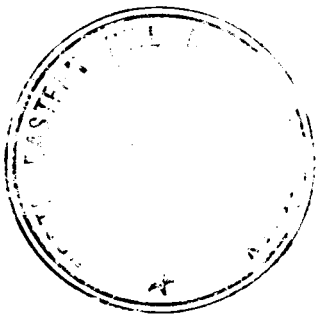
STATUS AND DETERMINANTS OF CHILD MORTALITY AMONG THE PNARS OF JAINTIA HILLS DISTRICT, MEGHALAYA

ABSTRACT



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Mortality is the most traumatic and final of the vital events. It is a form of attrition of the society. Although the act of dying is certainly a biological event, both social and psychological factors are clearly involved. Demographers have focused on mortality more than on any of the other vital events, possibly because it is most obvious and traumatic. How mortality occurs in the population is of extreme importance to the society being studied (Swedlund and Armelagos, 1976).

Mortality is the permanent disappearance of all evidences of life at any time after birth has taken place. Infant and child mortality, are commonly on top of the agenda of public health and international development agencies. They have received renewed attention as part of the United Nation's Millennium Development Goals (UN, 2001). Approximately 10 million infants and children under five years of age die each year, with large variations in under-five mortality rates and trends, across regions and countries (Espo, 2002).

Infant mortality may be defined as "mortality or death during the first year of life" and child mortality may be defined as "mortality or death during the age of 1 to 4 years" (Kabir *et al,* 1995). The child mortality rate has in recent years been recognised as an excellent summary index of the level of living and socio-economic development of a country. This recognition has inspired international organisations as well as national governments to intensify their efforts to lower the level of mortality and raise the level of child survival (Jain and Visaria, 1988).

After the United Nations declared 1979 as the 'International year of the child', the attention of the demographers and other social scientists was shifted from the research on fertility and family planning to the research on child mortality and its various biosocial correlates. So, research on child mortality, which is one of the very important demographic parameters to understand population growth and structure, has since then gained tremendous momentum.

The present thesis consists of seven chapters. The first chapter gives the topic of research in context of the current scientific knowledge especially in the field of infant and child mortality. It provides definition of terms and the theoretical frame of reference and identifies objectives and also describes the study area and population characteristics. The second chapter contains the review of related literature along with justifications for carrying out the present study. The third chapter describes the nature of data and the methods and techniques followed for collection and data analysis. The findings of the present study is presented in two chapters i.e., chapter four and chapter five. Chapter four deal with the demographic characteristics of the study populations. In chapter five the bio-social determinants of infant and child mortality of the study populations are dealt. Chapter six discusses the findings of the present study in the light of other studies. The summary and conclusion are given in chapter seven.

Objectives of the study

1. To study the overall demographic characteristics of the sample population.
2. To find out the status of infant and child mortality among the Pnars of Jowai town and Sanaro village.
3. To study the association of infant and child mortality with socio-economic background of mothers on one hand and access to health care facility on the other.

MATERIALS AND METHODS

Study Area and Population

The fieldwork of the present study was conducted among the Pnars of Jowai town and Sanaro village of Jaintia Hills District, Meghalaya. A total of 23 localities in Jowai town were identified and listed out. In the first phase of sampling, 5 localities namely Panaliar, Dulong, Chutwakhu, Ladthadlaboh and Khimmusniang were selected based on the descending order of the household size. 25% (approx.) of the total households from the above 5 localities was selected at random to constitute about 10% of the sample for this study. On the basis of the above, a house to house survey was conducted to collect data on demographic as well as on all possible bio-social determinants. Entire Sanaro village was surveyed for collecting the above data. A total of 276 households out of 3876 in

Jowai town were surveyed, whereas, in Sanaro village the complete enumeration of the households (157 households) was done.

Bio-social determinants

The bio-social determinants for the present study include age, sex, economic condition, religion, education, etc. Data were collected on all possible biological determinants like age of the mother, interval between births, multiple births, high fertility, etc., and the social determinants of infant and child mortality like family size, breast feeding, religion, education, income, occupation of parents, ignorance of child care, bad environmental sanitation, etc., as suggested by Mahadevan (1986).

The data were collected on the basis of a detailed scheduled comprising all aspects for the study. The nature of data and methods of data collection are as follows:

I. Demographic data: The demographic data was collected through structured schedules for household census and other demographic parameters like fertility and mortality of infant and children. The nature of demographic parameters, as suggested by the World Health Organization (WHO, 1967) and Mahadevan (1986) was taken into consideration. These are:

a). Individual household records: These included name of informant, relationship to head of the household, date and place at which record was taken, clan, tribe, religion, total number of family members, age, sex, marital status, birth order, place of birth, place of residence, nature of occupation, education, income and expenditure of household, etc.

b). Fertility records: They included pregnancy history of each married women, present age of the mother, age at marriage, age at first child birth, total number of live births, birth order, birth spacing, name, age, sex of each offspring, place of delivery, etc.

c). Mortality records: These included numbers of dead children, sex, date of birth, age at death, causes of death, number of reproductive wastage (spontaneous or induced abortion and still births), etc.

Such data were collected by interviewing the ever-married women aged 15-49 years from the sample with the help of interview schedule.

II. Data on household characteristics: Information regarding household characteristics was collected in order to find out whether they are related to infant and child mortality. These include types of residence, types of toilet, source of drinking water, etc.

a). Types of residence: These include questions on whether the house is Kaccha, Pucca, Semi-pucca, Assam type.

b). Types of toilet: Questions on types of toilet include: open field, septic tank, public toilet and own pit.

c). Source of drinking water: Questions on source of drinking water include unprotected well, protected well, hand pump, pond reservoirs, streams, rivers and pipe water.

III. Data on socio-economic determinants: Information relating to social determinants of child mortality like family size, religion, education, income, occupation of parent, child care, sanitation etc. were collected as suggested by Mahadevan (1986).

Some of the important social factors that affect infant and child mortality are as follows:

a). Religion: Religion is considered to be one of the important social factors that affect the infant and child mortality rate.

b). Family size: The size of the family affects fertility and mortality in different ways. In societies where the joint family system prevails, whether fertility and mortality is high or low depends upon the economic condition of the family. For the present study the family size is classified into three categories. The individuals who lived in a household with less than 4 family members are considered as having Small Family Size. The household which has 5-6 family members are considered to be Medium Family Size, while those households having 7 and above family members are considered as Large Family Size.

c). Education: Education plays an important role in influencing infant and child mortality. In countries where the percentage of literates is high, rate of infant and child mortality is low. The data on educational attainment of individuals in the present study were classified as: (i) those individuals who could not read and write were categorized as Illiterate, (ii) those individuals who attained their education up to class VIII were grouped as Primary Level of Education, (iii) those individuals who attained their education from

classes IX-X were categorized as Secondary Level of Education, (iv) those individuals who attained their education from classes XI-XII and above were grouped as Higher Secondary Level of Education.

d). Income: Household income of the family is also one of the social factors which decide the infant and child mortality in many societies. Data on household income for the present study were collected from the informants and were cross-checked taking into consideration some aspects of socio-economic conditions such as condition of the house, types of occupation, amount of land owned, monthly expenditure, etc. Data on monthly household income of the family were classified into three quartiles (Q_1= First Quartile, Q_2= Second Quartile and Q_3= Third Quartile) with the help of Microsoft Office Excel 2007.

IV. Data on reproductive history: Data on reproductive history of each mother were collected from the study population with the help of structured schedule which consist of the followings:

a). Age at marriage: Age at first marriage has a profound impact on childbearing because women who marry early have on average a longer period of exposure to pregnancy and a greater number of lifetime births. Information on age at first marriage was obtained by asking respondents the month and year, or age, at which they started living with their first partner (NFHS-2) (IIPS, 2000).

b). Age at menarche: Information on age at menarche was collected from all the married women (aged 15-49 years) in order to find out whether it has an impact on fertility and child mortality.

c). Number of infant deaths: These are number of infant deaths from birth to below 1 year of age.

d). Number of child deaths: Information on number of child deaths have been collected from mothers whose child died. These included i) number of children death from 1 to 4 years and ii) number of children death from 5 years and above.

e). Number of abortions: These included questions regarding the number of abortions including date, month and year of the abortion. For the present study, abortion has been divided into two types i.e., spontaneous and induced abortion.

f). Still births: These included questions on whether the children were born alive or not.

V. Data on antenatal and post-natal care: Data on antenatal and post-natal care were collected among the Pnar mothers with the help of structured schedule. Information were collected on pregnancy and birth histories, details of antenatal and delivery care received during their past pregnancies.

Some of the most important data on antenatal and post-natal child care are classified as follows:

a). Place of visit for check up: These include questions related to the place of visit for antenatal checkup such as hospital, private doctor, dai, ANM, etc.

b). Number of visits: This includes questions about attending and number of antenatal check up.

c). Stage of pregnancy at First abdominal check up: These include questions about the stage of pregnancy at first ANC visit and whether women received iron/folic acid tablet and tetanus injections. The stage of pregnancy are divided into 3 stages, i.e., first trimester which is the first three months, second trimester i.e., second three months and third trimester i.e., the last three months of pregnancy period.

d). Place of delivery: This includes questions regarding the place of delivery- hospital, clinic and home.

e). Instruments used for cutting placenta: This includes blade, hot water + detol, knife, bamboo stripe, etc.

f). Reasons for no antenatal check up: This question is for those women who did not go for antenatal check up. The reasons are: lack of knowledge, no visit of ANM, financial burden, socio-cultural barriers, far distance of hospital/clinic, did not feel necessary, not permitted by husband, etc.

g). Antenatal disease: This includes questions regarding any health problems faced by each woman during pregnancy like swelling of hand and feet, paleness, weakness,

tiredness, dizziness, visual disturbance, bleeding, convulsions, no movement of foetus, vomiting, fever, headache, etc.

h). Abnormal delivery: In case of abnormal birth, the informant was asked whether it was due to premature birth, obstructed labour, prolonged labour, breach presentation, etc.

i). Post-natal disease: This included information regarding health problems that occur to mothers during the first week from delivery. They are fever, headache, excess bleeding, dizziness, severe jaundice, low abdominal pain, vomiting, etc.

VI. Data on immunization and child care: Data on several areas of importance to child health: birth weight, vaccination status of children and treatment of childhood illness were collected from mothers having child born in the last 5 years from the date of interview. Mothers were asked whether colostrums were fed to their children and also the availability of the vaccination/immunization card. If a card was available, the dates when the child received vaccinations against each disease was noted down. Parents' report on vaccinations was also recorded although record on the card was unavailable. If the mother could not show a vaccination card, she was asked whether the child had received any vaccinations. Information on immunization coverage is important for monitoring and evaluation of the Expanded Programme on Immunization (EPI). In short, an attempt was made to follow as far as possible those guidelines given by the National Family Health Survey-2 (IIPS, 2000).

a). Breast feeding period: Mothers were asked for how many months or years their children were breast-fed.

b). Vaccination coverage: Information on immunization of children against tuberculosis, whooping cough, polio and measles were collected from parents as they are crucial to reducing infant and child mortality (NFHS-3) (IIPS, 2007). According to World Health Organization, children are considered fully vaccinated when they received the above vaccines.

VII. Data on child morbidity: The health status of a population is reflected in the levels of morbidity and the treatment behaviours of its members. Data on morbidity was based on "self-reported illness experience" of a subject as generally adopted in surveys, which

did not involve clinician (Strickland and Ulijaszek, 1993; Garcia and Kennedy, 1994; Strickland and Tuffrey, 1997). Self-reported morbidity (SRM) is also more preferable from the point of view that a clinical diagnosis involves much time, cost and technical expertise, which are not always possible when carrying out a community based studies in developing countries including India. The term "morbidity" in the present study was defined simply in terms of the number of illness in the last 28 days time before field work. Morbidity of children up to 14 years of age was recorded as has been reported by their parents. Any child reported to be at least two days ill was classified as being "ill". Data on child morbidity for the present study was classified as follows:

a). Cold/respiratory disorders: These included cough + running nose + headache, cough + running nose + headache + fever, fever cough, cough alone, swollen glands + cold, ear problem, breathing problem, chest pain, sore throat, tuberculosis.

b). Respiratory disorders: Respiratory infection is regarded as one of the leading causes of childhood morbidity and mortality throughout the world. The prevalence of acute respiratory infection was estimated by asking mothers whether their children up to 14 years of age had been ill with a cough accompanied by short, rapid breathing which was chest related in the past 28 days preceding the survey.

c). Diarrhoea/dysentery: Diarrhoea is one of the single most common causes of death among children under the age of five years worldwide, following acute respiratory infection (NFHS-3) (IIPS, 2007). Deaths from acute diarrhoea are most often caused by dehydration due to loss of water and electrolytes.

d). Malaria: Malaria contributes to high levels of malnutrition and mortality. It is also a major contributory cause of death in infancy and childhood in many developing countries.

e). Tuberculosis: Tuberculosis is contagious and spreads through droplets that can travel through the air when a person with the infection coughs, talks, or sneezes.

f). Fever: Fever is a major manifestation of malaria and other acute infections in children. Like malaria, fever also contributes to high levels of malnutrition and mortality.

g). Others: These included sores/boils, fever alone, chicken pox, typhoid, scabies, jaundice, body pain, headache alone, malnutrition, weakness and other symptoms.

VIII. Data on statistical analysis: Statistical analysis has been applied for the presentation of data mentioned above, keeping in view the objectives of the present study. Special attention has also been given to find out the status and determinants that are associated with infant and child mortality. The data were presented in terms of means, standard deviations, standard errors and proportions or percentages. All data were managed and analyzed using SPSS (PC Software), version 16 in which the level of significance was set at 5%. Some of the data were also calculated manually. The analysis was first carried out to present the basic demographic structure of the Pnar populations of Sanaro village and Jowai town, Jaintia Hills District, Meghalaya in terms of age, sex and marital status, which were based on household census data. The sex ratios for different age groups were calculated with the ideal sex ratio of 1:1. The t-test (2-tailed) was used to determine the statistical significance of the differences between two means like age at menarche, age at marriage, age at first child birth, etc. The differences between proportions were tested, using chi-square (χ^2) test.

Coefficient of correlation (r) was tested to find out an association between two continuous variables. The relationship between two variables may be positive or negative or scattered. When one variable increases, the other tends to increase (e.g. the child mortality rate increase as the age of mothers increases) – this is positive correlation. But there are relationships that are negatively correlated – as when one variable decreases, the other tends to increase (e.g. the child mortality rate decreases as the maternal educational level increases). Again, there are variables in which there exists no relationship. The value of correlation coefficient ranges from +1 to −1. The value of 'r' when closer to +1 indicates highly positive correlation; a value of 'r' closer to −1 indicates a highly negative correlation and when the value of 'r' = 0, then it indicates no association between the two variables.

Multiple regression analysis was done to estimate the coefficients of the linear equation, involving one or more independent variables that best predict the value of the

dependent variables. For example, we may predict a number of live births (the dependent variable) from independent variables such as age, educational level, income level, etc. However, in the present study, we are interested in testing whether the coefficient regression (B) is significant or insignificant after taking into consideration more than one independent variables.

The present findings may be summarized as follows:

Demographic characteristics

1. The overall sex ratio of Pnars of Sanaro village is 1:0.93, which shows that the number of males is slightly higher than the females, though the overall sex ratio in this population is very near to the ideal sex ratio of 1:1.
2. In Sanaro village, 21.69% of males and 17.78% of females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group, i.e., 15-49 years, there are 28.30% and 27.59% males and females respectively, and in the post reproductive age group i.e., 50+ years, they are 1.92% and 2.70% respectively.
3. The overall sex ratio of Pnars of Jowai town is 1:1.03, which shows that the numbers of females are slightly higher than the males, though the overall sex ratio is very near to the ideal sex ratio of 1:1.
4. In Jowai town, 14.41% of males and 12.53% of females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group i.e., 15-49 years, there are 30.47% and 30.34% males and females respectively. In the post-reproductive age group i.e., 50+ years, the percentages of males and females are 4.37% and 7.87% respectively.
5. In Sanaro village, the population pyramid of the Pnars becomes narrower as we move up from the base till the age group 10-14 years in both males and females which then becomes broader in the age groups 15-19 and 20-24 years in both the sexes. This population further indicates that the frequencies of male and female in various age groups are by and large, same and as age advances, population decreases.
6. In Jowai town, the population pyramid of the Pnars becomes broader as we move up from the base till the age group 20-24 years in males and 15-19 years in females. It

indicated that there is a decline in the fertility rate among the Pnars of Jowai town in the past 8 years.

7. The mean number of live births per mother is higher in Sanaro village (5.57 ± 0.25) than Jowai town (3.49 ± 0.12). The infant, child and juvenile mortality are found higher in Sanaro village than in Jowai town. The percentages of infant mortality are 14.06% in Sanaro and 2.91% in Jowai town, whereas, the child mortality are 12.71% and 1.14% respectively. The juvenile mortality are recorded 5.14% and 0.52% in Sanaro village and Jowai town respectively.
8. The mean age at marriage for the Pnar males of Sanaro is 18.82 ± 0.22 years and 17.38 ± 0.17 years for females, and the same is found 24.56 ± 0.28 years and 22.39 ± 0.24 years respectively for the males and females in Jowai town. Marriages have taken place earlier in females than in males in both the study areas. The mean age at marriage is found significantly greater in Jowai town than in Sanaro village in respect of both males ($t = 16.21$, $p < 0.001$) and females ($t = 17.22$, $p < 0.001$).
9. The mean age at first child birth is also higher in Jowai than Sanaro village. The mean age at first child births in Sanaro are 20.11 ± 0.23 years for males and 18.66 ± 0.17 years for females, and the same is 26.28 ± 0.29 years and 24.05 ± 0.25 years respectively in Jowai town. The differences in respect of the above trait is statistically significant for both males ($t = 16.68$, $p < 0.001$) and females ($t = 17.79$, $p < 0.001$) living in Sanaro and Jowai.
10. The average number of live births per such mother is higher in Sanaro village (8.83) compared to their Jowai counterparts (4.98). It indicates that the completed fertility is quite high among the Pnars of Sanaro village and the same is moderate in Jowai town. The average number of surviving offspring per such mother is 5.94 in Sanaro village whereas 4.60 found in Jowai town.
11. The child-women ratio (fertility ratio) is very high in Sanaro village (73.04) although the same is moderate (47.54) in Jowai town.
12. In both the present study areas, the average number of pregnancy per mother tends to increase as the age of the mother increases. It increases from 1.00 in the age group ≤

19 years to 9.89 in the age group ≥ 40 years in Sanaro village and the same increases from 1.00 to 5.13 respectively in Jowai town.

13. The total percentage frequency of surviving children is higher in Jowai town (95.43%) than in Sanaro village (68.11%). In both the study areas, mothers belonging to ≤ 19 years age groups possess highest number of surviving children i.e., 100% each. The average number of live births per mother tends to increase as the age group increases. In Sanaro village, it increases from 1.00 in the age group ≤ 19 years to 8.68 by age group ≥ 40 years and in Jowai town, it increases from 1.00 to 4.54 respectively.
14. The frequency of reproductive wastage in Sanaro village is found highest among the women of age group 30-39 years (14.80%) and lowest in the age group 20-29 years (9.89%). In Jowai town, the same is recorded highest in the age group ≥ 40 years (12.30%) which then decreases to 10.42% by 20-29 years age.
15. The average number of surviving children per mother is found slightly higher in Sanaro village (3.81) compared to their Jowai counterparts (3.33).
16. The age specific marital fertility rate (ASMFR) in Sanaro village exceeds their Jowai counterparts in all the age groups. Its highest peak reaches at 20-24 years (2.0710) and 25-29 years (1.6791) in Sanaro and Jowai town respectively. The total marital fertility rate (TMFR) is recorded higher in Sanaro (6.8726) than in Jowai (4.3442). The total marital fertility rate in Sanaro village seems to be fairly high although the same in Jowai town seems to be moderate. Figure 1.3 depicts the age specific marital fertility rate among the present populations.

Bio-social determinants of infant and child mortality

1. The percentage frequencies of infant mortality are inversely associated with mother's age in both the study areas and all age groups excepting the lowest age i.e., ≤ 19 years. The association between the infant mortality and mother's age group is statistically significant in Sanaro village ($\chi^2 = 13.44$, df = 3, $p < 0.005$) but not in Jowai town ($\chi^2 = 8.05$, df = 3, $p > 0.05$). There is no significant association between

child mortality and mother's age group in Sanaro village but they show significant association in Jowai town ($\chi^2 = 8.05$, df = 3, $p < 0.05$).

2. In Sanaro village, the highest percentages of infant and child mortality are recorded among those women who attended their menarcheal age at < 12 years and 13 years respectively. In Jowai town, these are 14 years and 15 years respectively. The infant and child mortality do not associate significantly with the mother's age at menarche in the present population of both the study areas.
3. The χ^2 test shows significant association between infant mortality and mother's age at marriage in Jowai town ($\chi^2 = 10.03$, df = 1, $p < 0.005$). Mother's age at marriage also shows significant association with child mortality only in Sanaro village ($\chi^2 = 9.12$, df = 1, $p < 0.005$).
4. In the present populations, higher educational level and better occupation of the mothers is found to be significantly associated with greater age at marriage of the mothers. Further, mothers belonging to nuclear family have married earlier than those living in the joint families.
5. The duration between the last two children births were found much longer in Jowai compared to their Sanaro counterparts. It ranges between 1 and 4 years in Sanaro whereas the same is 1 and 6+ years in Jowai. Frequency of infant mortality is inversely associated with birth spacing in Sanaro village. Highest frequency of infant mortality was recorded in the spacing duration of 1 year (18.85%) and then gradually decreases as the birth spacing period increases to 4 years (5.88%). Highest frequency of child mortality was recorded in the spacing period of 4 years (23.53%) followed by 1 year (19.95%) and the least was recorded in 3 years (12.33%) spacing period.
6. In Jowai town, mothers who had highest birth spacing i.e., 6+ years recorded the highest percentage of infant mortality (6.94%) and the least recorded of 3 years (0.68%). Child mortality found more or less same in all the birth spacing durations excepting 5 and 6+ years, where, no child death was recorded.
7. Birth spacing durations were found higher in the urban areas compared to their rural counterparts. Similarly, it is proportional to their income. So, place of residence and

household income found to be the two most important factors influencing the birth spacing in the present populations.

8. The χ^2 test between the live births and infant and child mortality is not significantly associated with the mothers' education in Sanaro village, although it is significantly associated on infant mortality in Jowai town (χ^2 = 8.69, df = 2, $p < 0.025$). Therefore, mother's education is found to be an important factor in regulating the infant mortality in Jowai town only.
9. The χ^2 test between live births and infant and child mortality do not show significant association in respect of mothers' occupation in both the study areas.
10. The χ^2 test between live births and infant and child mortality in respect of religion shows significant association only in Jowai town (Infant mortality: $\chi^2 = 4.79$, df = 1, $p < 0.05$; Child mortality: $\chi^2 = 6.36$, df = 1, $p < 0.025$).
11. There is no significant association between infant and child mortality with household income in both the present study areas.
12. The χ^2 test between live births and child mortality in respect of family types in both the study areas are statistically significant (Sanaro: χ^2 = 6.12, df = 1, $p < 0.025$; Jowai: χ^2 = 14.08, df = 1, $p < 0.025$), whereas the infant mortality do not show any significant association in both the study areas.
13. The χ^2 test shows significant association between infant mortality and family size only in Jowai town (χ^2 = 21.63, df = 2, $p < 0.005$). So, family size do not show significant influence on the infant and child mortality in Sanaro village and child mortality in Jowai town.
14. In Sanaro village, χ^2 test between live births and infant and child mortality shows no significant association in respect of house type, whereas in Jowai town, they show significant association (Infant mortality: χ^2 = 17.67, df = 1, $p < 0.005$; Child mortality: χ^2 = 9.18, df = 1, $p < 0.005$). This indicated that house type has a significant influence on the infant and child mortality only in the urban area i.e., Jowai town.

15. The χ^2 test between live births and infant and child mortality shows significant association in respect of types of toilet used in Sanaro village (Infant mortality: χ^2 = 9.67, df = 2, $p < 0.01$; Child mortality: $\chi^2 = 10.59$, df = 2, $p < 0.01$).
16. The χ^2 test between live births and both the infant mortality ($\chi^2 = 7.69$, df = 2, $p < 0.025$) and child mortality ($\chi^2 = 10.89$, df = 2, $p < 0.005$) are significantly associated with source of drinking water in Jowai town.
17. In Sanaro village, out of a total 157 mothers only 98 (62.42%) have visited ANC during their pregnancy, whereas, in Jowai town, out of a total of 276 mothers, almost all (i.e., 99.28%) are reported to have visited ANC.
18. The number of ANC visit in Jowai is high i.e., 56.16% mothers have visited for 6 or more times, whereas, only 4.46% mothers from Sanaro village have visited the same.
19. It is observed that the highest number of mothers (35.67%) in Sanaro village visited ANC during the 2nd trimester and the least visit (8.92%) in the 3rd trimester. But, in Jowai town, majority of the mothers (59.06%) have visited ANC during 1st trimester followed by 2nd trimester (38.77%) and then 3rd trimester (1.45%). The difference between the two study areas in respect of their visit to ANC is statistically significant ($\chi^2 = 25.60$, df = 2, $p < 0.005$).
20. The above observation reveals that place of residence also influences significantly on the frequency of ANC visit of the mothers. Present study shows that 38.22% of mothers of Sanaro village and 72.87% of Jowai town have received tetanus toxoid injection.
21. Nearly equal percentages of mothers who received (50.95%) and did not received (49.04%) iron and folic acid tablets during their pregnancies were reported in Sanaro village. But in Jowai town almost all (i.e., 99.28%) were reported to have received the same.
22. In Sanaro village, 26.11% of mothers were reported to have checked their blood pressure during pregnancy. In Jowai town, almost all, i.e., 99.28% of mothers got their blood pressure checked. The difference between the two study areas is statistically significant as well (χ^2 = 152.02, df = 1, $p < 0.005$). So, it may be

concluded that, mothers in Jowai town are much more advanced than their Sanaro counterparts in respect of ANC characteristics.

23. The χ^2 test between live births and infant mortality ($\chi^2 = 21.26$, df = 1, $p < 0.005$) and child mortality ($\chi^2 = 12.08$, df = 1, $p < 0.005$) in respect of ANC visit shows significant association in Jowai town whereas the same is not significantly associated in Sanaro village.
24. The association between mother's health problem and infant mortality is statistically not significant among the Pnars of Jowai town ($\chi^2 = 3.04$, df = 1, $p > 0.05$) but found significant association in respect of child mortality ($\chi^2 = 15.60$, df = 1, $p < 0.005$).
25. Place of delivery significantly influences the infant and child mortality in Sanaro village, whereas in Jowai town, it significantly influences only the infant mortality.
26. The χ^2 test shows significant association between the infant mortality and child mortality with feeding of colostrums in both Sanaro village and Jowai town.
27. The percentage of overall morbidity of mothers in Sanaro village is found much higher (80.89%) than that of their Jowai counterparts (52.17%). Of the many health problems, weakness/tiredness (74.52%), other types of health problems (47.77%), visual disturbance (49.68%), convulsion (45.22%) and swelling of hands and legs (38.85%) are the main health problems faced by mothers in Sanaro village during pregnancies. On the other hand, swelling of hands and legs (19.93%), other health problems (18.12%) and weakness/tiredness (17.39%) are the major health problems faced by mothers in Jowai town during pregnancies. Obstetric morbidity rate in Sanaro village found higher than in Jowai town.
28. The overall reported morbidity rate is found much higher in Sanaro village (78.98%) than in Jowai town (26.37%). In Sanaro village, the most common health problems faced by mothers during the first week after delivery are other types (65.61%) followed by headache (49.04%), cold/fever (36.94%), excess bleeding (29.94%), dizziness/vomiting (24.20%) and low abdominal pain (5.09%). In Jowai town, the common health problems faced by the mothers during the first week after delivery

were cold/fever (11.17%) followed by headache (6.99%), other types (6.59%), excess bleeding (4.51%), low abdominal pain (2.21%) and dizziness/vomiting (1.47%).

29. Among all the independent factors, number of live births, residence (rural/urban) and paternal education are significantly associated with mother's health problems after delivery. The prevalence of health problems found higher among those mothers who were having higher number of children. It is also observed that urban residence and higher parental education is associated with their lower morbidity rate in the present populations.
30. Among all the reported morbidities, cold and/or respiratory disorder is the most common health problem faced by the male children up to 14 years of age in both Sanaro village (20.20%) and Jowai town (11.45%). In Sanaro village, 11.01% and 15.61% suffer from intestinal disorder and other types of health problems (i.e., diarrhoea and dysentery) respectively. In Jowai town the above two health problems occurred is 2.70% each. Between the two study areas, the overall prevalence of morbidity among males is higher in Sanaro village (31.65%) than in Jowai town (15.82%).
31. Other type of health problem is the main cause of morbidity among the female children in Sanaro village (17.03%). But, in Jowai town, cold and/or respiratory disorder is the main health problem faced by 12.41% individuals. The other health problems in Sanaro are cold and/or respiratory disorders (14.31%) and intestinal disorder (5.50%). In Jowai town, intestinal disorder and other health problems affected 4.91% and 4.51% individuals respectively. As in the case of males, the overall prevalence of morbidity in females is also found higher in Sanaro village (29.67%) than their Jowai counterparts (21.05%).
32. Higher percentage of child morbidity in the present populations is significantly associated with smaller family size.
33. In Sanaro village, among the children aged between 1 and 14 years, polio recorded the highest percentage of immunization (85.00%) followed by BCG (53.50%), then whooping cough (31.00%) and least was the measles (4.50%). But, in Jowai all the

children are reported to have immunized with all the given vaccinations. The overall immunization rate among the males in Sanaro village is 88.00%, which is lower than that of the Jowai town. The above observation also shows that 79.01% of females in Sanaro village were immunized for polio, whereas, 48.76%, 22.22% and 8.02% were immunized for BCG, whooping cough and measles respectively. Like in the case of males, all the female children of Jowai town were immunized with each of the above vaccinations. The overall rate of immunization among females children in Sanaro village is 82.11%, whereas, the same is 100.00% in Jowai town.

34. Higher rate of immunization was recorded among the Pnar children of Jowai town than the Sanaro village. There is also a significant negative correlation between immunization and the age of children ($B = - 0.005 \pm 0.002$, $p < 0.01$) and sex of the children ($B = - 0.028 \pm 0.015$, $p < 0.05$). Therefore, residence and age are the most important factors influencing the immunization of children in the present populations.

