SOCIO-ECONOMIC DETERMINANTS OF INFANT AND CHILDHOOD MORTALITY IN SHINYANGA REGION IN TANZANIA

BY

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I HAVE READ THE DISSERTATION AND APPROVED FOR EXAMINATION

SIGNITURE OF THE SUPERVISOR:.....

ABSTRACT

This Thesis deals with Socio-Economic Determinants of Infant and Childhood Mortality in Shinyanga. The study was prompted by the high levels of infant and childhood mortality in some regions of Tanzania. Shinyanga was selected as a case study because it was one of those regions with high infant and childhood mortality rates by 1978. It was proposed that the high levels of infant and childhood mortality in that region could be explained by:

(a) Low educational achievement levels among Women;
(ii) Low income levels within the households;
(iii) Poor accessibility to clean water supply;
(iv) Poor accessibility to health facilities; manifested in transport difficulties and lack of drugs in the institutions;
(v) Low frequency of cooking and inaccessibility to food for children in between meal times and
(vi) Power relationships within the households.

The objectives were to find out how much of the child mortality levels could be explained by the socio-economic factors and cultural aspects with respect to the country wide child immunisation programme.

policies which should effect efficient accessibility to social amenities and develop strategies of implementation which would achieve more equitable distribution of the social facilities.

From the theoretical point of view, the findings would contribute to the existing body of knowledge on the subject. And lastly the Rural oriented programme often funded by external agencies would be able to direct their financial support in those areas where the gaps were identified in order to enhance child survival.

1.03 Objectives of the Study

Using Shinyanga as a case study, the objectives of this exercise are three fold.

(i) To establish whether variations in Socio-economic development, health facilities, income disparity, education, transportation, nutrition clean water supply can explain variations in infant and childhood mortality.

(ii) To establish whether the ethnic group of the mother can explain the level of infant and childhood mortality.

(iii) To determine the relationship between the levels of infant and childhood mortality rates and the cultural aspects related to household decision making and resource allocation.

keeping an additional child who is a handicap was traditionally felt and reflected among the survivors. In Tanzania certain population subgroups appeared to have a negligible number or no twins, albinos or handicaps. Possibly the culture was such that such people were eliminated in their infancy through various means. As a result, among the survivors within those population sub groups were only the able bodied personalities who could work and support themselves with minimum socio-economic support from the rest of the community. The researcher felt that in Shinyanga, mother's time for child caring is deprived by other time consuming productive activities. The activities include collecting and fetching firewood from distant points, drawing water, grinding and farm activities. All these activities consume time, reduce frequency of cooking and reduce time for child caring. As a result of their low economic power and the great distance involved between their homes and resource points, women will have to carry their babies at their backs while attending those economic activities, and have very little remaining time for cooking and to take proper care of their children. As a result, children go without food for a long time, while those who are breast feeding get little breast milk as their mothers stay hungry for a long time. This too will influence the health of the child.

childhood mortality rates through economic external aids without necessarily changing the internal operating socio-economic structures/pose any problems of implementation on caverage of immunisation programme? If yes, what are the required steps to rectify the situation. To separate child deaths which occurred due to maternal factors, the age of the mother (classified into five year age groups) was tested. Having separated those two levels the remaining levels of deaths of children would be regarded by deaths caused by socio-economic factors through environmental factors, nutrient deficiencies or injuries.

Do the existing structures

1.4 The Hypothesis

1.4.1 Hypothesis One

High infant and childhood mortality rates in Shinyanga region are closely related to poor accessibility to educational facilities.

Rationale of Hypothesis One:

Studies have indicated that variations in school enrolment levels existed between the regions of Tanzania. The variations range from 80% for Kilimanjaro region to 23% for Shinyanga by 1971-72 (Morisson, 1970: Mbilinyi 1969). (Mbilinyi, 1969) also noted that heads of household who perceived the value of Education only in terms of getting a

Protein energy malnutrition during the normal years were associated with insufficient feeding frequencies and low energy density foods rather than insufficient food within the households. However, in years with food shortages, lack of food is the main cause of protein energy mulnutrition (PEM) among children in Shinyanga. PEM was affecting more than 30% of children of under five years of age in Shinyanga Region (UNICEF, 1985).

Expectations of Hypothesis six:

The expected frequency of cooking shall be three times or more in a day; otherwise anything less is considered a low frequency of cooking.

It is expected that the high infant and childhood mortality rates are associated with low frequency of cooking. While high frequency of cooking is associated with high frequency of feeding and low infant and childhood mortality.

It is also expected that where children have no access to food in between meal times there are high infant and childhood mortality rates. In contrast to situations where children have accessibility to foods in between meal times. In such a situation infant and childhood mortality levels will be low.

It is expected that with low frequency of cooking and consequently low frequency of eating, low birth weights will be observed. The opposite will be true where high frequency of cooking operates. Low birth weights can put children at the risk of death.

4. The Sudden Death of the Researcher's Beloved Father Thomas Seda Kimaryo.

The sad news of the death of the researcher's beloved father , resulted into discontinuity of the study for 18 days. During the period the researcher had to travel home to attend and to pay condolence visits to Msaranga and Kisale Villages which were the deceased homes. The late father had two homes, located in two different villages. The children and close relatives had to attend funeral ceremonies (rituals) conducted in both homes. All of those activities took place in Rombo District in Kilimanjaro Region.

1.8 Analytical Framework

The data collected was to be coded, punched, and cross tabulated through computer. The analysis of frequency counts, percent distribution and cross tabulated tables have been done in chapters three and four. Due to anticipated reluctance and sensitivity to talk about the diseased; analytical tools like Brass, W. (1968) and Trussel's, J.T. (1975) techniques of estimating the levels of infant and childhood mortality in a society were employed.

The estimated values were compared with the North and West Model Life Tables, to be able to establish the levels of infant and childhood mortality in Shinyanga. The results obtained from the two techniques using both model life tables have been contrasted; and choice of the estimated levels were made depending on which Life Table model appeared to reflect best the age pattern mortality characteristics of Shinyanga

On the side of girls education most parents in that region preferred their daughters to marry early so that they (parents) received a considerable bride price; which was paid in terms of cattle. This bride price in some places decreased with increasing years of education of the girls because of the aging factor; that affected the schooling girls. Studies have shown that children of young mothers usually die. That is one of the reasons why in Brass method of estimating infant mortality from children ever born and those surviving, P1/P2 has been neglected because of the expected bias and estimates are based on 2qx. Since early marriage is encouraged in Shinyanga it is expected that it could be one of the factors which maintain high infant and childhood mortality levels. In Shinyanga girls are pressurized to get married early or are motivated to drop out of school in order to engage in more economic activities (RIDEP, 1975).

Other factors too explained the lagging behind of of girls education development in Shinyanga. (RIDEP, 1975) noted that some parents feared that by going to school, the girls will meet other lovers where parental arrangement for marriage was not entertained, a factor which would reduce the bride price. Besides, the aging factor, some parents feared the risk of their daughters getting pregnant and in so doing loose completely the bride price.

Assessment of water supply by region between 1976-81 showed that only 7% of the rural population of Shinyanga was supplied with water. There was no figure indicating the percent of the urban population served. The national average was to supply water to at least 23% of the region's total population. Shinyanga was one of those regions which did not reach the national average target of provision of water.

The region adopted the shallow well project programme under the Netherlands Government. Some 820 shallow wells equipped with hand pumps were installed throughout the region between October 1974 and June 1978 (UNICEF, 1987). By early 1980's a number of the shallow wells installed were not functioning and required major rehabilitation or actual replacement.

As a result, majority of the rural population of Shinyanga obtained their water from the traditional sources. The sources ranged from run-off-water in rivers and ponds, natural springs and water (charcos) during the dry season. In general, the region being semi-arid most of the water sources are of sub-surface nature. Where the water points are found, are not much protected and so the water is contaminated either by cattle, insects or even people who will wash and bath nearby the sources. Thus the water is of very poor quality.

In Negezi division for example, Negezi and Ukenyenge villages are served by piped water whose source is the Negezi river.

The water is mineralized so some inhabitants opt to obtain their drinking water from the traditional sources which are dug holes (charcos) in the river bed where the water is less salt. Besides the hand pumps are not in order for most of the time and so inhabitants deepend on their other sources, which are also for watering cattle. Water in Negezi therefore is just a direct source of risk for children, particularly so when the water is not boiled.

In Kishapu division, the study was concentrated in Mhunze village. The main source of water is the Tungu river. There are two main piped systems; one to serve the village, and the other to serve the ginnery unit. The villagers who were unable to obtain water from those piped systems, obtained their domestic water directly from the river where they have dug shallow holes. The quality of the water so obtained is very poor due to contaminations resulting from human activities like bathing, washing and watering cattle. The water obtained from the pipes is also mineralized, and so people do not like it for drinking.

Water born diseases put children of both Kishapu and Negezi at the risk of death unless some measures are taken to improve the situation; and to educate the people on the need to boil drinking water.

In Shinyanga town, the piped system orginated from Mwadui and operated in turns to serve different parts of the town at different times. Water is more reliable in Shinyanga Commercial Institute and in the Shinyanga Regional Hospital, where interruptions are less frequent. The rest of the town has a big problem of water such that some people obtain water from Mhumbu river north and south of the town.

The water is not protected in any form. Another pipe system from Ningwa Dam was under construction; and when completed the situation is due to improve.

Reliability of water sources was an issue in Shinyanga. Most of the taps are dry for several days. As a result, most people resort to their traditional unprotected sources (SIDA, 1980) defined a reliable source of water as one which operates without any major interruptions with a duration not exceeding one day; and with no more than 10 interruptions in a year. This is not the case in Shinyanga, where the sources of water are very unrealiable with frequent interruptions.

In terms of accessibility not every household can obtain water from the hand pumped pipes because there are either broken down or have some other problems. The shallow well project in Shinyanga considered 1.5kms radius to the water point a considerable walking distance. The distance is big compared to the officially accepted walking distance of 400m or less. Compared to the distance adopted in Morogoro by the same project; the distance was still big because that of Morogoro was only 1km. In other parts of Africa; Botswana for example the walking distance to a well was reduced to 200m. In Shinyanga some villagers walk up to 6km in one direction in search of and fetching water.

