

**HEALTH AND NUTRITIONAL STATUS OF YOUNG
ZAMBIAN CHILDREN RESIDING ON A SUGAR
ESTATE IN RURAL ZAMBIA**

By

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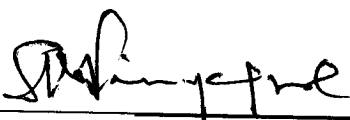
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DECLARATION

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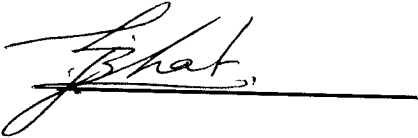
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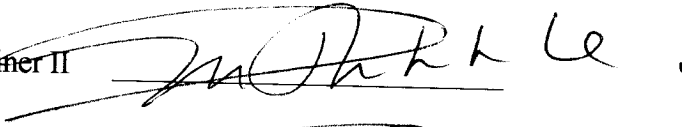
APPROVAL

This dissertation of Suwilanji S Sinyangwe is approved as fulfilling part of the requirement for the award of Master of Medicine degree in Paediatrics and Child Health by the University of Zambia

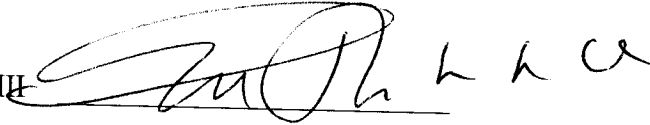
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ABSTRACT

The Health and Nutritional Status of young Zambian children aged 0-5 years and residing on a sugar estate in rural Zambia was studied over a period of three months from April to June 1995. The study design was cross-sectional and descriptive. The main out-come measures were: anthropometric measurements of growth; vaccination rates; causes of hospital admissions; prevalence of common childhood illnesses; utilisation of health care facilities; knowledge, attitudes and practices of care-givers and health workers. The results of the study are applicable to the population of the Nakambala Sugar Estate (NSE) Mazabuka, Zambia. A representative sample size was 332 obtained after systematically sampling 225 stratified households. Data analysis was done using the Epi-info programme.

RESULTS

Nutritional status varied with age group but not with gender ($X^2, 1^1 = 2.95; p>0.05$). When all the age groups were combined, 29.2% of children (94/322) had reduced weight-for-age; 18.5% (60/322) had reduced weight-for-height (wasting) and 18% (59/322) had reduced height-for-age (stunting). At least 14.5% (13/89) of children who were undernourished, started losing weight during the first year of life; the mean age at onset of loss of weight was 10.63 months with a standard deviation of ± 5.17 . Fourteen percent of children with wasting had diarrhoea and/or fever in the two weeks preceding the study. Eighty four percent of children less than 12 months of age were still breastfeeding.

Vaccination rates for BCG were more than 96.9% at all ages. At least 85% of children had received 3 doses of DPT and polio and 80.6% of children had received measles vaccine (95%CI = 65-76%). Vaccination rates against measles had declined from 100% in 1990 to 52.6% in 1994.

The commonest causes of hospital admissions were malaria (16%), diarrhoeal diseases (12.9%) and acute respiratory infections (9%). Most of the respondents (98%) utilised estate health facilities when their children fell sick.

There was a trend towards increased home deliveries as opposed to institutional deliveries in the past five years.

At least 98% of care-givers were aware of major illnesses on the Estate. Their knowledge of immunisation schedule was generally poor (55%) especially for measles (36.5%).

Among health workers, nurses (75%) had better knowledge about immunisation schedules than clinical officers (55%). As a group health worker's treatment of common illnesses was appropriate (80% cases) and outcome of treatment was very good (95% cases).

CONCLUSION

The nutritional status as measured by weight-for-age was generally poor but better than that reported for rural populations in Zambia. However, compared to the 1992 Zambia Demographic and Health Survey rates, the Estate's children revealed much more wasting (18.6% Vs 5%) and less stunting (18% Vs 40%). These differences were statistically significant ($p < 0.05$). Vaccination rates (85%) in all age groups were higher than those reported for rural Zambia (72%) and comparable with rates for developing countries (80%). Malaria, diarrhoeal diseases and acute respiratory infections were major problems on the Estate. There was progressive

increase in the utilisation of the Estate's health care facilities for deliveries although the majority of births were still taking place in homes.

RECOMMENDATIONS

The nutritional and health status of children at Nakambala Sugar Estate may be improved by some of the following measures:- Increasing immunization rates above 85% by improving the knowledge and practices of care-givers and health workers; prevention of diarrhoeal diseases by improving sanitation, hygiene and water supply; Vitamin A prophylaxis; reducing the incidence of malaria through improved malarial control programmes; promoting and supporting breast-feeding even though it is known that vertical transmission of HIV can occur through breast-feeding; growth monitoring by promoting the use of growth charts; early detection and treatment of illnesses.

Each Low-cost and medium-cost residential area should have at least two traditional birth attendants (TBAs).

TABLE OF CONTENTS

	PAGE
Copyright.....	i
Declaration	ii
Approval.....	iii
Aknowledgements	iv
Abstract	v
List of Figures, Maps and Tables	x
Abbreviations.....	xi
CHAPTER 1: INTRODUCTION.....	1-7
1.1 Background information	
1.2 Statement of the problem	
1.3 Literature review	
CHAPTER 2: OBJECTIVES.....	8 - 11
2.1 General objectives	
2.2 Specific objective	
2.3 Justification	
2.4 Assumptions	
CHAPTER 3: METHODOLOGY.....	12 - 18
3.1 Research Design	
3.2 Research setting	
3.3 Study population	
3.4 Sample size and sampling method	
3.5 Data collection instruments	
3.6 Data collection	
3.7 Data processing and analysis	
3.8 Ethical considerations	
3.9 Limitations	
3.10 Definitions and Operational Terms	
CHAPTER 4: FIELD EXPERIENCES AND OBSERVATIONS.....	19
CHAPTER 5: RESULTS.....	20-31
5.1 General Comments	
5.2 Age and Sex Distribution	
5.3 Nutritional Status	
5.4 Immunization Status	
5.5 Common Childhood Illnesses	
5.6 Utilization of Health Facilities	
5.7 Knowledge, Attitudes and Practices of Caregivers	
5.8 Knowledge, Attitudes and Practices of Health workers	

CHAPTER 6: DISCUSSION..... 32 - 37

CHAPTER 7: RECOMMENDATIONS 38 - 43

REFERENCES..... 44 - 45

Annex 1. Questionnaires, Checklists and Growth Reference Tables..... 46 - 63

Annex 2. Figures and Maps..... 64 - 66

LIST OF TABLES, FIGURES AND MAPS

	PAGE
Fig. 1	Age and Sex Distribution of Underfive Children.
	21
Fig. 2	Distribution of Birth Weight (1990 - 1995)
	21
Table 1	Mean, Standard Deviation and Incidence of Low Birth Weight (1990 -1995)
	22
Table 2	Weight-for-age distribution (Modified Gomez Classification)
	23
Table 3	Weight-for-Height Distribution
	23
Table 4	Height-for-Age Distribution
	24
Table 5	Age-Specific Vaccination Rates in Children less than 12 months
	25
Fig. 3	Vaccination Rates In Children age 5 - 11 months
	25
Table 6	Vaccination Rates (1990 - 1995)
	26
Fig. 4	Major Illness (Complaint) Suffered by the Child since Birth
	27
Table 7	Number of Children Suffering Recent Illness
	27
Fig. 5	Changing Trends in Place of Delivery (NSE 1991-1995)
	28
Table 8	Awareness among Caregivers of Major Illness
	29
Table 9	Type of Service Expected at Underfive Clinic
	30
Table 10	Knowledge of Immunisation Schedule among Caregivers
	30
Fig 6.	Trends of Immunisation Coverage, ZAMBIA 1984-1995
	64
Fig 7.	Reported Measles Cases, ZAMBIA 1991-1995
	65
	Map of Zambia
	66

ABBREVIATIONS

A & I	-	Accidents and Injuries
ANC	-	Antenatal Clinic
AIDS	-	Acquired Immuno Deficiency Syndrome
ARI	-	Acute Respiratory Infection
CO	-	Clinical Officer
GE	-	Gastroenteritis
HIV	-	Human Immunodeficiency Virus
HRD	-	Human Resources Department
MCH	-	Maternal & Child Health
MOH	-	Ministry of Health
MR	-	Medical Report
MUAC	-	Mid-upper Arm Circumference
NCCR	-	National Council for Scientific Research
NSE	-	Nakambala Sugar Estate
OPD	-	Out-Patient Department
PEM	-	Protein Energy Malnutrition
PHC	-	Primary Health Care
PTB	-	Pulmonary Tuberculosis
SRN	-	State Registered Nurse
STD	-	Sexually Transmitted Disease
TBA	-	Traditional Birth Attendant
TDRC	-	Tropical Diseases Research Centre
UNZA	-	University of Zambia
UTH	-	University Teaching Hospital
WHO	-	World Health Organization
ZDHS	-	Zambia Demographic and Health Survey
ZEN	-	Zambia Enrolled Nurse
ZSC	-	Zambia Sugar Company

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The Zambia Sugar Company (ZSC) is one of the largest agro-industries in Zambia. Its major occupation is the production of sugar for local and international consumption.

The sugar estates are located at Nakambala in the Mazabuka District, in the Southern Province. Nakambala is approximately 120 kilometres from Lusaka, the capital of Zambia. The estates cover a total of 13,000 hectares, and are 1000 metres above sea level. Temperatures range from 0 to 32 degrees Celsius throughout the year. Irrigation and rainfall play a major role in cane growing. The rainy season is generally between November and March. Cane-cutting and sugar processing take place during the dry season between April and November.

Agricultural operations were started in June 1964 as a pilot scheme but sugar production started effectively in December 1967.

There are approximately 7,540 employees on the Estate comprising skilled, semi-skilled and unskilled workers whose wages support a population of about 25,000.

Approximately 1200 of the labourers are male cane cutters aged between 18-30 years who are migrant workers recruited principally from the Western Province of Zambia on seasonal basis from April to November of each year. They do not come with their families. There are about twenty expatriates some of whom come with their families.

In general, the employees are provided with homes, electricity, water supply, sanitation facilities, recreation facilities, schools, clinics and they have access to a local district hospital.

The population of Southern Province in 1990 was 946, 353 with an annual population growth rate of 3.4%. The population of Mazabuka District was 157,724 (16.6% of Southern Province).¹ The 1993 Census of Housing and Population (CHP) conducted by the Zambia Sugar Company (ZSC) at Nakambala Sugar Estate (NSE) showed that the total population was approximately 23,000 (14.5% of Mazabuka district) out of which 4,000 were children under the age of five years. There were approximately 3,300 housing units of different categories.²

There are three clinics on the Estate serving three catchment areas. Until very recently, the major health services provided were mainly curative; but since 1988 efforts have been made to provide comprehensive Primary Health Care (PHC). The services provided include underfive clinics, family planning, antenatal care, uncomplicated maternal deliveries, sexually transmitted diseases (STD) and skin clinics.