CONCLUSION

The impact of various bio-social factors on infant and child mortality in the present study is recorded more among the Pnars of Sanaro village than the Jowai town. The mean age at marriage is found to be about five years less in Sanaro village as compared to their Jowai town counterparts. Similarly, the age at first child birth is also recorded about five and half year earlier to the Jowai town. The average number of live births is found almost double in Sanaro than in Jowai town. In spite of such differences, the average number of surviving children, by and large, remains same in both the study areas. In the present population, education, occupation, family type and birth spacing have influenced the age at marriage and age at first child birth. The frequencies of mothers visiting ANC, taking tetanus injection, iron folic acid in Jowai town is almost double than in Sanaro village. The overall morbidity of the mothers in Sanaro village is found almost three times higher than in Jowai town. In Sanaro, children are immunized mostly for polio only, whereas, in Jowai, 100% children are immunized for polio, BCG, whooping cough, measles, etc. In the light of the present findings, it may concluded that poor socio-economic and biological factors like the household income, mother's education, types of family, parent

occupation, low birth spacing, low age at marriage and age at first child birth, poor antenatal care, etc., are the factors that are influencing high infant and child mortality in the present study populations.

The decline in child mortality in urban areas has been slowed than in rural areas, and as a result urban-rural mortality differentials have become smaller. The factors contributing to this slowing decline include the lower social, cultural and health status of women. Thus, improving female education and health services during pregnancy and delivery would lower child mortality. Necessary policies and programme interventions have to be developed to tackle the factors which are responsible for high infant and child mortality. Health education programmes should be designed for the families who have experienced infant and child deaths so that the further risk of death may be substantially reduced. The effect of birth order and younger maternal age is mediated through short birth interval. Young mothers at high parity, those bearing children at short birth intervals, and mothers who had suffered child loss before are the vulnerable to excessive infant and child mortality. This may be used for future planning and policy decisions aimed at reducing infant and child mortality. Policies should be formulated with keeping in mind the factors like, age at marriage, timing of child bearing, birth spacing, educational and infrastructural facilities.

LIMITATIONS AND POLICY IMPLICATIONS

The present study has highlighted on the various factors that influence the infant and child mortality among the Pnars of Jaintia Hills. This study is restricted to only two populations of Jaintia Hills District, Meghalaya. More studies are needed to be carried out in different parts of the region. Despite the efforts of the government through its vast networking, some of them are still ignorant of education, ANC visit and immunization of children which are the main causes of high infant and child mortality. Further the study suggests that future generations should strive to enforce compulsory education for the village women in particular to reduce child mortality. In addition, this study would like to bring the attention of the policy makers and regional administrators that they should educate and bring awareness among the women particularly in villages about the

immunization of mothers and children, birth spacing and provide health care facilities to them and their children.

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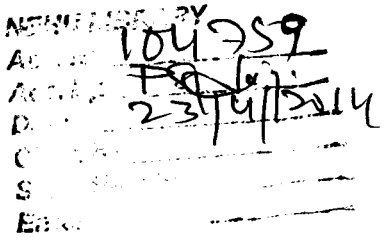

STATUS AND DETERMINANTS OF CHILD MORTALITY AMONG THE PNARS OF JAINTIA HILLS DISTRICT, MEGHALAYA

By

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THESIS

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Shillong: Meghalaya (793022)

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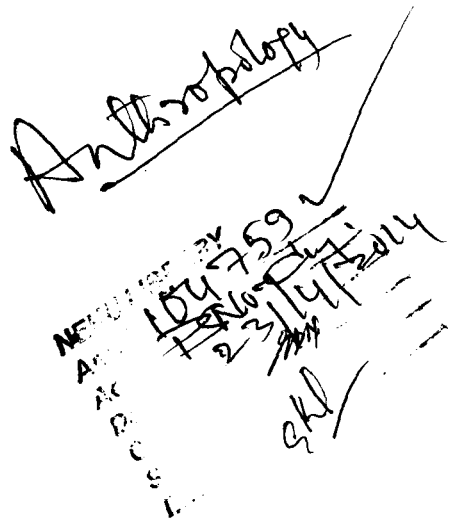

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DECLARATION

I, Happystone Syngkon, hereby declare that the subject matter of this thesis entitled "Status and Determinants of Child Mortality among the Pnars of Jaintia Hills District, Meghalaya" is the record of work done by me, that the contents of this thesis did not form the basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other university/institute.

This thesis is submitted to the North-Eastern Hill University for the **Degree of Doctor of Philosophy in Anthropology.**

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Certified that the thesis entitled "Status and determinants of child mortality among the Pnars of Jaintia Hills District, Meghalaya" submitted by Mr. Happystone Syngkon for the Degree of Doctor of Philosophy in the Department of Anthropology, North-Eastern Hill University, Shillong, Meghalaya, embodies the record of original investigation carried out by him under my supervision. He has been duly registered and the thesis presented is worthy of being considered for the award of the PhD Degree. The contents of this thesis did not form a basis of any previous degree to him or to the best of my knowledge to anybody else, and the thesis had not been submitted for any degree of any other University.

2.5.13

(Dr. D. K. Limbu)

CONTENTS

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Shillong

The 2nd May, 2013

(Mr. Happystone Syngkon)

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CHAPTER I

INTRODUCTION

In this chapter we shall introduce the topic of research in context of the current scientific knowledge especially in the field of infant and child mortality. It provides definition of terms and the theoretical frame of reference and identifies objectives and also describes the study area and population characteristics.

The analysis of mortality has also provided one of the best measures of adaptation in present populations. A significant increase in mortality is often an indication that a stressful situation is present.

Mortality is the most traumatic and final of the vital events. It is a form of attrition of the society. Although the act of dying is certainly a biological event, both social and psychological factors are clearly involved. Demographers have focused on mortality more than on any of the other vital events, possibly because it is most obvious and traumatic. How mortality occurs in the population is of extreme importance to the society being studied (Swedlund and Armelagos, 1976).

Mortality is the permanent disappearance of all evidence of life at any time after birth has taken place. Infant and child mortality, are commonly on top of the agenda of public health and international development agencies. They have received renewed attention as part of the United Nation's Millennium Development Goals (UN, 2001). Approximately 10 million infants and children under five years of age die each year, with large variations in under-five mortality rates and trends, across regions and countries (Espo, 2002).

Infant mortality may be defined as "mortality or death during the first year of life" and child mortality may be defined as "mortality or death during the age of 1 to 4 years" (Kabir *et al,* 1995). Infant mortality rate is "the ratio of infant deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births". Child mortality rate, on the other hand, is the number of deaths of children aged 1 to 4 years per 1000 children in the same age group in a given year (Raza and Nangia, 1984).

Bhuyan (2000) states that one frequent response of women worldwide to infant death is the renewed pregnancy - an attempt to replace relatively quickly that which was lost (Ware, 1977; Choudhury *et al,* 1976; Taylor *et al,* 1976). If so, the high rates of infant death represent, in addition to other problems, gross reproductive waste, draining the physical, economic and psychological resources of women who bear such vulnerable offspring. Hence the study of child mortality is important for a number of reasons. It has a substantial positive impact on fertility (Bhuyan *et al,* 1996; Mahadevan, 1979) and is strongly influenced by many biological and socioeconomic factors. The biological determinants of child mortality have been studied extensively (Scrimshaw *et al,* 1968; Jelliffe and Jelliffe, 1984; Mata, 1978). The important social determinants of child mortality which have been studied are education, occupation, income and wealth (Das Gupta, 1990).

Claeson (2004) studied child mortality trends and determinants - policy implications for child survival in India. In 2003, about 2.2 million children under age 5 *died in India which is the highest total of any country and about 20 percent of all child*

deaths globally. Recent years have shown a slowing down in the decline in infant mortality rates in India, resulting in a departure from the longer-term trends (Claeson *et al,* 1999, 2000). The slowing down in child mortality decline in India has called for new approaches that go beyond disease program and sector specific approaches. This paper provides an input to the debate about what, why and how to speed up the rate of decline and accelerate progress towards the child mortality Millennium Development Goal of India. This is a synthesis of analytical work done by the World Bank - WHO Child Health and Poverty Working Group, the Bellagio study group on child survival, the recent MDG analysis of trends and determinants discussed in the *Millennium Development Goals for Health; Rising to the Challenges* and on Bank analysis of child mortality in India (Victora *et al*, 2003; World Bank, 2004; Claeson *et al*, 2000).

Hill (1991) shows reasons for measuring childhood mortality: measures of child mortality, taken here to mean measures of risks of dying up to the age when such risks reach their minimum values, typically around 10, are used for a number of purposes. Child mortality, and particularly infant mortality, is often used as a broad indicator of social development or as a more specific indicator of health status. Measures of child mortality are necessary for making population projections. Characteristics of child mortality, such as its age pattern, socioeconomic differentials, cause of death structure, and sub-national distribution, are used to seek causal explanations and to design interventions. Information on trends, both national and disaggregated, is used to evaluate the impact of interventions. No one data collection system or analytical methodology provides the ideal information base for all these diverse objectives. Before discussing

individual systems or methods, it is thus necessary to review the criteria by which these systems or methods may be judged.

The child mortality rate has in recent years been recognised as an excellent summary index of the level of living and socio-economic development of a country. This recognition has inspired international organisations as well as national governments to intensify their efforts to lower the level of mortality and raise the level of child survival (Jain and Visaria, 1988).

After the United Nations declared 1979 as the 'International year of the child', the attention of the demographers and other social scientists was shifted from the research on fertility and family planning to the research on child mortality and its various biosocial correlates. So, research on child mortality, which is one of the very important demographic parameters to understand population growth and structure, has since then gained tremendous momentum.

Most of the meaningful researches on mortality, particularly on infant and child mortality have been carried out since the 1980's. They have been doing mostly at macro level. It is proved beyond doubt that there are marked variations in mortality patterns and rates between various countries and between various populations, even within one country. It is also reported that there are lots of variations in respect of mortality patterns and rates between different ecological zones. Recent researches on mortality have shown that mortality patterns and rates are influenced by various types of bio-social phenomenon as fertility is.

Mahadevan (1986) says that there prevails confusion regarding the nature and number of determinants of mortality, direction of causal relationship and priority of importance of different causal factors. He is of the opinion that since there is no comprehensive and systematic analytical framework and conceptual model, most of the researches on mortality suffer from poor coverage of appropriate variables and lack of depth.

Now, infant and child mortality enjoy a privileged position among the issues of demography. They lie at the heart of key debates of theoretical interest, and are illuminated by the wide variety of disciplines that have helped explain demographic phenomena. The search for a 'unified theory' of the demographic transition at one time centered upon problems of infant and child mortality because a decline in childhood mortality limits the fertility (Lynch and Greenhouse, 1994). The child mortality rate is an indicator of the social situation in a country. It reflects the adverse environmental health hazards including economic, educational and cultural characteristics of the family.

The determinants of fertility and mortality in human populations are many and involve biological, behavioural and socio-demographic factors, operating separately as well as in conjunctions with each other. The response of vital statistics to change in the environments of specific populations, as well as the implications of the response for the survival of children, especially in developing countries (Mosley and Chen, 1984), emphasize the importance of ascertaining bio-social and socio-demographic correlates of fertility and mortality. Bio-social study is pertaining to or entailing the interaction or

combination of social and biological factors; or pertaining to social phenomenons that are affected by biological factors.

As in other countries, in India too, the demographers and social scientists have done some useful researches on mortality rate and pattern and they have tried to explain their findings with the help of various bio-social determinants. But most of these researches in India have been carried out at macro-level, and consequently, they lack depth and failed to understand the bio-social problems that the individual populations are facing. A series of policies have been formulated and implemented in India to reduce the levels of mortality. This mortality rate started declining from 1921, but the rate of its declination has not been as rapid as in developed countries (Fernando, 1985).

The anthropologists are generally interested in human populations at micro-level. But if one scans through the anthropological literature carefully, one will find that only few detailed researches has so far been carried out at micro-level on Indian populations, particularly among the tribal populations of Northeast India regarding infant and child mortality and the effects of various bio-social determinants.

With this end in view, we have undertaken a study on status and determinants of child mortality among the Pnars of Jaintia Hills District, Meghalaya, with a view to understanding the following objectives:

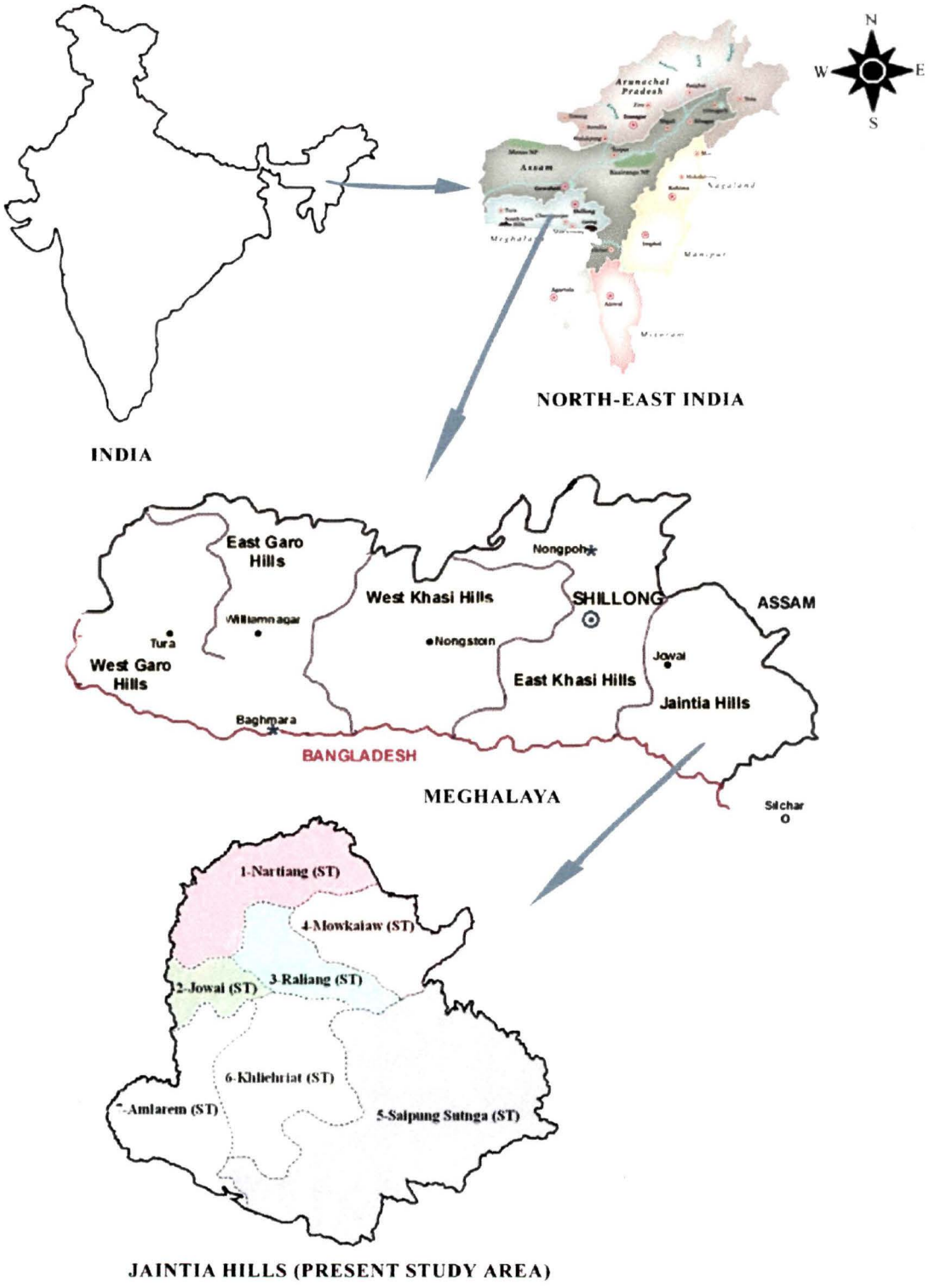
1. To study the overall demographic characteristics of the sample population.
2. To find out the status of infant and child mortality among the Pnars of Jowai town and Sanaro village.

3. To study the association of infant and child mortality with socio-economic background of mothers on one hand and access to health care facility on the other.

AREA OF STUDY

Meghalaya, the hilly state is one of the seven states of North-East Region of India. The state of Meghalaya was described as the 'Scotland of the East' by the first British colonial who gained entry into this enchanted land of lush green mountains and meandering rivers. It is located between 25° 02′ to 26° 06′ North latitudes and 89° 50′ to 92° 50′ East longitudes. It has seven administrative districts, these are: (1) Jaintia Hills, (2) Ri-Bhoi, (3) East Khasi Hills, (4) West Khasi Hills, (5) East Garo Hills, (6) West Garo Hills and (7) South Garo Hills Districts. The state is inhabited by 23, 06,069 persons (Census of India, 2001). Meghalaya literally called "abode of clouds". Meghalaya was created as an autonomous state within the state of Assam on 2nd April, 1970. The full-fledged state Meghalaya came into existence on 21st January, 1972.

Jaintia Hills District is one of the most beautiful districts of Meghalaya lying between 25° 05′ N to 25° 45′ N latitudes and 91° 58′ E to 92° 47′ E longitudes. It covers an area of about 3819 sq.km. As its name signifies, Jaintia Hills District is full of green hills and Crystals Rivers flow towards the north-east. One of the rivers named Iubha rises from the foot of Marangksih and Krosing Peaks which flows south-west and joins river Surma in Bangladesh. The river Kupli rose from the upland east of Passi, flows towards the north-east in Meghalaya via north-west in Kabri and finally joins the Brahmaputra. A major hydel project known as Kupli River Valley Project is in progress in the area. There



Map not to scale

is a hot water spring at Garampani which is a beautiful sight view for the tourists in the Jaintia and North Cachar Hills (Rana, 1989). This enchanting district is bounded on the North, East and South-East by Assam; on the South and South-West by Bangladesh and on the West by Khasi Hills. The District consists of four community Development blocks viz. Thadlaskien, Laskien, Amlarem and Khliehriat.

The total population of Jaintia Hills District according to the 2001 Census is 2, 95,692, of whom 1, 49,376 are males and 1, 46,316 are females. Out of this, the percentage of literacy is 52.79 (males = 50.13; females = 55.52). The density of population per square kilometer is 77 with sex ratio, 980. Jowai is the Headquarters of Jaintia Hills District. Present study was conducted among the Pnars of Jowai town and Sanaro village of Jaintia Hills District. Sanaro village is situated at a distance of 60 km toward the north from Jowai.

THE PEOPLE

There are five sub-groups of Khasi – namely, Khynriam, Pnar, War, Bhoi and Lyngngam. Khynriams live in the middle range of the Khasi Hills, while the Pnars occupy the Jaintia Hills lying on the eastern side. The Bhois inhabit the low hills towards north and northwest of the area. The Wars are met with the slopes and the deep valleys towards south. The Lyngngams are mostly concentrated in the south western part of the West Khasi Hills bordering Garo Hills.

The Jaintia Hills District of the state of Meghalaya is predominantly inhabited by the Jaintia people who belong to the Scheduled Tribe category. The name Jaintia is a generic term which includes the Pnar or Synteng and other subgroups, which form the

composite population of the district. The vast majority of population includes Scheduled tribe: 287049, Scheduled caste: 456 and remaining others (Census of India, 2001). The people inhabiting in the District are: Pnars, wars, Bhoi and Biates mainly.

ORIGIN

According to Historian, the Jaintias are the stock of Mon-Khmer people of Mongoloid race and are Austric by their linguistic affiliation. They resemble with the Mon-Khmer people in some basic characteristics of language, festivals and in erecting stone monoliths etc. Therefore, it could be said that the Jaintias may have come from the South-East Asian first to the splendid valleys of Assam and then the Meghalaya. The people who inhabit the Jaintia Hills District are known as 'Pnars' or 'Syntengs'. According to Dr. Suniti Kumar Chatterjee, the renouned historian, the word 'Jaintia' (*Zantain* or *Zonten*) was derived from the word 'Synteng'. B. Pakem being a Jaintia himself said that the word 'Synteng' is derived from 'Sutnga' (*Suteng*), the ruling dynasty of the Jaintias or from the word 'Sohkynting' (*Smynting or Synting*) a village through which the Khasis came to the Jaintia Hills. The term '*Teng*' means the ancient mother and therefore 'Syntengs' means the children of the ancestral mother. Jaintias seem to have an organization and the original Khasi word 'Synteng' (*Zeinten*) developed into Jaintia. G. Paul wrote in his book that the Jaintias were the original inhabitants of a State in the Chinese region called 'T' sin-tiang. This is an Austric word and the people of this State were called 'T' sin-tiang or 'T' sin-tien. In course of time they came to be known as 'Synteng' or 'syntein' (Devi, 2002).

PHYSICAL STRUCTURE

The Jaintias are strong and sturdy people. Their physical appearance is similar if not identical to the Khasis. However, due to environment and climatic conditions, the Jaintias are slightly different in complexion. The women are beautiful and fond of fashionable dresses. The Jaintias are not bulky because of climatic conditions and hard-working in the fields but they are enough strong. Quite interior parts of the Jaintias Hills, the men working in the fields, are not much bother of their health and care. Physical standard is normal. The women are of normal short height but hard working and beautiful of the average health (Rana, 1989).

The Pnars are rather short in stature, with a muscular body. The description of the physical features of the Khasis also describes the Pnars. In the whole of the plateau of Meghalaya it is seen that the people of higher altitude have lighter skin colour. The Pnars are found in higher altitude as well as lower altitudes, but the Pnars inhabiting the lower altitudes show lighter skin colour than other sections of the Khasis (Majumdar and Ray, 1984).

LANGUAGE

The Jaintia do not have a script of their own. They speak their own language and dialects. In the schools (primary and middle standard) the vernacular language used is Khasi as the Jaintia language has not so far developed enough to replace Khasi as a vernacular (Singh, 1994).

DRESS

The Khasi and Jaintia male dress is of the same kind. But a Jaintia woman can be distinguished from that of a Khasi woman because her dress is somewhat different. An earlier account of a Jaintia woman's dress stated she wears a cloth smoothed round the body, fastened above the breasts and dropping down to the ankles, while another cloth is thrown over the shoulders, and crossed in front. On festive occasions very handsome and expensive dresses are worn by both men and women. Women put on earrings and other ornaments of gold and silver. On such festive occasions the women wear a circlet of silver with spearhead ornament in front, rising four or five inches from the forehead (Singh, 1994).

FOOD HABITS

The staple food of the Jaintia is rice. They also consume good quantities of fish, both fresh and dry, and are very fond of meat of many kinds, specially pork, chicken and beef. Some of the Non-Christian Jaintia do not eat beef due to the influence of Hinduism. The Jaintia do not eat dogs or any other animal that they consider unclean. Originally the people did not like milk. Even today people in the interior villages do not relish milk. But nowadays, in general, cow's milk is being extensively consumed by the people because they have realized the food value of it. People, especially those in the War area, are very fond of betelnut and betel leaf. One can notice them constantly chewing something or the other throughout the day. What they chew is betelnut and betel leaf mixed with lime. This item has become a regular household presence which also forms part of their cultural

trait. If friends or relative come to visit their homes, at least betelnut and betel leaf will be readily available in the house to be offered to guests (Singh, 1994).

MARRIAGE

Marriage among the Jaintia is an elaborate system. The Jaintia marriage is a socially approved and arranged union. Moreover, the institution of marriage among the Jaintias is to be looked upon from two important aspects, social and religious. The Jaintia are generally endogamous within the tribe but exogamous as far as the clans are concerned. From the social side, marriage is regarded as a civil contract between the husband and wife. In the past, if incestuous marriages took place, which was taboo, the couples were exiled to a place called Puriang. This rule is strictly followed and incest is considered to be the greatest sin among the Jaintia. No person is also allowed to marry his father's sister's daughter as it amounts to a sort of an exchange (*Ya-Kyliang*), but may marry his maternal (not paternal) uncle's daughter. The best form of marriage is between persons who belong to different clans (*Kypasi-Pongrai*) and are of similar age groups or generations (*Ratap-rabiang*). As marriage is strictly exogamous, the Jaintia consider that there cannot be a greater sin than coition between members of the *Kur* or same clans. Other sins may be forgiven, but not this (Singh, 1994).

From the religious point of view, marriage is performed after certain rituals have been observed. When the boy and the girl indicate that they love each other, or when the parents themselves arrange a marriage, the two parties fix the time when the go-between, generally their uncles (*U Kni*) or a specially appointed person (*U Ksiang*) goes to the girl's parents. If the two sides agree, then they proceed to find out if there is any taboo

(*sang*) and if there is no *sang*, they later arrange for the engagement (*Yatsh Ktien*). On the day of engagement a ring made of brass is presented to the girl. The rich may provide a gold ring. After the engagement, the boy is not supposed to visit the girl at her residence until the marriage day. But nowadays this is hardly observed. In case there is a breach of engagement on either side, a taboo would be established between the two clans and in future no marriage would ever occur between them (*ibid*: 1994).

On the day, or shall we say the night, of the marriage, *U Kni* or *U Ksiang* of the bridegroom hands over the groom to *U Kni* or *U Ksiang* of the bride after reciting the marriage contract from both sides in the form of debates. In most cases the ring ceremony that follows is the symbol that the groom and the bride have been pronounced husband and wife. At times a man who is well versed in sacrificial lore mixes the gourd of the ricebeer from the two sides to signify the union of the two families. This is then followed by a feast for all friends and guests (*ibid*: 1994).

Generally after the boy and the girl are pronounced husband and wife, they are expected to live together. But this is not the case with the Jaintia traditional marriage customs. Traditionally among the Jaintia, after the marriage ceremonies and rituals are over, the husband visits his wife only after dark and does not stay there. Early in the morning he returns to his mother's house for eating and working purposes. It is only after some time; in most cases after the couples have children that the husband and his wife live together under the same roof. But when it concerns parties from distant places, the husband may stay in his wife's place. Even then, at the time of his death, his body will be

returned to his mother's house for death ceremonies. And if the wife promises not to remarry, then she may keep the bones of her husband after cremation (*ibid*: 1994).

DIVORCE

Divorce (*Ya Pyllait*), among the Jaintia may take place if it is due to adultery, barrenness, incompatibility of temperament, etc. But any divorce, to be effective, must have the consent of both the parties. After divorce, both sides may marry into other families. However, it seems to be quite inappropriate for the divorced parties to remarry each other. In any case, no divorce may take place during pregnancy. The rules relating to divorce require that *U Kni* or *U Ksiang* of the respective parties along with acquaintances and friends should witness the divorce ceremony. *U Tymmen Chnong* (a Village Elder) or *U Wasan* (Magistrate) then declares that the two parties have divorced each other, and that any other party is free to marry any one of the divorcees. To signify that the divorce proceedings are over, *U Tymmen Chnong* or *U Wasan* throws away the five cowries or pieces (*san-chyein*) collected from the two parties. Earlier, the symbolic act of divorce was the tearing away of betel leaf (*Khet-pathi*) into two pieces. After the divorce, the children belong to the mother (Singh, 1994).

Amongst the Jaintia, occasionally a widow is allowed to keep her husband's bones after his death, on the condition that she does not remarry; the idea being that as long as the bones remain in the widow's keeping, the spirit of her husband is still with her, in which case she cannot remarry. Otherwise as well, she is not free to marry within one year of her husband's death. Marriage within that period is not considered a clean

one and is looked upon as an act of fornication or *klim*. Certain rites have to be performed by the widow to clean herself (*ibid*: 1994).

There have been many changes noticeable in Jaintia society with regard to the institution of marriage. Factors like Christianity, education, exposure to the outside world amongst others have contributed to these changes. Even after conversion, the Christians are still observing the social aspects as well as the customary law of marriage. They do not alienate themselves from the traditional customs. The Jaintia practice of visiting husbands has changed tremendously, both among the Christians and non-Christians. Many of the husbands now live together with their wives and children under the same roof (*ibid*: 1994).

FAMILY

The smallest unit in the Jaintia social organization is the family (*Chi-yung*). A Jaintia family consists of the grandmother, mother, sisters, brothers, maternal uncles, aunts, nephews and nieces. Sometimes, the grandfathers or the father may reside in their wife's family respectively. Another opinion puts it that the 'Pnar domestic' group consists of the female head, her mother, married and unmarried male and female siblings (brothers and sisters), male and female offsprings of unmarried sisters; absent in this unit are spouses and (for obvious reasons) children of the married male matrikins. It will thus be apparent that membership to the Pnar domestic group is by birth and that there is no contingent relationship between marriage and the mode of residence of the matrikins (Singh, 1994).

The Jaintia family in the traditional system resembles that of the Hindu joint family with the role of the maternal uncle as the manager of the family affairs instead of

the father. His role extends to both social as well as religious matter. Nowadays, the Jaintia family is invariably a nuclear family (*ibid*: 1994).

In the house, mother is the originator of the family and as well as organizer in all respects. Mother is responsible to look after her children minor, major, married and unmarried (Rana, 1989).

INHERITANCE

The rule of inheritance of property is purely matrilineal in organization. Property is of two kinds- inalienable and alienable. The first is called *Yongrim or Nongtymmen* or ancestral and the latter is *Yutran or Nongkhynraw*, that is, personal. Inheritance is customarilyon the female side with some exceptions among a few subgroups. Inheritance of the ancestral land and houses passes from the mother to the youngest daughter (*Ka Khadduh or Ka Khynruit or Ka Yangyung*). The youngest daughter dies; the property is inherited by the second youngest. If no successor is available from the family (*Ka Yung or Ka Kur or Ka Kpoh*), then the family has to look up for the nearest branch starting again from the youngest daughter of the next family. If there is no daughter in the family, then the youngest son succeeds. The youngest daughter although inherits the ancestral property is not free to deal with it as she pleases. Each and every move that she makes should be with the knowledge and consent of her brothers or the mother. She is merely the custodian of the property while real control over them is vested in the hands of her maternal matrikin. Ancestral property cannot be alienated without the consent of all the possible heirs of the whole family. As far as the self-acquired property (*Yutran*) is concerned, it can be disposed off according to the will of the beholders. Self-acquired

property is considered to be the private monopoly of the owner and he can give it to anyone he likes or wills (*Pynkam*) (Singh, 1994).

DISPOSAL OF THE DEAD

Among the Jaintias, all belong to mother in life and after death. To die in the house of one's wife, is a taboo. So, whenever, man who, lives with his wife separately with his mother's permission, and has no hope for survival, is to be brought to his mother's house. In case, he dies in his wife's house, the dead body is brought to his mother's house and all the rites are performed in his mother's house only. The wife, at such time put betelnut in her husband's mouth as a last rite. Somewhere, in war area, wine and rice are sprinkled over the dead body before taken out of the house. The dead body of the Jaintias is preserved for three days before final disposal in order to perform the last homage by any relation residing in a distant place. As soon as dead body is taken out, the relatives break egg, one each and swallow up the yolk. It is believed that the egg gives all strength to the living relatives and cock is considered as a divine bird to the Jaintias who guides the departed soul, so its egg gives vitality and strength (Rana, 1989).

After a man dies, the dead body is washed, made to wear dhoti and turban. In general, dhoti and turban are made to wear clock-wise but the dead body is made to wear anti-clockwise. In some places, sword and shield are made hold by the dead body. For three days, all the family members observe in laying state. It is must. The important item that is betel-nut with betel leaves is given a last touch to the mouth of dead body. For three days prayers are made to God for the peacefulness of the departed soul and these days are considered as the days of mourning. Among the certain sections/clans of the

Jaintias, the cremation customs are different. The dead body duly covered with white cloth after three days, is carried by the relatives to the cremation ground accompanied by fire. The fire is only taken from the mother's house. Fire is first lit up to the pyre by the eldest male member of the mother's family. The position of the corpse is such that the head should point to the west and the legs to the east. It is done customarily in the Jaintia groups. Handling of the dead body before taking it to the cremation ground, differ from clans to clans (*ibid*: 1989).