As a result of the distances involved the comsumption of water is low. Studies have indicated that in Tanzania, where water has to be carried long distances especially during the dry season the consumption of water was low (Rimer, 1970). His studies among the rural population in Mwanza and in Shinyanga regions indicated that the rural population with limited supply of water which they could

carry, the consumption was usually less than 15 litres per capita per day. He then argued that the low consumption of water were among the causes of high infant and childhood mortality in those regions.

Time consumed in searching and fetching water was also much. (Andersoon, 1982) noted that in Mwanza and in Shinyanga the average time spent per household per day in fetching water varied from 2.2 hours in the wet season, to 4.1 hrs. in the dry season.

2.2.4 Accessibility to Health Facilities

The 1978 Inventory of Health Facilities in Tanzania, Indicated that Shinyanga region had 6 hospitals, 903 hospital beds in existence and 52 others under construction. There were 14 Health Centres in existence and 2 others were under construction. There were 120 government dispensaries and two others were under construction. There were 19 dispensaries run by Voluntary Agencies and one under construction. There were 4 dispensaries run by Parastatal Organisations in existence; and there were about 10 others run by individuals privately. Those were serving 1,323,482 people living in 620 villages which were grouped into 110 wards.

The issue was how accessible were those facilities to improve the health situation of the population of Shinyanga. This can be judged by looking at the distribution of the facilities at the district level. In the Urban district there are three hospitals; the Shinyanga Central Government Hospital, where services were free but the drugs

2.2.5 Frequency of Feeding and type of Food

Majority of the population in Shinyanga are farmers. They cultivate cotton for cash, maize, millet, rice, sorghum, potatoes and cassava for food. They keep cattle, goats, sheap and donkeys. (Mpumilwa, 1984) noted that women in agriculture societies do routine work throughout the year. They cultivate the cleared fields, sow, seeds, weed and harvest the crop and finally carry the harvest home. At home women collect fire wood, process food, search and fetch water, cook food for the family and children, clean and look after the children and other members of the household. The women work load and time consuming activities together with the type of kitchen used could reduce the frequency of feeding which in turn affects the health of the population, particularly that of the children.

In Shinyanga region eating practices was to have two meals a day. The diet is dominated by stiff porridge "ugali" together with sun dried green vegetables at time with fish and meat.(UNICEF, 1987) commented that such a low frequency of eating was not enough to provide young children with energy requirements; in the face of food maldistribution and low density staples like cassava. UNICEF felt that protein energy malnutrition observed among children of Shinyanga during good harvest years were due to low frequency of eating and low energy density of food rather than insufficient food within the household. However, Shinyanga is one of those regions which experience severe drought periods which may nessiciate the provision of relief food as the case was in 1973/74 and in 1974/75 as well as in 1983/84./ In those years Shinyanga suffered hunder

because the aggregate food supply in the region was not enough and the population had inadequate purchasing power.

Thus at times both low frequency of cooking and inadequate food supply put children of Shinyanga at the risk of death. Informal reports said that during food scarcity energy requirement is provided by the sun dried preserved green vegetables only and priority is given to the herders.

2.2.6 Type of Work that Most people do and their expected Income Levels.

Little can be said about the type of jobs that most people of Shinyanga do, and their expected income levels. This is because income is rather a secrete known to the earner so no body was really willing to say what he was earning from his trade.

However, Tanzania had a policy of reducing inequality among people employed in the country's different economic sectors. The emphasis is to reduce inequality between the urban and rural sectors.

A study was made to establish whether substantial inequality existed among rural areas in Sukumaland. (Rotenhan 1963:85) found out that there was a considerable variation of income among farmers in Sukumaland. An average family income varied from T.Shs. 2,249 in Shinyanga to T.Shs. 1,388/= in Kwimba-Mwanza region, to 890 T.Shs. in Ukerewe Island in Lake Victoria.

2.2.7 The Pattern of Power-relationship within th Household in Shinyanga.

Power relationship within the hoseholds in Shinyanga Region is best expressed in relation to communal ownership of property and property transaction characteristics which cropped from the culture of the inhabitants.

Over 80% of the people of Shinyanga are the Sukuma and the related Nyamwezi. They keep cattle in large numbers and a cattle kraal within a given household is a communal property. The son's of the same father keep their cattle together in the same kraal and same compound. Herding cattle takes place communally and so is security. The father in law lives in the same compound with his married sons and control of property including cattle and farms is in the hands of the male members of the household.

Decision power within the household is in the hands of the male members of the community. That is the pattern of power relationship within the households of Shinyanga. A Sukuma woman enters marriage as property and thus as a subordinate to men and subject to their authority. Such type of relationship developed because, as a result of communal ownership of cattle, the bridge wealth which was to be exchanged with the young woman was a communal property and required discussion between the household members. The issue concerned cattle transaction and thus the older male members of the household discussed and dealt with it accordingly.

Secondly a Sukuma woman is responsible for the husbands kinship organisation. Traditionally African women were found to have some considerable decision making powers in their spheres of food production, processing, storage, marketing and in their domestic roles of food preparation and budgeting (FAO, 1985).

However, the situation would be true in the absence of the older women within the household. Where the extended family structure exist as the case is in Shinyanga stronger power is given to the older women in the household. The bride is considered young and had to receive instructions from the older women on what duties she (the bride) is supposed to perform.

At times even the frequency of child bearing is also an issue. In extended family structures like Shinyanga, a large number of children is required as part of the old age security programme. Although modernization is threatening this structure, yet lagging behind of education in Shinyanga has delayed the reversal of the programme. So high frequency of child bearing is a factor in infant and childhood mortality.

On income allocation, the husband is responsible to decide how much of the household income is given to wife regard-less of how much of the wife's labour was expended on the production of the income earnings.

All these have impact on infant and chidhood mortality levels in Shinyanga.

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CHAPTER THREE

DATA PRESENTATION AND ANALYSIS

3.0 Introduction

Using data on children ever born and those surviving Chapter 3 attempts to estimate the levels of infant and childhood mortality in Shinyanga Region. The selected methods of estimation are those of Brass and Trussell's using the North Family and the West Family model life tables. The selection of model life tables were based one their age pattern mortality of Tanzania. The North model life table was applied on Tanzania population back in 1978 and the results were acceptable ;an act which motivated the present user. The western model was used on the advise of Trussell's who wrote, where mortality age pattern characteristics were not known it was advisable to apply the west model.

3.1 Data Analysis

A sample of 216 women were interviewed out of which 208 women were of child bearing age 15-49. The others were either over 50 years old or had no children.

The 208 women were asked to report

(a) the number of children over born alive.

(b) the number of children surviving.

(c) the number of children living away from their mothers households.

(d) The number of children who were dead.

An attempt was made to remind the respondents on those remote events like children who were now married and living independently or those who died a few days after they were born. The aim was to improve the quality of the data.

The number of children ever born alive was obtained by the summation of the reported number of children ever born alive, plus those who were living away from their mother's households and those who were reported dead. This sum numbered 983. The summation of the number of children reported surviving plus the number of children living away from their mothers' households resulted into the number of children surviving, and these numbered 798.

The data was subjected to Brass method of estimating infant and childhood mortality to obtain the results in Table 3.1 below. The number of children ever born in column three were divided by the corresponding number of women in each age group to obtain the average parity in column 4. The number of children reported surviving in column 5 were divided by the corresponding number of children ever born in column 3 to obtain the proportion of children surviving in column 6. The proportion of children surviving was deducted from one to obtain the proportion of children dead in column 7. The age intervals of children in column 8 represented the length of the period at which children born by mothers in various five year age groups were exposed to the risk of death. The value of P_1/P_2 from colum 4 was obtained as 0.348. These were compared with the values of P_2/P_3

in the appendix 3. The figure 0.348 was found to lie between values 0.387 and 0.330. The weights were obtained as 0.018 and 0.039 while the range was 0.057. A stronger weight was given to the column above 0.330 and lesser weight was given to the values above 0.387. Such that the multipliers were obtained by

$$\text{Multipliers} = \frac{0.038 \times 890}{0.057} + \frac{0.08 \times 0.859}{0.057} = 0.8802 \text{ for age group } 15\text{-}19$$

A similar exercise was done to obtain all the seven multipliers for all the other age groups and the results posted in column 9.

Column 10 was obtained by multiplying the values in column 7 by the corresponding values of column 9. When the products of column 10 which represented the estimated proportion dead were subtracted from one, the probability of surviving at exact age x was obtained and posted in column 11. When the survivorship probability at exact age x were compared to the survivorship probability of the Northern model life Table Level 15 the survivorship probability for the children of Shinyanga was found and posted in column 12. When the survivorship probabilities in column 11 were compared to the survivorship probability of the West model life table at level 15, the survivorship probability for Shinyanga was obtained and posted in column 13.

It can be concluded that (from Table 3.1) using Brass method and the North Family life Table Model infant mortality rate for Shinyanga was found to be 117 per thousand. Mortality at

age three was 133 per thousand while mortality rate at exactly age 5 was 151 per thousand. On the average childhood Mortality rate was 142 per 1000 live birth.

When using Brass method and the West Family life table model at level 15 infant mortality level for the region was found to be 126 per thousand. Mortality rate at exact age three was 136 per thousand. Mortality rate at exact age five was 148 per thousand with the average childhood mortality of 142 per thousand.

A few points could be raised here in relation to the choice of the method, choice of model life tables and in relation to the obtained results. Option to estimate the levels of infant and childhood mortality rates in this particular study was necessary to avoid inconsistencies which might arise from data reporting and recording. The choice of the method was controlled by the type of data collected. Due to the traditional reluctancy to speak about the deceased among many African populations it was feared that reports about the number of children dead would be under enumerated. Instead, number of children ever born and those who were surviving formed the base data for estimating infant and childhood mortality.

The sample size was small in the face of time and financial constraints, and longitudinal study was not possible to carry out.