1.2 **PROBLEM STATEMENT**

Since 1968 when the Zambia Sugar Company established its major operations at Nakambala the major health activities were limited to curative services targeted mainly at company employees and their immediate families. This was in line with the government health policies of those days. Preventive services were not sufficiently emphasised. The preventive services which evolved over the years were limited to prevention of malaria and to some extent improvement of water supply, sanitation and hygiene. Maternal and Child Health (MCH) services have lagged behind at Nakambala despite government's shift from a largely curative health care system to an increasingly more preventive system. Government and donor funding of the Estate's PHC programme has been limited to provision of vaccines, and anti-tuberculosis drugs.

Prior to 1988, there were no meaningful health records kept to show trends in morbidity and mortality. As a consequence formulating policies and practises was difficult. However from 1988 some Out Patient Department (OPD) records on morbidity were kept. A retrospective review of these records from 1988 to the end of 1990 showed that the major causes of morbidity in children attending NSE clinics were acute respiratory infections, malaria, gastro-enteritis and malnutrition.³ This pattern is similar to that seen.

in Zambia in general. Unfortunately most of these statistics have been based on health centre or hospital OPD attendances only; surveys to document the extent of the problems in the NSE communities have not been done.

From January to March 1992 there was an epidemic of measles in Mazabuka district including NSE; this affected mainly children 6 months to 15 years of age. Seventeen percent were below 9 months of age (the recommended time for measles immunisation in Zambia) and 30% were below 1 year of age. This outbreak was apparently country wide.⁴ Among the suspected reasons for the outbreak were country-wide low immunisation coverage rates for measles. Attempts at analysing immunisation coverage against vaccine - preventable diseases and nutrition status was hampered by poor records. To my knowledge, there have been no health surveys locally or nationally done that addressed NSE children specifically.

Mortality data in 1992 showed that 55% of deaths occurred in children less than five years of age. The major causes of death were malaria (25%) pneumonia (20%) malnutrition (15%), diarrhoea (20%) and tuberculosis (20%).⁵ The diagnosis of tuberculosis was based on history of contact, physical examination, chest X-ray examination and rarely on bacteriological confirmation.

The 1990 National Census of Housing and Population (NCHP) did not provide adequate information on NSE; this prompted the Zambia Sugar Company to conduct its own census in 1993.

Despite the introduction of a PHC programme in 1988, the health and nutritional status of children at NSE has remained unacceptable for the following reasons: high mortality in under-five children; poor development and support of underfive preventive health services and poor support of maternal health services.

It is hoped that this study will provide answers to some of the following questions:

1. What is the nutritional status of underfive children?
2. What is the immunisation coverage of children at NSE?

3. What is the prevalence of childhood illnesses among the Estate's children?
4. What are the causes of serious illnesses requiring admission to hospital among children?
5. To what extent are health facilities on the Estate utilised by children who are sick.
6. Are common illnesses managed correctly by health workers?
7. What is the level of knowledge among care-givers and health-workers regarding common illnesses?
8. What can be done to improve health information systems?
9. What can be done to reduce unnecessary mortality in children?

Answers to these questions will not only provide the ZSC with first hand information on the health and nutritional status of the population , but should be beneficial to children of other sugar estates in the region.

1.3 **REVIEW OF THE LITERATURE**

Establishing the facts

As Hendrickse has pointed out, in some developing countries health statistics are difficult to come by and when available can be notoriously unreliable.⁶ In consequence, in formulating policies and practice, reliance is placed on estimates derived by various means. Estimates based on unbiased and appropriate sampling can provide a reasonably accurate assessment of a country's demographic profile or of specific disease incidence and mortality.

Morbidity and Mortality

Apart from HIV/AIDS the major causes of sickness and death in childhood in the tropical and developing countries are nothing new in the history of the human race; as Grant has pointed out⁷ malnutrition, gastro-enteritis and respiratory infections which were scourges of the poor and underprivileged in Europe in the past, are today the principal scourges of children in the tropical and developing world. These countries have several things in common, viz: poverty, poor sanitation and hygiene, poor housing,

high Infant Mortality Rates (IMR), high Underfive Mortality Rates (U5MR) and high fertility rates.

A review of major health trends in Zambian children from 1982 to 1992 shows that the pattern obtaining at NSE is generally the same as for the rest of the country.⁸ The major causes of childhood morbidity and mortality viz: malaria, malnutrition, gastro-enteritis and acute respiratory infections, have remained the same over the years.

Of particular importance is the impact of HIV/AIDS on childhood morbidity and mortality. At NSE clinics serotesting for HIV is not routinely done. It is however done (after counselling and informed consent) in patients with suspected tuberculosis or as part of a general laboratory work-up when the situation demands. Studies conducted at NSE clinics in 1990 revealed an HIV sero-positivity rate of 55% among patients attending STD and skin clinics. The rates were almost equal in both male and female. The HIV sero-positivity rate for patients attending the NSE clinics for diseases other than STD/Skin, was 28%. Studies conducted in March 1995 at Nakambala among pregnant women attending antenatal clinics showed HIV sero-positivity rates of 20%. Similar sentinel studies conducted by the Ministry of Health (MOH) in antenatal clinics in urban, peri-urban and rural areas showed HIV sero-positive rates of 24 to 30%. HIV - associated TB is the commonest cause of death among adult patients attending NSE clinics.⁹

Immunisation coverage in the developing world has been increased to approximately 80% in the last ten years. As a result three million deaths from vaccine-preventable diseases are now being prevented each year. Over 60% of the 12.9 million child deaths in the world each year are caused by pneumonia, diarrhoeal diseases, or vaccine - preventable diseases, or by some combination of the three.¹⁰ In Zambia the percentage of children aged 12-23 months who were fully immunised was 67% on average.¹¹ This was less than the 80% immunisation coverage percentage for developing countries. The highest rates were in urban areas (74%) and the lowest rates (60%) in rural areas. The target in the 1992 National Health Policies and strategies was to increase immunisation coverage from 75% to 85% by the year 2000.

Summary

In summary the most urgent needs of children in developing countries include better housing, better nutrition, improved environmental sanitation, endemic disease control and immunisation against specific infections.

CHAPTER TWO

GENERAL OBJECTIVES

2.1 GENERAL OBJECTIVE

To assess the health and nutritional status of young *Zambian children* residing on a sugar estate in a rural town in *Zambia*.

2.2 SPECIFIC OBJECTIVES

1. To determine the prevalence of undernutrition in underfive children residing on a sugar estate.
2. To determine the immunisation status of underfive children on the estate.
3. To determine the prevalence of common childhood diseases in young children aged 0-5 years residing on a sugar estate in *Zambia*.
4. To study the utilisation patterns of health facilities at NSE by the care givers of children aged 0-5 years residing at the Estate.
5. To determine the Knowledge, Attitudes and Practices (KAPs) of care givers at NSE regarding common childhood diseases.
6. To determine the KAPS of health care providers (Nurses, Clinical Officers) at NSE on common childhood diseases.
7. To determine whether common childhood illnesses are correctly managed by health care providers at the NSE health facilities.
8. To provide ZSC urgently needed health information which is necessary for planning cost-effective interventions for young children aged 0-5 years.
9. To create a data base for evaluation of intervention programmes and to serve as an archive for future reference.
10. To identify areas needing further research.

2.3 JUSTIFICATION

The Government of the Republic of *Zambia* through the 1992 National Health Policies and strategies (Health Reforms) committed itself to improve the health of the population by achieving selected targets before the year 2000. Among these

targets were: to reduce the percentage of underweight children (0-5 years) from 23 to 18 percent; to increase from 75 to 85 percent the proportion of infants vaccinated with BCG, DPT, Polio and Measles and to increase the tetanus immunisation coverage of pregnant women as follows: TT5 from 10 to 50% and TT3 from 33 to 70% in 5 years time.

In order to monitor health indicators, baseline, population-based, reference data are needed. For various reasons such data may differ from region to region and within regions from population to population. It is therefore prudent to obtain baseline objective information for individual populations whenever possible.

The 1992 demographic and health survey found that in fact 25% of children (0-5 years) were under-nourished (weight for age). With the introduction of the Social Adjustment Programme (SAP) in the interim, and considering its inherent adverse effects on the socio-economic status of the majority of families, this problem is probably worse.

At NSE as elsewhere in the country, the majority of children seeking medical care are *under five years of age and mortality is highest in this group. Thus this is a special risk* group whose urgent needs should be determined and appropriate interventions implemented to reduce morbidity and mortality.

Because of logistical problems in procuring vaccines at NSE, there is a real danger that the children may not be as adequately covered as others. In addition, the reasons for the epidemic of measles in 1992 were not determined and as a first step it is wise to determine immunisation coverage not only for measles but for all recommended vaccines.

The population at Nakambala is supplied with housing, electricity, water and sanitation facilities and yet gastro-enteritis is highly prevalent and many children are underweight. In the search for the reasons for this state of affairs it is necessary to assess the knowledge, attitudes and practices of parents and health workers on major health problems affecting the population.

The ZSC urgently needs first-hand, basic information on the state of health of children at NSE so that interventions can be planned to reduce the unnecessary morbidity and mortality. It is hoped that this study will provide this needed information and may reveal areas that need further research.

2.4 **BASIC ASSUMPTIONS**

The relationship between the health status of children and the following factors is well documented:^{14,15} nutrition; immunisation status of the community; the family; social support; economics and the environment.

Sustainable breast-feeding is a strong conditioning factor. Availability of appropriate food and nutritional customs are other important factors influencing the health status of a community. These factors are locally variable.

Full immunisation in the community gives herd immunity and increases the protection to the few children who cannot be immunised.

Health largely depends on the family's social and physical environment, and its life-style and behaviour. The role of the family in health promotion, prevention and early diagnosis and care of disease is of crucial importance. The major part of health actions is carried out by individuals and families before they come in contact with any health workers.

The many factors affecting the health situation of children (and mothers) also include communication and social support measures. Whether these are available and how well they function has an impact on the health of the family.

The differentials in health between rich and poor, which can be observed in all age groups, are particularly striking among mothers and children. Among the factors affecting maternal and child health are: agricultural policy and land ownership, which have a direct influence on nutritional status; an unsanitary environment, including unsafe and insufficient water and over crowding; and transport and communication difficulties.

CHAPTER 3

METHODOLOGY

3.1 RESEARCH DESIGN

This was a descriptive as well as analytical cross-sectional study conducted over a period of 3 months from February to May, 1995.

The major variables in the study were:-

1. Immunisation coverage
2. Nutritional status
3. Underfive disease pattern
4. Underfive disease prevalence
5. Utilisation of health care facilities
6. Outcomes of treatment
7. Knowledge, attitudes and practices of care-givers (parents/guardians)
8. Knowledge, attitudes and practices of health workers in relation to common childhood illness.

3.2 RESEARCH SETTING

Three catchment areas at Nakambala Sugar Estate which together accommodate more than ninety percent of the population were studied.

3.3 STUDY POPULATION

Four thousand rural Zambian children aged between 0-5 years who reside on the Estate and whose parents are Zambia Sugar Company employees.

Sample size: 330

Sample size calculation was based on immunisation coverage of 71 percent in Southern Province (ZDHS, 1992). Using the immunisation coverage of 71% with required 95% confidence interval of 66-76% the sample size was calculated to be 330. This was derived from the formula for calculating sample size from single proportions i.e.

$$N = \frac{P(100 - P)}{e^2}$$

Where

N = Sample size

P = Percentage

e = required size of standard error

Sample calculations based on under-weight percentages were not used because they yielded smaller samples

SAMPLING METHOD

Systematic sampling of one hundred and fifty-three stratified households was needed to get the required sample size of three hundred and thirty (330) underfive children.