When cremation is over the bones are collected. Bones are collected by the relatives including a lady preferably mother or any female from the clans. They observe customary belief that they do not turn their faces backwards, do not talk to each other; they do collect bones only three times. The female hold the bones in the white cloth and offer food to the departed soul once again. Then the bones are carried to the family repositories because the Jaintias believe in the theory of life, after death and reincarnation. In case of accidental death, the body is burnt only in the place of death and bones are taken to the native place in the next day and bones are re-burnt with all the customs and rites. Since accidental death is considered due to sin, the cremation ground and repositories for bones are kept separately in the respective native places. In case of death due to epidemic, the dead body is first buried for a month or so and digs out again after the epidemic has sub-sided and burnt with all customary honours. It is said that after sometime when it is convenient and feasible to all concerned, the bones of all the dead are collected and transferred to the first repository of the clans after observing certain customary rules. The female offer food and dishes every year on a particular day of the

year to the dead ancestors. In certain case in some villages particularly Nartiang the customs and traditions are similar if not identical as in Aryan Hindu families (*ibid*: 1989).

Death ceremonies are also elaborate. There are rituals which are performed immediately after death, before the funeral, and even after that. Cock, bull, and fowls are sacrificed; other items that are used during the funeral are meat, egg, *riew hadem* (Indian corn), basket, bamboo bier (*ka krong*), flute, baked loaves etc. When the person dies, the body is bathed in warm water taken from three earthen pots and is lay on a mat, where it is dressed in white cloth. The body is not kept in the house for an even number of nights. It is usually kept for three nights (Singh, 1994).

ECONOMY

The Jaintia Hills has rich mineral resources. However, the using up has been very slow. In many cases, it has just started. Coal mining has become important. There are vast reserves of coal which is found both in cretaceous and nummulitic formations. The 1961 Census reports that in Jaintia Hills the largest deposits of nummulitic coal are found at Lakadong, Narpuh and cretaceous coal is found at Wapung. Land and forests are other economic sources of the people. Land in Jaintia Hills has been generally classified into five categories. These are:

a). *Raj Lands* or Government Lands- which used to be the property of the Jaintia Kings but later became Government Lands under the British administration.

b). Service Lands or *Rek*- these lands were given rent-free to the Dolois and their officials.

c). *Puja* Lands- these lands were set apart in each village for the purpose of worship.

d). Private Lands or *Buniat*- these lands are held by individuals. They may be transferred, mortgaged, sold or otherwise, at the will of the owner.

e). Private Lands as found in the War area- these lands are held as private properties mainly for the purpose of cultivation of horticultural and cash crops (Singh, 1994).

OCCUPATION

In the rural areas of Jaintia Hills, the primary occupation of the people is still agriculture. The common mode of subsistence is cultivation by simple implements. Both wet and slash-and-burn cultivation are popular. Some people manufacture furniture and other wooden articles of daily use. The people have not changed their traditional occupation. They mainly produce – paddy, potato, orange, ginger, turmeric, arecanut betelleaf, etc. Those people possessing no land property are working as day labourers. But with the rapid growth of education and owing to building of roads, even the rural folks have started migrating to the urban centres and district headquarters like Jowai and Shillong and even beyond that. Many rural people who have migrated to these urban centres have taken up white collar jobs or have got themselves engaged in petty business (Singh, 1994). People are engaged in business and services. There are also quite a few civil servants, engineers, medical practioners and lawyers, especially in the urban areas.

The main occupation of the Jaintia people is agriculture. However, the people practice other vocations too especially trade and commerce. This occupation was and is still very popular among the Jaintia. It is actually this occupation that helped the Jaintia

people undertake business outside their own area which in a sense was responsible for their earlier contact and linkages with the other neighbouring communities other than their own. As stated earlier, the Jaintia people had a long history of relations with the plains people of Nowgong and North Cachar Hills in the north and northeast of the Jaintia kingdom respectively and the people of Sylhet district in the south. Through trade and commerce, Jaintia people met and exchanged not only the commercial crops produced by them, but also ideas which in other sense enlarged their world view (Singh, 1994). The main articles of trade are oranges, potatoes, coal, lime, timber, etc., are sold to the plain areas in Assam and also sold across the international borders of Bangladesh.

RELIGION

At present there are three main religious sections in the Pnars. These are: (1) Ka Niamtre - believer of Pnars traditional religion, (2) The Christian Pnars - believer of Christianity and (3) The Hindu Pnars - believer of Hinduism. Of these religious groups, Ka Niamtre (Pnars religion) and the Christian Pnars are the most predominant sections in the Pnars. The Christian Pnars are divided into different sects like the Presbyterian, Roman Catholic, Seventh Day Adventist, Church of God and Fellowship are some of the denominations found among the Pnars Christians. There are also some Uniterians among the Pnars.

But there are also people of Pnar who are still following the traditional religion which may be described as animism or spirit-worship, or rather, the propitiation of spirits both good and evil on certain occasions, principally in times of trouble. The propitiation of these spirits is carried out either by priests, or by old men well versed in the art of

necromancy. The spirits worshipped by the Pnars are numerous. The following are some of the principal spirits worshipped by the Pnars: *U'lei Muluk, U'lei Umtong, U'lei Longspah, U'Ryngkew or U Basa Shnong, Uphan Kyrpad,* etc. The nature of these deities are described as follows-

a). *U'lei Muluk*: the god of the state, who is propitiated yearly by the sacrifice of a goat and a cock.

b). *U'lei Umtong*: the god of water, used for drinking and cooking purposes. This god is similarly propitiated once a year so that the water supply may remain pure.

c). *U'lei Longspah*: the god of wealth. This god is propitiated with a view to obtaining increased property.

d). *U'Ryngkew or U Basa Shnong*: the tutelary deity of the village. This god is propitiated by sacrifices whenever they are thought to be necessary.

e). *Uphan Kyrpad*: *U Phan U Kyrpad* is a similar godling to the above.

As regards their worship of natural forces and deities, the Pnars worship the Kopili River, which used to be accompanied by human sacrifices by the Jaintia Kings. The Myntang River, a tributary of the Kopili, must also be annually appeased by the sacrifice of a he goat. Numerous hills are also worshipped, or rather the spirits which inhabit them.

In matters of traditional religious belief, the Khasi and Jaintia cannot be strictly treated separately because the traditional religion of both happens to be one and the same. However, although the religion is one, the religious rites and rituals, religious ceremonies and observances differ from place to place, or clan to clan. The Jaintias believe that their

religion is God given, not one founded by man. They say that God gave them their religion when He sent their first forebears, *Ki Ynniaw Wasa* (the seven inns) from heaven to live on earth. The three commandments in the Khasi-Jaintia religion are:

a). *Kamai ia ka Hok*, which literally means, earn righteousness.

b). *Tipbru Tipblai,* which literally means, Know-man, Know-God, or man-conscious, God-conscious.

c). Tipkur-Tipkha, which means to know maternal relations and paternal relations.

The Jaintia believe that God is omnipotent, omnipresent and omniscient. They have no temples, churches or synagogues. They are also monotheistic. But they call God by various names according to the need of moment, as God has all the attributes of goodness and all the power to do good (Singh, 1994).

PRECEPTS

Precepts of the Jaintia religion are as under:

a). Respects the parents,

b). Love to all,

c). Earn righteousness,

d). Service to human being is a service to God,

e). Do not steal,

f). Worship God and ancestors.

Earn righteousness stands for right living and right thinking which leads to the way of happiness and prosperity of life. Respects to the parents are a demand among the Jaintia society. Love to all is love to god is a later slogan. Love to all creation is based on the doctrine of equality of all. They firmly believe in the message of love to all which bind and nourish the society.

SOME TABOOS

a). To encroach land of the neighbourers,

b). To construct houses on triangular plot,

c). To cut tree from a sacred forests,

d). To urinate in a stream or on fire,

e). To touch broom while sweeping entrance of the house door,

f). To keep broom's stick at the entrance of the house door,

g). To sleep pointing the feet toward east,

h). Spitting on the fire,

i). To offer anything with left hand,

j). To step over any one's body.

TABOOS FOR PREGNANT WOMEN

a). To accompany a funeral procession,

b). A pregnant women should not finish a sowing which she may have started prior to her pregnancy,

c). The husband of the pregnant women is not allowed to thatch the ridge of the house or a fix handle to an axe or a 'dao' (Rana, 1989).

ART AND CULTURE

The Jaintia are very rich in their art and culture. In case of carving engraving etc., the people have their own indigenous way of maintaining their artistic pursuits. Weaving may be considered an important cottage industry among the Jaintia but it has received a serious setback since the British entered the country. The traditional dress being abandoned, the people largely started to adopt textile goods, whereas the men have totally adopted the western dress. As such the traditional costumes are worn only during dances and festivals. But in spite of this change over, weaving has not entirely died out; it has got its hold in the Jaintia Hills and the northern Bhoi (Khasi Hills) where weavers still weave in their looms but even this has become less. Many Jaintia villages in the north and in the uplands, such as Um Mynso, Bhoi Lalu, Bhoi Khyrwang, Bhoi Ksi (some villages are now in Karbi Anglong) as well as Sumer, Shangpung and Mynso, still continue to produce specimens of *khor* (male head dress), *saru and khyrwang* (skirts and shawls), *sala* (cotton), *ryndia* (errandi/endi) and other minor loom crafts. Besides weaving, dyeing also exists. Numerous plants, roots, tubers and leaves are being used for this purpose. In some part of Jaintia Hills, cotton grows wild and is collected for domestic use (Singh, 1994).

In Khyrwang and Nongtung villages (now in Karbi Anglong) the people produced a special pattern of red and white or mauve and white stripped cotton and silk cloth. Similar cloths were woven at Mynso village, while Sutnga village used to weave red and blue sleeveless *cut* (*ka yingki*). The Biate villages used to produce coarse cotton cloth (*ka that subrap*) and much earlier in the War villages as in the Khyrwang and Nongtung

villages used to weave red and yellow small squared cloths (*kja ryndia stem or dia tngia*). Various kinds of cloths like a shawl made of *endi* (*ka ryndia tlem*), black and white big squared cloth (*ka thoh saru*) and others are manufactures in Jaintia Hills (*ibid*: 1994).

The pottery industry of Larnai village is quite unique in that, earthen pot (*kehu larnai*) had been manufactured without the potter's wheel as among the Konyak Nagas. *Laha* or *lac* (dark red resin dye) industry was also an important industry of the northern Jaintia Hills (*ibid*: 1994).

Craftwork of cane, bamboo and wood in multifarious designs are being made by the Jaintia. Wood and bamboo are used for house construction. With wood, rough pestles, mortars especially for pounding rice, handles for long and big knife or *daos*, or *wait*, *wakhu* or *koodalis* (hoes) etc., are made. Cane and bamboo works include the building of canoes, long and big baskets called (*khoh-tkot*) or *panniers* (polo) trays, mats baskets of different sizes and shapes, sunshades and rainshades, containers, fence and other articles (*ibid*: 1994).

ARCHITECTURE

There are many important specimens of architecture which include of palacial (or royal) and public buildings as well as megaliths, bridges and fortifications. Extensive ruins of old stone fortifications are observed at places like Mookyndur, Iawdaia, Borkhat, Jaintiapur and Nartiang. The one that are in Nartiang have stone blocks forming pillars and wall portions which are similar to those found at Borkhat. The gate-like portions of Nartiang palace still remain. At the outskirts of the Nartiang palace, remnants of old canon and artillery are seen; according to local informations there were numerous

carvings (floral, animal and human) on its walls which however are not visible now. Besides the majestic monoliths found in many places of the Jaintia Hills there are also a number of stone bridges, like that which may still be found at Thlu-Umwi and Umiakniah. Then there are the carvings at Rupasor, Khimmusniang, and Sutnga, footprints at U Sajar Nangli, lakes at Thadlakein, Nartiang and Sutnga, palace at Mar Kusain at Borkhat, and underwater carving of two stone-pestles near Dawki bridge (Singh, 1994).

MIRTH AND MUSIC

Music and dance are the main sources of welfare of these people. In these hills, the people are simple, laborious, God fearing, hospitable and equally music loving. Behdeinkhlam and Loho dances are very important and famous among the Jaintias. Men of all ages, dressed in their fine, participate in such dances which are performed to the beats of drums and tunes of flutes. Some people from this region are found an excellent on their folk songs and music of which echo the sweet and natural sound of the deep and long valleys. They have full devotion and spirit in order to maintain their old traditional dances and enchanted musics. Their music instruments and drums are generally similar of that the Khasis in the Khasi Hills (Rana, 1989).

The Jaintia music and dance is very rich in many respect. Their music and dances are accompanied by different musical instruments. Popular among these are the *bhuri* (a clarionet-like flute), *bom* (big drum). These instruments are used mainly for community dances. The music produced is very exciting and vigorously rhythmic. Then there is *ka*

chawiang, a home-made bamboo flute, which is used in expressing the intricate Jaintia melody (Singh, 1994).

FESTIVAL AND DANCES

The festivals of the Jaintias are mainly concerning homage to ancestors, adoration to gods or goddesses and an offering to hostile spirits as a retribution for any wrong done against them. The festivals are mostly followed by dances and merry-making, feasts and wine drinks. Every festival has its significance in order to keep the life peaceful and prosperous. Birth of a child is always a happy occasion for every Jaintias. To ensure safe and sound delivery and healthy life for mother and baby and in order to guard off an evil influences, all conceivable precautions and sacrifices of animal or birds especially white pigeon are observed from time to time. On birth of the baby all relatives are invited in the house and dry-fishes are baked and served among the relatives and neighbours. Naming ceremony of the baby is linked with auguries. Auguries are to be consulted about possible names. Ladies pray to God (Syeim Waboo), for the blessing to the new born child. Joys and feasts among the relatives take place. After one month the ears of the baby, male or female, are bored for wearing ear-rings of the grand-mother. The grand-mother's ear rings are called *'Ki Cha-Shkor Lawbei'* (Rana, 1989).

'Beh-dieng-khlam' festival which, now-a-days has a great significance than the olden days, is one of the most popular festivals among the Jaintias. It literally means in Jaintias to drive away evil spirits by wooden sticks. It is observed annually in the months of July or August when the climate is mostly moisture, crops are likely to be destroyed by the insects and when the people in this part suffer from infectious diseases. This period

for the Jaintias is taken as a crucial period from the point of view of agriculture and human health (*ibid*: 1989).

'Beh-dieng-khlam' is a major festival celebrated in Jaintia Hills during rainy season normally in July or August every year. The festival through its rituals drives away the devil which causes destruction to crops, properties or miseries of people (Dey, 2002). It is a very popular and colourful festival where men, young and old take part in the dancing to the tune of drums and flute.

There are other many festivals celebrated from time to time among the Jaintia societies. These are like Durga Puja, where the villages have come under the Hindu influence, worship of Gods and goddesses of nature and other worships to the ancestors, driving away the evils, the contiguous diseases, protection of life from the evil spirits, ushering in good luck and prosperous life (*ibid*: 1989).

FLORA AND FAUNA

The Jaintia Hills District has a natural wealth of both flora and fauna. The fauna available are cows, buffaloes, pigs, dogs, cats, monkeys, oxen, goats and poultry. Livestock is of considerable importance not only for their meat and hide, bones, hair and hooves but also for various economic commodities and agricultural works but also for socio-religious in the early days. Birds of several types like sparrows, crows, etc. Rivers and streams yield large quantities of crabs, frogs, snail, water insect, are also in abundance. Bees, butterflies, mice, rats are also found. Fruits and vegetables like pine apple, jackfruit, banana, sweet potato, mustard, sugarcane are also found out. The most important crop grown in the village is paddy usually swamp paddy.

The flora includes a variety of ferns, mushrooms and large number of orchids. Similarly, fauna include many birds and animals. The fascinating carnivorous plants called pitcher plant (Nepenthes Khasiana) are found at Jarain in Jaintia Hills (Dey, 2002). Pitcher plants, the insect eating plants of botanical wonder is found plenty in Jaintia Hills. It was said that this pitcher plant serves as a medical herb where the liquid found inside this pitcher has highly medicinal effect against pancreas ailness.

SOIL AND CLIMATE

The soil in the northern most strip of the district and in the river valley is alluvial and semi alluvial in nature. This soil is very deep. The northern strip, below that is composed of deep loamy soil. The central plateau is made up of Red soil and support good coniferous forest. On the other hand, the slope in the Southern aspect is composed of shallow sandy loam (Suchiang, 2002).

The Jaintia Hills, because of higher elevation, experiences a moderate climate. On an average, the plateau experiences a temperature of 24 degree centigrade throughout the year. The night temperature often goes below 1-5 degree centigrade in winter but maintain a mean average temperature of 3-5 to 4-5 in December and January. Winter is also characterized by heavy frost. The Jaintia Hills receive an average of 7700 mm of rainfall. The rest of the year is dry and receives an average of 60 mm rainfall in December and January (Gopalakrishnan, 2001).

CHAPTER II

REVIEW OF LITERATURE

In this chapter we shall include the review of related literature along with justifications for carrying out the present study.

Though study on the bio-social determinants of infant and child mortality is not very old, yet, several studies on it have been published by many scholars in India and outside India. Montague (1962) has viewed that girls adjust better to their post-natal environment than boys. According to the statistics given by UNICEF in 1973, out of 114 infants per thousand live births die under one year of age in rural areas of India against 78 in urban areas in a year. Three out of four among the babies under one month die due to the causes arising either before or during birth; the most common causes are prematurity, congenital debility, injury at birth, malformation, diarrhoea, influenza, pneumonia, oxygen deficiency, etc. Four diseases namely neonatal tetanus, pertussis, measles and acute lower respiratory tract infections cause one third of child deaths under 5 years of age in the developing world, (Chen *et al,* 1980). The World Health Organisation estimates that 1.5 million children die annually of measles and its complications and those are pneumonia, diarrhoea, under nutrition and systematic infection (Assad, 1983). Majumder (1991) studied breast feeding, birth interval and child mortality in Bangladesh. He found that preceding birth interval, subsequent pregnancy and breast-feeding duration each have an independent influence on early mortality risk. Within a specific interval, the risk of dying decreases with increase in duration of breast-feeding and also with an increase in the time between the index birth and the next pregnancy. The dramatic rise in infant mortality that occurred in the Soviet Union between 1970 and 1990 was accounted for in large part by an increase in death rates from causes which predominate after the

first month of life, most notably respiratory, infectious, and diarrhoeal diseases (Velkoff and Miller, 1995).

In the developing world, there is now clear evidence of differences in child survival rates associated with the education of mothers. A major theory at the linkage between increased maternal education and reduced child mortality is that education gives women the power and confidence to take decisions into their own hands (Caldwell, 1979).

O'Toole and Wright (1991) examined the relationship between parental education and child mortality in Burundi, Central Africa, and found that maternal and paternal educations have independent, negative effects on child mortality. Their study reaffirmed the importance of maternal education in reducing the risk of child mortality. However, the household income and father's occupation is also as important as the education is. Pant (1991) carried out a study on the effect of education and household characteristics on infant and child mortality in urban Nepal. His study showed that the effect of education without resources might not be important as a factor of lowering infant and child mortality. Both the education and the resources could be complementary to each other, and access to both of these may improve child survival in Nepal. Forste (1994) examined in details the effects of breast- feeding practices and birth spacing on infant and child survival in Bolivia. She found that birth spacing, lactation, antenatal care and mother's education improved chances of the survival of infant and child. Kabir *et al* (1995) reported that the decline in infant mortality in Bangladesh is attributed to the introduction of improved public health measures and access to maternal and child health

care services. Another study in Bangladesh reveals that lower infant mortality rates are found in the urban compared to the rural areas, which attributed to the greater availability of health care services, higher income and educational levels in urban areas. They also observed that the risk of dying decreases with increasing breast feed in the early childhood period (Chaudhury Biswas *et al,* 2000).

Iram and Butt (2008) studied socioeconomic determinants of child mortality in Pakistan. This study identifies that mother feeding protects children from early exposure to diseases and ill-health in different ways. It also appeared that mother's education is strongly related to neonatal mortality, infant mortality as well as child mortality not only through the improved child caring practices but also through other proximate determinants such as prenatal care, income and environmental contamination.

Kembo and Ginneken (2009) studied determinants of infant and child mortality in Zimbabwe. The objective of the paper is to determine the impact of maternal, socioeconomic and sanitation variables on infant and child mortality. Results show that births order 6+ with a short preceding interval had the highest risk of infant mortality. The infant mortality risk associated with multiple births was higher relative to singleton births.

Gaisie (1975) studied levels and patterns of infant and child mortality in Ghana. This paper attempts to measure infant and child mortality levels and also to determine their structure by utilizing the results of the 1968-1969 National Demographic Sample Survey which was conducted under the directorship of the author. Among the major problems encountered in the exercise are the adjustment of the current raw mortality data

and the estimation of infant and child mortality from independent source material. The estimated infant mortality rates range from 56 per 1,000 live births in the Accra Capital District to 192 in the Upper Region during the late 1960's. The urban rate is lower than the rural rate, 98 as against 161 per 1,000 live births. A large proportion of the deaths among children aged 0-4 occur in the second year of life, and deaths in this age group account for the bulk of the deaths within the age group 1-4 years.

Mondal *et al* (2009) studied and observed the influencing factors on infant and child mortality of suburban and rural areas of Rajshahi District, Bangladesh. Primary data have been used to examine the differential patterns of infant and child mortality. A multivariate technique is employed to investigate the effects of those variables both socioeconomic and demographic on infant and child mortality. The study results reveal that several socioeconomic, demographic and health related variables affect on infant and child mortality. Multivariate analysis results indicate that the most significant predictors of neonatal, post-neonatal, and child mortality levels are immunization, ever breastfeeding, mother's age at birth and birth interval. Again, the risk of child mortality is 78.20% lower among the immunized child than never immunized child and also the risk of neonatal mortality is 57.70% lower after a birth interval of 36 months and above than under 18 months. Parents' education, toilet facilities and treatment places are significant predictors during neonatal and childhood period but father's occupation is significant at post-neonatal periods. For instance, risk of neonatal mortality is 31.40% lower among the women having primary education and 52.30% lower among the women having secondary and higher education than those having no education. It is observed that the risk of child

mortality 32.00% lower among the household having hygienic toilet facility than those who have not such facilities. Similarly, risk of child mortality decreased with increased female education and wider access to safe treatment places. So, attention should be given to female education and expansion of public health system for reducing the risk of infant and child mortality.

Houweling *et al* (2007) studied social determinants of childhood mortality in Sri Lanka time trends & comparisons across South Asia. Sri Lanka has been able to achieve low childhood mortality levels at low cost. However, this achievement may have been at the expense of increasing mortality inequalities between socio-economic groups. This study addresses the question whether socio-economic mortality inequalities rise as overall mortality falls by describing socio-economic inequalities in under 5 mortality in Sri Lanka and comparing the magnitude of these inequalities over time and with other South Asian countries. Further, the role of female autonomy, fertility, malnutrition, and health care use in explaining the observed patterns in mortality inequality were also examined.

Uddin *et al* (2000) studied child mortality in a developing country. This study uses data from the "Bangladesh Demographic and Health Survey (BDHS) 1999-2000" to investigate the predictors of child (age 1-4 years] mortality in a developing country like Bangladesh. The cross-tabulation and multiple logistic regression techniques have been used to estimate the predictors of child mortality. The cross-tabulation analysis shows that parents' education is the vital factor associated with child mortality risk but in logistic regression analysis only the father's education has been found significant to reducing child mortality. Occupation of father has been found a significant characteristic

in both analyzes, further mother standard of living index, breastfeeding status, birth order has substantial impact on child mortality in Bangladesh. The findings also show that in both statistical analyzes maternal health care variables such as timing of first antenatal check and tetanus toxoid (TT) during pregnancy has momentous effect on child mortality. Finally these findings specified that an increase in parents' education, improve health care services which should in turn raise child survival and should decrease child mortality in Bangladesh.

Mortality and population data were derived from Statistics Netherlands for 16 towns and 11 rural areas. Mortality levels and their decline were estimated with a Poisson regression model. The associations of the estimated levels and declines, and determinants of infant and early childhood mortality were analysed using multivariate linear regression analysis. The causes of death studied were major contributors to infant mortality (convulsions, acute digestive disease, acute respiratory disease) and early childhood mortality (encephalitis/meningitis, acute respiratory disease, measles) Bosch *et al* (2000).

Wang (2002) studied determinants of child mortality in LDCs (Low Development Countries). Using Demographic and Health Survey (DHS) data, this study investigates determinants of child mortality in low-income countries both at the national level, and for rural and urban areas separately. DHS data from over 60 low-income countries between 1990 and 1999 reveal two interesting observations. First, is the observed negative association between the level and inequality in child mortality. Second, is the significant gap in child mortality between urban and rural areas, with rural population having a much slower reduction in mortality compared with their urban counterpart. The empirical

findings in this study both consolidate results from earlier studies and add new evidence. They find that, at the national level, access to electricity, vaccination in the first year of life and public health expenditure can significantly reduce child mortality. There exists a significant and robust electricity effect on mortality and the electricity effect is shown to be independent of incomes. In urban areas, only access to electricity has a significant health impact while in rural areas, increasing vaccination coverage is important for mortality reduction.

Vella *et al* (1992) studied determinants of child mortality in south-west Uganda. Anthropometric and socio-demographic variables were taken from 4320 children in a baseline survey carried out in March-April 1988 in the district of Mbarara, south-west Uganda. After 12 months, a follow-up survey assessed the mortality of the children during the preceding year. Lack of ownership of cattle, recent arrival in the village, using candles for lighting, being of birth order higher than 5 and having a father with less than 8 years of schooling were significantly associated with child mortality. The addition of mid-upper arm circumference significantly improved the logistic model of socioeconomic variables and mortality and did not diminish the predictive power of socioeconomic variables in relation to increased mortality. This suggests that nutritional status and specific socioeconomic factors are both, independently, important predictors of child mortality.

Between April 1988 and April 1989, researchers followed 4320, 0-59 month old children from 31 villages in Mbarara district in southwest Uganda to examine socioeconomic risk factors for child mortality. They used anthropometric data and

socioeconomic data collected during interviews. The major causes of death included diarrhoea (23%), acute respiratory infections (20%), measles (14%), and malaria (13%). Fathers who had received 7 years education were more likely to have experienced the death of a child than those with more education, but mother's education did not significantly affect child mortality. The following poverty indicators were also significantly associated with child mortality: candles used for lighting, family did not own a cow, and lived in the village for 4 years. Further children of birth order 5 were more likely to die than those at birth order of ≤ 5. In fact, the children with the greatest child survival were those of birth order 3-5 (ibid: 1992).

Franz and FitzRoy (2006) studied child mortality and fertility in 61 developing countries including the Central Asian Republics (CARs). To control for simultaneity, an estimated value of fertility was used in the mortality equation and a final specification included only exogenous socio-economic, health and environmental variables. They confirm the importance of female literacy in explaining both fertility and mortality, and also find a measure of consumption for the poorest share of the population to be significant, while controlling for nutrition, health expenditure, and income distribution. Incidence of tuberculosis and female agricultural population proxy for environmental impacts, but in spite of these controls, approximately 41% additional mortality was estimated due to living in the CARs. The results fill gaps in the literature: they use a wider range of socio-economic and environmental health variables than previously in an encompassing analysis of mortality and fertility, and find evidence of excessive mortality in the CARs most likely linked to environmental degradation in the region.

Edvinsson *et al* (2005) studied an analysis of infant mortality (based on 133,448 births) in two regions, Sundsvall and Skellefted, in north- eastern Sweden during the nineteenth century shows that infant mortality was highly clustered with a relatively small number of families accounting for a large proportion of all infant deaths. Using logistic regression, two important factors were found to be associated with high-risk families: (i) a biological component evidenced by an over-representation of women who had experienced stillbirths, and (ii) a social component indicated by an increased risk among women who had remarried. The results strengthen the argument for using the family rather than the single child as the unit of analysis. The clustering of infant deaths points to the need to re-evaluate our interpretations of the causes of infant mortality in the past.

Castle (1994) studied the (Re) negotiation of illness diagnoses and responsibility for child death in rural Mali. Kin and community power relationships in rural Mali shape the process of diagnosing a child with a fatal illness. This analysis draws on participant observation and interviews with 298 women in four Fulani and Humbebe communities in the Mopti region. Two folk illnesses regarded as supernaturally caused, foondu ("the bird") and heendu ("the wind") were important final diagnoses of the cause of death. The illnesses are regarded as fatal but tend to be diagnosed only after a child has died; thus they are not associated with resignation on the part of kin. The diagnoses tend to exonerate the child's caretakers, and because they are conferred by senior women in a patrilineage, they also reinforce hierarchical power relationships among women. The

diagnoses also encourage social support from affines for the woman whose child has died.

Materia *et al* (1993) studied a community survey on maternal and child health services utilization in rural Ethiopia. A household health interview survey on MCH services utilization was carried out in 22 villages of a rural district of Arsi region, Ethiopia, before the launching of an integrated MCH programme. Coverage of antenatal services was 26%, and 61% of the women who received antenatal care reported having had 3 or more visits. Antenatal care was positively associated with living within 10 km of the Health Centre. Twenty eight percent of the mothers attended the under-5 clinic and most returned for 3 or more visits. In addition, 99% reported having breast-fed their last child but more than 25% started weaning only after the seventh month of age. Differences in practice of treating diarrhea according to knowledge of ORS were found. Of the 33% of those with knowledge of ORS, almost 90% reported use of ORS for treating child's diarrhoea, showing a positive attitude towards modem health care. The proportion of women using family planning was 5%, with no difference found between Christians and Muslims. Results on EPI coverage validated data from routine reporting. Integration of MCH services including out-reach activities may increase access and coverage of MCH services.

Working Group on Women and Child Health (2002) studied improving child health the role of research. Child mortality (before age 5 years) has shown a relative decrease of 15% since 1990 but remains above 100 per 1000 live births in more than 40 countries. The risk of death can be reduced through evidence based interventions such as

immunization and oral rehydration treatment Research has helped to quantify child health problems, identified strategies to improve health, and shown the effectiveness of interventions. In preparation for the forthcoming United Nations special session on children, they review the major advances in child health in developing countries since 1990 and illustrate the role of research in this progress.

Kintner (1988) studied the impact of breastfeeding patterns on regional differences in infant mortality in Germany, 1910. This paper examines the impact of breastfeeding practices on the large regional differences in infant mortality in Germany around 1910. Breastfeeding is strongly negatively associated with infant mortality and remains so after controlling for public health measures and for demographic, economic, and social factors that also affect infant mortality. But it contributes much less to regional differences in infant mortality than do access to medical care, percentage legitimate and marital fertility. Breastfeeding is less important than these factors because it affects fewer causes of death and has a smaller impact on cause-specific infant mortality rates.