Table 3.1: Estimation of Infant and Childhood Mortality by Brass method using data on Children ever born and Surviving

Five Year Age groups of Mothers	No. of Mothers of Child bearing age 15–49 (F.P)	No. of Children ever born (CEB)	Average No. ever born (Children) (Pi)	No. of Children Surviving (Si)	Proportion of Children		Age Interval of the Children	Multiplying factors P1/P2 = .348 = 0.348	Estimated Proportion dead q(x)	Probability of Surviving at exact age x	Northern Model life table level 15	West Model Life Table Level 15 (Survivorship probability
					Surving (Ps)	Dead (Di)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			Col. Col 3 ÷ 2		Col.5 ÷ Col. 3	1-(s)			Col.7x9	1-Col.10	Level 15 Survivorship Prob.	Level 15
15–19	5	4	0.8	2	0.5000	0.5	1	0.8802	0.4401	0.5599	0.9070	
20–24	42	98	2.3	87	0.8878	0.1122	2	0.9524	0.1069	0.8931	0.8833	0.8974
25–29	65	239	3.7	205	0.8578	0.1422	3	0.9576	0.1362	0.8638	0.8686	0.8742
30–34	42	245	5.8	206	0.8408	0.1592	5	0.9706	0.1545	0.8455	0.8490	0.8639
35–39	28	187	6.7	151	0.8075	0.1925	10	0.9769	0.1881	0.8119	0.8253	0.8521
40–44	15	113	7.5	87	0.7699	0.2301	15	0.9496	0.2185	0.7815	0.8122	0.8386
45–49	11	97	8.8	62	0.6392	0.3608	20	0.9479	0.3420	0.6580	0.7967	0.8286
												0.8141
Total	208	983		798								

Source: Computed Data

One of the suitable techniques of estimating child deaths from defected data was developed by Brass,W.(1968). The method assumed that (a) the age specific fertility rate (ASFR) and infant and childhood mortality rates were approximately constant in the recent past. (b) There was no powerful association between the age of the mother and infant mortality, or between death rates of the mothers and children. (c) The omission rate of dead children and surviving children was approximately the same. (d) The age pattern of mortality of infants and children conformed approximately to the model life tables and that (e) The risk of dying of a child is a function of the age of the child only (and not of other factors like age of mother, or the child's birth order) and so the longer the period of risk the higher the mortality level (UN Manual X, 1983:73).

Although Brass identified three indexes of the age pattern of fertility, in this particular exercise only one of those indexes would be employed. The ratio P1/P2; where P1 and P2 are the average number of children ever born to women of age groups 15-19 and 20-24 respectively. The other of indexes are $\bar{m}$ and $\bar{m}'$ the mean and median of the ferility schedules respectively could be obtained from Appendix three.

Brass method had a number of limitations which necessitated the use of Trussell's method to obtain more plausible results. Among the most serious drawbacks of Brass methods was the omission of children ever born. There was a tendency for women to forget

the number of children ever born to them in their life time. This phenomena increased with the increasing age of the women. A higher proportion of children were omitted on the account of their being away from home either as independent individuals or have died. To improve the quality of the data in this study the respondents were asked to report number of children who were living in their mothers households, those who were living away and those who have died.

In Brass method demographic data are affected by age misstatement with the results that reports of children ever born and surviving were transfered to the other age groups which might distort the proportion of suviving children.

With Brass method it would not be possible to go beyond age 30-34 which gave the estimations of survivors at exactly age five (L5). This is because the methods assumed that fertility and mortality schedules were constant in the recent past as a result going beyond age 30-34 would mean going too far in the past where fertility and mortality might have been different.

In Brass technique 1_1 which was derived from child survival for women aged 15-19 could not be used as an indicator of infant mortality because in populations with reliable data, it appears that children of young mothers experienced mortality risks well above the average (U.N Manual X, 1983, Kamuzora, 1972). As a result 1_1 derived from reports of mothers of age group 15-19 would be substantially higher and unrealistic. Thus mortality estimated based on women in that age group

are discarded partly due to the above reason, and partly due to the fact that the number of children born and dead in that age group is usually small.* In the case of this study, there were only four children everborn of which two were surviving in the age group 15-19.

Estimations of infant and childhood mortality levels in this exercise were obtained from survivorship ratios ratios at l_2, l_3 and l_5, for age groups 20-24, 25-29 and 30-34 respectively.

The choice of suitable model life tables depended on the model's infant and childhood mortality characteristics. In the 1978 Population Census, the North Family model life table was applied, given the then existed age mortality characteristics among the Tanzanian population. See Appendix No.8. The model life table was characterized by low infant mortality and high childhood mortality. The life expectancy was ranging between 44.4 years for Sweden to 74.7 year for Norway. The model was affected by endemic diseases like tuberculosis.

It was found that the model could be suitable for Shinyanga population characteristics because infant mortality rate for the region was lower than the childhood mortality rate by 1978 Population Census; so was the case for the national average where the rates needed no repetition. The life expectancy at birth for Shinyanga was 42 years while that of the national average was 44 years. This formed the lower limit of life expectancy in the North

Family of the Coale-Demeny model life tables. Shinyanga and the rest of Tanzania was affected by endemic diseases like chorela and AIDS. These were enough reasons to believe that the North model was still suitable for Shinyanga in Tanzania as the case was in 1978.

However, as it would be observed later, in situations where the pattern of mortality in a community was not acertained. Trussell's advised the use of the West Family model life table. In this particular case, the model was derived from residuals of the tables and did not have systematic deviation from the standard models. The West model represented the most general mortality characteristics, with life expectancy ranging from 38.6 years for Taiwan (1921) to 75.2 years for Sweden (1959). The West model was used in this particular study, in order to be able to establish variations which might arise from an application of wrong model life table (i.e. the North model life table) in mortality pattern in the community studies were diffent.

Comments on the obtained results would best be expressed when Trussell's model has been described. Trussell's model was required to remove the effects of age misstatement which could not be removed by the Brass method. Trussell's method described the fertility schedule more adequately as it takes into consideration both P_1/P_2 and P_2/P_3 ratios. When the Shinyanga data was subjected to the model Table 3.3 below resulted. In table 3.2, the first 8 columns were obtained in exactly the same manner as in the previous table 3.1, but the multipliers in colums 9 and 12 were obtained differently.

In Brass method the multipliers were obtained by the ratio P1/P2 of the fertility schedule. In Trussell's method, the multipliers were calculated from the ratios P1/P2 and P2/P3 together with the standard regression coefficients, obtained from an appropriate family of model life table, selected as a suitable reflection of the age pattern of mortality in Shinyanga population. The functional formula used to obtain Trussell's multipliers was:

$$Ki = a(i) + b(i)P1/P2 + c(i)\ P2/P3$$

where P1, P2 and P3 were the mean number of children even born to women in age groups 15 - 19, 20 - 24, and 25 - 29 and the regression coefficients a(i), b(i) and c(i) were obtained from the North and the West model life tables given in the table in appendix 4. The resulting multipliers K(i) were posted on column 9. The nqx values in column 10 were obtained by qx = KiDi. That is the product of the proportion dead in column 7 times the multipliers in column 9 to obtain the estimated proportion dead in column 10. The probability of surviving in column 11 were obtained by reducing the probability dead in column 10 from one, and the results posted in column 11. Columns 12, 13 and 14 in Table 3.2 were obtained in the same procedures as the method used to obtain columns 9, 10 and 11, but instead of using the regression coefficients from the North Family model life table the West model was used (Appendix 4).

The results showed that by the application of Trussell's model and the North Family model life table the

Table 3.2 : Estimations of Infant and Childhood Mortality by Using Trussells Method; where Ki = a(i) + b(i) (P1/P2 + (P2/P3)

The Five Year Age Groups of the Mothers	No. of Mothers in the Child-bearing Age	No. of Children Ever Born	Average No. of Children Ever Born	No. of Surviving Children	Proportion of Children		Age intervals of the Children	Multipliers	Estimated proportion Dead by Age x	Probability of Surviving	Multiplies K(ii)	Estimated Proportion Dead by Age x	Probability Surviving
					Surviving	Dead							
		CEB	P1	S1	Ps	D1		K1	$_{q}x$ = K1D1	1 - $_{q}x$	Kii	$_{q}x$ = KiiDi	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15-19	5	4	0.8	2	0.5000	0.5000	1	0.6292	0.3146	0.6854	0.6763	0.3382	0.66
20-24	42	98	2.3	87	0.8878	0.1122	2	0.8296	0.0931	0.9069	1.2795	0.1436	0.85
25-29	65	239	3.7	205	0.8578	0.1422	3	0.8825	0.1255	0.8745	0.9475	0.1347	0.86
30-34	42	245	5.8	206	0.8408	0.1592	5	0.9586	0.1526	0.8474	0.9879	0.1573	0.84
35-39	28	187	6.7	151	0.8075	0.1925	10	1.0393	0.2001	0.7999	1.0169	0.1958	0.80
40-44	15	113	7.5	87	0.7699	0.2301	15	1.0317	0.2374	0.7626	1.0078	0.2319	0.76
45-49	11	97	8.8	62	0.6392	0.3608	20	1.0110	0.3648	0.6352	0.9992	0.3605	0.63

Source: Computed Data.

Survivorship rates for

$1_1 = 0.6854$

$1_2 = 0.9069$

$1_3 = 0.8745$

$1_5 = 0.8474$

Thus the mortality rates at those levels would be 315‰, 125‰ and 153‰ for 1q x, 2q x, 3q x, and 5qx respectively.

When using the western model, the results were:

$1_1 = 0.6618$

$1_2 = 0.8564$

$1_3 = 0.8653$

$1_5 = 0.8427$

With the consequence mortality rates of 1q x = 338‰

2q x = 144‰

3q x = 135‰

5q x = 157‰

On the average childhood mortality was obtained as 146‰ on the West model, while infant mortality was 144‰, and 1 qx was ignored to avoid biases, which are related to it. Using the North model on the average 2 qx = infant mortality rate of 93‰, while childhood mortality was 139‰.

At this point it is now possible to draw a summary table to compare the results obtained by using Brass and Trussel's methods of estimation of infant and childhood

mortality in a given population community. Table 5.3 below summarises the results obtained from both Brass and Trussell's methods and by the use of both North and West model life tables. The results are not very different when looking at the survivorship rates: l_1, l_2, l_3 and l_5 in both of the models and techniques. But when comparing Trussels' method to that of Brass in the North Model life table both infant and childhood mortality rates were lower in Trussells method than in Brass technique, since infant mortality rates based on 1 qx are unrealistic and therefore unreliable $_2q_x$ levels would be adopted to estimate the level of infant mortality rate in Shinyanga. Since infant mortality rates were still very high in the West. Model for both methods relative to the 1978 population census results that was an indication that the West model was not reflecting the true age pattern of mortality levels in Shinyanga. And also when taking into consideration the impact of immunisation programme in Shinyanga where the coverage was found to be around 100% in some diseases like T.B. and Polio and certainly above 80% in all other diseases . Although the levels obtained by Brass method in the West model were relativelyxlower yet Brass method leaned too much in early fertility (or too low in early fertility schedule) by employing P1/P2 in deriving multipliers.