The sampling exercise took into consideration the following factors: that households on the Estate are already stratified into high cost, medium cost and low cost categories in the following proportions: 15% (450) highcost, 65% (1950) medium cost, 20% (600) low cost; that, there are about four thousand underfive children on the Estate implying an average of 1.3 underfive children per household; a sample size of 330 requiring sampling of 253 households.

It followed therefore that the number of households to be selected in the highcost, medium cost and low cost areas was proportional to each category's contribution to the total. Hence from the highcost 38(15%), medium 164(65%) and low cost 51 (20%) households were sampled. The final sample size obtained for analysis was 332.

3.5 **DATA COLLECTION INSTRUMENTS**

These included: Caregiver and health worker questionnaires; Underfive clinic cards; Birth certificates; OPD treatment cards; measuring boards; weighing scales; tape measures; check lists; physical examination of children.

3.6 **DATA COLLECTION**

Eight Community Workers (without a health background) from the Human Resources Department at NSE were trained as research assistants. The training took place at Mazabuka District Hospital and lasted for three days from 4th to 6th April, 1995. They were all given a copy of the summary of the research proposal, questionnaires, and consent form to go through. Any matters arising were resolved.

Measurement of height and weight and left mid-upper arm circumference were demonstrated using scales, measuring boards and tape measures. For each parameter, the mean of two measurements was taken. The trainees were then allowed to practise taking measurements on children attending Mazabuka District Hospital O.P.D. Physical examination of children for oedema, jaundice, pallor and general appearance was demonstrated and practised in the Children's Ward at Mazabuka District Hospital.

The designed care-giver questionnaire was pretested in a compound in Mazabuka town which had low, medium and high cost houses similar to those found on the Estate.

The health worker questionnaire was pretested on nurses and clinical officers at Mazabuka District Hospital. No major revisions of the data-collecting tools and research procedures were needed. As there were no major ethical issues during the pilot phase, informed consent was not sought during the study.

3.7 **DATA PROCESSING AND ANALYSIS**

1. Data processing and analysis was done by Epi-info.
2. As recommended by the World Health Organisation (WHO) the nutritional status of children in the study samples was compared with an international reference population defined by the U.S. National Center for Health Statistics (NCHS).¹⁶ The parameters used were: Weight - for - height, Height - for - age, Weight - for - age and Left mid-upper arm circumference (MUAC). In the case of the first three parameters, percentages rather than Z-scores were used to calculate deviation from the reference mean. There were too many errors in calculating Z-scores.
3. Immunisation coverage was determined by vaccination rates for stipulated vaccines at stipulated ages according to the National Immunisation Schedule in Zambia i.e. BCG at Birth, DPT + Polio at 2,3, and 4 months, Measles at 9 months and DPT + Polio boosters at 18 months.
4. Prevalence was determined by the proportion of children suffering from specified recent illness (within two weeks preceding the survey).
5. Utilisation of Estate facilities was assessed by the proportion of children who usually utilised the health facilities when unwell.
6. Treatment of illness(es) was assessed as appropriate or not appropriate according to responses on predetermined questions (annex 1).
7. Outcome of treatment was assessed as very good (if the child had recovered): good (if the child was improving); poor (if there was no improvement) and bad (if the child was deteriorating).
8. Knowledge of care-givers and health workers was graded as very good, good, poor, and bad depending on correct scores on predetermined questions (annex 1).

3.8 **ETHICAL CONSIDERATIONS :**

The study was approved by the Ethics Committee of the School of Medicine, University of Zambia.

3.9 **LIMITATIONS**

The limitations of this study included: the fact that this was an observational study, and the results cannot be generalised to non NSE children; that the study did not include recognition of important nutrient deficiencies that affect health e.g. Vitamin A deficiency and Iodine deficiency; the failure to determine the impact of HIV/AIDS/TB. The fear that growth measurements taken by non health practitioners may not be reliable was to some extent resolved by taking the mean of two measurements for each parameter.

3.10 **DEFINITIONS AND OPERATIONAL TERMS**

1. **DEVELOPMENT**

Generally refers to the acquisition of physical, linguistic and social skills (Stuart and Prugh, 1960).

2. **GROWTH**

Generally refers to “those increases in the size of the body as a whole, or any of its dimensions, parts, or tissues which occur as part of the child’s progress toward maturity (Stuart and Prugh, 1960).

3. **HEALTH**

The W.H.O. defines health as a state of complete mental, and social-well being and not merely the absence of disease or deformity.

4. **INCIDENCE RATE:**

Number of new cases of a disease occurring in the
population during a specifies period of time
----- x 100
Number of persons exposed to risk of developing
the disease during that period of time.

CHAPTER 4

FIELD EXPERIENCES AND OBSERVATIONS

4.1 **FIELD EXPERIENCES AND OBSERVATIONS**

In the low cost housing areas, sanitation and hygiene were very poor. There were some broken and/or blocked sewerage pipes with overflow of effluent. Refuse was poorly disposed. Although housing units were single, toilets and water taps were communal. There were so-called traditional houses (mud-houses with thatched roofs) which had neither latrines nor piped water. In 20% (10/51) of the sampled low cost households there were two families per unit so that overcrowding was a problem.

In all areas, housing units were built in lines so that systematic sampling was straightforward.

Two research assistants fell ill during the study and were not replaced. Data collection therefore took longer than anticipated (16 days instead of 10).

The major languages spoken were Tonga (70%), Nyanja (10%) and English (10%). Bemba and Lozi each contributed 5%.

All the children studied had underfive clinic cards (U5CC). This was very unexpected since it is not mandatory to present U5CC in order for children to receive medical attention at NSE clinics. Since all children had U5CC it was possible in many cases to determine at what age children failed to gain adequately in weight (when malnutrition was present). It also made it possible to study relationships between birthweight and current percentile of weight for age.

CHAPTER 5

RESULTS

5.1 GENERAL COMMENTS

Height and weight measurements were converted to mean scores and these were used instead of single measurements. The greatest inter- and intra-observer bias was noted in MUAC measurements. This was partly due to the fact that some of the tapes used were stretchable while others were metallic. So MUAC was discredited from further analysis.

The pattern of reported diseases in the survey was generally similar to that derived from OPD records. Credit must be given to care givers and health workers for ensuring that all the children had underfive clinic cards and that the majority of the children (90%) were breast fed for sometime during the first year of life. Gender had no effect on either nutritional or immunisation status.

5.2 AGE AND SEX DISTRIBUTION

There were one hundred and fifty four male children (154) and one hundred and seventy eight (178) female children giving a male to female ratio of 1:1.2 (Fig. 1). The youngest child studied was 3 weeks old and the oldest was 58 1/2 months.

5.3 NUTRITIONAL STATUS

Birth weight:

For children less than 12 months of age, birth weights ranged from 1.6 Kg to 4.5 Kg with a mean of 2.9 Kg and a standard deviation of 0.3. The incidence of low Birth weight was only 6.3% (3/47). Between 12 to 23 months of age birth weights ranged from 1.8 to 4.6 Kg with a mean of 2.9 Kg and a standard deviation of 0.42. The incidence of low Birth weight was higher, 18% (7/39). For children older than 20 months birth weights ranged from 2 - 4 Kg with a mean of 3.1 Kg and a standard deviation or 0.57. (Fig 2 & table 1)

Fig.1 Distribution of Underfive Children by Age and Sex

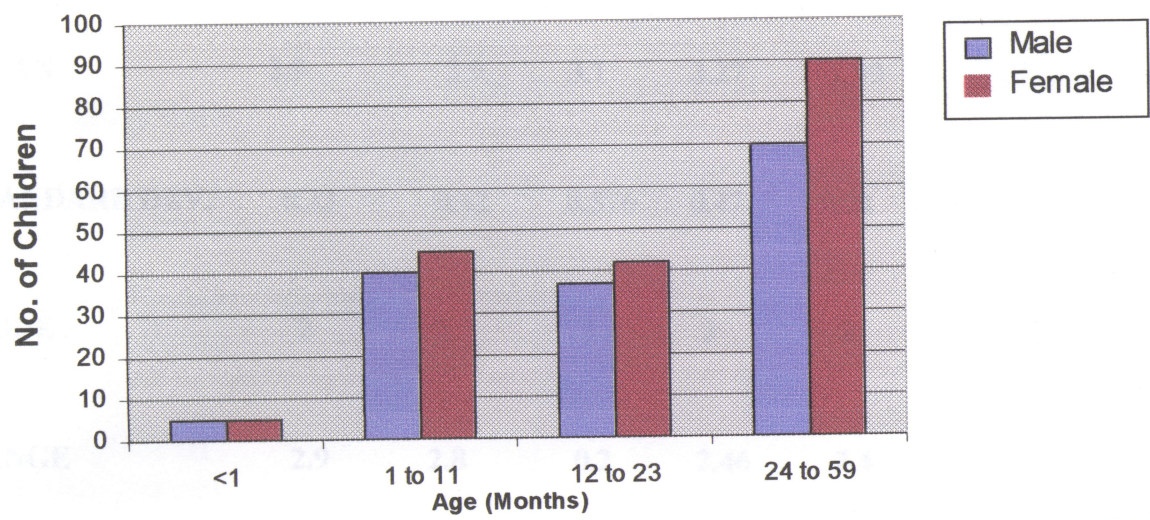


Fig.2 Distribution of Birth Weight (Institutional Births)

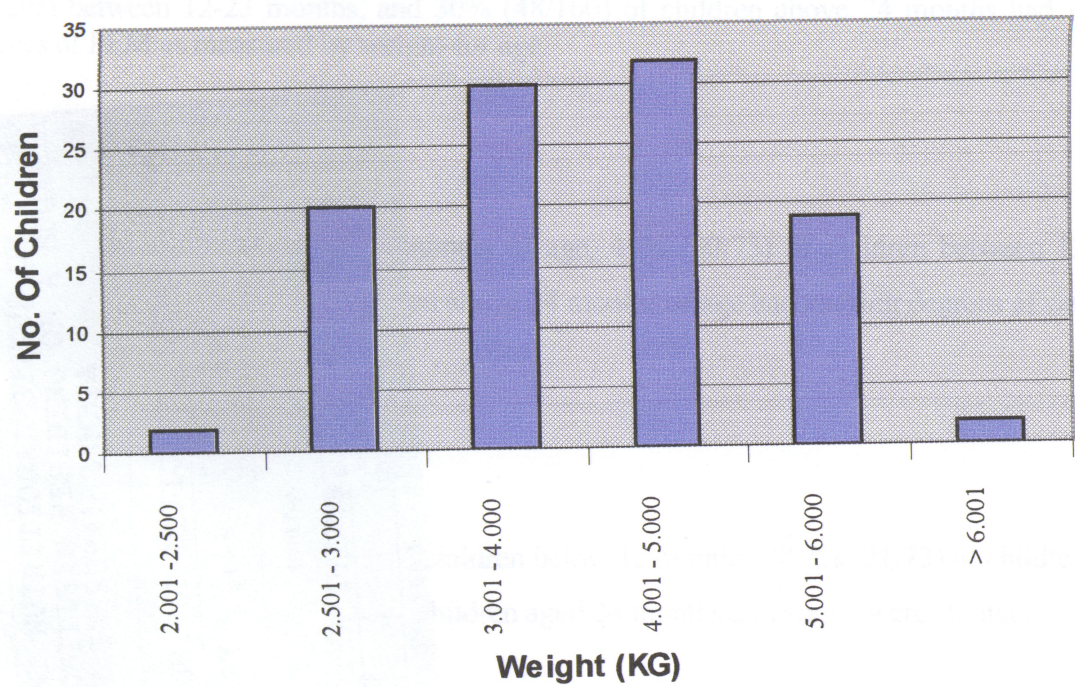


Table 1: Measures of Central Tendency of Birth Weight (Kg) 1990 - 1995

	<u>1994</u>	<u>1993</u>	<u>1992</u>	<u>1991</u>	<u>1990</u>
MEAN	2.9	2.9	3.1	3.27	2.99
STANDARD DEV.	0.33	0.42	0.576	0.47	0.21
MODE	2	2	3	3	3
RANGE	2.9	2.8	0.2	2.46	2.4
%LBW	6.3	18	9.4	5.5	2.0

Weight-for-Age

This is summarised in table 2. 14.6% (13/89) of children less than 12 months, 45.2% (33/73) of children between 12-23 months, and 30% (48/160) of children above 24 months had varying degrees of PEM as measured by weight-for age.