Anderson *et al* (2002) studied environment, access to health care, and other factors affecting infant and child survival among the African and Coloured populations of South Africa, 1989-94. Some maintain that environmental factors are unimportant for infant and child survival once mother's education and other characteristics have been taken into account. However, an analysis of survival of African and Coloured children based on the 1994 October Household Survey supports the importance of environmental factors in relatively high mortality populations. Among African households, the source of domestic water is important, but for Coloured households, almost all of which have safe

water, the type of sanitation is important. If safe drinking water is available, the type of sanitation influences survival; if safe drinking water is not available, sanitation seems to matter little.

Patel (1980) studied effects of the health service and environmental factors on infant mortality the case of Sri Lanka. One of the findings of this study is that regional variations in the infant mortality rates of Sri Lanka are large, ranging from 26 per 1000 live births in Jaffna to 91 per 1000 in Nuwara Eliya, a tea estate district. These differences are more strongly associated with regional variations in environmental determinants of mortality than with regional variations in public health expenditure. The most significant environmental factor associated with interregional infant mortality rates was found to tie the nature of the water supply. Regional government expenditure on health had only a weak association with infant mortality rates.

The major factors considered by demographers to have had a significant environmental effect on infant mortality are access to food, medical care, sanitation, and housing. In this study the association between, the last two and the infant mortality rates of different regions of Sri Lanka is quantitatively examined. The relationship between the primarily curative medical care services and the infant mortality rates is also examined. It is suggested that particular environmental improvements might significantly increase the impact of the medical care services of Sri Lanka on the health of the population and particularly on the infant mortality rates (ibid: 1980).

Schellekens (2001) studied economic change and infant mortality in England, 1580-1837. Neonatal and post-neonatal mortality have different cause of death distributions. Changes in neonatal mortality are usually considered to be independent of the pathological, socioeconomic, and cultural conditions into which a child is born. However, recent research suggests that these conditions may influence late fetal and neonatal mortality indirectly through the health and nutritional status of mothers. Prematurity is the main cause of death during the first month of life. Mothers whose health was impaired and who suffered malnutrition during pregnancy are more likely to give birth to premature children. Thus, changes in income may affect neonatal mortality indirectly through the nutritional status and health of mothers.

On the other hand, most causes of post-neonatal mortality are directly related to the pathological, socio-economic, and cultural conditions into which a child is born. Breast milk offers much protection against such causes. The decreased consumption of breast milk implies a loss of immunological protection, especially if it occurs early in the first year when the baby is essentially incapable of mounting its own defenses against environmental pathogens (ibid: 2001).

Bhuyan (2000) studied differential in child mortality by fertility in North-Eastern Libya. Apart from social, economic and environmental conditions, parity is one of the important factors responsible for infant and child mortality, in the present area of study the influence of most of the socioeconomic factors on child mortality is absent and hence parity may be identified as a responsible factor for mortality. Analytical results show that high parity women have higher child loss. The influences of some of the demographic

variables of high parity women on child loss are significantly different than those of low and medium parity women. This is observed by regression analysis. The fitted regression lines of child mortality observed from data on women having different parity levels are found to be significantly different.

The most important factors for child mortality are food shortages, contaminated water, crowded and sub-standard housing, unchecked infectious diseases, the absence of day care facilities for the children of working mothers and the lack of minimally adequate and free medical care (ibid: 2000).

In India also, number of studies have been conducted on infant and child mortality. The rate of infant mortality in India continues to be high mainly due to some persistent exogenic causes arising from environmental and nutritional conditions. The disorder of the respiratory system appears to be a very important cause of infant mortality. Congenital malformations and diseases in early infancy account for about 50% of all infant deaths in urban areas of India (Vaidyanathan, 1972).

The important causes of infant mortality in rural India for the years of 1973 to1979 as revealed by the Model Registration are prematurity, congenital malformation, birth injury, respiratory infection of newborn, cord infection, diarrhoea of newborn, malnutrition, convulsions, etc (Model Registration Unit, 1979). India deviates largely from other countries in its mortality patterns and it is characterised by very high levels of infant mortality (0-1 year). Infant mortality has two main phases, each with a distinct etiology – neonatal mortality that occurs within the first four weeks and post-neonatal mortality occurring within remainder of first year after birth. Sex differential in infant

mortality is considered to be a key indicator of sex-bias in parental care. The estimate of the census actuaries indicates that the male infant mortality rate has been consistently higher than the female rate from 1871-1971 (Office of the Registrar general India, 1981). The Indian data also seems to suggest that in the neonatal period, particularly during the first week of life, the female infants have better chance of survival than the male infants, while the situation is reversed in the post-neonatal period. In India, in fact, that accounts for about 30% of the total deaths (UNO, 1982). A retrospective survey carried out in three environmental zones in Punjab shows significantly higher neonatal mortality rates due to tetanus (Suleman, 1982). There are many types of intrauterine distribution that may cause an infant to be born with severe injuries and then be subject to miserable life (Devdas and Jaya, 1984). After studying the effects of consanguinity and inbreeding on fertility and mortality among the Malas of Chittoor District, Andhra Pradesh, Reddy *et al* (1993) found that the increase in consanguinity leads to the increase in prenatal and postnatal deaths with the decrease in fertility, live births and survival of offspring when compared with non-consanguinity.

Rambhadran and Swami (1982) have reported that the death rate in urban area is significantly lower than that in rural area, and that is true for all states in India. Bharati and Ghosh Dastider (1990) observed decline in both fertility and infant mortality with an increase in educational level of mothers among the Bengali population of Mahishya agricultural caste of Chakpota village, Howrah District, West Bengal. A study on fertility and mortality undertaken by Kshetriya *et al* (1993) in Bison Horn Madias of Dantewara Tehsil, Bastar District, Madhya Pradesh, reveals that the prevailing socio-economic,

cultural and health-care practices are the significant factors of high fertility and high mortality rate. The socio-cultural correlates of infant mortality among the Baigas of Mandala District of Madhya Pradesh were studied by Verma (2002). His study reveals that illiteracy of parents, parents engaged in agriculture related practices and persons married in blood relations had experienced high infant mortality which may be attributed to their belief in indigenous unhygienic method of delivery, primitive method of cutting the cord, discarding the colostrums, etc. Dabral and Malik (2005) studied the association between various bio-social factors that affect fertility, infant mortality and use of birth control methods among the Gujjars of Delhi. They found that among Gujjars, women's age has the most significant effect on fertility and family planning acceptance while fertility influences infant mortality the most. Women's education is also an important determinant of these variables. Fertility increases with higher infant mortality.

Arnold *et al* (1998) studied son preference, the family building process and child mortality in India. India is a country with a pervasive preference for sons and one of the highest levels of excess child mortality for girls in the world (child mortality for girls exceeds child mortality for boys by 43 percent). Data from the National Family Health Survey are used to examine the effect of son preference on parity progression and ultimately on child mortality. The demographic effects of family composition are estimated with hazard models. The analysis indicates that son preference fundamentally affects demographic behavior in India. Family composition affects fertility behavior in every state examined and son preference is the predominant influence in all but one of these states. The effects of family composition on excess child mortality for girls are

more complex, but girls with older sisters are often subject to the highest risk of mortality.

Kravdal (2004) studied child mortality in India the community-level effect of education. When assessing the health benefits of increased education in less developed countries, many researchers have been concerned about the omission of important determinants of an individual's education from the models. The study presented here shows that one should also be concerned about the limitations of the individual-level perspective. According to a multilevel discrete-time hazard model estimated with data from the National Family Health Survey, the average education of women in a census enumeration area has a strong impact on child mortality, in addition to the effect of the mother's own education. The lower child mortality associated with women's autonomy is taken into account in this estimation. Results from similar models for various health and health-care variables suggest that the effect of community education, like that of individual education, operates through the use of maternity services and other preventive health services, the child's nutrition, and the mother's care for a sick child.

Shaw (1988) studied fertility and child spacing among the urban poor in a third world city the case of Calcutta, India. Studies of fertility behavior in the Third World have relied heavily on two variables, income and education, to explain variations in fertility rates. If the socio-economic variables traditionally employed to account for variations infertility rates are invariant, what other factors could influence fertility rates and child spacing? On the basis of data from 180 slum households in Calcutta, India, the paper indicates that in a situation where material and social conditions are comparable,

cultural and demographic variables play a major role in influencing reproductive behavior. In this case study, caste and family type are shown to have a significant effect on the numbers of surviving children. As regards child spacing, the woman's age is of paramount importance.

Gupta (1990) studied death clustering, mothers' education and the determinants of child mortality in Rural Punjab, India. This identifies five groups of proximate determinants of child health: factors related to the mother (age, parity, birth interval); environmental contamination; nutrient deficiency; injury; and personal illness control. It is posited that all these are influenced by socio-economic determinants, which include (1) individual-level variables (individual productivity, as measured by education and occupation; and traditions, norms, and attitudes); (2) household-level variables (income, wealth); and (3) community-level variables (ecological setting, political economy, health system).

Though a number of studies have been conducted on many populations in India and outside, a survey of literature reveals only few of these on Northeast population. Barua (1982) undertook a study on bio-demographic factors associated with offspring mortality among the Hajongs of Meghalaya. He found that multiple births are associated with higher death risk among the offspring. His study indicates that offspring mortality gradually decreases with increasing birth order.

The nuclear family had a higher total fertility rate as well as foetal wastages compared to the joint family among the Ahoms of Upper Assam (Sengupta and Chakravarty, 1995). Khongsdier (1995) reported that the infant and juvenile mortality rates were quite moderate in the War Khasi of Meghalaya, as compared to other populations in the North East India, and to some extent, religion seemed to have played its role in regulating the prenatal and postnatal mortality rates.

Das and Majumder (2003) reported that diarrhoea is to be the killer disease among the Bihari Harijan children of Guwahati, Assam. Poor environmental sanitation, lack of sense of personal hygiene, lack of seriousness of the mothers towards child care may be attributed as the cause of diarrhoea among the children. The infant mortality rate among the rural Assamese of the Brahmaputra Valley of Assam was low in Mongoloid in comparison to the Hindu and Muslim (Das and Das, 1985). The estimation of fertility and mortality differentials among the Lotha Nagas of Nagaland was done by Murry *et al* (2005) and they found decrease of mortality with proper vaccination and better income level.

Adak (1996) in his study on infant and early childhood mortality among the Khasis of Shillong reported that infant mortality rate is high to the mothers who married at age between 13 and 17 years , and the illiterate mothers, mothers belonging to family having10 or more members and the mothers who were attended during delivery by neighbours or relatives. The author further estimated infant and early childhood mortality among the Khasi and found that greater percentage of infant or early childhood mortality among the mothers with no lactation, mothers without immunization and medical

checkup before delivery and mothers who used unboiled drinking water at household level.

Ladusing and Singh (2006) examined the relevance of socio-cultural and environmental factors in explaining child mortality in Northeast India. They provided evidence that lack of hygiene in the household and poor women's engagement in physically demanding agriculture based work contributes to higher risk of child mortality. Community education is also found as the dominant factor outside the household to have a significant effect on child mortality.

Though there are number of anthropological literatures (both cultural and physical) available on the Pnars, there are very few reports available on the infant and child mortality patterns of the Pnars.

The Pnars, particularly those living in towns, it is expected that they have become much more literate. As infant and child mortality rate declines with an increase in the educational level of mother, consequently, they have become more health conscious than those living in the villages. One of the reasons of high infant and child mortality rates in the villages are due to poor communication and transport facilities. There is lack of adequate community participation in the immunization programmed in the villages due to the lack of the knowledge of the masses about the diseases prevented by immunization; cultural beliefs which decrease acceptability. The major reasons for high infant and child deaths are- lack of knowledge and poor utilization of medical services, inaccessibility, belief in traditional remedies, and low female education. Since infant and child mortality is an index of social progress, we proposed to study mortality pattern and their bio-social

proximate among the Pnars of both town and the village with the idea that those living in the towns have been taking much more care for the children than those living in the villages.

The reasons of high infant and child mortality rates are due to poor transport communication, low income, lack of knowledge and poor utilization of medical services, inaccessibility, decrease in acceptability due to cultural belief and low female education. Sanaro is one of the remote villages of the Jaintia hills district which is lacking health centre, poor transportation facilities and having only primary school. Majority of the people are engaged in agriculture, having low education and are poor. So, we have selected Sanaro village for the present study. Jowai is the Headquarters of the Jaintia Hills District and people living in this town are expected to become more literate, rich and having better access to the medical services. As infant and child mortality rate declines with an increase within the educational level of mother, consequently, they have become more health conscious and have been taking much more care for their children than those living in the remote villages. With this end in view, we proposed to undertake the study on bio-social determinants of infant and child mortality among the Pnars of Jowai town and Sanaro village.

CHAPTER III

MATERIALS AND METHODS

In this chapter we shall discuss about the materials that were collected and the methods and techniques that have been applied for the present study.

SAMPLING METHOD

The fieldwork of the present study was conducted among the Pnars of Jowai town and Sanaro village of Meghalaya. A total of 23 localities in Jowai town were identified and listed out. In the first phase of sampling, 5 localities namely Panaliar, Dulong, Chutwakhu, Ladthadlaboh and Khimmusniang were selected based on the descending order of the household size. 25% (approx.) of the total households from the above 5 localities was selected at random to constitute about 10% of the sample for this study. On the basis of the above, a house to house survey was conducted to collect data on demographic as well as on all possible bio-social determinants. Entire Sanaro village was surveyed for collecting the above data. A total of 276 households out of 3876 in Jowai town were surveyed, whereas, in Sanaro village the complete enumeration of the households (157 households) was done.

BIO-SOCIAL DETERMINANTS

The bio-social determinants for the present study include age, sex, economic condition, religion, education, etc. Data were collected on all possible biological determinants like age of the mother, interval between births, multiple births, high fertility, etc., and the social determinants of infant and child mortality like family size, breast feeding, religion, education, income, occupation of parents, ignorance of child care, bad environmental sanitation, etc., as suggested by Mahadevan (1986).

NATURE OF DATA

The data were collected on the basis of a detailed scheduled comprising all aspects for the study. The nature of data and methods of data collection are as follows:

I. Demographic data: The demographic data was collected through structured schedules for household census and other demographic parameters like fertility and mortality of infant and children. The nature of demographic parameters, as suggested by the World Health Organization (WHO, 1967) and Mahadevan (1986) was taken into consideration. These are:

a). Individual household records: These included name of informant, relationship to head of the household, date and place at which record was taken, clan, tribe, religion, total number of family members, age, sex, marital status, birth order, place of birth, place of residence, nature of occupation, education, income and expenditure of household, etc.

b). Fertility records: They included pregnancy history of each married women, present age of the mother, age at marriage, age at first child birth, total number of live births, birth order, birth spacing, name, age, sex of each offspring, place of delivery, etc.

c). Mortality records: These included numbers of dead children, sex, date of birth, age at death, causes of death, number of reproductive wastage (spontaneous or induced abortion and still births), etc.

Such data were collected by interviewing the ever-married women aged 15-49 years from the sample with the help of interview schedule.

II. Data on household characteristics: Information regarding household characteristics was collected in order to find out whether they are related to infant and child mortality. These include types of residence, types of toilet, source of drinking water, etc.

a). Types of residence: These include questions on whether the house is Kaccha, Pucca, Semi-pucca, Assam type.

b). Types of toilet: Questions on types of toilet include: open field, septic tank, public toilet and own pit.

c). Source of drinking water: Questions on source of drinking water include unprotected well, protected well, hand pump, pond reservoirs, streams, rivers and pipe water .

III. Data on socio-economic determinants: Information relating to social determinants of child mortality like family size, religion, education, income, occupation of parent, child care, sanitation etc. were collected as suggested by Mahadevan (1986).

Some of the important social factors that affect infant and child mortality are as follows:

a). Religion: Religion is considered to be one of the important social factors that affect the infant and child mortality rate.

b). Family size: The size of the family affects fertility and mortality in different ways. In societies where the joint family system prevails, whether fertility and mortality is high or low depends upon the economic condition of the family. For the present study the family size is classified into three categories. The individuals who lived in a household with less than 4 family members are considered as having Small Family Size. The household which has 5-6 family members are considered to be Medium Family Size, while those households having 7 and above family members are considered as Large Family Size.

c). Education: Education plays an important role in influencing infant and child mortality. In countries where the percentage of literates is high, rate of infant and child mortality is low. The data on educational attainment of individuals in the present study were classified as: (i) those individuals who could not read and write were categorized as Illiterate, (ii) those individuals who attained their education up to class VIII were grouped as Primary Level of Education, (iii) those individuals who attained their education from classes IX-X were categorized as Secondary Level of Education, (iv) those individuals who attained their education from classes XI-XII and above were grouped as Higher Secondary Level of Education.

d). Income: Household income of the family is also one of the social factors which decide the infant and child mortality in many societies. Data on household income for the present study were collected from the informants and were cross-checked taking into consideration some aspects of socio-economic conditions such as condition of the house, types of occupation, amount of land owned, monthly expenditure, etc. Data on monthly household income of the family were classified into three quartiles (Q_1= First Quartile, Q_2= Second Quartile and Q_3= Third Quartile) with the help of Microsoft Office Excel 2007. Monthly household incomes were calculated separately for Jowai and Sanaro with the view that Jowai being the Headquarters of Jaintia Hills District would differ with respect to the amount of income and expenditure to that of the Sanaro. In Sanaro village, those households with monthly income of less than Rs. 1,500/- were categorized as Low Income Group (LIG), while those households with the monthly income between Rs. 1,500/- and Rs. 3,000/- were categorized as Middle Income Group (MIG) and those

households with the monthly income of greater than Rs. 3,000/- were classified as High Income Group (HIG). In Jowai town, those households with monthly income of less than Rs. 19,000/- were categorized as Low Income Group (LIG), while those households with the monthly income between Rs. 19,000/- and Rs. 29,000/- were categorized as Middle Income Group (MIG) and those households with the monthly income of greater than Rs. 29,000/- were classified as High Income Group (HIG).

IV. Data on reproductive history: Data on reproductive history of each mother were collected from the study population with the help of structured schedule which consist of the followings:

a). Age at marriage: Age at first marriage has a profound impact on childbearing because women who marry early have on average a longer period of exposure to pregnancy and a greater number of lifetime births. Information on age at first marriage was obtained by asking respondents the month and year, or age, at which they started living with their first partner (NFHS-2) (IIPS, 2000).

b). Age at menarche: Information on age at menarche was collected from all the married women (aged 15-49 years) in order to find out whether it has an impact on fertility and child mortality.

c). Number of infant deaths: These are number of infant deaths from birth to below 1 year of age.

d). Number of child deaths: Information on number of child deaths have been collected from mothers whose child died. These included i) number of children death from 1 to 4 years and ii) number of children death from 5 years and above.

e). Number of abortions: These included questions regarding the number of abortions including date, month and year of the abortion. For the present study, abortion has been divided into two types i.e., spontaneous and induced abortion.

f). Still births: These included questions on whether the children were born alive or not.

V. Data on antenatal and post-natal care: Data on antenatal and post-natal care were collected among the Pnar mothers with the help of structured schedule. Information were collected on pregnancy and birth histories, details of antenatal and delivery care received during their past pregnancies.

Information were collected from each woman on specific problems during their pregnancies and whether they received any antenatal check-ups. Women who received antenatal check-up were asked about the check-up timings (in months) of their first to last pregnancies, total number of check-up during pregnancy. The respondents were also asked whether they received tetanus injection, iron/folic acid tablets during their visits to antenatal care centres. In addition, they were asked whether blood pressure and body weights were measured at the time of visit to health centres or hospital during pregnancy. The availability and non-availability of heath centres/medicine facilities/clinic were also recorded from the respondents. Some of the most important data on antenatal and post-natal child care are classified as follows:

a). Place of visit for check up: These include questions related to the place of visit for antenatal checkup such as hospital, private doctor, dai, ANM, etc.

b). Number of visits: This includes questions about attending and number of antenatal check up.

c). Stage of pregnancy at First abdominal check up: These include questions about the stage of pregnancy at first ANC visit and whether women received iron/folic acid tablet and tetanus injections. The stage of pregnancy are divided into 3 stages, i.e., first trimester which is the first three months, second trimester i.e., second three months and third trimester i.e., the last three months of pregnancy period.

d). Place of delivery: This includes questions regarding the place of delivery- hospital, clinic and home.

e). Instruments used for cutting placenta: This includes blade, hot water + detol, knife, bamboo stripe, etc.

f). Reasons for no antenatal check up: This question is for those women who did not go for antenatal check up. The reasons are: lack of knowledge, no visit of ANM, financial burden, socio-cultural barriers, far distance of hospital/clinic, did not feel necessary, not permitted by husband, etc.

g). Antenatal disease: This includes questions regarding any health problems faced by each woman during pregnancy like swelling of hand and feet, paleness, weakness, tiredness, dizziness, visual disturbance, bleeding, convulsions, no movement of foetus, vomiting, fever, headache, etc.

h). Abnormal delivery: In case of abnormal birth, the informant was asked whether it was due to premature birth, obstructed labour, prolonged labour, breach presentation, etc.

i). Post-natal disease: This included information regarding health problems that occur to mothers during the first week from delivery. They are fever, headache, excess bleeding, dizziness, severe jaundice, low abdominal pain, vomiting, etc.

VI. Data on immunization and child care: Data on several areas of importance to child health: birth weight, vaccination status of children and treatment of childhood illness were collected from mothers having child born in the last 5 years from the date of interview. Mothers were asked whether colostrums were fed to their children and also the availability of the vaccination/immunization card. If a card was available, the dates when the child received vaccinations against each disease was noted down. Parents' report on vaccinations was also recorded although record on the card was unavailable. If the mother could not show a vaccination card, she was asked whether the child had received any vaccinations. Information on immunization coverage is important for monitoring and evaluation of the Expanded Programme on Immunization (EPI). In short, an attempt was made to follow as far as possible those guidelines given by the National Family Health Survey-2 (IIPS, 2000).

a). Breast feeding period: Mothers were asked for how many months or years their children were breast-fed.

b). Vaccination coverage: Information on immunization of children against tuberculosis, whooping cough, polio and measles were collected from parents as they are crucial to reducing infant and child mortality (NFHS-3) (IIPS, 2007). According to World Health

Organization, children are considered fully vaccinated when they received the above vaccines.

VII. Data on child morbidity: The health status of a population is reflected in the levels of morbidity and the treatment behaviours of its members. Data on morbidity was based on "self-reported illness experience" of a subject as generally adopted in surveys, which did not involve clinician (Strickland and Ulijaszek, 1993; Garcia and Kennedy, 1994; Strickland and Tuffrey, 1997). Self-reported morbidity (SRM) is also more preferable from the point of view that a clinical diagnosis involves much time, cost and technical expertise, which are not always possible when carrying out a community based studies in developing countries including India. The term "morbidity" in the present study was defined simply in terms of the number of illness in the last 28 days time before field work. Morbidity of children up to 14 years of age was recorded as has been reported by their parents. Any child reported to be at least two days ill was classified as being "ill".

Data on child morbidity for the present study was classified as follows:

a). Cold/respiratory disorders: These included cough + running nose + headache, cough + running nose + headache + fever, fever cough, cough alone, swollen glands + cold, ear problem, breathing problem, chest pain, sore throat, tuberculosis.

b). Respiratory disorders: Respiratory infection is regarded as one of the leading causes of childhood morbidity and mortality throughout the world. The prevalence of acute respiratory infection was estimated by asking mothers whether their children up to 14

years of age had been ill with a cough accompanied by short, rapid breathing which was chest related in the past 28 days preceding the survey.

c). Diarrhoea/dysentery: Diarrhoea is one of the single most common causes of death among children under the age of five years worldwide, following acute respiratory infection (NFHS-3) (IIPS, 2007). Deaths from acute diarrhoea are most often caused by dehydration due to loss of water and electrolytes.

d). Malaria: Malaria contributes to high levels of malnutrition and mortality. It is also a major contributory cause of death in infancy and childhood in many developing countries.

e). Tuberculosis: Tuberculosis is contagious and spreads through droplets that can travel through the air when a person with the infection coughs, talks, or sneezes.

f). Fever: Fever is a major manifestation of malaria and other acute infections in children. Like malaria, fever also contributes to high levels of malnutrition and mortality.

g). Others: These included sores/boils, fever alone, chicken pox, typhoid, scabies, jaundice, body pain, headache alone, malnutrition, weakness and other symptoms.

VIII. Data on statistical analysis: Statistical analysis has been applied for the presentation of data mentioned above, keeping in view the objectives of the present study. Special attention has also been given to find out the status and determinants that are associated with infant and child mortality. The data were presented in terms of means, standard deviations, standard errors and proportions or percentages. All data were managed and analyzed using SPSS (PC Software), version 16 in which the level of significance was set at 5%. Some of the data were also calculated manually. The analysis

was first carried out to present the basic demographic structure of the Pnar populations of Sanaro village and Jowai town, Jaintia Hills District, Meghalaya in terms of age, sex and marital status, which were based on household census data. The sex ratios for different age groups were calculated with the ideal sex ratio of 1:1. The t-test (2-tailed) was used to determine the statistical significance of the differences between two means like age at menarche, age at marriage, age at first child birth, etc. The differences between proportions were tested, using chi-square (χ^2) test.

The coefficient of correlation (r) was tested to find out an association between two continuous variables. The relationship between two variables may be positive or negative or scattered. When one variable increases, the other tends to increase (e.g. the child mortality rate increase as the age of mothers increases) – this is positive correlation. But there are relationships that are negatively correlated – as when one variable decreases, the other tends to increase (e.g. the child mortality rate decreases as the maternal educational level increases). Again, there are variables in which there exists no relationship. The value of correlation coefficient ranges from +1 to −1. The value of 'r' when closer to +1 indicates highly positive correlation; a value of 'r' closer to −1 indicates a highly negative correlation and when the value of 'r' = 0, then it indicates no association between the two variables.

Multiple regression analysis was done to estimate the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variables. For example, we may predict a number of live births (the dependent variable) from independent variables such as age, educational level, income level, etc.

However, in the present study, we are interested in testing whether the coefficient regression (B) is significant or insignificant after taking into consideration more than one independent variables.

CHAPTER IV

DEMOGRAPHY

In this chapter, we shall describe the demographic structure of the Pnars of Sanaro village and Jowai town of Jaintia Hills District, Meghalaya. Sanaro village represents the rural area whereas Jowai town represents the urban area.

Table 4.1. Distribution of total population by age, sex and marital status in Sanaro village

Age groups (in yrs)	Unmarried		Married		Widow/Divorced		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
0-4	130 (9.25	103 (7.33)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	130 (9.25	103 (7.33)
5-9	102 (7.25)	85 (6.04)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	102 (7.25)	85 (6.04)
10-14	73 (5.19)	62 (4.40)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	73 (5.19)	62 (4.40)
15-19	71 (5.04)	52 (3.69)	16 (1.13)	36 (2.56)	0 (0.00)	0 (0.00)	87 (6.18)	88 (6.25)
20-24	20 (1.42)	11 (0.78)	61 (4.33)	85 (6.04)	01 (0.07)	0 (0.00)	82 (5.83)	96 (6.82)
25-29	07 (0.49)	06 (0.42)	60 (4.26)	51 (3.62)	02 (0.14)	0 (0.00)	69 (4.90)	57 (4.05)
30-34	0 (0.00)	0 (0.00)	38 (2.70)	38 (2.70)	01 (0.07)	0 (0.00)	39 (2.77)	38 (2.70)
35-39	01 (0.07)	0 (0.00)	45 (3.20)	51 (3.62)	0 (0.00)	0 (0.00)	46 (3.27)	51 (3.62)
40-44	0 (0.00)	0 (0.00)	38 (2.70)	28 (1.99)	0 (0.00)	0 (0.00)	38 (2.70)	28 (1.99)
45-49	0 (0.00)	0 (0.00)	35 (2.48)	30 (2.13)	02 (0.14)	0 (0.00)	37 (2.63)	30 (2.13)
50-54	01 (0.07)	01 (0.07)	08 (0.56)	07 (0.49)	0 (0.00)	0 (0.00)	09 (0.64)	08 (0.56)
55-59	0 (0.00)	0 (0.00)	05 (0.35)	06 (0.42)	01 (0.07)	0 (0.00)	06 (0.42)	06 (0.42)
60-64	0 (0.00)	0 (0.00)	03 (0.21)	06 (0.42)	0 (0.00)	0 (0.00)	03 (0.21)	06 (0.42)
65-69	0 (0.00)	0 (0.00)	02 (0.14)	08 (0.56)	01 (0.07)	0 (0.00)	03 (0.21)	08 (0.56)
70+	0 (0.00)	0 (0.00)	06 (0.42)	10 (0.71)	0 (0.00)	0 (0.00)	06 (0.42)	10 (0.71)
Total	405 (55.47)	320 (47.33)	317 (43.42)	356 (52.66)	08 (1.09)	0 (0.00)	730 (51.92)	676 (48.07)
Grand Total	725 (51.56)		673 (47.86)		8 (0.56)		1406 (100.00)	

Figures in parentheses indicates percentage

Table 4.1 shows the distribution of total population by age, sex and marital status among the Pnars of Sanaro village. The total population in this village is 1406 of which 730 are males and 676 females. It shows that in the total population, 51.92% are males and 48.07% females. The overall sex ratio is 1:0.93, which shows that the number of males is slightly higher than that of females, though the overall sex ratio in this population is very near to the ideal sex ratio of 1:1. Of all males, it is found that about 55.47%, 43.42% and 1.09% are unmarried, married and widow/divorced, respectively. Among the females, these are 47.33%, 52.66% and 0.00% respectively. Taking all the males and females together, it is found that 51.56% of all individuals are unmarried, 47.86% are married and 0.56% are widow/divorced. It is seen that no individual after the age of 29 years remains unmarried, excepting in case of 2 males and 1 female (0.21%). However, it is seen from Table 4.1 that most of the marriages have taken place between 20 years and 24 years of age. It holds good for both sexes. It is found that the mean age at marriage for female is 17.38 ± 0.17 years and for males is 18.82 ± 0.22 years in this population.