For the above reasons, from now on wards infant and childhood mortality levels for Shinyanga would be those obtained by Trussells method in the North model life table; which read 93% and 139% respectively.

Table 3.3 : Summary Table: Estimation of Infant and Childhood Mortality Using Brass and Trussells Methods and the Northern and Western Family Model Life Tables.

Brass Method: P1/P2 = 0.348			Trussell's Model : Ki = a(i) + b(i) P1/P2) + c(i) (P1/P3) and $_nq_x$ = Ki Di	
Northern Model Life Table		Western Model Life Table	Northern Model Life Table	Western Model Life Table
L1	0.9070	0.8974	0.6854	0.6618
L2	0.0833	0.8742	0.9064	0.8564
L3	0.8686	0.8639	0.8745	0.8653
L5	0.8490	0.8521	0.8474	0.8427
Derived n $_nq_x$'s				
$_1q_x$	0.093	0.1026	0.3146	0.3382
$_2q_x$	0.1167	0.1258	0.0931	0.1435
$_3q_x$	0.1314	0.1361	0.1255	0.1347
$_5q_x$	0.151	0.1479	0.1526	0.1573
Mean Infant and Childhood Mortality Rates				
$_2q_x$	117%	126%	93%	144%
$_5q_x$	141%	142%	139%	146%

Source: Computed Data

Trussell's model was selected for the final estimates because it describes the fertility schedule more adequately by employing the ratios P1/P2 and P2/P3. The North model life table was accepted in the final estimates because it's mortality age pattern characteristics are similar to those found in Tanzania. The fact that both the model and the method were also accepted in the 1978 Population Census results, formed an encouraging factor to accept them now.

Trussell's method also assumed that both fertility and childhood mortality have been constant in the recent past and so could cause bias in the results. The method again assumed that the risk of death is a function of the child's age and not of other factors. These factors plus the truth that mortality in Tanzania and even in Shinyanga has been on the decline in the recent past; are assumed to cause minor biases, which are considered insignificance to influence the results. The most serious drawback would have been that of age pattern i.e. Age misstatement which exists in raw data and could not be removed by the Brass method. In Trussell's teachnique the age misstatement among mothers of child bearing age 15-49 was ironed out by involvement of both P1/P2 and P2/P3 in the calculation of the multipliers. At least that is one of the most important achievement at this level.

3.2. Estimated levels of infant and Childhood Mortality rates in Shinyanga

(i) It has been established beyond reasonable doubt that the levels of infant and childhood mortality rates in Shinyanga are not less than 93 per 1000 live births and 139 per thousand respectively. These levels are still high compared to the 1987 Annual Development Plan which intended to reduce infant mortality level to 50 per thousand by the year 2000.

(ii) However, the findings indicated that infant and childhood mortality rates in Shinyanga are declining. In contrast with the 1978 Population census results; infant mortality rates dropped from 150% to 93% while childhood mortality dropped from 252% to 139% by 1988 survey results.

In contrast to table 1.1 in chapter one the findings proved that infant and childhood mortality trend in Tanzania is still declining. This is an achievement particularly when considering the hostile environment in which the population lives in the face of cholera break outs, intestinal diseases, malaria and AIDS along with scarce resources of medicine, manpower, education and knowledge, water, food and many others.

(iii) The findings indicate that the rate of infant and childhood mortality decline is still low. One would expect that given the duration of immunisation which is now approaching

a deadline, the gradient should have been high. But the rates have not been so low. The time lag between 1978 is 10 years. The decline from 150‰ to 93‰ gives a range of 57‰. The childhood mortality dropped from 252‰ to 139‰ giving a range of 113‰.

The rate of decline obtained by computing geometric mean was 11.811% for 10 years. And an annual decline of 1.18%. This implies that by the year 2000 infant mortality would be 1.18 x 12 = 14.16% less than that of 1988. Thus by the year 2000 infant mortality rate for Shinyanga will only be 78.84‰ assuming that the conditions remain constant.

(iv) As a measure of socio-economic development, infant mortality rate in Shinyanga is still high. Even then the situation has improved as a survivorship probability at exact age five has increased from 748 by 1978 to 861 by 1988. This reflects improvement in socio-economic characteristics in the region.

(v) The findings on the childhood mortality were obtained by the summation of mortality rates in 3qx and those of 5qx and by dividing the sum by two to obtain the mean 5qx value of 139‰. These rates also declined from 252‰ to 139‰ in 1988 giving a rate of 18.7% decrease for 10 years and an annual decline of 1.87%. By the year 2000 infant mortality would be 22.45% less than the rate of 1988. Thus by the year 2000 childhood mortality would only be 116.5‰.

- Although the rates are declining, yet the gradient is so low that it raises questions on equity acquisition in the provision of social amenities like education, income distribution, accessibility to water, medical facilities, easy transportation, accessibility to food and the impact of culture in putting children at risk of death. More questions are raised in conjuction with Arusha Declaration and the Policy of Socialisms along with the operation of Child Immunization Programme.

Table 4.0 : No. of Children dead classified by Educational Achievement Level of the Mother and by their Age and Sex

Level of Education	No. of Respondents	% Distribution	Male Children						Female Children						Grand Total	% of Grand Total
			Perinatal	Neonatal	Infants	Childhood	Total	%	Perinatal	Neonatal	Infants	Childhood	Total	%		
Primary	131	60.6	12	-	19	37	68	97.1	6	10	33	17	66	98.5	134	97.8
Secondary	13	6.0	-	-	-	-	-	-	1	-	-	-	1	1.5	1	0.7
Tertiary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Adult	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not Applicable	5	2.3	-	2	-	-	2	2.9	-	-	-	-	-	-	2	1.6
Not Stated	67	31.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100	12	2	19	37	70	100	7	10	33	17	67	100	137	100
%			17.1	2.9	27	52.9	100		10.4	14.9	49.3	25.4	100			
% of the Grand Total							51.1						48.9			100

Source: Computed Data

The rate of infant and childhood mortality decreased with increasing educational level of the mother. A large number of infant and childhood mortality was found among mothers with only primary school education. If we consider the sexes separately; then 27% of male infants and 52.9% of the male children between year one and five were associated with mothers who had primary school education. While there were no male children in those age groups who died from among those mothers who had secondary education.

On the girls side some 44.3% of the infants and 25.4% of the children between years one and five died with their mothers with primary school education. None of the infants or children having mothers with some secondary school education died from among the girls.

Hypothesis one then was confirmed that high infant and childhood mortality would be found among women with low education while low infant and childhood mortality would correspond to those women with higher education (where higher education means post primary education).

It was also true that majority of the women interviewed had less than secondary education. Out of 216 respondents 131 had primary school education and only 13 had secondary school education, comprising 60.6% and 6% respectively.

Table 4.01 : No. of Children dead classified by the ed.cational achievement level of the father and by their Age and Sex

Level of Education	No. of Respondents	%	Male dead Children						Female dead Children						Grand Total	% of grand Total
			Perinatal	Neonatal	Infants	Childhood	Total	%	Perinatal	Neonatal	Infants	Childhood	Total	%		
Primary	116	53.7	9	4	18	34	65	76.5	3	9	28	17	57	79.2	122	77.7
Secondary	31	14.35	1	-	9	8	18	21.2	2	2	6	4	14	19.4	32	20.4
Tertiary	4	1.05	-	-	-	-	-	-	1	-	-	-	1	1.4	1	0.6
Adult	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not Applicable	2	0.92	-	2	-	-	2	2.4	-	-	-	-	-	-	2	1.3
Not Stated	63	29.16	-	-	-	- -	-	-	-	-	-	-	-	-	-	-
Total	216	100	10	6	27	42	85	100	6	11	34	21	72	100	157	100%
%			11.8	7.0	31.8	49.4	100		8.3	15.3	47.2	29.2	100			
% of Grant Total							54.1						45.9		100	

Source: Computed Data.

Some education in contrast to 53.4% of the deaths which were associated with fathers with some education. This means: If more women were educated there would be less infant and childhood mortality rates in Shinyanga.

Again perinatal and childhood mortality rates were higher among boys; while neonatal and infant mortality rates were higher among the girls. It is assumed that this sex defferential age pattern mortality in Shinyanga is rooted in the culture of the society (community) and sex division of labour. Whereby survivorship probability is reflected in the sex preference and division of labour exposes particular sex to a greater risk than the other at their childhood ages. But at perinatal age a lower probability of surviving among male children is a biological fact that, exposed to the same risks boys are weaker than girls and they (boys) react by drying in great numbers.

Infant and childhood mortality rates decreased with increasing education of the father. Generally education of the parents is associated with a reduction of infant and childhood mortality in Shinyanga.

4.02 Analysis of Parential Income Levels as a Determinant of Infant and Childhood Mortality in Shinyanga

Table 4.2 below shows the number of children dead classified by the income levels of their mothers. The income levels were based on the government salary scale (MS). Generally very few women were employed. Out of 216 respondents 73.6% did

Table 4.2 : No. of children dead classified by their age and sex and by the Income level of father

Income Levels in T.Shs. and in MS Salary Scale 1050	Freq. Count of Women Respondents	%	Male Children						Female Children						Grand Total	% of Grand Total
			Perinatal	Neonatal	Infants	Childhood	Total	%	Perinatal	Neonatal	Infants	Childhood	Total	%		
	21	9.7	1	3	3	4	11	52.4	1	1	3	4	9	36.0	20	43.5
1050-2375	10	4.6	2	-	-	-	2	9.5	1	2	6	-	3	12.0	5	10.9
2371-3065	11	5.1	2	-	-	-	2	9.5	-	2	-	-	8	32.0	10	21.7
3066-3905	8	3.7	-	-	-	-	-	-	-	-	-	-	1	4.0	1	2.2
3906-5210	2	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5211-6050	2	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6051-6370	0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Over 6371	0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.A.	3	1.4	-	2	-	4	6	28.6	-	-	-	4	4	16	10	21.7
N.S.	150	73.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100	5	5	3	8	21	100%	3	5	9	8	25	100%	46	100%
%			23.8	23.8	14.8	38.1	100		12	20	36	32	100			
% of Grand Total							45.7						54.3			100%

Source: Computed Data.

boys

girls

total children dead

not state their employment. Of the remaining 9.7% were earning an income of less than 1850 T.Shs. Some 4.6% of the respondents were earning an income between T.Shs.1850-2375; while 5.1% were earning an income of between T.Shs. 2371-3065. The remaining 3.7% of the mothers were earning an income of between 3066-3985T.Shs. while some 1.8% of the mothers were earning some income of between T.Shs.3066-6050.