Weight-for-Height

8.8% (9/91) of children below 12 months of age, 41% (30/73) of children between 12 - 23 months and 13.3% (21/158) of children above 24 months of age had varying degrees of wasting (table 3).

Weight-for-Age

As depicted in table 4, 6.5% (6/91) of children below 12 months, 28.7% (21/73) of children aged 12-23 months and 20.2% (32/158) of children aged 24 months and above were stunted.

Table 2: Weight-for-Age Distribution (Modified Gomez Classification).

<u>NUTRITIONAL STATUS</u>	<u>AGE GROUP IN MONTHS</u>			
	<u>< 12</u> (N=89)	<u>12 - 23</u> (N=73)	<u>24 & ABOVE</u> (N=160)	<u>ALL CHILDREN</u> (N=322)
Normal (weight-for-age > 80%)	76(85.3%)	40(54.7%)	112(70%)	228(68.6%)
Mild or grade I PEM (weight-for- age 70-80%)	8(8.9%)	16(21.9%)	40(25%)	64(19.2%)
Moderate or grade II PEM (weight-for-age 60-70%)	4(4.5%)	10(13.6%)	8(5%)	22(6.6%)
Severe or grade III PEM (plus Oedema)	1(1.1%)	7(9.5%)	0(%)	8(2.4%)

Prevalence of Moderate and Severe Malnutrition in NSE Children was 9% (30/322)

Table 3: Weight-for-Height Distribution By Age

<u>WEIGHT</u>	<u>AGE GROUP IN MONTHS</u>			
	<u>< 12</u> (N=89)	<u>12-23</u> (N=73)	<u>>24</u> (N=158)	<u>TOTAL</u> (N320)
Normal' (weight-for- height > 80%)	82 (90%)	43 (58.9%)	137(86.7%)	262(81.8%)
Wasting' (weight-for-height 70 - 80 %)	5(5.5%)	25(34.2%)	19(12%)	49(15.0%)
Severe "Wasting" (weight-for-height < 70%)	4(4.4%)	5(6.8%)	2(1.2%)	11(3.4%)

Prevalence of Wasting 18.7% (60/320)

Table 4: Height-for-Age Distribution

<u>HEIGHT</u>	<u>AGE IN MONTHS</u>			
	<u>< 12</u>	<u>12-23</u>	<u>> 24</u>	<u>TOTAL</u>
	(N=91)	(N=73)	(N=158)	(N=322)
Normal	85(93.4%)	52(71.2%)	126(79.7%)	263(81.6%)
Height-for-age > 90%)				
“Stunting”	4 (4.3%)	19 (26%)	26(16.4%)	49(15.2%)
Height-for-age 80-90%)				
Moderate “stunting”	1 (1.%)	1 (1.3%)	3(1.8%)	5(1.5%)
Height-for-age 70-80%)				
Severe “stunting”	1 (1.0%)	1 (1.3%)	3.(1.8%)	5(1.5%)
Height-for-age <70%)				

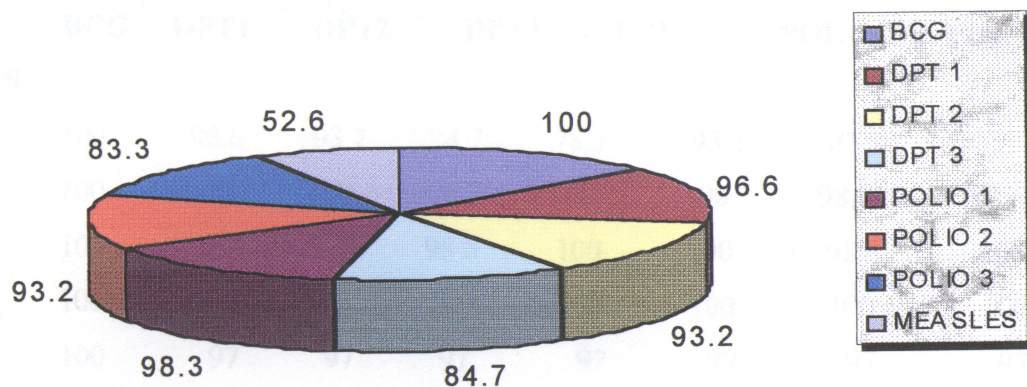
Prevalence of Stunting 18.3% (59/322)

When all the age groups were combined, 29.2% (94/322) had reduced weight-for-age, 16.5% (60/322) had reduced weight-for-height and 18.3% (59/322) had reduced height-for-age. 62.5% of children started losing weight in infancy. The mean age at onset of loss of weight was 10.63 months with a standard deviation of 5.17. There was no record of action taken by health workers to address the problem.

IMMUNIZATION STATUS

The majority of children (80%) had received specified vaccine at any time. The highest coverage was for BCG (100%) and the lowest for measles (52.6%). The worst coverage for all vaccines was in 1994 (Fig 3, Table 5,6)

Fig.3 Vaccination Rates in Children Aged 5-11 Months - (N=51)



NB. Children between 5 - 11 months should be fully “protected” i.e. should have had BCG, 3 DPT, 3 Polio and Measles

Table 5: Age-Specific Vaccination Rates in Children Less Than 12 Months.

<u>VACCINE</u>	<u>AGE (MTHS)</u>	<u>NO. VACCINATED</u>	<u>%VACCINATED</u>
BCG	1	(9/10)	90
DPT 1	2	(8/8)	100
DPT 2	3	(6/6)	100
DPT 3	4	(10/10)	100
POLIO 1	2	(5/8)	62.5
POLIO 2	3	(5/6)	83.3
POLIO 3	4	(4/10)	40.0
MEASLES	8-11	(10/19)	52.6%

NB: BCG -ALL CHILDREN REPORTED HAD BCG SCARS

Table 6: VACCINATION RATES (%) FROM 1990-1994

<u>YEAR</u>	<u>V A C C I N E</u>						
	BCG	DPT1	DPT2	DPT3	POL 1	POL 2	POL 3
MEASLES							
1994	100	96.6	93.2	84.7	78.3	93.2	83.3
1993	100	100	100	96.2	100	100	98.7
1992	100	100	100	98.6	100	100	98.6
1991	100	100	100	100	100	100	100.0
1990	100	97	97	97	97	97	97

NOTE: 1994 Corresponds to age group < 12 months
1993 “ “ “ “ 12-23 months
1992 “ “ “ “ 23-35 months
1991 “ “ “ “ 36-47 months
1990 “ “ “ “ 48-59 months

5.5 Common Childhood Illnesses

Malaria ,gastroenteritis and pneumonia were identified as causes of serious morbidity in children although malaria was a clinical diagnosis (Fig. 4). Convulsions were an important cause of morbidity but not a common cause of hospital admission.

Prevalence of Childhood Illnesses

38.8% of children (129/332) were sick in the two weeks preceding the interview (table 7).

Fig.4 Major Illness (Complaint) Suffered by Child Since Birth

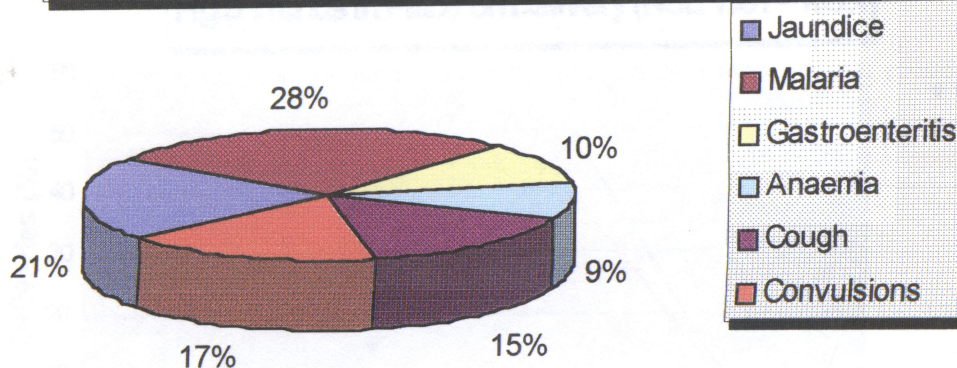


Table 7: Number Of Children Suffering From Specified Recent Illness
(Within two weeks preceding the study)

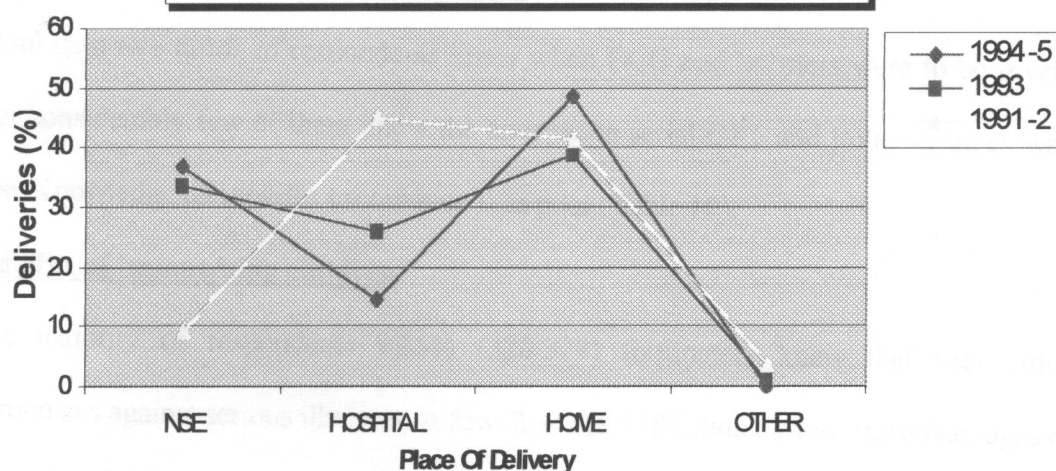
<u>COMPLAINT</u>	<u>NUMBER OF CHILDREN</u> <u>PER THOUSAND</u>
Fever	120
Cough/difficult breathing	141
Diarrhoea	144
Others	63

5.6 UTILIZATION OF HEALTH FACILITIES

Place of Delivery

This is summarised in Fig. 5. It is notable that most deliveries took place at home. Deliveries conducted in the local hospital have decreased over the years. It is pertinent to mention that deliveries were conducted by traditional birth attendants in only 20% of cases. The rest of the deliveries seem to have been unsupervised.