Table 4.2. Distribution of total population by age, sex and marital status in Jowai town

Age groups (in yrs)	Unmarried		Married		Widow/Divorced		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
0-4	165 (4.32)	135 (3.53)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	165 (4.32)	135 (3.53)
5-9	162 (4.24)	155 (4.05)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	162 (4.24)	155 (4.05)
10-14	224 (5.86)	189 (4.94)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	224 (5.86)	189 (4.94)
15-19	213 (5.57)	224 (5.86)	0 (0.00)	05 (0.13)	0 (0.00)	0 (0.00)	213 (5.57)	229 (5.99)
20-24	187 (4.89)	154 (4.03)	50 (1.31)	47 (1.23)	01 (0.03)	0 (0.00)	238 (6.23)	201 (5.26)
25-29	93 (2.43)	92 (2.41)	97 (2.54)	111 (2.90)	01 (0.03)	0 (0.00)	191 (4.10)	203 (5.31)
30-34	30 (0.78)	24 (0.63)	141 (3.69)	145 (3.79)	04 (0.10)	0 (0.00)	175 (4.58)	169 (4.42)
35-39	08 (0.21)	20 (0.52)	123 (3.22)	126 (3.30)	05 (0.13)	0 (0.00)	136 (3.56)	146 (3.82)
40-44	05 (0.13)	10 (0.26)	92 (2.41)	112 (2.93)	12 (0.31)	0 (0.00)	109 (2.85)	122 (3.19)
45-49	02 (0.05)	05 (0.13)	99 (2.59)	85 (2.22)	02 (0.05)	0 (0.00)	103 (2.69)	90 (2.35)
50-54	0 (0.00)	03 (0.08)	56 (1.46)	77 (2.01)	03 (0.08)	0 (0.00)	59 (1.54)	80 (2.09)
55-59	0 (0.00)	08 (0.21)	38 (0.99)	57 (1.49)	07 (0.18)	0 (0.00)	45 (1.18)	65 (1.70)
60-64	01 (0.03)	01 (0.03)	29 (0.76)	46 (1.20)	03 (0.08)	0 (0.00)	33 (0.86)	47 (1.23)
65-69	0 (0.00)	0 (0.00)	10 (0.26)	45 (1.18)	02 (0.05)	0 (0.00)	12 (0.31)	45 (1.18)
70+	0 (0.00)	0 (0.00)	17 (0.44)	64 (1.67)	01 (0.03)	0 (0.00)	18 (0.47)	64 (1.67)
Total	1090 (57.89)	1020 (52.58)	752 (39.94)	920 (47.42)	41 (2.18)	0 (0.00)	1883 (49.25)	1940 (50.75)
Grand Total	2110 (55.19)		1672 (43.74)		41 (1.07)		3823 (100.00)	

Figures in parentheses indicates percentage

Distribution of total population by age, sex and marital status among the Pnars of Jowai town is shown in Table 4.2. The total population enumerated is 3823 of which 1883 are males and 1940 females. It shows that in the total population, 49.25% are males and 50.75% females. The overall sex ratio is 1:1.03, which indicates that the numbers of females are slightly higher than the males, though the overall sex ratio in this population is very near to the ideal sex ratio of 1:1. Of all males, 57.89%, 39.94% and 2.18% are unmarried, married and widow/divorced, respectively. Among the females, these are 52.58%, 47.42% and 0.00% respectively. Taking all the males and females together, it is found that 55.19% of all individuals are unmarried, 43.74% are married and 1.07% are widow/divorced. However, from the above table it is seen that most of the marriages have taken place between 30 years and 34 years of age. It holds good for both sexes. The mean age at marriage for female is 22.39 ± 0.24 years and for males 24.56 ± 0.28 years in this population.

Table 4.3. Population by age, sex and marital status (extracted from table 4.1) in Sanaro village

Age group (in yrs)	Unmarried		Married		Widow/Divorced		Total		M + F	Sex Rati
	Male	Female	Male	Female	Male	Female	Male	Female		
0-14 %	305 (21.69)	250 (17.78)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	305 (21.69)	250 (17.78)	555 (39.47)	1:0.82
15-49 %	99 (7.04)	69 (4.90)	293 (20.83)	319 (22.68)	06 (0.42)	0 (0.00)	398 (28.30)	388 (27.59)	786 (55.90)	1:0.97
50+ %	01 (0.07)	01 (0.07)	24 (1.70)	37 (2.63)	02 (0.14)	0 (0.00)	27 (1.92)	38 (2.70)	65 (4.62)	1:1.41
Total	405	320	317	356	08	0	730	676	1406	1:0.93

Table 4.3, extracted from Table 4.1, shows the total population according to the age group and sex among the Pnars of Sanaro village. It is seen that 21.69% of males and 17.78% of females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group, i.e., 15-49 years, they are 28.30% for males and females 27.59% and in the post reproductive age group i.e., 50+ years, 1.92% and 2.70% for males and females, respectively.

In the reproductive age group, 7.04% and 4.90% are unmarried males and unmarried females, respectively. In the same age group 0.42% of males and no female is either widow or divorced. The percentages of individuals, who are widow or divorced, are 0.14% for males and no female in the post reproductive age group i.e., 50+ years. In the present population, nearly 55.90% of all individuals belong to the reproductive age group, 39.47% belong to the pre-reproductive age group and 4.62% of them are in the post reproductive age group. 39.47%, 55.90%, 4.62% of all the individuals belonged to the age group of 0-14 years (pre-reproductive group), 15-49 years (reproductive group) and 50+ years (post-reproductive group) respectively.

As mentioned earlier, the overall sex ratio in this population is 1:0.93, i.e., it is slightly tilted in favour of males. The sex ratio in the pre-reproductive age group i.e., 0-14 years, is 1:0.82, which indicates that the numbers of males are slightly higher than the females. But in the reproductive age group i.e., 15-49 years, the sex ratio is 1:0.97 i.e., it is tilted in favour of males. So, it indicates that female mortality is slightly higher than the male mortality till reproductive age group. In the post-reproductive age group i.e., 50+

years only, the sex ratio slightly tilted in favour of females, i.e., 1:1.41. It indicates that the average longevity is, perhaps, remains slightly higher in females than in males.

In this population, the mean age at first child birth in females is 18.66 ± 0.17 years and in males is 20.11 ± 0.23 years. So, the mean age at first child birth, taking both males and females together, becomes 19.39 ± 0.20 years among the Pnars of Sanaro village.

Table 4.4. Population by age, sex and marital status (extracted from table 4.2) in Jowai town

Age group (in yrs)	Unmarried		Married		Widow/Divorced		Total		M + F	Sex Ratio
	Male	Female	Male	Female	Male	Female	Male	Female		
0-14	551	479	0	0	0	0	551	479	1030	1:0.87
%	(14.41)	(12.53)	(0.00)	(0.00)	(0.00)	(0.00)	(14.41)	(12.53)	(26.94)	
15-49	538	529	602	631	25	0	1165	1160	2325	1:0.99
%	(14.07)	(13.84)	(15.75)	(16.51)	(0.65)	(0.00)	(30.47)	(30.34)	(60.82)	
50+	01	12	150	289	16	0	167	301	468	1:1.80
%	(0.03)	(0.31)	(3.92)	(7.56)	(0.42)	(0.00)	(4.37)	(7.87)	(12.24)	
Total	1090	1020	752	920	41	0	1883	1940	3823	1:1.03

Table 4.4, extracted from Table 4.2, shows the total population according to age group and sex among the Pnars of Jowai town. From the above table it is seen that, 14.41% males and 12.53% females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group, i.e., 15-49 years, 30.47% and 30.34% are males and females respectively, whereas in the post reproductive age group i.e., 50+ years, 4.37% and 7.87% belong to male and female respectively.

In the reproductive age group, 14.07% and 13.84% of individuals are unmarried males and females respectively. In this age group, 0.65% males are widowed or divorced. In the post reproductive age group i.e., 50+ years there are 0.42% of males were widower

or divorced. No widow or divorced female was found. It is also found that in this population nearly 60.82% of all individuals belong to the reproductive age group, 26.94% belong to the pre-reproductive age group and 12.24% in the post reproductive age group. In this population, 26.94%, 60.82%, 12.24% of all individuals belong to the age group of 0-14 years (pre-reproductive group), 15-49 years (reproductive group) and 50+ years (post-reproductive group) respectively.

As mentioned earlier, the overall sex ratio in this population is 1:1.03, which is slightly tilted in favour of females. The sex ratio in the pre-reproductive age group i.e., 0-14 years, is 1:0.87, i.e., the numbers of males are slightly higher than the females. But in the reproductive age group i.e., 15-49 years, the sex ratio is 1:0.99. It is tilted in favour of males. So, it indicates that female mortality is slightly higher than male mortality in the earlier age group. In the post-reproductive age group i.e., 50+ years, the sex ratio slightly tilted in favour of females, i.e., 1:1.80. It indicates that the average longevity is, perhaps, higher in females than in males.

In this population, it has been calculated that the mean age at first child birth in females is 24.05 ± 0.25 years and in males is 26.28 ± 0.29 years. So, the mean age at first child birth, taking both males and females together, becomes 25.17 ± 0.27 years among the Pnars of Jowai town.

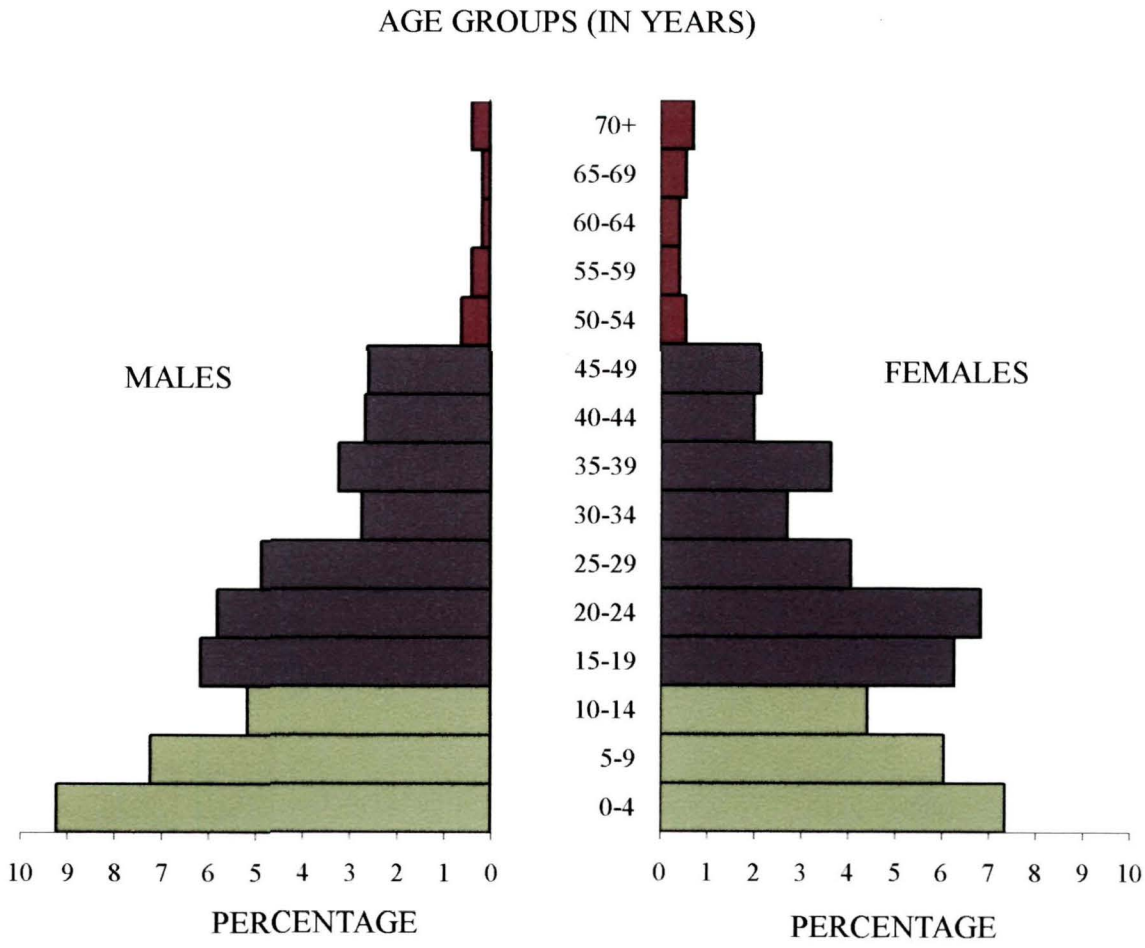


Fig. 1.1. Population pyramid of the Pnars of Sanaro village.

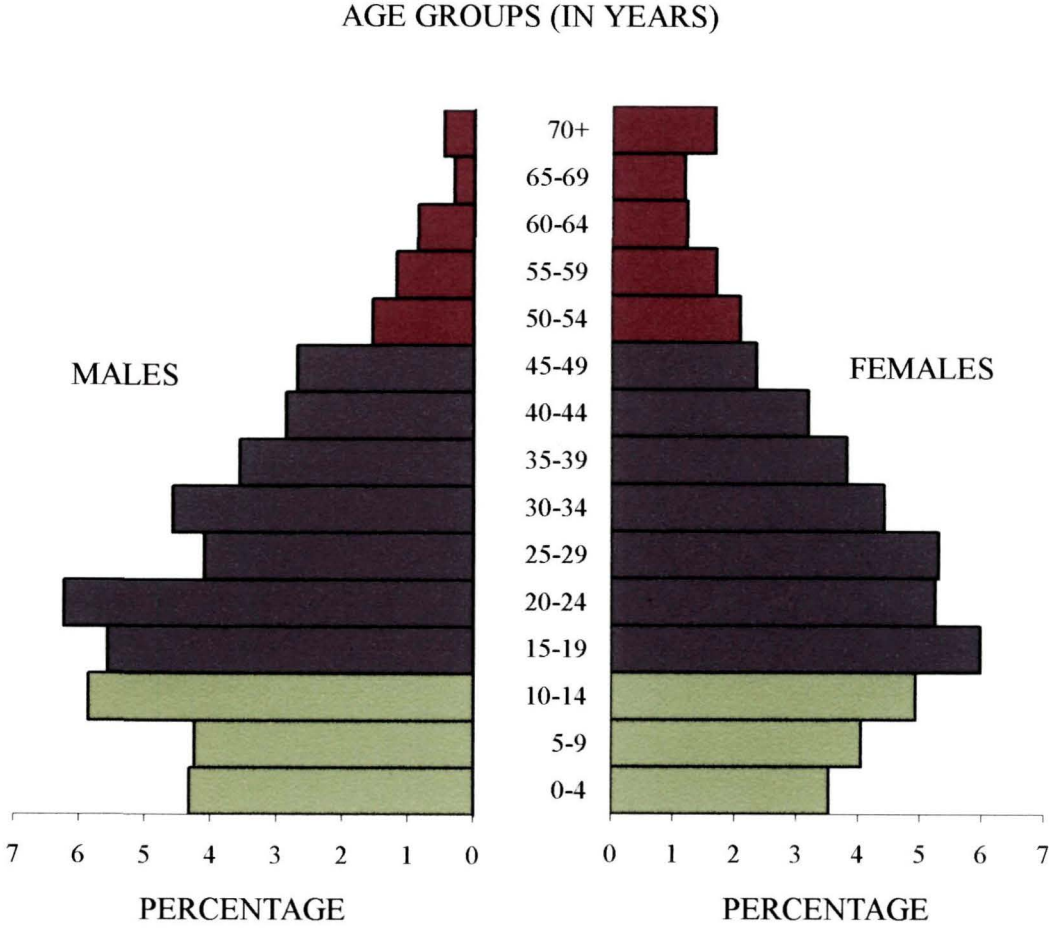


Fig. 1.2. Population Pyramid of the Pnars of Jowai town.

Figure 1.1 shows a diagrammatic distribution of the population by age groups of the Pnars of Sanaro village. The entire population has been classified into 15 age groups. Among all age groups, the lowest age group (0-4 years) is the broadest in both males and females. The pyramid becomes narrower as we move up from the base till the age group 10-14 years in both males and females which then becomes broader in the age groups 15-19 and 20-24 years in both the sexes. This population further indicates that the frequencies of male and female in various age groups are by and large, same and as age advances, population decreases.

Diagrammatic distribution of the population by age groups of the Pnars of Jowai town is given in Figure 1.2. The entire population is divided into 15 age groups. It shows that the pyramid becomes broader as we move up from the base till the age group 20-24 years in males and 15-19 years in females. It indicated that there is a decline in the fertility rate among the Pnars of Jowai town in the past 8 years. The pyramid becomes narrower as we move up to the higher age groups from 20-24 years in males and 15-19 years in females. It is also observed that the pyramid is narrowest in the age group 65-69 years in both males and females.

Table 4.5. Percentage frequency of fertility and infant and child mortality among the Pnars

VARIABLES	SANARO	JOWAI
No. of live births (Mean ± SE)	875 (5.57 ± 0.25)	962 (3.49 ± 0.12)
No. of infant deaths (below 1 year) (%)	123 (14.06)	28 (2.91)
No. of child deaths (1-4 years) (%)	111 (12.71)	11 (1.14)
No. of juvenile deaths (5-14 years) (%)	45 (5.14)	5 (0.52)

Table 4.5 shows the percentage frequency of fertility and mortality among the Pnars of Sanaro village and Jowai town. The mean number of live births per mother is higher in Sanaro village (5.57 ± 0.25) than Jowai town (3.49 ± 0.12). The infant mortality, child mortality and juvenile mortality are found higher in Sanaro village than in Jowai town. The percentage of infant mortality are 14.06% in Sanaro and 2.91% in Jowai town, whereas, the child mortality are 12.71% and 1.14% respectively. The juvenile mortality are recorded 5.14% and 0.52% in Sanaro village and Jowai town respectively.

Table 4.6. Mean age at marriage

Sex	SANARO		JOWAI		t – value
	Number	Mean ± SE	Number	Mean ± SE	
Male	157	18.82 ± 0.22	271	24.56 ± 0.28	16.21, $p < 0.001$
Female	157	17.38 ± 0.17	276	22.39 ± 0.24	17.22, $p < 0.001$

Mean age at marriage among the Pnars of Sanaro village and Jowai town is shown in Table 4.6. In Sanaro village, the mean age at marriage is 18.82 ± 0.22 years for males and 17.38 ± 0.17 years for females, whereas the same is 24.56 ± 0.28 years and 22.39 ± 0.24 years respectively in Jowai town. The above table also reveals that marriages take place

earlier in females than in males in both the study areas. The mean age at marriage is significantly greater in Jowai town than in Sanaro village among both males ($t = 16.21$, $p < 0.001$) and females ($t = 17.22$, $p < 0.001$). In other words, marriages among the Pnars take place earlier in Sanaro village than in Jowai town.

Table 4.7. Mean age at first child birth

Sex	SANARO		JOWAI		t – value
	Number	Mean ± SE	Number	Mean ± SE	
Male	157	20.11 ± 0.23	268	26.28 ± 0.29	16.68, $p < 0.001$
Female	157	18.66 ± 0.17	273	24.05 ± 0.25	17.79, $p < 0.001$

Table 4.7 shows the mean age at first child birth among the Pnars of Sanaro village and Jowai town. The mean age at first child birth is found to be greater in Jowai town than in Sanaro village. These are 20.11 ± 0.23 years for males and 18.66 ± 0.17 years for females in Sanaro village and 26.28 ± 0.29 years and 24.05 ± 0.25 years respectively in Jowai town. The differences between the two study areas in respect of age at first child birth are also statistically significant in both males ($t = 16.68$, $p < 0.001$) and females ($t = 17.79$, $p < 0.001$).

Table 4.8. Completed family size

Number of mothers aged 45+ years	Total pregnancy	Live Births			Average number of live births per mother	Average number of surviving offspring per mother
		Living	Dead	Total		
SANARO 18	172	107	52	159	8.83	5.94
JOWAI 47	264	216	18	234	4.98	4.60

Completed family size among the Pnars is given in Table 4.8. Only those women, who are aged 45 years and above and lived continuously in wedlock till attainment of 45 years of age, have been taken into consideration to find out the completed family size. There are 18 such mothers who have had 159 live births in Sanaro village whereas there are 47 such mothers who have had 234 live births. The average number of live births per such mother is found to be higher in Sanaro village (8.83) than in Jowai town (4.98). It indicates that the completed family size is quite high among the Pnars of Sanaro village, although the same is quite moderate in Jowai town. The average number of surviving offspring per such mother is 5.94 in Sanaro village and 4.60 in Jowai town.

Table 4.9. Child-Women ratio (fertility ratio) of the Pnars

No. of children (0-4 years)	No. of women (15-49 years)	Fertility ratio
SANARO 233	319	73.04
JOWAI 300	631	47.54

Table 4.9 shows the child-women ratio among the Pnars of Sanaro village and Jowai town. It is another measure of fertility in which all children aged 0 to 4 years and all women aged 15-49 years, irrespective of marital status, have been taken into consideration. It is found that there are 233 children aged 0-4 years in Sanaro village and 300 in Jowai town. There are also 319 women in Sanaro village and 631 in Jowai town who are aged between 15 and 49 years, irrespective of marital status. The child-women ratio (fertility ratio) is found to be quite higher in Sanaro village (73.04) than in Jowai

town (47.54). So, the child-women ratio in Sanaro village seems to be quite high although the same in Jowai town is quite moderate.

Table 4.10. Ever pregnant and never pregnant Pnar married women

	Age of married women				Total
	≤ 19 years	20-29 years	30-39 years	≥ 40 years	
SANARO					
Ever pregnant (%)	1 (0.64)	59 (37.58)	60 (38.22)	37 (23.57)	157 (100)
Never pregnant (%)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Never pregnant (%) of all	0.00	0.00	0.00	0.00	0.00
JOWAI					
Ever pregnant (%)	1 (0.36)	45 (16.30)	120 (43.48)	110 (39.90)	276 (100)
Never pregnant (%)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Never pregnant (%) of all	0.00	0.00	0.00	0.00	0.00

Figures in parentheses indicate percentage based on total number of married women

The frequency of ever pregnant and never pregnant women among the Pnars is shown in Table 4.10. It shows that, all the married women (i.e., 157 in Sanaro village and 276 in Jowai town) have experienced pregnancy at least once in their life time. It is further seen that as age advances the percentage of ever pregnant women increases till the age group 30-39 years which then decreases at the age group ≥ 40 years in both the study areas. So, the percentage of pregnant women increases from 0.64% in the age group ≤ 19 years to 38.22% in the age group 30-39 years in Sanaro village, whereas, in Jowai town, it

increases from 0.36% to 43.48% respectively which then decreases to 23.57% in the age group ≥ 40 years in Sanaro village and 39.90% in Jowai town.

Table 4.11. Live births, surviving children and mortality by age of the Pnar mothers

Age group (in yrs)	Number of mothers	Total no. of pregnancy	Average no. of pregnancy per mother	Live births****			% Surviving	Average live births	Mortality (based on all live births)
				Living	Dead	Total			
SANARO									
≤ 19	1	1	1.00	1	0	1	100	1.00	0.00
%				(0.17)	(0.00)				
20-29	59	204*	3.46	105	62	167	62.87	2.83	37.13
%				(17.62)	(22.22)				
30-39	60	457**	7.62	266	120	386	68.91	6.43	31.09
%				(44.63)	(43.01)				
≥ 40	37	366***	9.89	224	97	321	69.78	8.68	30.22
%				(37.58)	(34.77)				
Total	157	1028	6.55	596	279	875	68.11	5.57	31.89
%				(68.11)	(31.89)				
JOWAI									
≤ 19	1	1	1.00	1	0	1	100	1.00	0.00
%				(0.11)	(0.00)				
20-29	45	102*	2.27	82	4	86	95.35	1.91	4.65
%				(8.93)	(9.10)				
30-39	120	431**	3.60	361	15	376	96.01	3.13	3.99
%				(39.32)	(34.10)				
≥ 40	110	564***	5.13	474	25	499	94.99	4.54	5.01
%				(51.63)	(56.82)				
Total	276	1098	3.98	918	44	962	95.43	3.50	4.60
%				(95.43)	(4.57)				

*This age group includes 22 women who are still pregnant and 3 twin pregnancies in Sanaro village whereas there are 6 still pregnant women in Jowai town.

**There are 11 women who are still pregnant and include 6 twin pregnancies in Sanaro village whereas there are also 10 women who are still pregnant along with 2 twin pregnancies in Jowai town.

*** There are 4 women who are still pregnant and include 3 twin pregnancies in Sanaro village whereas there is only 1 woman who is still pregnant along with 7 twin pregnancies in Jowai town.

****Since the above pregnancies have not yet been terminated, they have not been included in further analysis.

Table 4.11 shows the frequencies of live births, surviving children and mortality by age of mothers among the Pnars. In Sanaro village, there are 157 mothers, who have had

altogether 1028 pregnancies. These 1028 pregnancies include 37 pregnancies, which have not yet been matured. 37 mothers of age group 20-29 years, 30-39 years and 40 years and above are still pregnant. In Jowai town, there are 276 mothers, who have had altogether 1098 pregnancies including 17 pregnancies which have not yet been matured. It may also be noted that there are 12 mothers belonging to the age groups 20-29 years, 30-39 years and $\geq$ 40 years who have delivered twins in Sanaro village whereas there are 9 such mothers belonging to the age groups 30-39 years and $\geq$ 40 years in Jowai town. Each of these twin births has been taken as one pregnancy.

It is also observed that altogether there are 1028 pregnancies and the average number of pregnancy per mother is 6.55 in Sanaro village. In Jowai town, there are 1098 pregnancies and the average number of pregnancy per mother is 3.98. The average number of pregnancy per mother tends to increase as age of the mother increases in both the study areas. It increases from 1.00 in the age group $\leq$ 19 years to 9.89 in the age group $\geq$ 40 years in Sanaro village, whereas, the same increases from 1.00 to 5.13 respectively in Jowai town.

Table 4.11 further shows that altogether there are 875 live births in Sanaro village, which include 12 twin births, whereas, there are altogether 962 live births in Jowai town, which include 9 twin births. It may be noted that for each twin birth, 2 live births have been counted. Out of the 875 live births in Sanaro village, 596 (i.e., 68.11%) are still surviving, whereas 279 (i.e., 31.89%) have already died. Out of 962 live births in Jowai town, 918 (i.e., 95.43%) are still surviving, and 44 (i.e., 4.57%) have already died. The above table also shows that the total percentage of surviving children is higher in

Jowai town (95.43%) than in Sanaro village (68.11%). Mothers in the age group ≤ 19 years recorded to have the highest number of surviving children among all age groups in both Sanaro village and Jowai town with 100% each. The average number of live births per mother tends to increase as the age group increases in both the study areas. In Sanaro village, it tends to increase from 1.00 in the age group ≤ 19 years to 8.68 in the age group ≥ 40 years. In Jowai town, it increases from 1.00 to 4.54 respectively.

The mortality rate (irrespective of age at the time of death) varies from 30.22% in case of the mothers, aged ≥ 40 years, to 37.13% in case of the mothers, aged 20-29 years in Sanaro village, whereas, it varies from 3.99% in case of the mothers, aged 30-39 years, to 5.01% in case of the mothers, aged ≥ 40 years in Jowai town. So far as the mortality rate is concerned, there is consistent pattern observed with age of the mothers in both the study areas.

Table 4.12. Reproductive wastage by age of the Pnar mothers

Age group (in yrs)	Total no. of mothers	Total pregnancy*	Reproductive wastage		
			Abortion	Still births	Total
SANARO					
≤ 19	1	1	0	0	0
%		(0.10)	(0.00)	(0.00)	(0.00)
20-29	59	182	11	7	18
%		(18.37)	(6.04)	(3.85)	(9.89)
30-39	60	446	51	15	66
%		(45.01)	(11.43)	(3.36)	(14.80)
≥ 40	37	362	37	7	44
%		(36.53)	(10.22)	(1.93)	(12.15)
Total	157	991**	99	29***	128
%			(9.98)	(2.93)	(12.92)
JOWAI					
≤ 19	1	1	0	0	0
%			(0.00)	(0.00)	(0.00)
20-29	45	96	8	2	10
%			(8.33)	(2.10)	(10.42)
30-39	120	421	35	12	47
%			(8.31)	(2.90)	(11.20)
≥ 40	110	563	56	13	69
%			(10.45)	(2.31)	(12.30)
Total	276	1081**	99	27	126
%			(9.20)	(2.50)	(11.70)

*Current pregnancies are not included.
** Includes 12 twin births in Sanaro village and 9 twin births in Jowai town.
*** Includes 1 twin still birth in Sanaro village.

Frequency of reproductive wastages among the Pnars of Sanaro village and Jowai town is given in Table 4.12. It shows that, there are 157 mothers in Sanaro village who have had 991 pregnancies, of which 9.98% have terminated into abortions and 2.93% into stillbirths. In Jowai town, there are 276 mothers who have had 1081 pregnancies, of which 9.20% have terminated into abortions and 2.50% into stillbirths. The overall frequency of reproductive wastages (abortion and still births) is found to be 12.92% and 11.70% of all pregnancies in Sanaro village and Jowai town respectively. Table 4.12

further reveals the frequency of reproductive wastage by age of mothers. The frequency of reproductive wastage in Sanaro village is found highest in the age group 30-39 years (14.80%) and lowest in the age group 20-29 years (9.89%). In Jowai town, the same is highest in the age group ≥ 40 years (12.30%) which then decreases to 11.20% in the age group 30-39 years and 10.42% in age group 20-29 years.

Table 4.13. Surviving sibship size of Pnar married women

Total number of mothers	Number of Surviving Children (N = 157 for SANARO and 276 for JOWAI)													Average no. of surviving children per mother
	0	1	2	3	4	5	6	7	8	9	10	11	12	
SANARO														
157	6 (3.82)	24 (15.30)	28 (17.83)	23 (14.65)	22 (14.01)	14 (8.92)	14 (8.92)	15 (9.60)	5 (3.20)	2 (1.30)	3 (1.91)	0 (0.00)	1 (0.64)	3.81
JOWAI														
276	4 (1.45)	42 (15.22)	62 (22.50)	48 (17.40)	53 (19.20)	34 (12.32)	16 (5.91)	9 (3.30)	5 (1.81)	3 (1.11)	0 (0.00)	0 (0.00)	0 (0.00)	3.33

Table 4.13 shows the surviving sibship size by the number of married women among the Pnars. It shows that there are altogether 157 married women in Sanaro village who have had 596 surviving children, whereas, in Jowai town there are altogether 276 married women who have had 918 surviving children. The average number of surviving children per mother is slightly higher in Sanaro village (3.81) than in Jowai town (3.33).

The above table also shows that, in Sanaro, there are 6 mothers (i.e., 3.82% of all married women), who have no surviving child. There are 28 mothers (17.83%), who are in majority and are having 2 surviving children each. It is followed by 15.30% of all mothers, who have 1 surviving children each. It is also observed that less than 1% of all

mothers (0.00% or 0.64%) have had 11 or 12 surviving children each. The rest of the mothers are having 3 to 10 surviving children each.

The above table further shows that, in Jowai town, there are 4 mothers (i.e., 1.45% of all married women), who have no surviving child. There are 62 mothers (22.50%), who are in majority and are having 2 surviving children each. It is followed by 19.20% of all mothers, who have 4 surviving children each. It is also observed that less than 2% of all mothers (1.81% or 1.11%) have had 8 or 9 surviving children each.