A total of 46 children died out of which 25 were girls and 21 were boys. No deaths were associated with those mothers who did not state their employment, but a total of 21.7% of the deaths were associated with the mothers who were over aged (i.e. above 50 years of age).

One way of assessing the impact of income levels in relation to the infant and childhood mortality is by obtaining the median income level. When that was done, the median value was zero because the majority of the people did not state their employment; and yet no deaths of children were associated with that category. At this point it was necessary to classify the deaths of the children according to their mothers employment opportunities. It was found that out of 215 respondents 176 women (81.5%) were unemployed and had a corresponding child mortality level of 92.4% out of 262 deaths. Some 28 respondents (13%) were employed by the government and had corresponding mortality level of 5.3% out of 262 deaths. Some five women (2.3%) were employed by private people, and their corresponding

childhood mortality was 0.4%. Two mothers did not state their employers and one was employed by some other sectors but both had no corresponding child mortality levels.

With this information it was possible to draw a conclusion as per expectations of hypothesis two. The findings confirmed that high infant and childhood mortality were associated with women without employment particularly those of the rural areas. It was also true that few women were employed as wage earners.

Higher infant and childhood mortality was found among households with low income levels. As far as the women employment was concerned that was partially true. Some 43.5% of all deaths of children which occurred were associated with women whose monthly earnings were less than T.Shs. 1850/=.

Further conclusions would be drawn from the analysis of the income levels of the father; as per table 4.21. Majority of the respondents who appeared in that table were those who were employed in some parastatal organisations, government employees , private employees and also some other people who specified their income levels. The specified income levels were scaled according to the government salary scale (MS) as a standard measure to compare the incomes.

On accumulative frequency counts, it was found from table 4.21 that 152 out of 216 respondents (i.e. 70.37%) were obtaining an income of some kind which was specified. The remaining

Table 4.21. No. of children dead classified by the Income levels of their fathers and by their Age and Sex

Income Levels in T.Sh. at Monthly Salary Scale	Frequence count of respond	%	Male Children						Female Children						Grand total	% of grand total
			Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%	Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%		
Less than 1850	44	80.4	3	-	6	5	14	16.9	1	2	3	4	10	11.6	24	14.2
1850 - 2375	10	4.6	-	1	-	5	6	7.2	1	-	-	8	9	10.5	15	8.9
2376 - 3065	41	19.0	3	-	3	4	10	12.0	2	4	15	9	30	34.9	40	93.7
3066 - 3985	21	9.7	-	-	11	4	15	18.1	-	-	7	8	15	17.4	30	17.8
3986 - 5210	10	4.6	-	-	-	4	4	4.8	-	-	-	-	-	-	4	2.4
5211 - 6050	4	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6051 - 6370	1	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Over 6371	21	9.7	1	-	3	28	32	38.6	1	8	12	-	21	24.4	53	31.4
N.A.	3	1.44	-	2	-	-	2	2.4	1	-	-	-	1	1.7	3	1.8
N.A.	61	28.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100%	7	3	23	50	83	100	6	14	37	29	86	100	169	100
%			8.4	3.6	27.7	60.2	100		7.0	16.3	43	33.7	100			
% of grand total							49.1						50.9		100%	

Source: Computed Data

Table 4.31. No. of children dead classified by Accessibility to Clean Water Supply Age and Sex

Source of Domestic Water Supply	Freq. count of respondants	%	Males						Females						Grand total	% of grand total
			Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%	Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%		
Tap	126	58.3	2	4	1	39	46	36.2	6	6	14	21	47	43.9	93	39.7
Well	1	0.5	-	-	-	-	-		-	-	-	-	-	-	-	-
River	88	40.7	3	10	28	40	81	63.77	3	13	44	24	60	56.0	141	60.3
Dams/Ponds			-	-	-	-	-		-	-	-	-	-	-	-	-
Springs			-	-	-	-	-		-	-	-	-	-	-	-	-
Rain Water			-	-	-	-	-		-	-	-	-	-	-	-	-
Other source	1	0.5	-	-	-	-	-		-	-	-	-	-	-	-	-
N.A.			-	-	-	-	-		-	-	-	-	-	-	-	-
N.S.			-	-	-	-	-		-	-	-	-	-	-	-	-
Total	216	100%	5	14	29	79	127	100	9	19	58	45	107	100	234	100
%			3.9	11.0	28.8	62.2	100		8.4	17.75	54.2	42.0	100			
% of grand total							54.3						45.7			100

Source: Computed Data

Table 4.32. No. of Children classified by Sex and Age and by Treatment (boiling) of Drinking Water

Water	Freq.	%	Males						Females						
Treatment	counts		Peri-natal	Neon-natal	Inf-ants	Child-hood	Total	%	Peri-natal	Neon-natal	Inf-ants	Child-hood	Total	%	Grand Total	%
Boiled	104	48.1	4	2	1	22	99	23.4	4	10	21	17	52	43.3	81	32.2
Not boiled	105	50.0	7	8	23	57	95	76.6	5	9	26	28	68	56.7	163	66.8
Total	209	98.1	11	10	24	79	124	100%	9	19	47	45	120	100	(244)	100
%		8.9	8.9	8.1	19.4	63.7	100		7.5	15.8	39.2	37.5	100%			
% of Grand Total							50.8						49.2			

Table 4.33 No. of Children dead classified by Age and Sex by distances from Water Sources

Distance from	Freq.	%	Males						Females						
sources	counts		Peri-natal	Neon-natal	Inf-ants	Child-hood	Total	%	Peri-natal	Neon-natal	Inf-ants	Child-hood	Total	%	Grand Total	%
Less than 1km	143	66.2	9	6	20	43	78	55.3	7	5	20	21	53	45.7	131	51
1 - 5 km	57	26.4	3	8	15	36	62	44	2	12	27	20	61	52.6	123	48
Over 5 km	12	5.6	-	-	1	-	1	0.7		2	-	-	2	1.7	3	1.2
Total	216	100	12	14	36	79	141	100	9	19	47	41	116	100		
%			8.5	9.9	25.5	56	100		7.8	16.4	40.5	35.3	100			
% of Grand Total			4.7	5.4	14	30.7	54.9		3.5	7.4	18.3	16	45.1		(257)	100

Source: Computred Data

of the respondents (81%) stored their domestic water in pots, 1.4% had refregerators, while 10.9% stored water in other containers at the household levels. Some 6.5% did not specify their storage facilities, while 0.9% obtained water directly from the taps for consumption, and they had no refrigerators. Their storage systems were categorised as the not applicable. Attempt was made to investigate how the domestic water was protected at home. The results showed that 95.4% of all the respondents were covering the domestic water 1.4% did not specify the truth while 0.5% of those who obtained water from taps were not directly concerned.

A total of 234 children died in the category of water sources, in table 4.31 out of which 127 were boys and 107 were girls; constituting 54.3% and 45.7% respectively. The boys were more affected by the water sources. Out of 127 boys who died 36.2% of them were obtaining water from taps while 63.8% of the remaining deaths were associated with those households which obtained water from rivers. For the girls, out of 107 children who died 43.9% were obtaining water from taps while the remaining 56% deaths were associated with those households which obtained water from rivers.

The findings confirmed the expectations of hypothesis three that high infant and childhood mortality rates were to be observed from among those households which obtained their domestic water from traditional sources (i.e. 63.0%).

so they mix it with some cold water to restore the taste. This was reported by some respondents. (b) Cooling process - cold water might deliberately and ignorantly be mixed with the boiled water for rapid cooling. This was observed in some households when the elder males and the male children were already served meals but the water was not cold enough for drinking. The mixture was sent to the males; while the entire female population who usually eat in separate apartments drunk water which was not boiled. (c) In some cases the boiled water might not be covered immediately so that it was again contaminated by either insects, dust from the air and the containers which were used to draw water from the respective pots.

(ii) Distances involved in drawing water for some families were too great to obtain enough water for domestic use. As a result, just a little amount of water could be obtained for drinking from the improved sources if they were functioning; while the remaining quantity was drawn from the charcos near homes.

(iii) Some of the interviewees reported that water from the improved sources-land pumps, and taps was too salty for drinking; so that they used such water for washing and cleaning. The drinking water was obtained from the charcos dug by hands in the river beds. Such water was less salty as it was obtained from less depth. This was true for some parts of Mhunze village.

Table 4.33 above shows that the distances from home to the water points. The corresponding mortality levels were 257 children out of which 141(54.9%) were boys and 116(45%) were girls. Some 51% of the children who died were associated with those households which obtained water from less than 1 km.distance. The remaining 49.2% were obtaining water from more than 1km radius from home. Among the boys who died when assessed separately, 55.3% of them out of 141 children had their homes within one km radius from the sources of water; 47% had their homes between 1.5kms, radius, and only 0.7% had their homes more than 5kms from the sources of water. On comparative basis 55.3% had their homes close to the water points while 44.7% had their homes away from the water sources.

On the girls side again when considered separately 45.7% of those who died lived within 1km radius 52.6% were living between 1-5kms radius and 1.7% were living more than 5kms. away from the water points.

As whole distance from water appeared to affect more girls than boys. It's only the girls who confirmed the expectations of the hypothesis that high infant and childhood mortality were associated with distances from the water point. The boys and on total mortality of both sexes mortality was still higher even where the water points were very close. The girls were affected more by distances probably because of over burderning them or their mothers to draw water from

distance points and exposing them more to contaminated and untreated water for drinking while walking in the hot sun.