Fig.5 Trends In Place on Delivery (NSE 1991 - 1995)



Place of Treatment

Most of the respondents 98.4% (327/332) sought medical treatment at NSE facilities when their children fell sick. The rest took the children to the district hospital or bought medicines from the chemist. None had taken their children to a traditional healer.

5.7 KNOWLEDGE, ATTITUDES AND PRACTICES AMONG CARE GIVERS

Knowledge of Major Illness

Most of the care givers were aware of some of the major illnesses on the Estate (Table 8).

Services expected at USC

The majority of respondents (99%) indicated that they expected vaccination and weighing (100%). Only one third of respondents expected health education to be a component of underfive clinic activities. 60% of care givers didn't think treatment of sickness was part of the activities of underfive clinics (table 9).

Knowledge about immunisation schedule

More than two thirds of respondents knew when BCG and boosters were to be given. But considerably few of them knew the ages when serial DPT and Polio vaccines were due. Knowledge on measles vaccination was poor (Table 10).

Benefits of Immunising children

The majority of respondents 97.5% (320/328) fortunately knew that vaccination immunizes against serious illnesses. A few, 2.4% (8/328), didn't know any advantages of immunization. None of the respondents thought that immunization was a school requirement.

Action taken when a scheduled appointment for vaccination was missed

The majority of respondents (80%) said that they attended on another day.

Presentation of U5CC to NSE health facilities when child is sick

2.4% (8/331) of care givers said they were asked to present U5CC before their children could be treated. The majority (97.6%) were not--a highly significant finding as missed opportunities are not handled.

TABLE 8: Awareness Among Caregivers of Major Illnesses (N=332)

<u>Illness</u>	<u>Positive Response</u>
Malnutrition	330/332 (99.3%)
Malaria	332/332 (100%)
HIV/AIDS	332/332 (100%)
T.B.	332/332 (100%)
Tetanus	328/332 (98.7%)
Measles	332/332 (100%)
Pneumonia	326/332 (98%)
Polio	332/332 (100%)

TABLE 9: Type of Service Expected at Underfive Clinic (N=332)

<u>SERVICE</u>	<u>RESPONDENTS EXPECTING SERVICE</u>
Health Education	109/332 (33%)
Vaccination	330/332 (99%)
Weighing	332/332 (100%)
Treatment of illnesses	200/332 (60%)

TABLE 10: Knowledge Of Immunisation Schedule Among Caregivers

<u>VACCINE</u>	<u>CORRECT RESPONSE</u>
BCG	269/326 (82.5%)
DPT 1	198/326 (60.7%)
DPT 2	172/326 (52.7%)
DPT 3	168/326 (51.5%)
DPT Booster	220/326 (67.4%)
Polio 1	161/326 (49.3%)
Polio 2	151/326 (46.3%)
Polio 3	147/326 (45%)
Polio Booster	204/326 (62,5%)
Measles	(119/326) (36.5%)

5.8 KNOWLEDGE, ATTITUDES AND PRACTICES OF HEALTH WORKERS

80% of nurses and 100% of clinical officers did not routinely review U5CCs and they did not weigh children at every clinical encounter. 75% and 55% of nurses and clinical officers respectively had good knowledge about the immunisation schedule. 30% of both nurses and clinical officers had poor knowledge of the benefits of immunisation. The majority (80%) had been trained in management of diarrhoeal diseases and malaria and only 10% had received some training in the management of ARIs. Their treatment of illness was however appropriate in 80% of the cases and outcome of treatment was very good i.e. 95% of the cases.

CHAPTER 6

DISCUSSION

6.1 In this study 29.2% of underfive children were underweight for age; 18.5% were wasted and 18.3% were stunted. 9% of children had moderate to severe malnutrition (tables 2,3,4). In the 1992 ZDHS, 25% of children were underweight for age, 5% were wasted and 40% were stunted. The differences in wasting and stunting between the NSE and ZDHS study groups were significant ($p < 0.05$). Wasting implies acute onset of PEM which may be precipitated by acute infections in a child whose nutritional status is already precarious. Acute infections could have been a contributing factor to wasting in the NSE study as 14% of wasted children had an episode of diarrhoea and/or fever in the two weeks preceding the survey (table 7). The high prevalence of wasting in the NSE study may be due to bias as the survey was conducted during the peak periods of malaria and gastro-enteritis at NSE (January to April).

At least 14.5% (13/89) of malnourished children started losing weight during the first year of life (table 2) despite the fact that 90% of the children were reported to have been breast-fed for sometime during the first year of life. A review of OPD records showed no presence of significant illness in 60% of patients but examination of underfive clinic cards showed that 6% of children had evidence of failure to thrive during infancy.

Although the causes for this situation are not obvious there is a strong possibility that there are problems with sustainable breast-feeding and/or weaning practices.

However, the concurrent presence of HIV/AIDS/TB in some of these patients must be considered in view of the fact that 20% of pregnant women attending antenatal clinics

at NSE are HIV seropositive and the incidence of PTB in the adult population is high.¹⁸ It must also be re-iterated that many children in developing countries fail to gain *adequately in weight during the weaning period but start to gain weight again at 18-24 months of age albeit on a lower percentile*. By the time that they are 48 months, they have a low height - and a low weight-for-age but a normal weight-for-height.

In Zambia, in spite of a nation-wide vaccination campaign against measles, measles is still a major cause of hospital admissions in infants and young children, particularly in urban areas.¹⁹ Among children admitted in Mazabuka District Hospital in the 1992 outbreak, 30% were under the age of one year and 17% were below 9 months (the recommended age for immunisation in Zambia). In a 2 year hospital-based survey of measles infections carried out at the UTH, Lusaka, Zambia, from January 1992 to December 1993, the overall case fatality rate was 12.6% and was higher in children aged 0-3 years (14.3%).²⁰ In the present study at NSE, the lowest vaccination rate was for measles (52.6%) in 1994. At the time of the study there was no measles outbreak presumably due to the fact some children had measles during the 1992 outbreak. The overall measles case fatality rate for NSE during the outbreak was 10% although this figure was probably due to under-reporting. 8% of the NSE children had measles before the vaccination age. However, a vaccine coverage rate of 52.6% is totally unacceptable and would not protect children if another outbreak were to take place. It is known that low vaccine rates (which correlate with low herd immunity) lead to high genetic diversity in the 'H' antigen of the measles virus and therefore it is important, apart from maintaining the cold chain, to use strain-specific measles vaccine. Recent work in the

UTH Virology Laboratory, Lusaka, would suggest this could be part of the problem in Zambia (Dr. Mpabalwani, M. unpublished data).

In the present study, the highest vaccination rates were for BCG (96.9%). The number of children who had received all specified vaccine by the age of 12 months was on average 87.2% (fig. 3). This was comparable to other developing countries²¹ and higher than the national average. In the case of DPT and Polio, there was a progressive decline in the number of children who returned to receive the 2nd and 3rd doses after the 1st dose (table 6). This can be attributed, partly, to the poor knowledge of immunisation schedules among care givers (table 10). The low OPV rates as compared to DPT were due to erratic supply of the vaccine. Overall, vaccination rates have been good since 1990 except for measles which declined from 93.6% in 1993 to 52.6% in 1994 (table 6).

Malaria, gastro-enteritis, cough and malnutrition were reported major illnesses requiring hospital admission (fig. 4). The most prevalent illnesses in the two weeks preceding the survey were in order of importance: gastro-enteritis, ARI and fever (table 7). Malaria transmission at NSE is perennial but it reaches a peak during the hot, rainy season (November to April). Gastro-enteritis also occurs throughout the year but has two peaks: one corresponding to the malaria peak and the other occurs during the hot, dry season (September and November). The present survey was conducted in mid-April and this should be taken into consideration when interpreting the results. However OPD attendances do indicate that at any time during the year malaria, coughs and gastro-enteritis tend to be the main problems.

According to NSE Laboratories, only 18-20% of patients with fever but without any obvious cause have smear-positive malaria. Negative blood slides suggest the absence of malaria parasites but other causes of fever should be assiduously sought. At NSE patients with fever and a negative slide frequently receive anti-malarials. Whatever merit may be present in this practice, there is a potential danger of delaying definitive diagnosis and inducing multiple drug resistance. It is reasonable to screen for HIV, Tuberculosis and Urinary Tract Infections in all children with recurrent fever especially when there are no physical findings on clinical examination. Children with PEM secondary to some systemic illness e.g. HIV are usually symptomatic; thus they may present with recurrent fever and recurrent or persistent diarrhoea. Tuberculosis may turn out to be a major problem among the Estate's children as alluded to earlier, because the reservoir of infection among adults is high. Thus from 1990 to 1994 on average 117 new cases of TB were diagnosed annually. The lowest number, 71 cases, was in 1990 and the highest, 175, in 1994. Approximately 20% of all these patients were sputum - positive. At NSE there has been no formal programme of contact-tracing (particularly house contact) and treatment until recently. Thus it is feasible that some children with PEM could simply have TB.

The majority of children (98%) when they were unwell attended NSE clinics. This is not a new trend and there are perhaps several reasons including the following:

- there are no fees for service at NSE clinics; NSE clinics are generally close to residential areas while the district hospital is on average 5 km away and NSE clinics are well stocked with medicines for most of the time. A rather disturbing trend is that there

has been an increasing number of deliveries taking place at home (fig. 5). Since there is no formal programme of training traditional birth attendants, dangers of unsupervised home deliveries may be a problem. They include: maternal soft tissue injuries, excessive bleeding during and after delivery, maternal infections due to poor hygiene, fresh still births due to foetal asphyxia, aspiration syndromes due to poor neonatal resuscitation technique and introduction of infections (especially tetanus) due to poor hygiene.²¹

More than 98% of care-givers had heard about the most important illnesses on the Estate (table 8). Although tetanus has not been reported in the past three years at NSE or Mazabuka District Hospital it was encouraging that most respondents had heard of it. This awareness is attributable perhaps, to the tetanus vaccination programme in antenatal clinics. Awareness about Polio was 100% and this could be attributed to the fact that Polio Awareness Week in 1995 fell during the period of the survey.

Knowledge about the immunisation schedule was generally poor (table 10). This may explain why there was a progressive and significant decline in the number of children who returned for revaccination (χ^2 0.001, $15^\circ = 37$; $p < 0.001$).

It is quite clear that the advantages of immunisation to the individual child and community have not been adequately expounded by health workers. The point to emphasise from this evidence is that although vaccination rates for the children are generally high there is likely to be a progressive decline in immunisation rates if knowledge of care-givers is not improved and re-inforced.

The majority of medical and nursing staff had good knowledge of the immunisation schedule but they generally had poor knowledge of the benefits of immunisation. In addition, health workers did not routinely review growth charts at every child encounter. This creates the danger that children with growth failure may not be detected early enough for meaningful interventions and may have contributed to the stunting seen in the first year of life.

CHAPTER 7

RECOMMENDATIONS

7.1 IMPROVEMENT OF INFANT NUTRITION

Important and practical interventions to improve infant nutrition include: breast-feeding; good weaning practices; prevention of diarrhoea and other infections; early detection and treatment of illness, and growth monitoring. Breast feeding, especially exclusive breast-feeding during the first 4 to 6 months of life is crucial. Mothers should be educated about this and they should be given all the necessary support. It is necessary to train health workers in breast-feeding practices and counselling so that they can encourage and assist mothers when problems with breast-feeding arise.

