
Yumu
Bagaruwa
Kada 1
Kada 2
Yantaia
T. Alh Chikuwa
Tilo
Bunzawa
Goro
Cikeke
Old Yondi
Angwan Sarkawa
Yabo
Gungu Ikum
Gungu Sarki
Baba
Yauri
Rukubalo
Inambiro
Gungu Zamare
Damisa
Kangaia
T. Alh. Sharu
Jarbabu
Tungakia
Yunawa
Zamare
Jijima
Rogo
T. Homa Jijima
Uchu
Anguwan Kuka
Gungu
Haisabaii
T. Baushe
Dandabo II
Danabo
T. Todo
Makara
T. Gumbi
T. Zaure
T. Dandare
T. Mangoro
T. Leda
Yerimawa
Pasaguri
Utonu
Uneku
Yumu Foge
Muja Foge
Zakari Hataia
Zariayu
Ulaira
Magobiti
Bunzawa
Lopa
Tunga Itaie
Gungun Hasu
Goshin Dutse
Bakin Ruwa
T. Hasawa
Tunga Haje
Waye Ranka
Hasamaii
Kandawa Gafara
Gafara Baban
Wawu
Wawu Jaji
Chupamini
Sobon Duli
Raishe Sarkawa
Sabon Dulii
Bakari
Gunugu Tagwe
Tunga Liman
Wara
Hailidu
T. Hairuwa
Kwanga
Libata
Tateku
Idi Hakumi Inuwa
Garba Yunawa
Dan Bature
Gyama
Kade
T. Lopawa
T. Wadata
Loco Hoiofo
T. Bai Allah
T. Manu Loko Uba
Musa Gomina
Ladan
Hanchi Haiturara
Garafini Auna
Gumbi
T. Daniadi Biri
T. Giwan
Kajabu
T. Gungawa
T. Alh. Ibrahim
Fakawa
Yunawa
Tunga Bata
Gadan Zare
Tunga Kindawa
Anfani
Samia Daiah
Sabon Gida
T.Alh. Hussa
Angulu
T. Dorowa
Tunga Gora
Kindawa
Bozai
Sake Jijika
Kaya
T. Gari
Bai
Bara

Annex 3 List of sample villages

	Western shore		Eastern shore
1.	Bakin Dam 2	1.	Sake Jijinka
2.	Bakin Dam 1	2.	Angulu
3.	Kwata Wara	3.	Gada Zare
4.	Tunga Wadata	4.	Bai Allah
5.	Tunga Ango	5.	Tunga Gungawa
6.	Tunga Aliyu	6.	Kajabu
7.	Malale	7.	Tunga Giwan
8.	Tunga Sule	8.	Tunga Danladi Biri
9.	Kwanga	9.	Gumbi
10.	Maira Kumi	10.	Garafini
11.	Gwanda	11.	Tunga Kade
12.	Teleke I	12.	Tunga Maiuloko Uba
13.	Sabon Yuma	13.	Tunga Rini
14.	Tunga Sani	14.	Kwata
15.	Maman Maisage	15.	Machin Kayi
16.	Amboshidi II	16.	Lopa
17.	Tunga Leda	17.	Wuchi
18.	Yantala	18.	Malofo
19.	Doga Mashaya	19.	Kade
20.	Kuku Bawa	20.	Garba Yunawa
21.	Samai	21.	Kuka Uku
22.	Shekare	22.	Halidu
		23.	Warra
		24.	Tunga Liman
		25.	Raishe Sarkawa
		26.	Chupamini
		27.	Wawu Jaji
		28.	Wawu
		29.	Masamali
		30.	Waye Ranka
		31.	Bakin Ruwa
		32.	Gushin Dusi
		33.	Bakari
		34.	Banzawa

Annex 4 Training workshop programme

Training Programme for Enumerators

Venue: VIP Guest House, NIFFR

Date: 14.10.96 - 16.10.96

Day 1:	10^{30}-11^{00}	General briefing
	11^{00}-12^{00}	Introduction to Survey background, purpose and objectives Introduction to Survey timetable
	12^{00}-1^{00}	Introduction to methodology Part I: Questionnaire
	1^{00}-2^{00}	Break
	2^{00}-4^{00}	Discussion/Translation of questionnaire
Day 2:	10^{30}-11^{00}	Short lecture: Undernutrition in children (marasmus and kwashiorkor)
	11^{00}-12^{00}	Introduction to Child Health Card
	12^{00}-1^{00}	Introduction to methodology Part II: Anthropometry
	1^{00}-2^{00}	Break
	2^{00}-4^{00}	Discussion of sources of error in anthropometric measurement techniques and age calculation
		Discussion of any unclear points
Day 3:	10^{30}-1^{00}	Demonstration/Practice with anthropometric measurement techniques (MCH, New Bussa), questionnaire
	1^{00}-2^{00}	Break
	2^{00}-4^{00}	Analysis of completed questionnaires, Discussion
		Post-Test
		Discussion of any unclear points, Review

Annex 5 Survey timetable

MONTH	October				November			
WEEK	1	2	3	4	1	2	3	4
Review of available information	---							
Sourcing of materials	---							
Identification of survey staff	---							
Training of survey staff		---						
Discussion/ translation of questionnaire		---						
Pre-test of questionnaire		---						
Discussion of pre-test, adjustments, printing		---						
Communication with sample communities/ representatives		---						
General preparations		---						
Data collection			--------	-				
Supervision of data collection			--------	-				
Training of data entry assistants			---					
Data compilation/ entry				----	--			
Data analysis					---			
Report writing						--------		
Presentation of results to project communities							---	

Annex 6 Hypothetical causal model of a nutritional situation