About 81% of the respondents were storing water in pots at home and 95.4% of them were covering it. An analysis of mortality by age and sex and water as a causal factor showed that 62.2% of the boys who died were between years 2-5, while 22.8% were infants. Some 3.9% were perinatals while 11% were neonatal. On the girls side 8.4% were perinatals, 17.8% were neonatal, 54.2% infants and 42% were children between years 2-5. Distances to the water points and water as a causal factor of mortality were found to have a negative impact to child survival in Shinyanga. Probably attributed to the sex division of labour which exposes the two sexes differently to risk of death. Water and distances from sources were found to have a greater negative impact on children of age 2-5 in Shinyanga; where the victims respond by dying in great numbers. The age sex pattern of mortality in these aspects were similar to the other tables so far discussed.

4.04 Analysis of Accessibility to Medical Facilities as a Factor of Infant and Childhood Mortality in Shinyanga

Accessibility to medical facilities was assessed on two levels. The first levels was in terms of geodesic distance from home to and from the medical institutions. And the 2nd was on drug availability.

In the first level, majority of the respondents were living between zero and 5kms away from the nearest medical institutions. About 36.1% of the respondents were living within less than a km radius; while some 37.5% of them were living between one and 5kms away. The remaining 26.4% were living over 5kms away from the nearest medical institutions.

The corresponding mortality rates were 28.0%, 48.4% and 23.6% respectively. Some 254 children died of which 141 were boys and 113 were girls. Thus more boys were affected by distances from the medical institutions than the girls, constituting 55.5% and 44.5% respectively.

When considering the boys in their separate entity 8.5% of them died in their first week of life, while only 8% of the girls died at the same age. More girls than boys died in their neonatal and infancy ages, while more boys than girls died in their childhood ages. The corresponding percent distributions were 9.9%, 25.5% for neonatal infant stages among boys, while for the girls 16.3% and 38.9% were the corresponding values. For childhood deaths among boys were 56% while girls were 36.3%.

On drug availability, 82.0% of the families (216) obtained drugs from the ncearest medical institutions while 39 families about 19.8%, were not getting medicine from those institutions. A total of 251 children died of which 131 were boys and 120

were girls. Some 83.7% of the children died although their parents reported that they were obtaining medicine from the nearest medical institutions, implying that probably they were under / or over dosed or were not following instructions due to the problem of knowledge. Only 16.3% of the children who died were associated with those parents who did not obtain drugs from the nearest medical institutions. Majority of those who were in the later category were purchasing drugs from the nearest medical stores/shops or privately owned medical institutions.

As per hypothesis 4 expectations it is true that geodesic distance has affected negatively the child survival in Shinyanga. Table 4.4 below shows that out of 216 respondents 36.1% were living / within less than 1km radius; with the corresponding mortality rates of 28.0% out of 254. The remaining 72% of the deaths were associated with all those parents who lived more than 1km away from the nearest medical institution even though the highest toll of child mortality was associated with families who lived within 1-5kms. radius, who were also many.

However, on drug availability majority of the people who were obtaining medicine from hospitals had the highest number of death tolls comprising 83.7% of the total 251 deaths. In contrast, those who had no access to medicine were only 39 (18%) of the total respondents only 16.3% of their children died. But when contrasting the ratios it would be found that those who had access to medicine had an average of 210 divide 177=1.2 children dead, while those who had no access to medicine had 41 divide 39=1.1

Those who although

Table 4.4 No. of Children dead classified by accessibility to medical facilities by Age and Sex

Accessibility to Medical facilities	Freq. counts	%	Males						Females							
			Perinatal	Neonatal	Infants	Childhood	Total	%	Perinatal	Neonatal	Infants	Childhood	Total	%	Grand Total	%
1. Distances																
Less than 1km	78	36.1	4	4	11	22	41	29	2	6	5	17	30	26.5	71	28
1 - 5km	81	37.5	7	6	10	37	60	42.6	5	12	30	16	63	55.8	123	48.
Over Km.	57	26.4	1	4	15	20	40	28.4	2	1	9	8	20	17.7	60	23.
Total	216	100	12	14	36	79	141	100	19	19	44	41	113	100%	254	
%			8.5	9.9	25.5	56	100	8	8	16.8	38.9	36.3				
% of Grand							55.5						44.6			10
2. Drug Accebility	No. of children dead classified by age and drugs availability and Sex.															
Yes	177	82.5	7	8	33	65	113	86.3	7	15	38	37	97	80.8	210	83
No	39	18.0	2	6	-	10	18	13.7	2	-	8	13	23	19.2	41	16.
Total	216	100	9	14	33	75	131	100	9	15	46	50	120	100%	251	1
%			6.9	10.7	25.2	57.3	100%		7.5	12.5	38.3	41.7	100%			
% of Grand Total							52.2							47.8		1

Source: Computed Data

Table No. 4.5 No. of Children dead classified by Transport Problems and by their Age. and sex

Ownership of Means of Transport	Frequency Counts	%	Males						Females						Grant Total	
			Perinatal	Neonatal	Infants	Childhood	Total	%	Perinatal	Neonatal	Infants	Childhood	Total	%		
Bicycle	87	40.3	3	6	12	34	55	39	5	1	-	20	26	24.5	81	32.8
Car	18	8.3	4	2	14	13	13	23.4	1	-	8	13	22	20.8	55	22.3
Carts	13	6.0	1	-	4	8	9	6.4	1	2	3	-	6	5.7	15	6.1
None	98	45.4	4	6	10	24	44	31.2	2	14	24	12	52	49.6	96	38.9
Total	216	100	12	14	36	79	141	100%	9	15	35	45.0	106	106	247	100%
%			8.5	9.9	25.5	56.	100		8.5	14.2	33	42.5	100			
% of gran Total							57.0						42.9		247	100%
2. Availability and Accessibility of Alternative means of Transport																
Vehicles	72	33.3	-	2	16	20	38	47.5	1	7	12	4	24	32.4	62	40.3
Railways	11	5.1	2	4	6	10	22	27.5	2	4	18	-	24	32.4	46	29.9
On foot	133	61.6	6	4	10	-	20	25.	2	3	4	17	26	35.1	46	29.9
Total			8	10	32	30	80	100	5	14	34	21	74	100	154	100
%			10	12.5	40	37.5	100									
% of Grand Total							51.9							48.1	154	100%

SOURCE: Computed Data.

Linking the results with the expectations of hypothesis four; it was found that high infant and childhood mortality were associated with those who had no motor transport. The ratio of child deaths in relation to ownership of oxen carts was 7.4 children per family which was very high. This was obtained by dividing the number of children who died by the number of cart owners. Whereas the ratio of child deaths amongst bicycle owners was only 81 divided to 87 = 0.9 children per family.

Majority of the respondents were living within close proximity to all weather roads. The main problem was the availability of vehicles which exaggerated the distances in the face of poverty situation. It was found that 40% of the respondents had bicycles. However, those were not the majority of the respondents as they were less than half of the interviewed population contrary to the expectations. Low infant and childhood mortality were among the bicyle owners as per above ratios, whereas in contrast with cart owners where less child mortality were observed. However, since even in those households with bicycles was found that at least 0.9% children would die, then bicycles and oxen carts have not been very much useful in enhancing child survival in Shinyanga; in the face of great distances involved to arrive to the health institutions, and in the presence of low income earners. This is in a situation where other variables are considered dormant. But in real situation the impact of the other variables have not been controlled; and so infant and childhood mortality rates in Shinyanga can best be explained

by multiple factors; although inaccessibility to health facilities have manifested itself through transport problems.

4.06 Analysis of decision Making Power within the Household in Relation to the risk of Death Among Children in Shinyanga.

This issue was linked to income distribution within the households. An attempt was made to find out who was the final decision maker in the household expenditure system.The expenditure system was singled out among other factors because it controls accessibility to resources allocated to different consumer groups in the households. Table 4.6 below shows that out of 216 households visited, the husbands were the final decision makers in 151 households: comprising 69.9% of the total the corresponding child mortality was 265 children dead; out of which 141 were boys and 124 were girls. Comprising 53.2% boys and 46.8 girls respectively. Some 76.2% of the children who died were associated with those households where the husbands were the sole final decision makers. In other wordsin every one family where the husband was the final decision maker, there was a ratio of 202 divide 151 = 1.3 children dead. Whereas 19.2% of the child deaths were associated with 24.5% of the households where the housewives were the final decision makers on expenditure/consumption patterns. When ratio is compared; it's observed that the ratio was 51/53=0.96. This implies that in every one household where the final decision makers was the housewife about one

Table 4.6 No. of children Dead classified by the power relationship: Final Decision maker on Expenditure pattern and by Age and sex

Final decision maker	Frequency counts	%	Males						Females							
			Peri-natal	Neona-tal	Infants	Child-hood	Total	%	Perina-tal	Neona-tal	Infa-nts	Child-hood	Total	%	Grand Total	%
Husband	151	69.9	6	12	25	63	106	75	8	17	34	37	96	77.4	202	76.2
Wife	53	24.5	4	2	11	16	33	23.4	1	2	7	8	8	14.5	51	19.2
Relative of wife	2	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not stated	10	4.6	2	-	-	-	2	1.4	-	-	6	4	10	8.0	12	4.5
Total	216	100%	12	14	36	79	141	100	9	19	47	49	124	100	265	100
%			8.5	9.9	25.5	56			7.2	15.3	37.9	39.5	100			
% of Grand total			-				53.2						46.8	100%	265	100

Source: Computed data.

Table 4.7(a) Part 1 No. of Children dead classified by type of kitchen, age and sex.