Postnatal transmission of HIV via breast milk feeding does occur.²² Even in babies who have had intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1, the efficacy is fourteen per cent (95% CI 20-64) up to age 14-16 weeks of continued breast-feeding.^{23, 24} So infected women who are going to breast-feed should be informed of the potential risks.

It is important to detect growth failure early so that the cause can be determined and corrective measures taken before irreversible damage occurs. The most practical way to achieve this is to routinely monitor child growth and record it on growth charts and this should be done not only at underfive clinics but at every child encounter as well as at entry to kindergarten and pre-school.

As low Birth Weight is an important indicator of subsequent malnutrition, it is important to prevent or reduce it. Some feasible and practical ways to achieve this include the following: educating mothers about the importance of good nutrition, particularly during pregnancy; early detection and treatment of maternal diseases such

as malaria, anaemia, syphilis, hypertension, tuberculosis, diabetes mellitus and urinary tract infections; educating mothers about the injurious effects on the foetus of smoking and excessive alcohol intake during pregnancy.²⁵

7.2 **IMPROVEMENT OF IMMUNISATION COVERAGE**

All children attending OPD and underfive clinics, should have their vaccination status checked and vaccinated accordingly. The same should apply to children entering kindergarten, pre-school and school and, there should be a policy or regulation to mandate this. Vaccination rates should be monitored continuously. All children below five years who have not been vaccinated against measles should be identified and vaccinated as soon as possible.

7.3 **PREVENTION OF COMMON ILLNESSES ON THE ESTATE**

Malaria is clearly a serious problem on the Estate. This is despite the fact that entomological studies carried out by the Biology department of the University of Zambia showed that the majority of mosquitoes at NSE were not the malaria- carrying type but of biting nuisance.²⁶ The current malaria control activities are probably inadequate.

The following recommendations can be made to address the malaria situation: firstly, the current malaria control programmes at NSE should be critically re-appraised in collaboration with experts from Nation Malarial Control Programme MOH, University of Zambia and Tropical Diseases Research Centre and WHO. Secondly, prevention of mosquito bites should be universally practised by use of mosquito nets, insect repellents etc.

The role of malarial chemoprophylaxis in underfive children on a mass scale is controversial. The general view is that if immediate treatment of acute disease cannot be guaranteed all children under 3 years of age in holo-endemic and hyper-endemic malarious areas are at high risk of serious malaria and therefore should receive

chemoprophylaxis. In addition the following categories of children are at special risk from malaria, and chemoprophylaxis is recommended:- infants born to non-immune mothers in malarious areas; indigenous children who may be immuno-suppressed by disease or as a result of treatment with immuno-suppressive drugs and children with sickle-cell anaemia living in malarious areas.²⁷

For gastro-enteritis, the most important interventions should include improvement of sanitation, hygiene and water supply; educating care-givers and health workers on the *prevention and treatment of diarrhoeal diseases; monitoring ORS and ORT use rates in the community*. Children with persistent or chronic diarrhoea should of course be referred for further investigations.

Respiratory infections should be taken seriously. ARIs can be adequately managed by medical and nursing staff if they receive adequate training in management of coughs. This should be done urgently and can be arranged locally in collaboration with the District Hospital. Persistent or chronic coughs should be investigated to rule out treatable conditions such as tuberculosis and to some extent bronchial asthma and pertussis. All household contacts of adult patients with TB, should be screened for TB and treated accordingly.

Vertical Transmission of HIV occurs in 13 - 40% of babies born to HIV infected mothers.²⁸ Antenatal screening and counselling has not been done in the past; this perhaps can be done in selected cases as vertical transmission of HIV infection from mother to baby can be reduced by appropriate administration of Zidovudine (AZT).^{29,30}

7.4

INCREASED UTILISATION OF NSE HEALTH CARE FACILITIES

There are more maternal deliveries taking place in homes rather than in formal health care facilities. The dangers inherent in this practice have already been alluded to. Research is needed to determine whether delivery in homes is due to genuine patient preference or to logistical problems such as distance, lack of transport, poor treatment at

health care facilities etc. If there is genuine individual preference for home delivery, then consideration should be given to undertake a project to train and support TBAs.

7.5 **KNOWLEDGE, ATTITUDES AND PRACTICES OF HEALTH WORKERS**

Continuing medical education in the form of in-service training for medical and nursing staff should be encouraged. This may take the form of lectures, seminars/workshops on topics related to major health problems on the Estate. This can be done in collaboration with resource persons from local institutions e.g. Mazabuka District Hospital, (U.T.H.) School of Medicine and MOH. There is great and urgent need to improve the working *relationship between NSE health workers, the community and the District Health Management Team.*

7.6 **HEALTH INFORMATION**

Age-specific morbidity and mortality data should be diligently recorded. This will assist in planning services objectively. This information should be computerised if possible.

Prevalence of HIV sero-positivity in children age 18-60 months should be determined in order to assess how much of so-called PEM in this age group is due to HIV/AIDS/TB. Presence of HIV antibodies in children before the age of 18 months does not necessarily mean that they are infected, it may be due to passive transfer of maternal antibodies. The danger is that when such children fall ill they may mistakenly be thought to have HIV infection from their parent(s) when, in fact, all they may have is TB or just PEM. Omitting to screen such children for TB would therefore result in high and unacceptable wastage of children's lives.

7.7 **COMMUNITY PARTICIPATION**

As far as possible the community must participate in the formulation and implementation of solutions to local problems so that they feel that they are part of the answer.

7.8 **PROGRAMME EVALUATION**

All programmes must be periodically evaluated as objectively as possible and modified accordingly.

7.9 **RESEARCH RECOMMENDATION LIST**

1. Determine the prevalence of exclusive breast-feeding in early infancy at NSE.
Rationale: To prevent failure to thrive attributable to poor breast-feeding practices.
2. Determination of ORS and ORT use rates in the prevention and treatment of dehydration in underfive children.
Rationale: This was not done in this study. Since gastro-enteritis is one of the most prevalent problems, the information would be used to promote and monitor programmes.
3. Knowledge, Attitudes and Practices of TBAs at NSE.
Rationale: Since most deliveries at NSE take place in the homes, some training must be offered to the attendants depending on what they already know or do not know.
4. Knowledge, Attitudes and Practices of the NSE community in malaria control.
Rationale: To plan community participation in malaria control programmes.
5. To determine the incidence of tuberculosis in children living in households of HIV/AIDS adult patients.

Rationale: To determine whether children living in such households should receive TB chemoprophylaxis.

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ANNEX 1

SECTION 1: IDENTIFICATION OF HOUSEHOLD

STUDY NUMBER

HOUSE NUMBER.....

CATCHMENT AREA.....
(1 = NJOMONA, 2 = KALEYA 3 = CHUULA)

NAME OF HOUSEHOLD HEAD

COMPANY NUMBER

SECTION 2: INTERVIEWER VISITS

NAME OF INTERVIEWER.....

DATE OF INTERVIEW
(DD /MM /YR)

LENGTH OF INTERVIEW.....
MINUTES

FINAL VISIT.....
(DD /MM /YR)

NUMBER OF INTERVIEW VISITS.....

LANGUAGE OF QUESTIONNAIRE

RESPONDENTS LOCAL LANGUAGE

LANGUAGE USED IN INTERVIEW

TRANSLATOR USED
(1 = NOT AT ALL; 2 = SOMETIMES; 3 = ALL THE TIMES)

LANGUAGE CODE:

1 = ENGLISH
2 = TONGA
3 = NYANJA

4 = BEMBA
5 = LOZI
6 = OTHER

SECTION 3: INDIVIDUAL CHILD QUESTIONNAIRE

I would now like to ask some questions regarding this child.

P l e a s e t e l l m e

.....

1. What is the name of this child?

2. Is the child male or female? 1= male 2=female

3. Do you have an under-five card or birth certificate of this child?

1 = yes, seen

2 = yes, not seen

3 = no card

4. When was the child born?

(DD / MM / YR)

Age

(0 - 59 months)

5. Where was the child born?.....

1 = NSE Clinic

2 = Hospital

3 = Other Health Centre

4 = At home

5 = Other (specify)

6. What was the birth weight?..... kilograms

Source of information (1 = U5C, 2 = Mother recall)

Please copy vaccination dates for each vaccine from the card if available. Use the following code:

1 = Yes

2 = No

Source of information: (3 = U5C) (4 = Mothers recall)

7. *Has the child been given BCG, that is an injection in the left forearm that caused a scar?*

(1 = Yes)

(2 = No)

When was it given?

(DD / MM / YY)

Source of information

(3 = U5C)

(4 = Mothers recall)

8. *Has this child been given DPT?*

If not, please explain why?.....

- a = Child was sick
- b = Was out of town
- c = Had forgotten when to bring the child
- d = Child had reaction with previous DPT
- e = Other reason

DPT I Date given Source of
 (DD/MM/YY) information

DPT II Date given Sources of
 (DD/MM/YY) information

DPT III Date given Sources of
 (DD/MM/YY) information

Booster Date given Sources of
 (DD/MM/YY) information

9. Has this child received polio vaccine, that is drops in the mouth?

If not, why?

(a,b,c,d,e)

Polio I	Date given..... (DD/MM/YY)	Source of..... information
---------	-------------------------------	-------------------------------

Polio II	Date given..... (DD/MM/YY)	Source of..... information
----------	-------------------------------	-------------------------------

Polio III	Date given..... (DD/MM/YY)	Source of..... information
-----------	-------------------------------	-------------------------------

Booster	Date given..... (DD/MM/YY)	Source of..... information
---------	-------------------------------	-------------------------------

10. Has this child received measles vaccine?

If not, please explain why?

11. Where do you take the child for vaccination?

1 = Nakambala Sugar Estate (NSE)

2 = Hospital

3 = Government Health Centre

4 = Others (specify)

12. Have you ever heard of under-five clinic?

13. What type of service do you expect from the USC?

1 = Health education

2 = Vaccination

3 = Weighing

4 = Treatment of sickness

5 = Other

14. Do you know at what age(s) you are supposed to take the child for vaccination?

If yes, please tell me at what age the child should have?

BCG
DPT I
DPT II
DPT III
DPT Booster
Polio I
Polio II
Polio III
Polio Booster
Measles

a = at birth

b = at 2 months

c = at 3 months

d = at 4 months

e = at 18 months

f = at 9 months

15. Please tell me some advantages of vaccinating children (may choose more than one answer)

a = Don't know

b = Protect child from serious disease

c = The community benefits

d = Allows child to be admitted to school

e = Other (specify)

16. Which of the following has your child ever experienced following vaccination?
(May choose more than one answer)

.....
a Fever
b Convulsions
c Severe pain and swelling at the injection site
d Paralysis
e Excessive crying
f None of the above

17. If you miss the appointment at the under-five, do you still attend on another day?
.....

18. When the child is sick and you take it to NSE, for treatment how often are you asked to produce the underfive card in order to be given treatment?
.....

1 = never; 2 = sometimes; 3 = always

19. Where do you usually take the child when he/she is sick?
.....

- 1 = NSE clinics
- 2 = Hospital
- 3 = Private doctor
- 4 = Traditional healer
- 5 = Self treat with medicine from chemist

If you do not take the child to NSE clinics, please explain why?.....
.....