Table 4.14. Age Specific Marital Fertility Rate of the Pnar married women

Age-class no.	Age group (in years)	SANARO			JOWAI		
		No. of married women	No. of live births	Age-specific marital fertility	No. of married women	No. of live births	Age-specific marital fertility
3	15-19	157	201	1.2803	276	53	0.1920
2	20-24	156	323	2.0710	275	316	1.1490
3	25-29	122	238	1.9508	268	450	1.6791
4	30-34	97	173	1.7835	230	267	1.1608
5	35-39	74	108	1.4594	173	101	0.5838
6	40-44	37	35	0.9459	110	12	0.1090
7	45+	18	1	0.0555	47	0	0.0361
Total Marital Fertility Rate			1079	6.8726		1199	4.3442

The age specific marital fertility rate among the Pnars of Sanaro village and Jowai town is shown in Table 4.14. It shows that the age specific marital fertility rate in Sanaro village exceeds their Jowai town counterparts in all the age groups. It reaches its highest peak in the age group 20-24 years (2.0710) in Sanaro village and 25-29 years (1.6791) in Jowai town. In Sanaro village, the age specific marital fertility rate tends to increase from 1.2803 in the age group 15-19 years to 2.0710 in the age group 20-24 years and thereafter

it steeply decreases from 1.9508 in age group 25-29 years to 0.0555 in age group 45+ years. In Jowai town, the age specific marital fertility rate increases among mothers in the age group 15-19 years to mothers in the age group 25-29 years. The age specific marital fertility rate in this period increases from 0.1920 to 1.6791 and, thereafter, it steeply decreases from 1.1608 in age group 30-34 years to 0.0361 in age group 45+ years. The above table further reveals that the total marital fertility rate (T. M. F. R.) is found to be higher among the Pnars of Sanaro village (6.8726) than the Jowai town (4.3442). The total marital fertility rate in Sanaro village seems to be fairly high although the same in Jowai town seems to be fairly moderate. Figure 1.3 depicts the age specific marital fertility rate among the Pnars of Sanaro village and Jowai town.

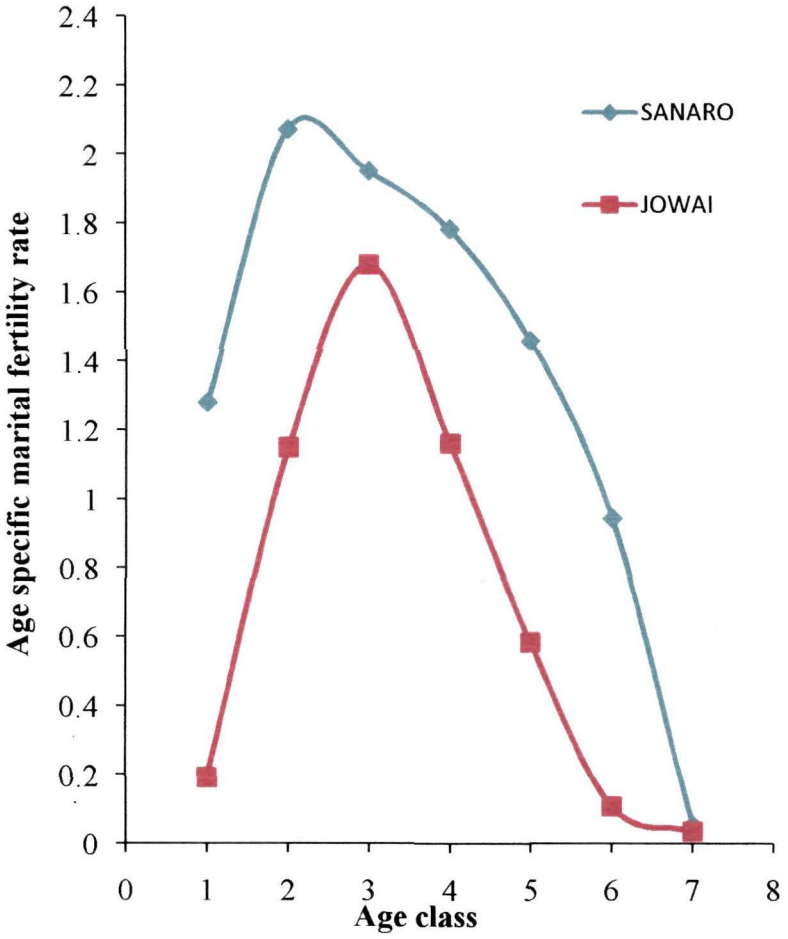


Fig. 1.3: Age Specific Marital Fertility Rate of the Pnars in Sanaro village and Jowai town.

CHAPTER V

BIO-SOCIAL DETERMINANTS

In this chapter, we shall describe the various biological and socio-economic factors determining the infant and child mortality among the Pnars of Sanaro village and Jowai town in Jaintia Hills District, Meghalaya.

Table 5.1. Percentage frequency of infant and child mortality by age group of the Pnar mothers

Age group of mothers	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
19 years and below	1	1	0	0
(%)			(0.00)	(0.00)
20 – 29 years	59	167	39	23
(%)			(23.35)	(13.77)
30 – 39 years	60	386	53	67
(%)			(13.73)	(17.36)
40 years and above	37	321	31	66
(%)			(9.66)	(20.56)

- *χ^2 between live births and infant mortality in respect of mothers' age group is 13.44, df = 3, $p < 0.005$*
- *χ^2 between live births and child mortality in respect of mothers' age group is 2.68, df = 3, $p > 0.05$*

JOWAI				
19 years and below	1	1	0	0
(%)			(0.00)	(0.00)
20 – 29 years	45	86	3	1
(%)			(3.49)	(1.16)
30 – 39 years	119	376	11	4
(%)			(2.93)	(1.06)
40 years and above	110	499	14	11
(%)			(2.81)	(2.20)

- *χ^2 between live births and infant mortality in respect of mothers' age group is 0.14, df = 3, $p > 0.05$*
- *χ^2 between live births and child mortality in respect of mothers' age group is 8.05, df = 3, $p < 0.05$*

Table 5.1 shows the percentage frequency of infant and child mortality by age group of the mothers in Sanaro village and Jowai town. It is observed that the percentage of infant mortality are inversely associated to the mother's age group in both the study areas excepting in the lowest age group (i.e., $\leq$ 19 years) where, there are only 1 mother and 1

live birth each. It ranges from 23.35% in the age group 20-29 years to 9.66% in the age group ≥ 40 years in Sanaro village. In Jowai town, the percentage of infant mortality decreases from 3.49% to 2.81% respectively. However, the relationship between the infant mortality and mother's age group is statistically significant in Sanaro village (χ^2 = 13.44, df = 3, $p < 0.005$). However, the same is not significant in Jowai town (χ^2 = 2.68, df = 3, $p > 0.05$).

The above table further shows that, unlike the infant mortality, the child mortality in Sanaro village is inversely related to the mother's age group. It is found highest in the age group ≥ 40 years (20.56%) followed by 30-39 years (17.36%) and then 20-29 years (13.77%). In Jowai town, the highest occurrence of child mortality is recorded in the age group ≥ 40 years (2.20%) followed by 20-29 years (1.16%) and then 30-39 years (1.06%). There was no child death in the age group ≤ 19 years in both the study areas. χ^2 test between the live births and child mortality do not show significant association with mothers' age in Sanaro village but the same has significant association in Jowai town (χ^2 = 8.05, df = 3, $p < 0.05$).

Table 5.2. Percentage frequency of mortality by age at menarche of the Pnar mothers

Age at menarche	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
12 years and below	20	122	26	22
(%)			(21.31)	(18.03)
13 years	49	264	38	57
(%)			(14.39)	(21.59)
14 years	47	267	29	38
(%)			(10.86)	(14.23)
15 years	24	143	17	24
(%)			(11.89)	(16.78)
16+ years	17	79	13	15
(%)			(16.46)	(18.99)

- *χ^2 between live births and infant mortality in respect of mothers' age at menarche is 8.52, df = 4, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' age at menarche is 3.55, df = 4, p > 0.05*

JOWAI				
12 years and below	37	133	2	2
(%)			(1.50)	(1.50)
13 years	67	213	4	4
(%)			(1.88)	(1.88)
14 years	91	331	14	4
(%)			(4.23)	(1.21)
15 years	49	180	5	4
(%)			(2.78)	(2.22)
16+ years	32	105	3	2
(%)			(2.86)	(1.90)

- *χ^2 between live births and infant mortality in respect of mothers' age at menarche is 3.56, df = 4, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' age at menarche is 0.85, df = 4, p > 0.05*

Occurrence of infant and child mortality by age at menarche of the mothers is shown in Table 5.2. There is no consistent pattern in respect of the infant as well as the percentage of child mortality in both the study areas. However, the highest percentage of infant mortality is recorded among mothers attaining their menarcheal age at $\leq$ 12 years (21.31%) and lowest at 14 years (10.86%) in Sanaro village. The highest percentage of child mortality is recorded among mothers who attain their menarcheal age at 16 years (18.99%), whereas, the lowest is recorded at 14 years (14.23%). In Jowai town, the

percentage of infant mortality is found highest among the mothers who have attained their menarcheal age at 14 years (4.23%) and lowest at ≤ 12 years (1.50%). Highest percentage of child mortality was recorded among the mothers who have attained their menarcheal age at 15 years (2.22%). The same is found lowest at 14 years (1.21%) of age. The χ^2 test between live births and infant mortality in respect of mothers' age at menarche is not found significant ($\chi^2 = 8.52$, df = 4, $p > 0.05$) in Sanaro and ($\chi^2 = 3.56$, df = 4, $p > 0.05$) in Jowai town. χ^2 test between live births and child mortality in respect of mothers' age at menarche also shown no significant association in both the study areas (i.e., Sanaro, $\chi^2 = 3.55$, df = 4, $p > 0.05$; and Jowai town, $\chi^2 = 0.85$, df = 4, $p > 0.05$).

Table 5.3A. Percentage frequency of infant and child mortality by age at marriage of the Pnar mothers

Age at marriage	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
19 years and below	138	763	112	133
(%)			(14.68)	(17.43)
20 years and above	19	112	11	23
(%)			(9.82)	(20.54)

- *χ^2 between live births and infant mortality in respect of mothers' age at marriage is 1.49, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' age at marriage is 9.12, df = 1, p < 0.005*

JOWAI				
19 years and below	67	282	16	2
(%)			(5.67)	(0.71)
20 years and above	209	680	12	14
(%)			(1.76)	(2.06)

- *χ^2 between live births and infant mortality in respect of mothers' age at marriage is 10.03, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of mothers' age at marriage is 2.16, df = 1, p > 0.05*

Table 5.3A shows the percentage frequency of infant and child mortality by age at marriage of the Pnar mothers of Sanaro village and Jowai town. For the present study, mother's age at marriage is categorised into 19 years and below, and 20+ years. The

percentage of infant mortality among the mothers who married at the age of 19 years and below are 14.68% for Sanaro village and 5.67% for Jowai town. The same are 9.82% and 1.76% among the mothers who married at the age of 20 years and above respectively. Unlike in the case of infant mortality, the percentages of child mortality are found to be higher among mothers who married at the age of 20 years and above in both the study areas. The percentages of child mortality among mothers marrying at 19 years and below are 17.43% and 0.71% for Sanaro village and Jowai town respectively. These are 20.54% and 2.06% among the mothers who married at the age of 20 years and above respectively. The above table shows that, χ^2 test between live births and infant mortality in respect of mothers' age at marriage is significant only in Jowai town (χ^2 = 10.03, df = 1, $p < 0.005$). However, χ^2 test between the live births and child mortality in respect of mothers' age at marriage is significantly associated in only Sanaro village (χ^2 = 9.12, df = 1, $p < 0.005$).

Regression of age at marriage of the Pnar mothers of Sanaro village and Jowai town on independent factors is given in Table 5.3B. Of all the independent variables included in the model, mother's age at marriage is significantly influenced by maternal occupation, maternal education and family types. The above table also shows that the association between mother's age at marriage with maternal occupation ($B = 0.042 \pm 0.020$, $p < 0.05$) and maternal education ($B = 0.182 \pm 0.030$, $p < 0.01$) which are positive but it is negative in the case of family types ($B = -0.101 \pm 0.045$, $p < 0.05$). In other words, higher educational level and better occupation of the mothers is found to be significantly

associated with greater age at marriage of the mothers. Further, mothers belonging to nuclear family have married earlier than those living in the joint families.

Table 5.3B. Regression of age at marriage of the Pnar mothers on independent factors

Parameters	Coefficients of regression (B) and its Standard Error (SE)	t – value	p – level
	B ± SE		
Age at marriage			
Residence (Rural/Urban)	0.158 ± 0.089	1.775	Insignificant
Maternal occupation	0.042 ± 0.020	2.124	Significant at 5%
Paternal occupation	0.060 ± 0.043	1.402	Insignificant
Maternal education	0.182 ± 0.030	2.124	Significant at 1%
Paternal education	- 0.013 ± 0.031	- 0.434	Insignificant
Religion	- 0.074 ± 0.050	- 1.483	Insignificant
Household income	- 0.001 ± 0.024	- 0.048	Insignificant
Family types	- 0.101 ± 0.045	- 2.234	Significant at 5%
Constant	0.943 ± 0.138	6.832	Significant t 1%

Table 5.4A. Percentage frequency of infant and child mortality by birth spacing (based on the last two child births)

Residence	Duration (in years)	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO	1 year	69	366	69 (18.85)	73 (19.95)
	2 years	66	414	45 (10.87)	70 (16.91)
	3 years	13	73	8 (10.96)	9 (12.33)
	4 years	4	17	1 (5.88)	4 (23.53)
	5 years	0	0	0 (0.00)	0 (0.00)
	6+ years	0	0	0 (0.00)	0 (0.00)
	Coefficient of correlation (r)			- 0.17*	- 0.05

Contd.

JOWAI	1 year	61	240	8 (3.33)	5 (2.08)
	2 years	80	298	8 (2.68)	5 (1.68)
	3 years	41	147	1 (0.68)	3 (2.04)
	4 years	26	100	2 (2.00)	2 (2.00)
	5 years	16	69	3 (4.35)	0 (0.00)
	6+ years	21	72	5 (6.94)	0 (0.00)
	Coefficient of correlation (r)			0.07	- 0.08

*$p < 0.05$

Table 5.4A shows the percentage frequency of infant and child mortality by birth spacing among the Pnars of Sanaro village and Jowai town. It shows that the duration between the last two child births were much longer in Jowai town compared to their Sanaro counterparts. It ranges between 1 and 4 years in Sanaro, whereas, 1 and 6+ years in Jowai. Frequency of infant mortality is inversely associated with birth spacing in Sanaro village. Highest percentage frequency of infant mortality was recorded in the spacing duration of 1 year (18.85%) and then gradually decreases as the birth spacing period increases to 4 years (5.88%) in general. Highest percentage of child mortality was recorded in the birth spacing period of 4 years (23.53%) followed by 1 year (19.95%) and least was recorded in the 3 years (12.33%). The coefficient of correlation (r) shows a negative relationship between birth spacing and infant mortality as well as the child mortality in Sanaro village although it is not statistically significant in the later (Infant mortality: $r = - 0.17$, $p < 0.05$; Child mortality: $r = - 0.05$, $p > 0.05$).

The above table further shows that there is no consistent pattern in respect of both the infant and child mortality in Jowai town. Mothers having the greatest birth spacing (i.e., 6+ years) recorded the highest percentage of infant mortality (6.94%) and the least recorded by 3 years (0.68%). But, the percentage of child mortality in the same area is more or less similar in all the birth spacing durations with no child death in 5 and 6+ years. However, it is found highest in the spacing period of 1 year (2.08%) followed by 3 years (2.04%) and least in 2 years (1.68%) spacing. The relationship between birth spacing and infant as well as child mortality in this area are statistically not significant.

Table 5.4B. Regression of birth spacing of the Pnar mothers on independent factors (based on the last two child births)

Parameters	Coefficients of regression (B) and its Standard Error (SE) B ± SE	t – value	p – level
Duration between births			
Residence (Rural/Urban)	1.175 ± 0.341	3.447	Significant at 1%
Maternal occupation	0.012 ± 0.098	0.122	Insignificant
Maternal education	0.004 ± 0.137	0.029	Insignificant
Religion	- 0.007 ± 0.231	- 0.030	Insignificant
Household income	0.243 ± 0.114	2.131	Significant at 5 %
Family size	- 0.136 ± 0.120	- 1.132	Insignificant
Constant	0.338 ± 0.587	0.576	Significant at 5%

Regression of birth spacing among the Pnar mothers (Sanaro and Jowai combined) on independent factors which are based on the last two child births is shown in Table 5.4B. Among all independent variables, only residence (rural/urban) ($B = 1.175 \pm 0.341$, $p < 0.01$) and household income ($B = 0.243 \pm 0.114$, $p < 0.05$) are significantly related to

birth spacing. It indicates that the spacing between births is greater in urban area as compared to their rural counterparts. Likewise, it also increases along with the increasing income level in the present population. So, place of residence and household income are the most important factors influencing the birth spacing in the Pnar population of Jaintia Hills.

Table 5.5. Percentage frequency of infant and child mortality by education of the Pnar mothers

Educational levels	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Illiterate	110	658	99	126
(%)			(15.05)	(19.15)
Primary	41	172	21	23
(%)			(12.21)	(13.37)
Secondary	6	44	3	7
(%)			(6.82)	(15.91)
Higher secondary+	0	0	0	0
(%)			(0.00)	(0.00)

- *χ^2 between live births and infant mortality in respect of mothers' education is 2.29, df = 2, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' education is 2.30, df = 2, p > 0.05*

JOWAI				
Illiterate	0	0	0	0
(%)			(0.00)	(0.00)
Primary	36	161	10	5
(%)			(6.21)	(3.11)
Secondary	94	344	8	5
(%)			(2.33)	(1.45)
Higher secondary+	146	457	10	6
(%)			(2.19)	(1.31)

- *χ^2 between live births and infant mortality in respect of mothers' education is 8.69, df = 2, p < 0.025*
- *χ^2 between live births and child mortality in respect of mothers' education is 2.36, df = 2, p > 0.05*

Table 5.5 shows the percentage frequency of infant and child mortality by education of the Pnar mothers. It is observed that there are 110 mothers who are illiterate and not a

single mother with higher secondary and above level of education in Sanaro village, whereas, all the mothers in Jowai town are literate. The percentage frequency of infant mortality in Sanaro village is inversely associated with the mother's education as it varies from 6.82% among secondary and above level to 15.05% among the illiterate mothers. The percentage of child mortality in the same village is recorded highest among the illiterate mothers (19.15%), which are followed by secondary educated mothers (15.91%), and lowest was found in primary educated mothers (13.37%). χ^2 test between the live births and infant and child mortality is not significantly associated with the mothers' education in Sanaro village. However, the χ^2 test between live births and infant mortality in respect of mothers' education is significantly associated in Jowai town ($\chi^2 = 8.69$, df = 2, $p < 0.025$). The infant mortality varies from 6.21% among primary educated mothers to 2.19% among higher secondary and above level whereas the child mortality varies from 3.11% to 1.31% respectively. Therefore, mother's education is found to be an important factor in regulating the infant mortality in Jowai town only.

The percentage frequency of infant and child mortality by occupation among the Pnar mothers is given in Table 5.6. Most of the mothers (154) are engaged in cultivation and only few (3) are in service. Higher infant and child mortality are recorded in the cultivator mothers in Sanaro village despite the absence of statistically significance. The occurrences of infant mortality in this area are 14.34% for cultivators and 4.35% for service holders whereas the child mortality in the same area are 18.10% and 8.70% respectively. In Jowai town, the percentage of infant mortality is recorded to be highest among the cultivators (9.68%) followed by those who run business (3.66%), housewives

(3.02%) and then employees (2.29%). The child mortality in the same area are 2.01%, 1.22% and 1.76% for housewives, business and services respectively. No child death was recorded among the cultivators. χ^2 test between live births and infant and child mortality do not show significant relationship in respect of mothers' occupation in both the study areas.

Table 5.6. Percentage frequency of infant and child mortality by occupation of the Pnar mothers

Occupation	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Housewives	0	0	0	0
(%)			(0.00)	(0.00)
Cultivators	154	851	122	154
(%)			(14.34)	(18.10)
Business	0	0	0	0
(%)			(0.00)	(0.00)
Services	3	23	1	2
(%)			(4.35)	(8.70)

- *χ^2 between live births and infant mortality in respect of mothers' occupation is 1.52, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' occupation is 1.02, df = 1, p > 0.05*

JOWAI				
Housewives	58	199	6	4
(%)			(3.02)	(2.01)
Cultivators	9	31	3	0
(%)			(9.68)	(0.00)
Business	40	164	6	2
(%)			(3.66)	(1.22)
Services	169	568	13	10
(%)			(2.29)	(1.76)

- *χ^2 between live births and infant mortality in respect of mothers' occupation is 5.41, df = 3, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' occupation is 1.17, df = 3, p > 0.05*

Table 5.7. Percentage frequency of infant and child mortality by religion of the Pnar mothers

Religion	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Non-Christian	0	0	0 (0.00)	0 (0.00)
Christian (%)	157	875	123 (14.06)	156 (17.83)
JOWAI				
Non-Christian (%)	111	418	18 (4.31)	12 (2.87)
Christian (%)	165	544	10 (1.84)	4 (0.74)

- *χ^2 between live births and infant mortality in respect of religion in Jowai town is 4.79, df = 1, $p < 0.05$*
- *χ^2 between live births and child mortality in respect of religion in Jowai town is 6.36, df = 1, $p < 0.025$*

Table 5.7 shows the percentage frequency of infant and child mortality by religion of the Pnar mothers in Sanaro village and Jowai town. It is seen that all the mothers in Sanaro village are Christian although a large number of Non-Christians Pnars also reside in Jowai town. The infant as well as the child mortality in Jowai town are found to be significantly higher among Non-Christians than their Christian counterparts. The infant mortality are 4.31% for Non-Christians and 1.84% for Christians, whereas, the child mortality are 2.87% and 0.74% respectively. The χ^2 test between live births and infant mortality in respect of religion is significantly associated in Jowai town ($\chi^2 = 4.79$, df = 1, $p < 0.05$) whereas the same is statistically significant in respect of child mortality also ($\chi^2 = 6.36$, df = 1, $p < 0.025$).

Table 5.8. Percentage frequency of infant and child mortality by monthly household income of the Pnar family

Income Groups	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
LIG (Rs. < 1500)	63	306	52	61
(%)			(16.99)3	(19.93)
MIG (Rs. 1500 - 3000)	68	392	50	70
(%)			(12.76)	(17.86)
HIG (Rs. > 3000)	26	176	21	25
(%)			(11.93)	(14.20)

- *χ^2 between live births and infant mortality in respect of household income is 2.32, df = 2, p > 0.05*
- *χ^2 between live births and child mortality in respect of household income is 1.77, df = 2, p > 0.05*

JOWAI				
LIG (Rs. < 19000)	133	469	14	12
(%)			(2.99)	(2.56)
MIG (Rs. 19000 - 29000)	73	256	4	2
(%)			(1.56)	(0.78)
HIG (Rs. > 29000)	70	237	10	2
(%)			(4.22)	(0.84)

- *χ^2 between live births and infant mortality in respect of household income is 2.92, df = 2, p > 0.05*
- *χ^2 between live births and child mortality in respect of household income is 4.35, df =2, p > 0.05*

The percentage frequency of infant and child mortality by monthly household income of the Pnar family is given in Table 5.8. The amount for income groups in the two study areas were calculated separately as their monthly income varies among them. The income groups were categorised into Low Income Group (LIG), Middle Income Group (MIG) and High Income Group (HIG). In Sanaro village, households having monthly income of Rs < 1500, Rs. 1500 – 3000 and Rs. > 3000 were categorised as LIG, MIG and HIG respectively. In Jowai town, these are Rs. < 19000, Rs. 19000 – 29000 and Rs. > 29000 respectively.

The above table shows that the percentages of infant mortality as well as the child mortality are inversely related to household income in Sanaro village, their relationships are statistically not significant. The percentage of infant mortality in this area decline from 16.99% among LIG to 11.93% among HIG whereas the child mortality varies from 19.93% to 14.20% respectively. The above table further shows that the percentage of infant mortality among the LIG, MIG and HIG in Jowai town are 2.99%, 1.56% and 4.22% respectively, whereas, the child mortality are 2.56%, 0.78% and 0.84% respectively. The χ^2 test between live births and infant and child mortality in respect of household income are statistically not significant in Jowai town.

Table 5.9. Percentage frequency of infant and child mortality by types of family

Types of family	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Nuclear	135	788	114	143
(%)			(14.47)	(18.15)
Joint	22	87	9	13
(%)			(10.34)	(14.94)

- *χ^2 between live births and infant mortality in respect of family types is 0.85, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of family types is 6.12, df = 1, p < 0.025*

JOWAI				
Nuclear	179	635	15	10
(%)			(2.36)	(1.57)
Joint	97	327	13	6
(%)			(3.98)	(1.83)

- *χ^2 between live births and infant mortality in respect of family types is 1.86, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of family types is 14.08, df = 1, p < 0.005*

Table 5.9 shows the percentage frequency of infant and child mortality by types of the Pnar family. It is observed from the above table that the frequency of infant and child mortality in Sanaro village are found higher in nuclear family than in joint family. The

percentage of infant mortality in this area are 14.47% for nuclear family and 10.34% for joint family, whereas, the child mortality are 18.15% and 14.94% respectively. Unlike in Sanaro, the percentages of infant and child mortality in Jowai town are found higher in joint families compared to the nuclear families. The percentages of infant mortality in this area are 2.36% for nuclear family and 3.98% for joint family. The child mortality in the same area are 1.57% and 1.83% respectively. χ^2 test between live births and child mortality in respect of family types in both the study areas are statistically significant (Sanaro: $\chi^2 = 6.12$, df = 1, $p < 0.025$; Jowai: $\chi^2 = 14.08$, df = 1, $p < 0.025$). However, infant mortality in respect of family type do not show any significant association in both the study areas.

Table 5.10. Percentage frequency of infant and child mortality by size of family

Size of family	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Small	49	311	41	49
(%)			(13.18)	(15.76)
Medium	54	302	46	56
(%)			(15.23)	(18.54)
Large	54	262	36	51
(%)			(13.74)	(19.47)

- *χ^2 between live births and infant mortality in respect of family size is 2.46, df = 2, p > 0.05*
- *χ^2 between live births and child mortality in respect of family size is 1.05, df = 2, p > 0.05*

JOWAI				
Small	43	72	2	0
(%)			(2.78)	(0.00)
Medium	85	279	8	2
(%)			(2.87)	(0.72)
Large	148	611	18	14
(%)			(2.95)	(2.29)

- *χ^2 between live births and infant mortality in respect of family size is 21.63, df = 2, p < 0.005*
- *χ^2 between live births and child mortality in respect of family size is 4.11, df = 2, p > 0.05*

Percentage frequency of infant and child mortality by size of the Pnar family in Sanaro village and Jowai town is shown in Table 5.10. Households having less than 5 members are categorised as Small whereas households having 5-6 members and more than 6 members are categorised as Medium and Large size families respectively. The above table shows that medium size family recorded the highest infant mortality whereas it is the large size family for the highest percentage of child mortality in Sanaro village. The percentages of infant mortality in this area are 13.18%, 15.23% and 13.74% for small, medium and large size families. The percentages of child mortality in the same area are 15.76%, 18.54% and 19.47% respectively. In Jowai town, there is a slight increase in the infant mortality from small to large size families as it is varying from 2.78% to 2.95% respectively. The child mortality as well is higher in large size family (2.29%) than in medium size family (0.72%) with no child death in small size family. χ^2 test between live births and child mortality do not show significant association. However, the χ^2 test between live births and infant mortality shows significant association in respect of family size ($\chi^2 = 21.63$, df = 2, $p < 0.005$) in Jowai town only.

Table 5.11. Percentage frequency of infant and child mortality by house type of the Pnars

House type	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Kaccha	96	537	79	87
(%)			(14.71)	(16.20)
Semi-pucca	61	338	44	69
(%)			(13.02)	(20.41)
Pucca	0	0	0	0
(%)			(0.00)	(0.00)

- *χ^2 between live births and infant mortality in respect of house type is 0.37, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of house type is 1.74, df = 1, p > 0.05*

Contd.

JOWAI				
Kaccha	0	0	0	0
(%)			(0.00)	(0.00)
Semi-pucca	151	513	15	10
(%)			(2.92)	(1.95)
Pucca	125	449	13	6
(%)			(2.90)	(1.34)

- *χ^2 between live births and infant mortality in respect of house type is 17.67, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of house type is 9.18, df = 1, p < 0.005*

Table 5.11 shows the percentage frequency of infant and child mortality by house type among the Pnars of Sanaro village and Jowai town. No pucca house was found in Sanaro and no kaccha house in Jowai town. The infant mortality in Sanaro village is recorded slightly higher in kaccha (14.71%) than in semi-pucca houses (13.02%). But, it is reverse in case of the occurrence of child mortality where the higher percentage is recorded in semi-pucca (20.41%) than in kaccha houses (16.20%). In Jowai town, the percentage frequency of infant mortality in semi-pucca (2.92%) and pucca (2.90%) houses are almost equal, although the child mortality in the same area is found higher in semi-pucca (1.95%) than in pucca (1.34%) houses. The χ^2 test between live births and infant mortality and child mortality shows no significant association in respect of house type in Sanaro village. However, in Jowai town, χ^2 test between live births and infant mortality ($\chi^2 = 17.67$, df = 1, $p < 0.005$) and child mortality ($\chi^2 = 9.18$, df = 1, $p < 0.005$) shows significant association. This indicates that house types influence infant and child mortality only in the urban areas i.e., Jowai town but not in Sanaro village.

Table 5.12. Percentage frequency of infant and child mortality by types of toilet

Types of toilet	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Open field	148	840	121	153
(%)			(14.40)	(18.21)
Own pit	7	25	1	2
(%)			(4.00)	(8.00)
Septic tank	2	10	1	1
(%)			(10.00)	(10.00)

- *χ^2 between live births and infant mortality in respect of types of toilet in Sanaro is 9.67, df = 2, p < 0.01*
- *χ^2 between live births and child mortality in respect of types of toilet in Sanaro is 10.59, df = 2, p < 0.01*

JOWAI				
Open field	0	0	0	0
(%)			(0.00)	(0.00)
Own pit	0	0	0	0
(%)			(0.00)	(0.00)
Septic tank	276	962	28	16
(%)			(2.91)	(1.66)

The percentage frequency of infant and child mortality by types of toilet used by the Pnars of Jaintia Hills is given in Table 5.12. There are three types of toilets used viz, open field, own pit and septic tank in Sanaro village, whereas, there is only septic tank type toilet used in Jowai town. Infant mortality in Sanaro village found highest among those who use open field type (14.40%) followed by septic tank (10.00%) and then own pit type (4.00%). The same is also true in case of the child mortality. These are 18.21%, 10.00% and 8.00% respectively. χ^2 test between live births and infant mortality (χ^2 = 9.67, df = 2, p < 0.01) and child mortality (χ^2 = 10.59, df = 2, p < 0.01) shows significant association in respect of types of toilet used in Sanaro village.