Type of	Freq.	%	Males						Females							
1. Kitchen	counts		Perina-tal	Neona-tal	Infants	Child-hood	Total	%	Perina-tal	Neona-tal	Infants	Child-hood	Total	%	Grand Total	%
Fuel stove	64	29.6	1	8	14	36	59	41.8	3	10	21	21	55	46.6	114	44
Charcoals stove	105	48.6	7	4	19	31	61	43.3	3	3	14	8	28	23.7	89	34.4
Combination of stoves	44	20.4	4	2	3	12	21	14.9	3	4	12	16	35	29.7	56	21.6
Not stated	3	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100	12	14	36	79	141	100%	9	17	47	45	118	100%	259	100
%			8.5	9.9	25.5	56	100		7.6	14.4	39.8	38.1	100			
% of Grand							54.4						45.6		259	100
2. Freq. of Cooking	Part 2															
Once	8	3.7	-	2	9	4	15	12.8	2	-	3	4	9	8.4	24	10.7
Twice	40	18.5	-	6	12	16	34	29.1	1	4	16	16	37	34.6	71	31.7
Thrice	108	50.0	7	6	6	42	61	52.1	2	8	25	17	52	48.6	113	50.4
Whoever Necessary	30	13.8	3	-	-	4	7	6.0	3	2	-	4	9	8.4	16	7.1
N.A.	2	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.S.	28	12.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100	10	14	27	66	117	100%	8	14	44	41	107	100%	224	100%
%			8.5	12	23	56.4	100	-	7.5	13.1	41.1	38.3	100%	-	-	-
% of Grand							52.2						47.7			

Source: Computed Data

Table No. 4.7 (b) Part 1 No. Child deaths by Accessibility of food and by Age and sex

1. Accessibility of Food between Meals	Freq. Counts	%	Males						Females						Grand Total	% of Grand Total
			Perinatal	Neonatal	Infants	Childhood	Total	%	Prenatal	Neonatal	Infants	Childhood	Total	%		
Milik	30	13.9	2	2	3	5	12	17.4	1	6	15	4	26	24.1	38	21.5
Fruits	21	7.7	2	-	5	9	13	18.8	-	2	1	4	7	6.6	20	11.3
Cooked food	24	11.6	3	-	9	16	28	40.5	3	-	4	13	20	18.5	48	27.1
Rawfoods	1	0.5	-	4	-	-	-	-	-	-	-	-	-	-	-	-
N.A.	3	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subinations	93	43.1	3	-	13	-	16	23.2	3	9	27	16	55	50.9	71	40.1
N.S.	44	20.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100%	10	6	27.1	30	69	100%	7	17	47	37	108	100%	177	100%
%			14.5	8.7	39.1	43.5	100%		6.5	15.7	43.5	34.3	100%			
% of Grand						38.9							61		177	100%
Part II Food Maldistribution.																
Eat Individually	65	30.1	4	-	6	25	35	24	3	6	15	4	28	24.1	63	24
Eat in Age Group	80	37	6	8	14	22	50	34.2	4	11	24	22	68	58.6	118	45
Eat in sex groups	45	20	1	14	11	24	50	34.2	1	-	-	12	20	17.2	70	26.7
Other combinations	4	1.9	-	11	-	-	11	7.5	-	-	7	-	-	-	11	4.2
N.A.	3	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.S.	19	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216	100%	11	33	31	71.0	146	100%	8	17	46	45	116	100%	262	100%
%			7.5	22.6	21.2	48.6	100		7	14.7	39.7	38.8	100%			
% of Grand							55.7						44.3		262	100%

Source: Computed Data.

4.08 Analysis of Ethnic group of the Mother in Relation to the level of Infant and Childhood Mortality in Shinyanga.

During the survey, many children were reported dead from among mothers who originated from the Nyiramba ethnic group, while the Nyiramba were not the majority of the dwellers of Shinyanga. It was assumed that the culture of the ethnic group of the mother could have some relationship with infant and childhood mortality in Shinyanga.

Attempt was made to compare the ethnic distribution of the people of Shinyanga by 1988; with those of the 1967; and the following results were obtained.

It was found that the majority of the people in Shinyanga were the Sukuma; but their proportion have declined from 76.4%(1967) to 61.6% by 1988. The proportion of the Nyamwezi has declined from 11.2% in 1967 to 6.9% in 1988. The proportion of the Nyiramba increased from 2.7% to 6.0% between 1967 and 1988. That of the Sumbwa declined from 4.1% to 0.5% while that of the Ha increased from 0.5% to 1.4%. The proportion of other tribes increased from 5.1% to 18.4% between 1967 and 1988. There were 5.6% of the population who did not specify their tribes; but had no child deaths associated with them. Refer to tables 4.8(i) and 4.8(ii).

However, the most important concern was related to the level of infant and childhood mortality as compared to the

TABLE: SHOWS THE SHINYANGA REGION ETHNIC DISTRIBUTION BY 1967 AND 1988, 4.8 AND THE CORRESPONDING CHILD MORTALITY BY 1988

(i)

Ethnic Name	% By 1967 Pop. Census	% By 1988 Survey Results	Corresponding Child mortality	% Distribution of Child mortality
Sukuma	76.4	61.6	198	78.3%
Nyamwezi	11.2	6.9	8	3.2%
Nyiramba	2.7	6.0	21	8.3%
Sumbwa	4.1	0.5	-	0.0%
Ha	0.5	1.4	9	3.6%
Other tribes	5.1	18.4	17	6.7%
Not specified	-	5.6	-	0.0%
Total	100	100.0	253	100%

Source: 1967, Pop. Census Cum Computed Data.

Table 4.8 (ii)

No. of Children dead classified by Sex and Age and by the Ethnic Group of the Mother.

No. of Children dead classified by ethnicity of mother			Males						Females						Grand Total	%
	Freq.	%	Peri-natal	Neon-atal	Inf-ants	Child-dhood	Total	%	Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%		
Sukuma	133	61.6	6	10	30	60	106	75.7	6	14	33	37	92	81.4	198	78.3
Nyamwezi	15	6.9	1	2	3	1	7	5	-	1	-	-	1	0.9	8	3.2
Sumbwa	1	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nyiramba	13	6.0	1	-	-	12	13	9.3	1	4	3	-	8	7.1	21	8.3
Ha	3	1.4	1	-	-	4	5	3.6	1	-	3	-	4	3.5	9	3.6
Others	39	18.1	3	2	3	1	9	6.4	1	-	3	4	8	7.1	17	6.7
N.S.	12	5.6	-	-	-	-	-	-	-	-	-		-	-	-	-
Total			12	14	36	78	140	100%	9	19	44	41	113	100%	253	100%
%			8.5	10	25.7	55.7	100%		8	16.8	38.9	36.2	100%			
% of Grand							55.3						44.7			

Source: Computed Data

porportion of the ethnic groups by 1988, died; of which 78.3% were associated with the Sukuma mothers who were also the majority. The next group was the Nyiramba who were the 2nd majority with 8.3%, followed by the Ha; 3rd majority with 3.6% child deaths. The Sumbwa who were the least group in the region had no child mortality cases associated with them. A mixture of other tribes had a total child mortality of 6.7%. Two facts are drawn from here:

(i) The declining number of some tribes like the Nyamwezi and Sumbwa and increasing of the proportion of some other tribes like the Nyiramba and the Ha is an expression of in and out-migration population dynamics.

(ii) The increasing proportion of a particular ethnic group was followed by the increasing proportion of child deaths among that particular ethnic group; but this information does not indicate whether the culture of the group has anything to do with infant and childhood mortality.

As a result an attempt was made to assess the community attitudes towards disabled children. It was found that out of 216 respondents half declined to reveal their attitudes. Of the remaining 50%; 9.7% reported the practice of infanticiding; 2.3% reported the practice of negligence which puts the disabled child at risk; 2.8% reported other measures including sending the child away from home to live with grand parents. Thus the corresponding mortality were 122 deaths

in total ;out of which 21.3% were infanticided by the application of various means including feeding the infant with raw flour to accelerate death, others were thrown either in the river banks or on mountain or hill tops. Other were forced to suffocate by being covered in pots and left in mountain or hill tops, or along river banks. Others were deprived of medical care to accelerate deaths. Some 4.1% of the deaths were associated with those parents who took other measures. Some 72.1% of all the disabled children were accepted and taken care off (Refer to table 4.8(b).

Since all the respondents belonged to either one of the ethnic groups; it was then concluded that the culture of the groups has moulded attitudes which put some children at risk. However no distinction was made to identify which particular culture was more responsible; because it was above the scope of this study.

4.09 Immunisation coverage in Shinyanga

A brief survey was done to investigate the degree of immunisation coverage as a factor of child survival in the region. Out of the 216 respondent 58.8% were sending their youngest children to MCH clinics, 38.9% were not attending , 2.3% were childless. Those who were not attending clinics only 1.9% lived over 5kms from the health centre, 2.8% mothers were too busy 2.3% were avoiding vaccination for fear of causing fever in children; and 25.9% of the respondents

TABLE 4.8 (b) Cultural Control Over Attitude Towards Disabled Children classified in Age and Sex

Treatments towards Disabled	Freq.	%	Males						Females						Grand Total	%
			Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%	Peri-natal	Neon-atal	Inf-ants	Child-hood	Total	%		
Killed	21	9.7	2	2	9	4	17	24.3	1	2	1	5	9	17.3	26	21.3
Negleted	5	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other measures	6	2.8	-	-	-	-	-	-	1	-	-	4	5	9.6	5	4.1
Accepted	73	33.8	3	4	17	29	53	75.7	-	1	16	16	35	67.3	88	72.1
N.A.	1	0.5	-	-	-	-	-	-	2	-	3	-	3	5.8	3	2.5
N.S.	110	50.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	216		5	6	26	38	70	100%	4	3	20	25	52	-	122	100%
%			7.5	8.6	37.1	47.1	100		7.7	5.8	38.5	48.1	100	100		
% of Grand							57.4						42.6		122	100%

Source: Computed Data

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.01 Introduction

The aim of the study was to investigate the degree to which socio-economic determinants could explain the high levels of infant and childhood mortality rates in some regions of Tanzania. It was puzzling to observe the very high levels of infant and childhood mortality rates in Tanzania by 1978 population census; in a country where child immunisation programme was national wide; while a number of social amenities were provided free of charge. It was questionable whether the national development target to reduce infant mortality rate to 50 per thousand by the year 2000 would be achieved if the index was still 137 per thousand by the year 1978; while child immunisation programme which boosted the process of child survival was approaching a deadline.

5.02 The Observations

Shinyanga was selected as a case study area because it was one of those regions with high infant and childhood mortality rates in Tanzaniaø by 1978. It was first observed that not every eligible child in Shinyanga was reached by the immunisation programme. Efficient operation of child immunisation programme in Shinyanga region was hindered by the existing

socio-economic structures; which manifested themselves in the form of transport difficulties resulting from lack of fuel (diesel and kerosene in particular), lack of vehicles and poor road surfaces, along with poor knowledge among the community.