- a = Bad treatment from health workers
- b = Long queues
- c = Too far
- d = Usually no vaccines and medicines at NSE
- e = Other

20. Have you ever heard of a disease called:-

Malnutrition:

Malaria:

AIDS:

T.B.:

Tetanus:

Polio:

Pneumonia:

21. Since this child was born, what disease has she/he suffered from?

DISEASE/PROBLEM

HOSPITALIZED

1 = Yes; 2 = No

- a. = Jaundice
- b. = Convulsions
- c. = Meningitis
- d. = Malaria
- e. = Anaemia
- f. = Diarrhoea and/or vomiting
- g. = Heart disease
- h. = Cough
- I. = Other

22. In the past two weeks, has this child been sick?.....

If yes, what was the problem?.....

(a,b,c,d)

- a. = Fever
- b. = Cough
- c. = Diarrhoea and/or vomiting
- d. = Other

23. What treatment was the child given (circle all that apply)

- a. = None
- b. = Antibiotic
- c. = Cough Mixture
- d. = Antimalarial
- e. = Antidiarrhoeal
- f. = Antipyretic
- g. = Don't know
- h. = Other please specify

24. Who treated the child? (Circle all that apply)

- a. = ZEN
- b. = SRN
- c. = Clinical Officer
- d. = Doctor
- e. = Other (Please specify).....

25. Is the child well now?

26. If you travel to another town/village and the day arrives for under five clinic, will you take the child to the nearest place, for vaccination?.....

27. Did you breast feed this child ?.....

If yes , at what age did you stop breast feeding?.....months.

If no, please explain why?.....

(a,b,c,d,e,f)

- a. = Working mother
- b. = No milk in breast
- c. = Advised against breast feeding
- d. = Mother was ill
- e. = Baby refused breast feeding
- f. = Other

28. Have you ever taken this child to the nutrition centre at NSE?.....

29. Does your child receive food supplements from the nutrition centre?.....

30. How often have extension workers visited your home in the last one month?

1 = None; 2 = Once; 3 = Twice; 4 = More than twice

31. Do you know there is a nutrition centre for underfive children at NSE?.....

Well, thank you very much. I would now like to examine the child.

32. General physical examination of the child (circle all the apply)

- a = Wasted
- b = Oedema
- c = Fairly well nourished
- d = Well nourished
- e Jaundiced
- f = Pale
- g = Other (specify).....

33. Weight.....kilograms

N.B.: Do not weigh if there is clinically evident oedema.
Weigh in underclothes only.

34. Height/length.....centimeters.

N.B.: Remove shoes if worn.

35. LMUACcentimeters

N.B.: Remove all clothing from the arm.

THANK YOU FOR YOUR CO-OPERATION

ANNEX 1

CHECK LIST FOR INDIVIDUAL CHILD AND CARE-GIVER

QUESTIONNAIRE

INDIVIDUAL CHILD INFORMATION

- Q2 Sex
- Q4 Date of Birth: DD/MM/YY Age:..... Months
- Q5 Place of Birth
- Q7 Immunisation: BCG: Date
- Q8 Immunisation: DPT: Date
- Q9 Immunisation: Polio: Date
- Q10 Immunisation: Measles: Date
- Q11 Immunisation: Place
- Q21 Major illness suffered by the child since birth
- Q22 Recent illness suffered by the child
- Q23 Treatment given for recent illness
- Q24 Person treating the child
- Q25 Outcome of treatment
- Q27 Breastfeeding history
- Q28 Visit to nutrition centre
- Q29 Food supplements
- Q30 Extension workers visit
- Q32 General physical examination of the child
- Q33 Weight - Kilograms
- Q34 Height/Length - Centimeters
- Q35 LMUAC - Centimeters

CARE-GIVER KNOWLEDGE

- Q12 Awareness of the presence of under-five clinics
- Q13 Knowledge of activities carried out at under-five clinics.
- Q14 Knowledge of immunisation schedule.
- Q15 Knowledge of advantages of immunisation.
- Q19 Utilisation of Health facilities.
- Q20 Awareness of important diseases.

CARE-GIVER PRACTICES

- Q17 Practice when child misses appointment for vaccination.
- Q19 Type of health care utilised when child is unwell.
- Q26 Practice when child is out of town and appointment day for vaccination arrives.

CARE-GIVER ATTITUDES

- Q18 Attitudes on Nakambala Sugar Estate Clinics.

ANNEX 1

INDIVIDUAL QUESTIONNAIRE FOR HEALTH WORKERS

INSTRUCTIONS: Please read the questions and statements carefully before answering.

Q1. When were you employed by Zambia Sugar Company?
DD/MM/YY

Q2. What is your job?

- a = Enrolled nurse
- b = Registered Nurse
- c = Clinical Officer
- d = Other (please specify)

Q3. Are you permitted to treat children when they come to seek medical attention at NSE clinics? (please circle)

- a = Yes
- b = No

Q4. In which of the following areas have you been formally trained? (please circle all that apply)

- a = Management of diarrhoeal disease in children
- b = Treatment of Malaria in children
- c = Childhood immunisation
- d = Management of acute respiratory infections in children

Q5. Please list the vaccine(s) given in the space provided

- a = At birth
- b = At 8 - 9 months
- c = To pregnant women
- d = At 2,3 and 4 months
- e = At 18 months

Q6. What advice do you give to parents who have brought to you an infant with diarrhoea but no dehydration? (circle all that apply)

- a = Continue breast feeding
- b = Stop breast feeding if the diarrhoea continues
- c = Give the child more fluid to drink than usual
- d = Refer

Q7 In your practice at NSE (circle all that apply)

- a = It is routine to review UFCC before treating children
- b = You are allowed to administer vaccines to children
- c = Children are weighed routinely at every clinical encounter
- d = Children who have.....fever or diarrhoea without dehydration and are otherwise healthy, can be vaccinated.

Q8 What do you do when a child is brought to you with fever, and diarrhoeal without dehydration (circle only was alternative)

- a = Give chloroquine, an antibiotic, paracetamol and send child home.
- b = Ask the doctor to examine
- c = Take history, examine the child, and ask for a blood slide for HP before you decide how to treat
- d = Refer the child to the hospital

Q9 The following statements are true (please circle)

- a = A 2 year old child who has never been vaccinated can still be fully vaccinated.
- b = Children who have missed some vaccines, should not be given the vaccines they have missed.
- c = Children with malnutrition should not be vaccinated.
- d = If a child has missed any vaccine, the parents or guardians should be punished somehow.

Q10 The following statements are true (please circle)

- a = Most children who have vomiting can still be given ORS
- b = Most children with a cough do not require an antibiotic
- c = All children with diarrhoea and dehydration should be referred to the hospital
- d = Most children with diarrhoea and dehydration can and do recover when given ORS only.

Q11 Which of the following conditions can you reasonably diagnose simply by looking at the child? (please circle)

- a = Measles
- b = Tetanus
- c = Malnutrition
- d = Pneumonia
- e = Malaria

Q12 In which areas do you feel you need more training? circle all that apply)

- a = Management of diarrhoeal diseases in children
- b = Management of coughs in children
- c = How to communicate effectively with your patients
- d = Obtaining and recording health information
- e = Treatment of malaria in children

Q13 How often do you need guidance when treating children?

- a = All the time
- b = Most of the time
- c = Sometimes
- d = Rarely
- e = Not at all

Q14 What do you think should be done to improve health care of children at NSE (circle all that apply)

- a = Stop referring them to Mazabuka District Hospital
- b = Improve communication between NSE, Mazabuka District Hospital and all private practitioners in town.
- c = Promote health education for everybody on the Estate
- d = Building a hospital at NSE is the best solution

Q15 What are the advantages of vaccinating children (circle all that apply)

- a = Don't know
- b = Protects child from serious diseases
- c = The community benefits
- d = Allow the child to enter school

ANNEX 1

CHECK LIST FOR HEALTH WORKERS (FROM HEALTH WORKER QUESTIONNAIRE)

- Q1 Period of employment at NSE
- Q2 Worker category

ASSESSMENT OF KNOWLEDGE OF HEALTH WORKERS

- Q4 Formal training in management of common illness causing significant morbidity and mortality in young children
- Q5 Immunisation schedule
- Q6 Home management of a child with diarrhoea but no dehydration
- Q8 Assessment of a sick child
- Q9 Immunisation of the sick child and the child who has missed vaccination
- Q10 Management of the child with diarrhoea, acute upper respiratory infection
- Q11 Spot diagnosis of some important childhood conditions
- Q15 Advantages of immunising children

PRACTICES OF HEALTH WORKERS

- Q7 Approach to the sick child
- Q13 Need to seek guidance when treating children

ATTITUDES OF HEALTH WORKERS

- Q12 Attitudes on further training in the management of children
- Q13 Attitudes towards other health institutions

SCORE SHEET FOR KNOWLEDGE OF HEALTH WORKERS
(FROM INDIVIDUAL QUESTIONNAIRE FOR HEALTH WORKERS)

QUESTION NUMBER	RESPONSE	SCORE
4	a	1
	b	1
	c	1
	d	1
5	1	1
	2	1
	3	1
	4	1
	5	1
6	a	1
	b	0
	c	1
	d	0
8	a	0
	b	0
	c	1
	d	0
9	a	1
	b	0
	c	0
	d	0
10	a	1
	b	1
	c	0
	d	1
11	a	1
	b	1
	c	1
	d	1
	e	0
15	a	0
	b	1
	c	1
	d	0
TOTAL	34	22

GRADING OF CORRECT SCORES

17-22 = Very Good
11-16 = Good
7-10 = Poor
Less than 7 = Bad

ANNEX 1

GENERAL ANTHROPOMETRIC STANDARDS OF REFERENCE

(1) Weight for Age, Birth to 60 months, sexes combined

Age (months)	Weight (kg)				
	Standard	90% Standard	80% Standard	70% Standard	60% Standard
0	3.4	3.0	2.7	2.4	2.0
1	4.3	3.7	3.4	2.9	2.5
2	5.0	4.4	4.0	3.4	2.9
3	5.7	5.1	4.5	4.0	3.4
4	6.3	5.7	5.0	4.5	3.8
5	6.9	6.2	5.5	4.9	4.2
6	7.4	6.7	5.9	5.2	4.5
7	8.0	7.1	6.3	5.5	4.9
8	8.4	7.6	6.7	5.9	5.1
9	8.9	8.0	7.1	6.2	5.3
10	9.3	8.4	7.4	6.5	5.5
11	9.6	8.7	7.7	6.7	5.8
12	9.9	8.9	7.9	6.9	6.0
13	10.2	9.1	8.1	7.1	6.2
14	10.4	9.35	8.3	7.3	6.3
15	10.6	9.5	8.5	7.4	6.4
16	10.8	9.7	8.7	7.6	6.6
17	11.0	9.9	8.9	7.8	6.7
18	11.3	10.1	9.0	7.9	6.8
19	11.5	10.3	9.2	8.1	7.0
20	11.7	10.5	9.4	8.2	7.1
21	11.9	10.7	9.6	8.3	7.2
22	12.05	10.9	9.7	8.4	7.3
23	12.2	11.1	9.8	8.6	7.4
24	12.4	11.2	9.9	8.7	7.5
25	12.6	11.4	10.1	8.9	7.6
26	12.7	11.6	10.3	9.0	7.7
27	12.9	11.8	10.5	9.2	7.8
28	13.1	12.0	10.6	9.3	7.9
29	13.3	12.1	10.7	9.4	8.0
30	13.5	12.2	10.8	9.5	8.1