Table 5.13. Percentage frequency of infant and child mortality by source of drinking water

Sources	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Pipe water	0	0	0 (0.00)	0 (0.00)
Protected well	0	0	0 (0.00)	0 (0.00)
Pipe water + protected well	157	875	123 (14.06)	156 (17.83)
JOWAI				
Pipe water	170	569	15 (2.64)	9 (1.58)
Protected well	59	208	10 (4.81)	5 (2.40)
Pipe water + protected well	47	185	3 (1.62)	2 (1.08)

- *χ^2 between live births and infant mortality in respect of source of water in Jowai is 7.69, df = 2, $p < 0.025$*
- *χ^2 between live births and child mortality in respect of source of water in Jowai is 10.89, df = 2, $p < 0.005$*

Table 5.13 shows the percentage frequency of infant and child mortality by source of drinking water among the Pnars. From the above table it is observed that there is only one type of water source in Sanaro village (i.e., pipe water + protected well), whereas, there are three different types of water source exist in Jowai town (i.e., pipe water, protected well and pipe water + protected well). In Jowai town, the percentage of both the infant and child mortality is found highest among those Pnar households whose source of drinking water is protected well. The percentage frequency of infant mortality in this area are 4.81%, 2.64% and 1.62% for protected well, pipe water and pipe water + protected well respectively. Child mortality in the same area are 2.40%, 1.58% and 1.08%

respectively. χ^2 test between live births and both the infant mortality ($\chi^2 = 7.69$, df = 2, p < 0.025) and child mortality ($\chi^2 = 10.89$, df = 2, p < 0.005) are significantly associated with types of source of water used in Jowai town.

Table 5.14A shows the characteristics of antenatal care (ANC) among the Pnar mothers in Sanaro village and Jowai town (based on the last pregnancy). Out of 157 mothers in Sanaro village, 98 (62.42%) have visited ANC during pregnancy. In Jowai town, out of 276 mothers, almost all (i.e., 99.28%) have visited ANC. The difference between the two study areas in respect of ANC visit of mothers is highly significant ($\chi^2 = 67.81$, df = 1, p < 0.005). The number of ANC visit is found to be higher in Jowai town as 56.16% mothers in this area have visited for 6 or more times, whereas, it is only 4.46% in Sanaro village. In general the numbers of mothers are inversely related to the number of ANC visit in Sanaro village, whereas, it is more or less corresponding in Jowai town. The χ^2 value also shows a highly significant difference between the two study areas in this respect ($\chi^2 = 110.03$, df = 6, p < 0.005). Stage of pregnancy is categorised into 1st trimester (the 1-3 months of pregnancy), 2nd trimester (4-6 months of pregnancy) and 3rd trimester (7-9 months of pregnancy). It is observed that the highest number of mothers (35.67%) in Sanaro village visited ANC during the 2nd trimester with the least (8.92%) in the 3rd trimester. But, in Jowai town, majority of the mothers (59.06%) have visited ANC during 1st trimester followed by 2nd trimester (38.77%) and 3rd trimester (1.45%). The difference between the two study areas is also statistically significant ($\chi^2 = 25.60$, df = 2, p < 0.005).

Table 5.14A. Characteristics of antenatal care (ANC) among the Pnar mothers in Sanaro village and Jowai town (based on the last pregnancy)

Characters	SANARO (N = 157)		JOWAI (N = 276)		χ^2 value
	No.	Percentage	No.	Percentage	
ANC visit					
No	59	37.58	2	0.72	$\chi^2 = 67.81$, df = 1, $p < 0.005$
Yes	98	62.42	274	99.28	
No. of ANC visit					
0	59	37.58	2	0.72	$\chi^2 = 110.03$, df = 6, $p < 0.005$
1	25	15.92	0	0.00	
2	31	19.75	7	2.54	
3	28	17.83	23	8.33	
4	5	3.18	45	25.58	
5	2	1.27	44	15.94	
6+	7	4.46	155	56.16	
Stage of pregnancy at 1st ANC visit					
1st trimester	28	17.83	163	59.06	$\chi^2 = 25.60$, df = 2, $p < 0.005$
2nd trimester	56	35.67	107	38.77	
3rd trimester	14	8.92	4	1.45	
Received of tetanus toxoid injection					
No	97	61.78	2	0.53	$\chi^2 = 122.62$, df = 1, $p < 0.005$
Yes	60	38.22	274	72.87	
Received of iron and folic acid tablet					
No	77	49.04	2	0.72	$\chi^2 = 92.01$, df = 1, $p < 0.005$
Yes	80	50.95	274	99.28	
Blood pressure tested					
No	116	73.88	2	0.72	$\chi^2 = 152.02$, df = 1, $p < 0.005$
Yes	41	26.11	274	99.28	

The above table also shows that 38.22% of mothers had received tetanus toxoid injections in Sanaro village, whereas, 72.87% in Jowai town. The χ^2 test shows that the number of mothers who received tetanus injection is significantly higher in Jowai town compared to their Sanaro counterparts ($\chi^2 = 122.62$, df = 1, $p < 0.005$). Sanaro village shows not much difference between mothers who received and did not received iron and folic acid tablet. But, in Jowai town, almost all (i.e., 99.28%) were reported to have received the same. Comparing the two areas, the difference in this respect is highly significant ($\chi^2 = 92.01$, df = 1, $p < 0.005$). The percentages of mothers in Sanaro village (26.11%) were reported to have measured their blood pressure during pregnancy. In Jowai town almost all, i.e., 99.28% had measured it. The difference between the two study areas is statistically significant as well ($\chi^2 = 152.02$, df = 1, $p < 0.005$). So, it may be concluded that, mothers in Jowai town are much more advanced than their Sanaro counterparts in respect of ANC characteristics.

Table 5.14B shows the percentage frequency of infant and child mortality by ANC visit of the mothers during pregnancy. The percentage frequency of the infant mortality in Sanaro village is higher among those mothers who have visited ANC (15.85%) during pregnancy than those who did not (11.04%). But, the reverse is true in case of the child mortality. These are 18.71% of mothers who did not visit ANC and 17.30% who have visited. However, the association between ANC visit with the infant and child mortality are statistically significant in Jowai town. χ^2 test between live births and infant mortality ($\chi^2 = 21.26$, df = 1, $p < 0.005$) and child mortality ($\chi^2 = 12.08$, df = 1, $p < 0.005$) in

respect of ANC visit shows significant association in Jowai town whereas the same is not significantly associated in Sanaro village.

Table 5.14B. Percentage frequency of infant and child mortality by ANC visit of the Pnar mothers during pregnancy

ANC visit	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
No	59	326	36	61
(%)			(11.04)	(18.71)
Yes	98	549	87	95
(%)			(15.85)	(17.30)

- *χ^2 between live births and infant mortality in respect of ANC visit is 2.98, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of ANC visit is 0.19, df = 1, p > 0.05*

JOWAI				
No	2	5	2	0
(%)			(40.00)	(0.00)
Yes	274	957	26	16
(%)			(2.72)	(1.67)

- *χ^2 between live births and infant mortality in respect of ANC visit is 21.26, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of ANC visit is 12.08, df = 1, p < 0.005*

The percentage frequency of infant and child mortality by health problems of the Pnar mothers is shown in Table 5.15 which is based on the last pregnancies which shows that infant mortality is higher among mothers having health problem (14.78%) than those without health problem (11.71%) in Sanaro village although their association is statistically not significant (χ^2 = 0.93, df = 1, p > 0.05). The percentage of child mortality is higher among the mothers with no health problem (21.95%) than those who were having health problem (16.57%) despite not having statistical significance (χ^2 = 2.11, df = 1, p > 0.05). In Jowai town, the percentage of infant mortality is higher among mothers having health problem during pregnancy (3.93%) than to those without health

problem (1.98%). But, in respect of child mortality, the percentage is more or less similar among all the mothers. These are 1.53% and 1.78% respectively. However, the association between mother's health problem and infant mortality is statistically not significant among the Pnars of Jowai town (χ^2 = 3.04, df = 1, p > 0.05) but found significant association in respect of child mortality (χ^2 = 15.60, df = 1, p < 0.005).

Table 5.15. Percentage frequency of infant and child mortality by health problems of the Pnar mothers during pregnancy (based on the last pregnancy)

Health problems	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
No	35	205	24	45
(%)			(11.71)	(21.95)
Yes	122	670	99	111
(%)			(14.78)	(16.57)

- *χ^2 between live births and infant mortality in respect of mother's health problem is 0.93, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of mother's health problem is 2.11, df = 1, p > 0.05*

JOWAI				
No	141	504	10	9
(%)			(1.98)	(1.78)
Yes	135	458	18	7
(%)			(3.93)	(1.53)

- *χ^2 between live births and infant mortality in respect of mother's health problem is 3.04, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of mother's health problem is 15.60, df = 1, p < 0.005*

Table 5.16. Percentage frequency of infant and child mortality by place of delivery of the Pnar mothers (based on the last pregnancy)

Place of delivery	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
Home	145	791	110	144
(%)			(13.91)	(18.20)
Hospital	12	84	13	12
(%)			(15.48)	(14.29)

- *χ^2 between live births and infant mortality in respect of place of delivery is 11.42, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of place of delivery is 8.63, df = 1, p < 0.005*

Contd.

JOWAI				
Home	20	85	7	0
(%)			(8.24)	(0.00)
Hospital	253	877	21	16
(%)			(2.39)	(1.84)

- *χ^2 between live births and infant mortality in respect of place of delivery is 8.44, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of place of delivery is 3.74, df = 1, p > 0.05*

Table 5.16 shows the percentage frequency of infant and child mortality by place of delivery (based on the last pregnancy). It shows that the percentage of infant mortality in Sanaro village is higher among mothers whose delivery took place at hospital (15.48%) than those who delivered at home (13.91%). In contrast, the child mortality in the same area is higher among mothers who delivered at home (18.20%) than hospital (14.29%). χ^2 test between live births and infant mortality (χ^2 = 11.42, df = 1, p < 0.005) and child mortality (χ^2 = 8.63, df = 1, p < 0.005) in respect of place of delivery is significantly associated. However, in Jowai town place of delivery is associated significantly with infant mortality (χ^2 = 8.44, df = 1, p < 0.005) and not with child mortality.

Table 5.17. Percentage frequency of infant and child mortality by feeding of colostrums of the Pnars

Feeding of colostrums	No. of mothers	No. of live births	Infant mortality	Child mortality
SANARO				
No	5	25	1	7
(%)			(4.00)	(28.00)
Yes	152	850	122	149
(%)			(14.35)	(17.53)

- *χ^2 between live births and infant mortality in respect of feeding of colostrums is 7.45, df = 1, p < 0.01*
- *χ^2 between live births and child mortality in respect of feeding of colostrums is 6.67, df = 1, p < 0.01*

Contd.

JOWAI				
No	28	111	5	4
(%)			(4.50)	(3.60)
Yes	245	851	23	12
(%)			(2.70)	(1.41)

- *χ^2 between live births and infant mortality in respect of feeding of colostrums is 4.53, df = 1, p < 0.05*
- *χ^2 between live births and child mortality in respect of feeding of colostrums is 8.04 , df = 1, p < 0.005*

The percentage frequency of infant and child mortality by feeding of colostrums among the Pnars is shown in Table 5.17. It shows that the percentage of infant mortality in Sanaro village is found higher to those mothers who fed colostrums to their children (14.35%) than to those who did not feed them (4.00%). But, the reverse is true in case of the percentage frequency of child mortality, i.e., 28.00% for those who did not feed colostrums and 17.53% for those who fed them. In Jowai town, the infant as well as the child mortality are higher to those mothers who did not feed colostrums to their children. The percentage of infant mortality in this area is 4.50% for those who did not feed colostrums to their children whereas the same is 2.70% for those who fed them. The percentages of child mortality in the same area are 3.60% and 1.41% respectively. χ^2 test between live births and infant mortality and child mortality in both Sanaro village and Jowai town shows significant association in respect of feeding of colostrums.

Reported health problems

Table 5.18A. Self reported obstetric morbidity of the Pnar mothers during pregnancy

Health problems*	SANARO (N = 157)		JOWAI (N =276)	
	No.	Percentage	No.	Percentage
Cold/fever	7	4.46	5	1.81
Swelling of hands and legs	61	38.85	55	19.93
Paleness	43	27.39	0	0.00
Weakness/tiredness	117	74.52	48	17.39
Dizziness/vomiting	90	57.73	12	4.35
Visual disturbance	78	49.68	2	0.72
Bleeding	10	6.37	16	5.79
Convulsion	71	45.22	2	0.72
No movement of fetus	28	17.83	2	0.72
Others**	75	47.77	50	18.12
Overall morbidity***	127	80.89	144	52.17

*Based on the last pregnancy for the non-pregnant mothers at the time of survey.
** Others include stomachache, diarrhoea, dysentery, malaria, chronic pelvic pain, etc.
***Based on the number of mothers who suffered from at least one of the mentioned categories of health problems.

Table 5.18A shows self reported obstetric morbidity among the Pnar mothers based on their last pregnancy. It is observed that, the overall morbidity rate in Sanaro village is much higher (80.89%) than that of their Jowai counterparts (52.17%). Of the many health problems, weakness/tiredness (74.52%), other type of health problem (47.77%), visual disturbance (49.68%), convulsion (45.22%) and swelling of hands and legs (38.85%) are the main health problems faced in Sanaro village. On the other hand, swelling of hand and legs (19.93%), other health problems (18.12%) and weakness/ tiredness (17.39%) are the major health problems faced by the mothers during pregnancy in Jowai town.

Table 5.18B. Coefficients of the logistic regression of obstetric morbidity of the Pnar mothers (Sanaro and Jowai populations combined) during pregnancy on independent factors (based on the number of mothers who suffered from any health problems during the last pregnancy)

Parameters	Coefficients of regression (B) and its Standard Error (SE)			
	Model – 1		Model – 2	
	B	(±) SE	B	(±) SE
Obstetric morbidity				
Maternal age	- 0.063	0.042	-	-
No. of live births	0.007	0.014	-	-
Residence (Rural/Urban)	- 0.355**	0.119	- 0.425**	0.059
Maternal education	- 0.025	0.039	-	-
Paternal education	0.016	0.040	-	-
Household income	0.024	0.031	-	-
Maternal occupation	0.053*	0.026	0.047*	0.023
Paternal occupation	- 0.018	0.054	-	-
Family size	- 0.033	0.037	-	-
ANC attendance	0.295**	0.075	0.303**	0.074

*$p < 0.05$, **$p < 0.01$

Model - 1 includes obstetric morbidity and each independent variable.

Model - 2 includes only residence, maternal occupation and ANC attendance as covariates.

The coefficients of the logistic regression of obstetric morbidity of the Pnar mothers (Sanaro and Jowai populations combined) during pregnancy on independent factors is given in Table 5.18B. It shows that, of all the independent variables included in Model 1, the coefficient of regression (B) of mother's obstetric morbidity is negatively associated with residence (rural/urban) ($B = - 0.355 \pm 0.119$, $p < 0.01$), whereas it is positively associated with maternal occupation ($B = 0.053 \pm 0.026$, $p < 0.05$) and ANC attendance ($B = 0.295 \pm 0.075$, $p < 0.01$). In Model 2, we included only those independent variables which are significant in Model 1 to understand the relative importance of each

independent variables and found that all these variables are again significantly related with mother's obstetric morbidity. In other words, the obstetric morbidity rate in Sanaro village is higher than their Jowai counterpart. But, it is not clear why the obstetric morbidity rate is higher among mothers attending ANC than those who did not. However, those mothers who did not attend ANC during pregnancy are expected to underrate their health problems which abstain the medical check-up.

Table 5.19A. Self reported health problems of the Pnar mothers during the first week after delivery

Health problems*	**SANARO** (N = 157)		**JOWAI** (N =273)	
	No.	Percentage	No.	Percentage
Cold/fever	58	36.94	32	11.17
Excess bleeding	47	29.94	12	4.51
Dizziness/vomiting	38	24.20	4	1.47
Headache	77	49.04	19	6.99
Low abdominal pain	8	5.09	6	2.21
Others**	103	65.61	18	6.59
Overall morbidity***	124	78.98	72	26.37

*Based on the last delivery.
**Others include blood pressure, gastric, stomachache, diarrhoea, dysentery, malaria, chronic pelvic pain, etc.
***Based on the number of mothers who suffered from at least one of the mentioned categories of health problems.

Table 5.19A shows the self reported health problems of the Pnar mothers during the first week after delivery. The overall reported morbidity rate is found to be much higher in Sanaro village (78.98%) compared to their Jowai counterparts (26.37%). In Sanaro village, the most common health problems faced by the mothers during the first week after delivery are other types (65.61%) followed by headache (49.04%), cold/fever

(36.94%), excess bleeding (29.94%), dizziness/vomiting (24.20%) and low abdominal pain (5.09%). In Jowai town, the most common health problems were cold/fever (11.17%) followed by headache (6.99%), other types (6.59%), excess bleeding (4.51%), low abdominal pain (2.21%) and dizziness/vomiting (1.47%).

Table 5.19B. Coefficients of the logistic regression of health problems of the Pnar mothers (Sanaro and Jowai populations combined) during the first week after delivery on independent factors (based on the number of mothers who suffered from any health problems in the last delivery)

Parameters	Coefficients of regression (B) and its Standard Error (SE)			
	Model – 1		Model – 2	
	B	(±) SE	B	(±) SE
Obstetric morbidity				
Maternal age	- 0.032	0.037	-	-
No. of live births	0.022*	0.013	0.014	0.008
Residence (Rural/Urban)	- 0.395**	0.118	- 0.806**	0.069
Maternal education	- 0.038	0.035	-	-
Paternal education	- 0.102**	0.036	- 0.084**	0.027
Household income	0.026	0.028	-	-
Maternal occupation	0.020	0.023	-	-
Paternal occupation	0.061	0.049	-	-
Family size	- 0.016	0.033	-	-
ANC attendance	0.074	0.067	-	-
Place of delivery	0.045	0.079	-	-

*p < 0.05, **p < 0.01
Model - 1 includes obstetric morbidity and each independent variable.
Model - 2 includes only number of live births, residence and paternal education as covariates.

The coefficients of the logistic regression of health problem of the Pnar mothers (Sanaro and Jowai populations combined) during the first week after delivery on independent factors is given in Table 5.19B. Among all the independent factors, number of live births,

residence (rural/urban) and paternal education are significantly associated with mother's health problem after delivery. In Model 1, mother's health problem is positively associated with number of live births ($B = 0.022 \pm 0.013$, $p < 0.05$) whereas, it is negatively associated with residence ($B = -0.395 \pm 0.118$, $p < 0.01$) and paternal education ($B = -0.102 \pm 0.036$, $p < 0.01$). In other words, the prevalence of health problem of mothers is higher to those mothers who were having more number of children. It is also seen that urban setting and higher parental education is associated with lower rate of morbidity. In Model 2, we included only those independent factors that were significantly associated with mother's health problem in Model 1 and found that there is a significant negative relationship between mother's health problem and residence as well as paternal education. So, it can be concluded that residence and paternal education are the two most important factors influencing the health problem of mothers in the present population.

Table 5.20A. Reported morbidity of the Pnar children upto 14 years of age

Morbidity status	SANARO VILLAGE		JOWAI TOWN	
	No.	Percentage	No.	Percentage
Males				
Cold and/or respiratory disorders	44	20.20	34	11.45
Intestinal disorders*	24	11.01	8	2.70
Others**	34	15.61	8	2.70
No reported morbidity	149	68.35	250	84.18
Overall prevalence of morbidity***	69	31.65	47	15.82
Total no. of children	218	100.00	297	100.00

Contd.

Females				
Cold and/or respiratory disorders	26	14.31	33	12.41
Intestinal disorders*	10	5.50	13	4.91
Others**	31	17.03	12	4.51
No reported morbidity	128	70.33	210	78.95
Overall prevalence of morbidity***	54	29.67	56	21.05
Total no. of children	182	100.00	266	100.00

* Intestinal disorders include diarrhoea and dysentery.
** Other health problems include malaria, fever, headache, etc.
*** Based on the number of children with reported morbidity.

Table 5.20A shows the morbidity of the Pnar children upto 14 years of age. Cold and/or respiratory disorder is the most common health problem prevailed among the males in both Sanaro village (20.20%) and Jowai town (11.45%). In Sanaro village, 11.01% and 15.61% suffer from intestinal disorder and other type of health problems (i.e., diarrhoea and dysentery) respectively. In Jowai town these two health problems cause 2.70% each. Comparing the two study areas, the overall prevalence of morbidity among males is higher in Sanaro village (31.65%) than in Jowai town (15.82%).

The above table also shows that the other type of health problem is the main causes of morbidity among females in Sanaro village (17.03%). But, in Jowai town, cold and/or respiratory disorder is the main problem causing 12.41% of individuals. The other health problems in Sanaro are cold and/or respiratory disorders (14.31%) and intestinal disorder (5.50%). In Jowai town, intestinal disorder and other health problem causes 4.91% and 4.51% individuals respectively. As in the case of males, the overall prevalence

of morbidity among females is also found higher in Sanaro village (29.67%) compared to their Jowai town counterparts (21.05%).

Table 5.20B. Regression of reported morbidity of the Pnar children upto 14 years (Sanaro and Jowai populations combined) on independent factors

Parameters	Coefficient of regression (B) and its Standard Error (SE) B ± SE	t – value	p – level
Health problems			
Residence (Rural/Urban)	0.269 ± 0.260	1.035	Insignificant
Age of children	- 0.006 ± 0.004	- 1.759	Insignificant
Sex of children	0.007 ± 0.030	0.025	Insignificant
Maternal education	- 0.026 ± 0.026	- 0.988	Insignificant
Paternal education	0.007 ± 0.022	0.322	Insignificant
Household income	0.016 ± 0.020	0.795	Insignificant
Types of toilet	- 0.155 ± 0.135	- 1.150	Insignificant
Family size	- 0.106 ± 0.022	- 4.761	Significant at 1%
Constant	0.527 ± 0.158	3.346	Significant at 1%

Regression of reported morbidity of the Pnar children upto 14 years old is shown in Table 5.20B. Of all the independent factors included in the model, family size is the only factor that significantly influences the child morbidity among the Pnars of Sanaro village and Jowai town ($B = - 0.106 \pm 0.022$, $p < 0.01$). In other words, higher child morbidity rate in the present population is significantly associated with smaller size of family.

Immunization

Table 5.21A. Immunizations of the Pnar children aged 1 to 14 years

Vaccinations	SANARO		JOWAI	
	No.	Percentage	No.	Percentage
Males				
Polio	170	85.00	279	100.00
BCG	107	53.50	279	100.00
Whooping cough	62	31.00	279	100.00
Measles	9	4.50	279	100.00
No immunization	24	12.00	0	0.00
Overall immunization rate*	176	88.00	279	100.00
Total no. of children	200	100.00	279	100.00
Females				
Polio	128	79.01	247	100.00
BCG	79	48.76	247	100.00
Whooping cough	36	22.22	247	100.00
Measles	13	8.02	247	100.00
No immunization	29	17.90	0	0.00
Overall immunization rate*	133	82.11	247	100.00
Total no. of children	162	100.00	247	100.00

* Based on the number of children who received at least two of the given vaccinations.

Table 5.21A shows the immunizations of the Pnar children between 1 and 14 years of age. Among males in Sanaro village, polio recorded the highest immunization rate (85.00%) followed by BCG (53.50%), whooping cough (31.00%) and least is the measles (4.50%). But, in Jowai town all the children are reported to be immunized with all the given vaccinations. The overall immunization rate among males in Sanaro village is 88.00% which is lower than that of the Jowai town. The above table also shows that 79.01% of females in Sanaro village were immunized for polio, whereas, 48.76%, 22.22% and 8.02% were immunized for BCG, whooping cough and measles respectively.

Like in the case of males, all females in Jowai town were reported to be immunized with each of the given vaccinations. The overall rate of immunization among females in Sanaro village is found to be 82.11%, whereas, the same is 100.00% in Jowai town.

Table 5.21B. Coefficients of the logistic regression of immunization of the Pnars children from 1 to 14 years (Sanaro and Jowai populations combined) on independent factors

Parameters	Coefficients of regression (B) and its Standard Error (SE)			
	Model – 1		Model – 2	
	B	(±) SE	B	(±) SE
Immunization				
Residence (Rural/Urban)	0.224**	0.034	0.150**	0.015
Age of children	- 0.005**	0.002	- 0.005**	0.002
Sex of children	- 0.028*	0.015	- 0.027	0.015
Household income	0.012	0.010	-	-
Paternal education	- 0.020	0.011	-	-
Maternal education	- 0.014	0.012	-	-
Family size	- 0.011	0.011	-	-

*p < 0.05, **p < 0.01
Model -1 includes child immunization and each independent variable.
Model -2 includes only residence, age and sex as covariates.

The coefficients of the logistic regression of immunization of the Pnar children aged between 1 and 14 years is given in Table 5.21B. We have included all the selected independent factors in Model 1 and found a significant and positive correlation between immunization of the children and residence (rural/urban) ($B = 0.224 \pm 0.034$, $p < 0.01$) which reveals the higher rate of immunization among urban children. There is also a significant negative correlation between immunization and the age of children ($B = - 0.005 \pm 0.002$, $p < 0.01$) as well as sex of the children ($B = - 0.028 \pm 0.015$, $p < 0.05$). In other words, younger children and especially male children are more likely to be immunized with the given vaccinations. In Model 2, we included those independent

factors that were significant in Model 1 and found that the significant influence of sex on immunization disappeared. Therefore, residence and age are the most important factors influencing the immunization of children in the present population.

CHAPTER VI

DISCUSSION

After the United Nations declared 1979 as the 'International year of the Child', the attention of the demographers and other social scientists was shifted from the research on fertility and family planning to the research on child mortality and its various biosocial correlates. So, research on child mortality and its various important demographic parameters to understand population growth and structure, has since then gained tremendous momentum.

The child mortality rate has in recent years been recognized as an excellent summary index of the level of living and socio-economic development of a country. This recognition has inspired international organizations as well as national governments to intensify their efforts to lower the level of mortality and raise the level of child survival (Jain and Visaria, 1988).

Like in other countries, in India too, the demographers and social scientists have done some useful researches on mortality rate and pattern in relation to bio-social determinants. But most of these researches have been carried out at macro level, so, lack the depth and failed to understand the status and determinants of infant and child mortality at individual level. Anthropologists are generally interested to study human population at micro level.

With this end in view we have undertaken a study on the status and determinants of infant and child mortality among the Pnars of Sanaro village and Jowai town in order to find out the influence of rural/urban setting as well as the various socio-economic and biological factors on the infant and child mortality in this population.

Pnar is one of the five sub-groups of the Khasi tribe who occupy the Jaintia Hills lying on the eastern side of Meghalaya. Pnars are generally endogamous within the tribe but exogamous as far as the clans are concerned. Traditionally, they practiced visiting husband system, where, after marriage, the husband visits his wife only after dark and does not stay there. It is after sometime; in most cases after the couples have children that the husband and wife live together under the same roof. In Jowai town, the visiting husband system still prevails among the Non-Christians whose parent's house is nearby. However, the Christians living in Jowai town and Sanaro village donot practice the visiting husband system.

In the preceding chapters we have presented our findings on the Pnars of Sanaro village and Jowai town. In the present chapter we shall discuss all the findings on the Pnars of Sanaro village and Jowai town. We shall also compare the present findings with the available data on some other populations especially in the Northeast India.

Demographic characteristics

The demographic structure of the Pnars of Sanaro village and Jowai town has been given in Chapter IV. It is seen that populations of both the study areas appear to be of progressive type according to Sundbarg's classification of population. Among the Pnars of Sanaro village, the number of females per 1000 males increases from pre-reproductive age group to the post-reproductive age group and the overall sex ratio being 1:0.93. Similarly, in Jowai town also the number of females per 1000 males increases from the pre-reproductive to the post-reproductive age group and the overall sex ratio being 1:1.03 which is very close to the ideal sex ratio of 1:1, though it is slightly tilted in favour of

females. The overall sex ratio among the Pnars of Sanaro village is tilted in favour of males, whereas, in Jowai town it is in favour of the females. However, it is also observed that the occurrence of mortality among males is higher than females in the early age groups, although the average longevity in males is more than the females in Jowai town but the same is not true in case of Sanaro village.

In Sanaro village, the mean age at marriage for Pnar females is 17.38 ± 0.17 years and that for males is 18.82 ± 0.22 years, whereas, in Jowai town the mean age at marriage for males and females is 24.56 ± 0.28 years and 22.39 ± 0.24 years respectively. The above findings show that marriages take place earlier among the Pnars of Sanaro village than their Jowai town counterpart.

Similarly, the mean age at first child birth among the Pnar females is 18.66 ± 0.17 years and the males are 20.11 ± 0.23 years. So, the mean age at first child birth taking both males and females together, becomes 19.39 ± 0.20 years. In Jowai town, the same is found to be 26.28 ± 0.29 years in males and 24.05 ± 0.25 years in females. So, taking both males and females together, the mean age at first child birth in Jowai town is found to be 25.17 ± 0.27 years. As in the case of mean age at marriage, the mean age at first child birth among the Pnars is greater in Jowai town as compared to their Sanaro village counterparts indicating that the Pnars of Sanaro village are likely to have their first child earlier than their Jowai town counterparts. These differences between the two study areas are also statistically significant in both males ($t = 16.68$, $p < 0.001$) and females ($t = 17.79$, $p < 0.001$).

The mean number of live births per mother is found to be higher in Sanaro village (5.57 ± 0.25 years) than in Jowai town (3.49 ± 0.12 years). The present finding also revealed that the percentage of infant, child and juvenile mortality are found to be higher in Sanaro village than their Jowai counterparts. These differences between the two study areas may be mainly due to their differences in socio-economic conditions, i.e., the people living in Jowai town are more advanced as compared to that of the Sanaro village.

The completed family size among the Pnars of Sanaro village is found to be 8.83 whereas the average number of surviving children per mother in the same area is 5.94. In Jowai town, these are found to be 4.98 and 4.60 respectively. Comparing the two study areas, the completed family size as well as the average number of surviving children in Sanaro village is found to be higher than in Jowai town. The completed family size among the Kota is reported to be 3.67 (Ghosh, 1976). Khongsdier (1992) has reported the completed family size among the Pnars of Jaintia Hills is 6.98 and Deka (1989) has reported the completed family size of the same population in a different village as 8.1. Limbu (1996) reported the completed family size among the Semsa of Semkhor village, North Cachar Hills District to be 7.52. So, it seems that the completed family size among the Pnar populations in Sanaro village is higher than the above populations although the same in Jowai town is found to be low.

The child-woman ratio (fertility ratio) among the Pnars of Sanaro village is 73.04, which is certainly higher in comparison to the Pnars of Jowai town (47.54). The fertility ratio among the Kota (Ghosh, 1976) is found to be 62.17. Khongsdier (1993) has reported that the fertility ratio, among the Christians and Non-Christians War Khasis to be 61.48

and 62.10 respectively. According to Khongsdier (1992), the fertility ratio among the Pnars of Jaintia Hills is as high as 86.96 which is much higher than that found in present population of both the study areas. Khongsai (2012) observed that the fertility ratio among the Khongsai Kukis in Saikul sub-division of Manipur is 75.71. Eaton and Mayer (1953) have reported that the fertility ratio among the Hutterites is 96.3 was then highest in the world.

So, it shows that in comparison with whatever data found from different populations, the Pnars of Jowai town show lower value in respect of child-woman ratio. However, the Pnars of Sanaro village shows that this ratio is slightly higher than the Kota and the Khasi. The reason for such low value indicated by child-woman ratio is that among the Sanaro populations, the infant and child mortality rate before the age of 4 years is quite high.