The second observation was related to the mortality trend among children in Shinyanga. It was found that the trend is still declining but the gradient was still low so that it was doubtful whether the level of (IMR) of 50 per thousand by the year 2000 would be acquired. Thus a decline of infant mortality rate from 150 per thousand (1978) to 93 per thousand by 1988 survey results; indicated a low gradient; which in turn reflected poor socio-economic development between 1978 and 1988. This is because IMR is an index which is used as a measure of socio-economic development of a society. The higher the index the lower the rate of socio-economic development; while the lower the index the higher the rate of socio-economic development in that society.

The question is whether equity was achieved in the country's attempt to provide water, education, medicine and reducing inequalities among the income earners and between the urban and the rural areas.

5.03 Education as a Determinant Factor of Infant and Childhood Mortality in Shinyanga.

It was observed that 294 children died in Shinyanga in relation to education of the parents; of which 137 deaths were related to mothers educational achievement levels. Those constituted some 46.6% of the total deaths in this category. The remaining 53.4% of the deaths were associated with fathers with some education. But only 60.5% of the female respondents had passed through primary school education and 6% had passed through secondary school education. Thus higher numbers of infant and childhood mortality were associated with women with lower levels of education. And education of the mother had a strong negative relationship with infant/childhood mortality in Shinyanga.

As a factor determinant, mothers' education explained 96.6% of all child deaths in Shinyanga. It is recommended that women in Shinyanga should be more accessible to formal education. This can be done if:

(i) On the enrolment to primary one, the number of girls equals that of boys;

(ii) School entry age for girls is lowered to 7 years in Shinyanga. This would do away with problems of drop outs in favour of early marriages, because the girls would only be 14 years by the time they complete standard seven;

(iii) Lower school age entry would also solve the problem of some parents prohibiting girls from going to school because of fear of loosing bride prices. This is because if the girls did not pursue secondary school education; they would go back to the villages early for marriage proposals.

Alternatively; lower school age entry would give the girls greater chances of pursuing further education, because being young still the girls will concentrate more on their lessons than on other social factors.

(iv) Policy makers can utilise lower school age entry for girls in Shinyanga as a measure of controlling population size. This is because if many girls go to school and they pursue secondary and tertiary education they will delay their marriages. If this technique will be combined with that of POFLEP (i.e. Population and Family Life Education); chances of having frequent birth intervals will be reduced; which in turn reduces infant and childhood mortality rates.

On the other hand, there would be the desired family sizes: and so the technique would act as a fertility control measure which in turn would control population size; and promote economic development.

5.04 Income levels at the household as a determinant factor of infant and Childhood Mortality.

(a) It was observed that majority of the women were unemployed. Only 15.3% were employed as wage earners and a total

of 24.9% of the women had income of any kind. This was expected because most women had low education. At the household scale, out of 215 deaths which occurred 78.6%(169) were associated with fathers income; while 21.4%(46) were associated with those households with income earning mothers. It is true that the death tolls among children was less among income earning mothers. It was also observed that mortality of children among mothers with some income was less in contrast to child mortality cases among fathers with some income. Where mothers had no income of any kind or were unemployed, child mortality was as high as 92.42%.

It is recommended that in the rural areas where land is the only source of income; women should own cattle. Village governments should assign land to interested women applicants where they should keep dairy cattle. Since the fields are cleared for cultivation; folder crops should be grown initially prior to the ownership of the first animals.

Enclosure system needed to be developed in Shinyanga such that the animals could provide manure for the fields and the fields provide folder crops and straw for the animals. Milk and meat is the product for the women. To obtain financial support, WFP i.e. World food Security Programme has special funds for every region in Tanzania which is given to women applicants interested in establishing dairy projects so long as they can show land title deeds and written plan of the

project proposals. The services are offered by the CRDB i.e. Cooperative and Rural Development Bank and also found in NBC offices; while the land ownership certificate could be obtained from the village governments. The CRDB has three special fund programmes for women. These are: (i) UWT/DANIDA fund, (ii) ILO/Arabu Gulf fund and (iii) Australian Grant Fund; and they do all the project write ups for women free of charge; so as to enable more women to obtain the loans (Week End Magazine, Friday July 14, 1989). The most interesting fund for women was that of Australia. The ceiling is at 0.5m/- for individuals and 1.5m/- for groups.

Capital contribution from the borrower is 10%, and it is paid either in cash or in kind - i.e. it can be contributed in terms of project structure, labour and management.

Since it would be difficult for the women to pay the initial capital contribution they would have to pay them in kind and if the village government supported the women applicants; it is recommended that the village governments provide supporting documents; or contribute in terms of cattle sells.

In the urban areas; the petty business women in the informal sector should organise themselves into food and tailoring kiosks. Applications should pass through the Town Council of Shinyanga to acquire plots for such development. Funds for further development could be acquired from CRDB fund for women

Development Projects. It is hoped that such project would help women to acquire income which is directly accessible to themselves and to their children. Otherwise as it would be seen later accessibility of income of father to the members of the household is much controlled by the decision power.

(b) The findings showed that in those households where the decision maker on matters concerning the expenditure or consumption pattern(s) was the husband, there were more child deaths than among those families where the wives were en-cooperated in the decisions. Some 265 deaths occurred of which 76.2% of them were associated with the husbands as the final decision makers; while only 19.2% were associated with the wives as the final decision makers. It was concluded that this pattern of mortality among the children reflected how inaccessible the household income was to the different members of the household particularly the children.

It was then recommended that more house-wives should be encouraged to have a final decision on consumption patterns within the households. Since majority of the women were unemployed and had no income ownership of cattle, food and tailoring kiosks would be the immediate solutions.

The long terms solution lies in education programmes for women in particular and for the community at large to impart knowledge.

5.05 Accessibility of Water as a Determinant factor of infant and Childhood mortality in Shinyanga.

Some 234 child deaths occured in association with water sources. Some 60.3% of the deaths were associated with those households which obtained water from rivers and 19.5% were associated with those households which obtained water from taps. Some 66.8% of the deaths out of 244 were associated with those homes where water is never boiled for drinking purposes. On distances; out of 257 deaths 48% were associated with homes which were between 1-5kms away and 1.2% of the deaths had their water sources more than 5kms away.

Conclusion: Most water in Shinyanga is of subsurface nature and it causes high infant and childhood mortality due to it inaccessibility; distance involved and its contamination.

It is recommended that where water can be obtained from taps; it must be boiled to kill bacteria that cause water born diseases like diarrhoea, typhoid and other intestinal diseases; which were among the first 10 child killer diseases in Shinyanga by 1987.

Because of the frequent interruptions of the water systems either by breaking down or other causes e.g. lack of fuel (diesel) consumers tend to return to their traditional contaminated/contaminated

sources. So to reduce infant and childhood mortality in Shinyanga the frequency of interruption should be reduced by increasing more efficient and frequently maintained hand pumps and protected shallow wells in the river beds.

In the areas far away from the rivers and which have rich underground aquifers deep rooted bore holes operated by high derrecked Wind Mill Systems of the Singida type should be established. In those areas which are far away from the river beds and do not have underground water it is recommendable to have rain water harvesting systems. This would be possible in village schools, dispensaries or CCM buildings or other Institutions. Here rain water obtained from the roofs of all the institutional buildings is directed into storage systems for use in the dry season. Similar structures were built by the Missionaries at Tumaini Secondary School at Kinampanda in Iramba district in Singida Region. Singida and Shinyanga have similar climatic conditions and should have similar solutions to their climatical problems.

It is recommended also that all water sources be protected and animal (cattle) watering should take place in specified areas. Since majority of the respondents preferred unboiled water for drinking rather than the boiled on the account of the flat taste in the later; education is the solution. Other respondents preferred water from the traditional sources for drinking as compared to tap water; on the account of salty

taste in the later. Education is also the solution. Public gathering religious services etc., should educate masses and state clearly the pros and cons against water from a tap in contrast to traditional sources; or boiled against unboiled water.

5.06 Accessibility to Medical facilities as a determinant factor of infant and childhood mortality.

Distance factor even at a close proximity of 1km. to the nearest medical institution appears to put children at risk in Shinyanga. Medicine in public institutions were more scarce than in parastatal or private Institutions. This scarcity in the face of low income levels among the Shinyanga population put children at risks. In the rural areas public dispensaries have medicine available in the first week of each month as the Essential Drug Programme provides them.

It is recommended that the Essential Drug Programme should increase the frequency of providing medicine to the rural areas dispensaries.

The public should be educated on the need to prevent rather than to cure the disease out breaks. There is a strong need to emphasise on the use of modern treatment rather than the current dependency on traditional medicine men; an act which delays the proper diagnosis of the health problem and treatment thus putting a patient to a greater risks of death.

Over all age-sex mortality pattern in Shinyanga indicated that at their first week of life and later between year two and five more boys than girls died. However, in their first month of life (neonatals) and in their /first/ years of life (infants) /more/ girls than boys die.

Two factors can explain this pattern:

(i) The perinatal mortality has a biological explanation that exposed to the same risks more boys will die than girls because boys are weaker.

(ii) (a) Higher levels of mortality among boys than girls at their childhood age probably expresses the impact of age sex division of labour which probably exposes boys to greater risks through cattle rearing - an act which can expose them to snake bites and contaminated water along with low frequency of feeding as the herders stay all day away from home without food.

(b) It can also be interpreted as a reflection of sex preference. When the boys marry they drain away wealth which is paid in form of cattle as bride price. Surviving of boys means impending poverty. While surviving of the girls means impending wealth, assuming that all the girls get married they would be exchanged with cattle in form of bride price

- so they bring wealth to their fathers' households.

It is recommended that further research should be done to evaluate the impact of age sex division of labour and sex preference in explaining the high levels of childhood mortality among boys in Shinyanga.

Finally most of the socio-economic factors studied showed strong correlation with the level of infant and childhood mortality in Shinyanga. With the exception of education of the mother and water which had an inverse relationship, other factors had positive relationships.

It was then concluded that the high levels of infant and childhood mortality in Shinyanga are a product of multiple of factors, although water medicine and education seemed to claim the highest o/c tolls. Factor determinants could best be established by multiple correlation analysis an exercise which was left out for the interest of statisticans because it was above the scope of this thesis.