ASSESSMENT OF NUTRITIONAL STATUS

(2) Length for Age, Birth to 60 months, sexes combined

Age (months)	Length (cm)				
	Standard	90% Standard	80% Standard	70% Standard	60% Standard
0	50.5	45.4	40.3	35.3	30.2
1	54.8	43.7	43.3	38.3	32.5
2	58.0	51.7	46.2	40.5	34.5
3	60.0	54.0	48.0	42.0	36.0
4	62.3	56.3	49.5	43.3	37.3
5	64.4	58.1	51.1	44.8	38.5
6	65.8	59.2	52.6	46.1	39.5
7	67.6	60.7	54.1	47.2	40.5
8	69.2	62.0	55.3	48.3	41.5
9	70.7	63.6	56.5	49.5	42.4
10	72.2	64.5	57.7	50.4	43.2
11	73.5	66.0	58.8	51.3	44.1
12	74.7	67.2	59.8	52.3	44.8
13	76.0	68.3	60.7	53.1	45.4
14	77.1	69.5	61.5	54.0	46.2
15	78.1	70.3	62.4	54.6	46.8
16	79.3	71.3	63.3	55.4	47.5
17	80.5	72.3	64.2	56.3	48.2
18	81.4	73.2	65.1	57.0	48.8
19	82.7	74.2	65.8	57.7	49.4
20	83.5	75.1	66.9	58.4	50.0
21	84.4	75.0	67.4	59.0	50.7
22	85.4	76.9	68.3	59.7	51.3
23	80.3	77.7	68.9	60.2	51.8
24	87.1	78.4	69.6	60.9	52.2
25	88.0	79.1	70.3	61.2	52.7
26	88.8	80.0	71.0	62.0	53.3
27	89.7	80.7	71.5	62.7	53.8
28	90.4	81.3	72.2	63.2	54.2
29	91.3	82.0	72.8	63.7	54.7
30	91.8	82.5	73.4	64.2	55.1
31	92.6	83.2	74.0	64.7	55.5
32	93.3	83.7	74.6	65.2	50.0

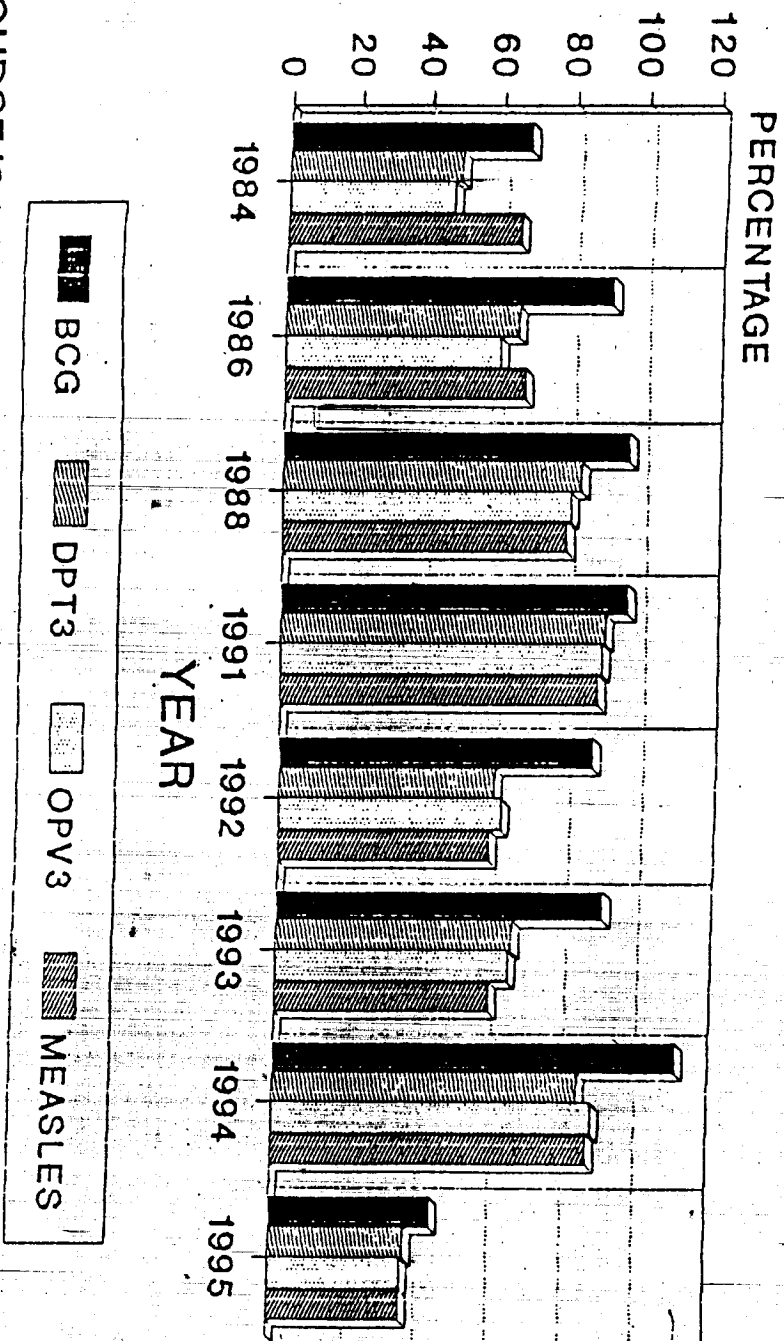
ANNEX 1

(3) Weight for Length, Young children, sexes combined,
52 - 108 cm in Length (continued)

Length (cm)	Weight (kg)				
	Standard	90% Standard	80% Standard	70% Standard	60% Standard
85	12.0	10.7	9.6	8.4	7.2
86	12.2	11.0	9.8	8.5	7.3
87	12.4	11.1	9.9	8.6	7.4
88	12.6	11.3	10.1	8.8	7.6
89	12.8	11.5	10.2	9.0	7.7
90	13.1	11.8	10.5	9.2	7.9
91	13.4	11.9	10.7	9.3	8.0
92	13.6	12.2	10.9	9.5	8.2
93	13.8	12.4	11.0	9.6	8.3
94	14.0	12.6	11.2	9.8	8.4
95	14.3	12.8	11.4	10.0	8.5
96	14.5	13.1	11.6	10.2	8.7
97	14.7	13.3	11.8	10.3	8.8
98	15.0	13.5	12.0	10.5	9.0
99	15.3	13.7	12.3	10.7	9.2
100	15.6	14.0	12.5	10.9	9.4
101	15.8	14.2	12.6	11.1	9.5
102	16.1	14.5	12.9	11.3	9.7
103	16.4	14.7	13.2	11.5	9.8
104	16.7	15.0	13.4	11.7	10.0
105	17.0	15.3	13.6	11.9	10.1
106	17.3	15.5	13.8	12.1	10.4
107	17.6	15.9	14.0	12.3	10.5
108	18.0	16.2	14.4	12.6	10.8

Values derived from Harvard Standards - Stuart & Stevenson (1959)

TRENDS OF IMMUNIZATION COVERAGE ZAMBIA, 1984-1995

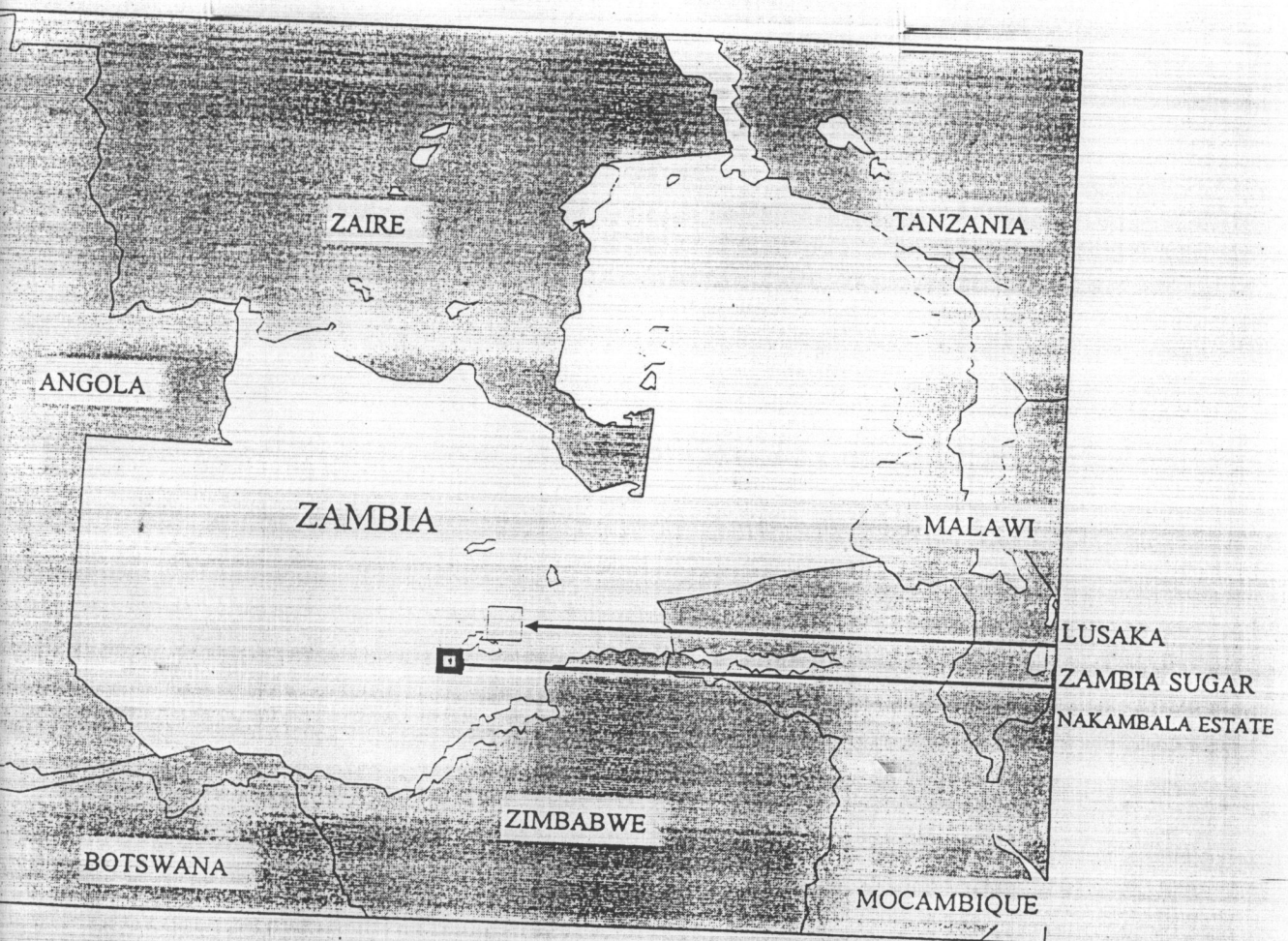


SOURCE: 84-'91 BASED ON COVERAGE SURVEY
'92 '93 '94 BASED ON 85%, 87% 100%
1995 DATA IS FOR FIRST SEMESTER ONLY

ANNEX 2

Zambia Sugar

Information Pack



June 1997