The present study reveals that not a single married Pnar woman was found in both the present study areas, who had never became pregnant. However, Haloi (2011) reported 5.51 percent Assamese Muslim married women of Dadara and Agyathuri villages who had never experienced any pregnancy. Khongsai (2012) reported 3.58 percent of Khongsai Kuki married women in Saikul and 2.36 percent in Imphal town of Manipur who had never experienced any pregnancy.

Among the Pnars of Sanaro village, the frequency of reproductive wastage (still birth and abortion together), based on the total number of pregnancies, is found to be 12.92 percent, whereas this value is 11.70 among the Pnars of Jowai town. Among the Semsa of N. C. Hills, Limbu (1996) found it to be 5.90%. Among the Kota of Nilgiri

Hills, Ghosh (1976) had reported that the frequency of reproductive wastage is 8.34% which is lower than that found among the present populations of both areas. So, it seems that the frequency of reproductive wastage among the Pnars of both the present study areas is higher than those data available on other populations of India.

The average number of surviving children per all mothers is found to be higher in Sanaro village (3.81) than in Jowai town (3.33).

The total marital fertility rate (T.M.F.R) is found higher among the Pnars of Sanaro village (6.8726) than the Jowai town (4.3442). The total marital fertility rate in Sanaro village seems to be fairly high although the same in Jowai town found moderate. Limbu (1996) reported total marital fertility rate among the Semsa is 6.0293. Khongsai (2012) reported it is 4.8498 among the Khongsai Kukis of Saikul and 3.7132 in Kukis of Imphal town. Haloi (2011) reported it to be 6.2398 among the Assamese Muslims of Dadara and Agyathuri villages of Kamrup District, Assam. The total marital fertility rate (T.M.F.R) among the Pnars of Sanaro village seems to be highest when compared with other neighbouring populations.

Bio-social determinants of infant and child mortality

Infant and child mortality rates reflect a country's level of socio-economic development and quality of life and used for monitoring and evaluating population and health programmes and policies. Many earlier findings have suggested that biological as well as social factors such as women's age, age at marriage, age at menarche, age at first child birth, age at menopause, types of marriage, education, income, religious attitudes, adoption of contraceptive devices and others that have an effect on infant and child

mortality (RGI; Caldwell, 1979; Lee 1979; Elamin and Bhuyan, 1999 and Reddy et al, 2006). Present study shows that place of residence, age at marriage, birth spacing, mother's education, religion, type of family, family size, house type, types of toilet used, source of drinking water, ANC visit by mothers and immunization are the major factors of infant and child mortality.

This study examines the socio-economic determinants of infant and child mortality among the Pnars of Jaintia Hills District in respect of both urban and rural settings. In Sanaro village the highest percentages of infant mortality (14.34%) and child mortality (18.10%) are associated with those mothers who are engaged in agriculture. In Jowai town also infant mortality rates (9.68%) are found to be highest among those mothers who are engaged in agriculture though there are very few mothers. The occurrence of infant and child mortality is found to be higher in Sanaro village compared to the Jowai town. This could be due to the nature of the occupations available in the rural areas which are manual such as agriculture, so, women are not available for long time to care for their children. While in urban areas, because of the assumed availability of health services, the survival of children is determined by his/her mother's awareness and thus educational level. Kabir and Choudhury (1993) explained that urban-rural differentials may be attributed to different healthcare services including higher coverage with immunization, safe delivery of births and access to health services. The study shows that biological and demographic variables are also important determinants of infant and child mortality.

The percentages of infant mortality decrease with the increase of mothers' age in both the present study areas. But in Sanaro, the percentage of child mortality is found to increase with the increase of the mothers' age. However, in this respect, no specific pattern was observed in Jowai town. In both the study areas, higher percentages of infant mortality was observed among those mothers who got married at the age of 19 years and below compared to those who married at 20 years and above. Mondal *et al* (2009) also reported that infant and child mortality levels are higher for mothers who are under 20 years of age. The same are found lower for the children whose mothers are aged between 20-29 years. The percentages of child mortality found increase with the increase of mother's age. The age of the mother at the time of the childbirth is an important factor for infant and child survival. Galway *et al* (1987) reported that babies born to mothers who are less than 19 years of age, or 35 or more years of age are also at higher risk of dying infants. These supports the findings of the present study that mortality are always higher for teenage mothers due to the complication in pregnancy and delivery, premature birth and other related causes. In the present population, mothers' age at marriage found to play a significant role in determining infant and child mortality. Factors like mothers' occupation, maternal education and family types significantly influence mothers' age at marriage. However, the association between mothers' age at marriage with maternal occupation and maternal education are positive, but, it is negatively associated with family types. In other words, higher educational level and better occupation of the mothers is found to be significantly associated with greater age at marriage of the mothers. A similar type of study undertaken by Khongsai (2012) where he has observed

that higher age of mother is significantly associated with higher child mortality. However, birth order and causes of deaths seem to have no significant impact on the infant and child mortality among the Khongsai Kuki population of both rural and urban Manipur.

Most of the studies in the developing countries, which consider birth spacing as a determinant of infant and child mortality, show that the length of preceding birth intervals are the prime factors that influence mortality during infancy as well as other childhood ages of life. Maternal depletion is often cited as the primary mechanism responsible for the adverse effects of short birth intervals. Women with short intervals between pregnancies have insufficient time to restore their nutrition reserves, a situation which is thought to be adversely affecting foetal growth. Negative relationship was found between birth spacing and infant and child mortality rate in Sanaro village, but no specific pattern in this respect was observed in Jowai. In the present populations, infant and child mortality decreases with the increase of duration of birth. Khongsai (2012) too observed negative association between infant mortality and mean birth intervals in both the urban and rural areas of Manipur. Mondal *et al* (2009) observed among the suburban and rural populations of Rajshahi District, Bangladesh that neonatal born less than 18 months of the birth of its preceding siblings experienced higher mortality level (49.2%) in comparison to the neonatal born 18-36 months (31.4%), while during post-neonatal period, child mortality level is higher for birth intervals of 18-36 months (58.6%) than birth intervals of less than 18 months (15.8%) and 36+ months (25.6%). The information

provided here indicated that short intervals significantly reduced the probability of survival for infants.

The length of the birth interval is a very important factor for the survival status of infants and immunization practice is directly related with health status of children. It saves children from dangerous diseases. The children who do not doing immunization practice may have greater chance of being attacked by several diseases. If length of the birth interval is short, the probability of dying is high. These reports support the findings of Hobcraft *et al*, (1983) as well as the present findings. Mahfouz *et al* (2000) reported among the population of Malakan Town Southern Sudan that there is a significant association between birth interval and infant and under five children mortality.

In the present populations, place of residence and household income are significantly related to birth spacing. However, interval of birth spacing is higher in urban areas. It also increases as the income increases. So, place of residence and household income are the only most important factors influencing the birth spacing in the present study populations. Mondal *et al* (2009) found in the Rajshahi District, Bangladesh that the most significant predictors of infant and child mortality are immunization, ever breast feeding, mother's age at birth and birth interval. They further observed that parent's education, toilet facilities, and treatment places are significantly associated to infant and child mortality. In the present study populations, the percentages of infant and child mortality are inversely associated with mother's education although it is statistically significant only in the case of infant mortality. Mother's education is found to be an important factor in regulating the infant mortality in Jowai town only. Furthermore, the

study undertaken by Mahfouz (2000) showed a significant association between mother's education and infant and child mortality. Maternal education has been identified as one of the most important socio-economic determinants of infant and child mortality. Many studies have shown that the higher the level of the maternal education, the lower is infant and child mortality. Uddin *et al* (2000) observed that parent's education has been identified as the most important socio-economic predictions of child mortality that means mortality rate decreases with increase in both mothers and father's educational level i.e., parent's education has significant role in reducing the risk of child mortality. D'Souza and Bryant (1999) observed among the slum children of Karachi, Pakistan that the children of illiterate mothers had a seven times higher risk of dying than children of educated mothers. Illiteracy, lack of awareness and restricted maternal autonomy and delays seeking treatment and a mild illness can progress to a serious one and have five times risk of her child dying. Education is also a factor which is likely to influence maternal autonomy and empower women in decision making in household level. However, father's education is significant only in the early childhood period. Caldwell (1979) argued that maternal education plays an important role in determining child's survival even after. Houweling (2007) reported that under five mortality among children born to mothers with only primary education or below in Sri Lanka was about twice as high as that among children born to higher educated mothers.

In Jowai town, the percentages of infant mortality are found to be 4.31% among Non-Christians and 1.84% among the Christians. The child mortality among the Christians and Non-Christians are 2.87% and 0.74% respectively. Religion has a

significant impact on the infant and child mortality in Jowai town. So, religion seems to play an important role in regulating the infant and child mortality among the Pnars of Jowai town. In Sanaro, the percentages of infant mortality are 14.47% and 10.34% whereas the child mortality is 18.15% and 14.94% among nuclear and joint families respectively. In Jowai, joint families exhibit higher percentages of infant and child mortality where infant mortality rates are found to be 2.36% in nuclear family and 3.98% in joint family. Type of family is significantly associated with child mortality in both the Sanaro and Jowai populations. D'Souza and Bryant (1999) observed among the slum children of Karachi, Pakistan that conditions within a nuclear family could delay seeking treatment for the child, as the mother has to wait for her husband to return from workplace to accompany her or take decisions. Children in nuclear families had a three times risk of death as compared to children in extended families. Living in a joint family may work to the advantage of the child in some situations. Even though the mother is not allowed to take decisions on her own, if the mother-in-law or some other family member is available, this can facilitate a quick decision and the child being taken for treatment while her other small, children can be looked after.

Highest percentages of infant (15.23%) and child mortality (19.47%) were found in medium and large size families in Sanaro village. In Jowai town, there is a slight increase in the infant mortality from small to large size families which varies from 2.78% to 2.95% respectively. Child mortality as well is found higher in large size family (2.29%) than in medium size family (0.72%). Family size is significantly associated with infant mortality in Jowai town only. Mahfouz *et al* (2000) observed that family size

affects directly on the infants and under five children mortality rates. Increase in family size will increase the risk of dying for a child. In his study, the significant association between family sizes can show more exposure of children to infectious diseases.

The incidence of infant and child mortality in both the present study areas, i.e., Sanaro village and Jowai town are inversely associated with the household income. Mahfouz *et al* (2000) observed the family income as one of the most important determinants of the standard of living, economic and social welfare. The study found significant association between family income and child mortality. Low income definitely will affect the accessibility of the medical services.

In Sanaro, infant mortality rate is found slightly higher in kaccha (14.71%) houses compared to the semi-pucca houses (13.02%). But, the higher percentages of child mortality are recorded in semi-pucca (20.41%) than in kaccha houses (16.20%). In Jowai there is not much difference of infant mortality in respect of semi-pucca (2.92%) and pucca (2.90%) houses although percentage frequency of the child mortality is found higher in semi-pucca (1.95%) than in pucca (1.34%) houses. The infant and child mortality is significantly influenced by house type among the Pnars of Jowai town.

The percentage of infant mortality in Sanaro village recorded highest among those children who use open field type of toilet (14.40%) followed by septic tank (10.00%) and then own pit type (4.00%). The same is also true in case of the child mortality. These are 18.21%, 10.00% and 8.00% respectively. However, it was found that types of toilet used seem to play a significant role in respect of both infant and child mortality of the Pnars in Jowai town. In Jowai town, both the percentages of infant (4.81%) and child mortality

(2.40%) were found highest among those households whose source of drinking water is protected well. The relationship between mortality rates and source of drinking water are statistically significant in Jowai town. So, the source of drinking water seems to be an important factor for influencing on infant and child mortality in the present population.

In Sanaro village, 62.42% women had visited ANC during their pregnancy period, whereas, in Jowai town, almost all i.e., 99.28% have visited the same. It is observed that the highest number of mothers (35.67%) in Sanaro visited ANC during the 2nd trimester with the least (8.92%) in the 3rd trimester. But, in Jowai town, majority of the mothers (59.06%) have visited ANC during 1st trimester followed by 2nd trimester (38.77%) and then 3rd trimester (1.45%). The difference between the two study areas in respect of mothers visiting ANC is also statistically significant. The percentage frequency of infant mortality in Sanaro village is found higher among those mothers who visited ANC (15.85%) during pregnancy than those who did not (11.04%). But, the reverse is true for the child mortality rate. In Jowai town, the infant mortality is significantly higher among those mothers who did not visit ANC (40.00%) than to those who have visited (2.72%). Zacharia *et al* (1994) have shown that medical attention at the time of delivery and antenatal care (ANC) are significant factors in the survival chance of the newborn. Uddin *et al* (2000) in their Bangladesh Demographic and Health Survey, observed among the children of Bangladesh that immunization of the mothers' during pregnancy, antenatal checking, during pregnancy reduced child mortality. He also observed that parents' education, breastfeeding, and maternal healthcare factors reduce risks of child mortality in developing countries. Park and Park (1989) recommended at least four antenatal

checkups, one each during the third, sixth, eighth and ninth months of pregnancy. However, in India the Reproductive and Child Health Programme recommends that a pregnant woman should have at least three ANC check-ups. ANC checkups shows that women living in urban areas are more likely to go for ANC services compared with their rural counterparts. The higher educated level of spouse, the more is the utilization of ANC services. In the same way woman from better economic background are more likely to use ANC services than those from poor economic situations. The mother's obstetric morbidity is negatively associated with place of residence, whereas, it is positively associated with maternal occupation and ANC attendance. In other words, the percentage of obstetric morbidity in Sanaro village is higher than their Jowai counterpart. But, it is not clear why the obstetric morbidity rate is higher among mothers attending ANC than those who did not. However, those mothers who did not attend ANC during their pregnancy are expected to underrate their health problems which abstain from the medical check-up. The overall reported percentage of morbidity during the first week after delivery of the mothers is found to be much higher in Sanaro village (78.98%) than their Jowai counterparts (26.37%).

The number of mothers who received tetanus injection is significantly higher in Jowai town compared to Sanaro village. In Sanaro about half of the mothers were found to have received iron and folic acid tables. But, in Jowai almost all (i.e., 99.28%) women were reported to have received the same. The difference between the two study populations in this respect is highly significant. The percentages of mothers in Sanaro village (26.11%) have got their blood pressure measured during pregnancy period. In

Jowai almost all, i.e., 99.28% had measured it. Difference between the two study areas in respect of the above trait is statistically significant as well. So, it may be concluded that, mothers in Jowai are much more advanced than their Sanaro counterparts in respect of their antenatal care. In Sanaro, the percentage of infant mortality found higher among those mothers who had health problem (14.78%) than those who did not (11.71%). In Jowai also, the infant mortality rate is found higher among those mothers who were having health problem during pregnancy (3.93%) than to those who were without health problem (1.98%). By and large, child mortality is similar among all the mothers in Jowai town, whereas, in Sanaro, it is slightly higher (21.95%) among those who did not have health problem. However, the association between mother's health problem and infant and child mortality rates are statistically not significant excepting the child mortality of the Pnars of Jowai town.

Place of delivery is also an important determinant of child survival. In Sanaro, the percentage of infant mortality was found higher among those mothers whose delivery took place at hospital (15.48%) than at home (13.91%). In contrast, the percentage of child mortality was observed higher among those mothers who delivered at home (18.20%) than at hospital (14.29%). In Jowai, the percentage of infant mortality also was recorded higher among the mothers who delivered at home (8.24%) than hospital (2.39%). In developing countries, children die owing to the lack of safe delivery facilities, untrained *dais*, relatives and neighbours attend most of the deliveries, a practice that presents risk to both the mother and the newborn baby. The data from Bangladesh Demographic and Health Survey (BDHS) used by Uddin *et al* (2000) clearly shown that

neonatal, post-neonatal and child mortality is higher to those whose place of deliveries are home (92.1% for neonatal, 93.8% for post-neonatal and 98.5% for child mortality than those delivered at hospital/clinic (7.9%, 6.2% and 1.5% respectively). These results may imply that more and better antenatal care services during pregnancy may increase the children's chances of survival.

The infant mortality in Sanaro village found higher to those mothers who fed colostrums to their children (14.35%) than to those who did not feed (4.00%). But, the reverse is observed in case of the child mortality. In Jowai town, the percentage frequencies of the infant as well as the child mortality are higher to those mothers who did not feed colostrums to their children.

It is observed that, the percentage of overall morbidity in Sanaro village is much higher (80.89%) than those living in Jowai (52.17%). Of the many health problems, weakness/tiredness (74.52%), other type of health problems (47.77%), visual disturbance (49.68%), convulsion (45.22%) and swelling of hands and legs (38.85%) are the main health problems faced by the mothers during pregnancy in Sanaro village. On the other hand, swelling of hands and legs (19.93%), other health problems (18.12%) and weakness/tiredness (17.39%) are the major health problems faced by mothers during pregnancy in Jowai town. Cold and/or respiratory disorder is the most common health problems faced by male children in both Sanaro (20.20%) and Jowai (11.45%). In Sanaro village, 11.01% and 15.61% suffer from intestinal disorder and other types of health problems (i.e., diarrhoea and dysentery) respectively. Considering the two study areas, overall prevalence of morbidity among the males is higher in Sanaro village (31.65%)

than in Jowai town (15.82%). In Jowai town, cold and/or respiratory disorder is the main problem causing morbidity (12.41%) to female children. The other health problems (17.03%) found among the female children in Sanaro village followed by cold and/or respiratory disorders (14.31%) and intestinal disorder (5.50%). In other words, higher child morbidity rate in the present population is significantly associated with smaller size of family.

Among all the independent factors, number of live births, place of residence and paternal education are significantly associated with mother's health problem after delivery. Mother's health problem is positively associated with number of live births, whereas, it is negatively associated with residence and paternal education. In other words, the prevalence of health problems is recorded higher to those mothers who were having higher number of children. It is also seen that urban setting and higher parental education is associated with lower morbidity rate. There is a significant negative association between mother's health problem and residence as well as paternal education. So, it can be concluded that residence and paternal education are the two most important factors influencing the health problems of the Pnar mothers of Jaintia Hills.

Neonatal tetanus, whooping cough, polio, BCG and measles all of which contribute significantly the high childhood mortality and these can be prevented through immunization practice. Thus immunization of the children is an important factor that contributes s to the child's chances of survival. In Sanaro village, highest percentage of immunization was recorded as polio (85.00%) followed by BCG (53.50%), and whooping cough (31.00%) and least is the measles (4.50%). But, in Jowai all the children

are reported to have immunized with all the given vaccinations. The overall rate of immunization among females in Sanaro village is 82.11%, whereas, the same is 100.00% in Jowai town. Mondal *et al* (2009) reported among the infants and children of the Rajshahi District, Bangladesh that child mortality is lowest to them who have been fully immunized (27.8%) while those who have been partially immunized is the highest child mortality (38.3%) and those children who are not immunized is 33.8% mortality level.

This study reveals that the higher rate of immunization among the urban children. There is also a significant negative correlation between immunization and the age of children as well as sex of the children. In other words, younger male children are more likely to be immunized with the given vaccinations. Therefore, residence, age and sex of the children are the most important factors influencing the immunization of children in the present population. Findings of Mahfouz *et al* (2000) also supports the present study that immunization is an important factor that affects the under five mortality.

The present study reveals that both the infant and child mortality are higher in Sanaro village compared to Jowai town. Most of the mothers in Jowai town are educated having higher income, awareness of ANC and child immunization. As a result they are more access to medical facilities than their Sanaro counterparts. Women living in Sanaro village are less educated having low income and are cultivators. They are also lacking the awareness about ANC and child immunization. Besides many other socio-economic factors, the above factors are also responsible for the infant and child mortality among the Pnars of both Sanaro village and Jowai town.

CHAPTER VII

SUMMARY AND CONCLUSION

SUMMARY

Mortality is the most traumatic and final of the vital events. It is a form of attrition of the society. Although the act of dying is certainly a biological event, both social and psychological factors are clearly involved. Demographers have focused on mortality more than on any of the other vital events, possibly because it is most obvious and traumatic. How mortality occurs in the population is of extreme importance to the society being studied (Swedlund and Armelagos, 1976).

Mortality is the permanent disappearance of all evidences of life at any time after birth has taken place. Infant and child mortality, are commonly on top of the agenda of public health and international development agencies. They have received renewed attention as part of the United Nation's Millennium Development Goals (UN, 2001). Approximately 10 million infants and children under five years of age die each year, with large variations in under-five mortality rates and trends, across regions and countries (Espo, 2002).

Infant mortality may be defined as "mortality or death during the first year of life" and child mortality may be defined as "mortality or death during the age of 1 to 4 years" (Kabir *et al,* 1995). The child mortality rate has in recent years been recognised as an excellent summary index of the level of living and socio-economic development of a country. This recognition has inspired international organisations as well as national governments to intensify their efforts to lower the level of mortality and raise the level of child survival (Jain and Visaria, 1988).

After the United Nations declared 1979 as the 'International year of the child', the attention of the demographers and other social scientists was shifted from the research on fertility and family planning to the research on child mortality and its various biosocial correlates. So, research on child mortality, which is one of the very important demographic parameters to understand population growth and structure, has since then gained tremendous momentum.

In the present study, we have undertaken a study on the status and determinants of child mortality among the Pnars of Jaintia Hills District, Meghalaya, with a view to understanding the following objectives:

1. To study the overall demographic characteristics of the sample population.
2. To find out the status of infant and child mortality among the Pnars of Jowai town and Sanaro village.
3. To study the association of infant and child mortality with socio-economic background of mothers on one hand and access to health care facility on the other.

In the present study, we have taken into consideration, the demography of the population, socio-economic background, morbidity of mothers and infants and child mortality with a view to understand the comparative study of the status and determinants among the Pnar children living in rural and urban areas i.e., Sanaro village and Jowai town of Jaintia Hills District, Meghalaya.

The present findings may be summarized as follows:

Demographic characteristics

1. The overall sex ratio of Pnars of Sanaro village is 1:0.93, which shows that the number of males is slightly higher than the females, though the overall sex ratio in this population is very near to the ideal sex ratio of 1:1.

2. In Sanaro village, 21.69% of males and 17.78% of females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group, i.e., 15-49 years, there are 28.30% and 27.59% males and females respectively, and in the post reproductive age group i.e., 50+ years, they are 1.92% and 2.70% respectively.

3. The overall sex ratio of Pnars of Jowai town is 1:1.03, which shows that the numbers of females are slightly higher than the males, though the overall sex ratio is very near to the ideal sex ratio of 1:1.

4. In Jowai town, 14.41% of males and 12.53% of females belong to the pre-reproductive age group of 0-14 years. In the reproductive age group i.e., 15-49 years, there are 30.47% and 30.34% males and females respectively. In the post-reproductive age group i.e., 50+ years, the percentages of males and females are 4.37% and 7.87% respectively.

5. In Sanaro village, the population pyramid of the Pnars becomes narrower as we move up from the base till the age group 10-14 years in both males and females which then becomes broader in the age groups 15-19 and 20-24 years in both the sexes. This

population further indicates that the frequencies of male and female in various age groups are by and large, same and as age advances, population decreases.

6. In Jowai town, the population pyramid of the Pnars becomes broader as we move up from the base till the age group 20-24 years in males and 15-19 years in females. It indicated that there is a decline in the fertility rate among the Pnars of Jowai town in the past 8 years.

7. The mean number of live births per mother is higher in Sanaro village (5.57 ± 0.25) than Jowai town (3.49 ± 0.12). The infant, child and juvenile mortality are found higher in Sanaro village than in Jowai town. The percentages of infant mortality are 14.06% in Sanaro and 2.91% in Jowai town, whereas, the child mortality are 12.71% and 1.14% respectively. The juvenile mortality are recorded 5.14% and 0.52% in Sanaro village and Jowai town respectively.

8. The mean age at marriage for the Pnar males of Sanaro is 18.82 ± 0.22 years and 17.38 ± 0.17 years for females, and the same is found 24.56 ± 0.28 years and 22.39 ± 0.24 years respectively for the males and females in Jowai town. Marriages have taken place earlier in females than in males in both the study areas. The mean age at marriage is found significantly greater in Jowai town than in Sanaro village in respect of both males ($t = 16.21$, $p < 0.001$) and females ($t = 17.22$, $p < 0.001$).

9. The mean age at first child birth is also higher in Jowai than Sanaro village. The mean age at first child births in Sanaro are 20.11 ± 0.23 years for males and 18.66 ± 0.17 years for females, and the same is 26.28 ± 0.29 years and 24.05 ± 0.25 years

respectively in Jowai town. The differences in respect of the above trait is statistically significant for both males ($t = 16.68$, $p < 0.001$) and females ($t = 17.79$, $p < 0.001$) living in Sanaro and Jowai.

10. The average number of live births per such mother is higher in Sanaro village (8.83) compared to their Jowai counterparts (4.98). It indicates that the completed fertility is quite high among the Pnars of Sanaro village and the same is moderate in Jowai town. The average number of surviving offspring per such mother is 5.94 in Sanaro village whereas 4.60 found in Jowai town.

11. The child-women ratio (fertility ratio) is very high in Sanaro village (73.04) although the same is moderate (47.54) in Jowai town.

12. In both the present study areas, the average number of pregnancy per mother tends to increase as the age of the mother increases. It increases from 1.00 in the age group $\leq$ 19 years to 9.89 in the age group $\geq$ 40 years in Sanaro village and the same increases from 1.00 to 5.13 respectively in Jowai town.

13. The total percentage frequency of surviving children is higher in Jowai town (95.43%) than in Sanaro village (68.11%). In both the study areas, mothers belonging to $\leq$ 19 years age groups possess highest number of surviving children i.e., 100% each. The average number of live births per mother tends to increase as the age group increases. In Sanaro village, it increases from 1.00 in the age group $\leq$ 19 years to 8.68 by age group $\geq$ 40 years and in Jowai town, it increases from 1.00 to 4.54 respectively.

14. The frequency of reproductive wastage in Sanaro village is found highest among the women of age group 30-39 years (14.80%) and lowest in the age group 20-29 years (9.89%). In Jowai town, the same is recorded highest in the age group ≥ 40 years (12.30%) which then decreases to 10.42% by 20-29 years age.

15. The average number of surviving children per mother is found slightly higher in Sanaro village (3.81) compared to their Jowai counterparts (3.33).

16. The age specific marital fertility rate (ASMFR) in Sanaro village exceeds their Jowai counterparts in all the age groups. Its highest peak reaches at 20-24 years (2.0710) and 25-29 years (1.6791) in Sanaro and Jowai town respectively. The total marital fertility rate (TMFR) is recorded higher in Sanaro (6.8726) than in Jowai (4.3442). The total marital fertility rate in Sanaro village seems to be fairly high although the same in Jowai town seems to be moderate. Figure 1.3 depicts the age specific marital fertility rate among the present populations.

Bio-social determinants of infant and child mortality

1. The percentage frequencies of infant mortality are inversely associated with mother's age in both the study areas and all age groups excepting the lowest age i.e., ≤ 19 years. The association between the infant mortality and mother's age group is statistically significant in Sanaro village (χ^2 = 13.44, df = 3, $p < 0.005$) but not in Jowai town (χ^2 = 8.05, df = 3, $p > 0.05$). There is no significant association between child mortality and mother's age group in Sanaro village but they show significant association in Jowai town (χ^2 = 8.05, df = 3, $p < 0.05$).

2. In Sanaro village, the highest percentages of infant and child mortality are recorded among those women who attended their menarcheal age at < 12 years and 13 years respectively. In Jowai town, these are 14 years and 15 years respectively. The infant and child mortality do not associate significantly with the mother's age at menarche in the present population of both the study areas.

3. The χ^2 test shows significant association between infant mortality and mother's age at marriage in Jowai town ($\chi^2 = 10.03$, df = 1, $p < 0.005$). Mother's age at marriage also shows significant association with child mortality only in Sanaro village ($\chi^2 = 9.12$, df = 1, $p < 0.005$).

4. In the present populations, higher educational level and better occupation of the mothers is found to be significantly associated with greater age at marriage of the mothers. Further, mothers belonging to nuclear family have married earlier than those living in the joint families.

5. The duration between the last two children births were found much longer in Jowai compared to their Sanaro counterparts. It ranges between 1 and 4 years in Sanaro whereas the same is 1 and 6+ years in Jowai. Frequency of infant mortality is inversely associated with birth spacing in Sanaro village. Highest frequency of infant mortality was recorded in the spacing duration of 1 year (18.85%) and then gradually decreases as the birth spacing period increases to 4 years (5.88%). Highest frequency of child mortality was recorded in the spacing period of 4 years (23.53%) followed by 1 year (19.95%) and the least was recorded in 3 years (12.33%) spacing period.

6. In Jowai town, mothers who had highest birth spacing i.e., 6+ years recorded the highest percentage of infant mortality (6.94%) and the least recorded of 3 years (0.68%). Child mortality found more or less same in all the birth spacing durations excepting 5 and 6+ years, where, no child death was recorded.

7. Birth spacing durations were found higher in the urban areas compared to their rural counterparts. Similarly, it is proportional to their income. So, place of residence and household income found to be the two most important factors influencing the birth spacing in the present populations.

8. The χ^2 test between the live births and infant and child mortality is not significantly associated with the mothers' education in Sanaro village, although it is significantly associated on infant mortality in Jowai town ($\chi^2 = 8.69$, df = 2, $p < 0.025$). Therefore, mother's education is found to be an important factor in regulating the infant mortality in Jowai town only.

9. The χ^2 test between live births and infant and child mortality do not show significant association in respect of mothers' occupation in both the study areas.

10. The χ^2 test between live births and infant and child mortality in respect of religion shows significant association only in Jowai town (Infant mortality: $\chi^2 = 4.79$, df = 1, $p < 0.05$; Child mortality: $\chi^2 = 6.36$, df = 1, $p < 0.025$).

11. There is no significant association between infant and child mortality with household income in both the present study areas.

12. The χ^2 test between live births and child mortality in respect of family types in both the study areas are statistically significant (Sanaro: $\chi^2 = 6.12$, df = 1, $p < 0.025$; Jowai: $\chi^2 = 14.08$, df = 1, $p < 0.025$), whereas the infant mortality do not show any significant association in both the study areas.

13. The χ^2 test shows significant association between infant mortality and family size only in Jowai town ($\chi^2 = 21.63$, df = 2, $p < 0.005$). So, family size do not show significant influence on the infant and child mortality in Sanaro village and child mortality in Jowai town.

14. In Sanaro village, χ^2 test between live births and infant and child mortality shows no significant association in respect of house type, whereas in Jowai town, they show significant association (Infant mortality: $\chi^2 = 17.67$, df = 1, $p < 0.005$; Child mortality: $\chi^2 = 9.18$, df = 1, $p < 0.005$). This indicated that house type has a significant influence on the infant and child mortality only in the urban area i.e., Jowai town.

15. The χ^2 test between live births and infant and child mortality shows significant association in respect of types of toilet used in Sanaro village (Infant mortality: $\chi^2 = 9.67$, df = 2, $p < 0.01$; Child mortality: $\chi^2 = 10.59$, df = 2, $p < 0.01$).

16. The χ^2 test between live births and both the infant mortality ($\chi^2 = 7.69$, df = 2, $p < 0.025$) and child mortality ($\chi^2 = 10.89$, df = 2, $p < 0.005$) are significantly associated with source of drinking water in Jowai town.

17. In Sanaro village, out of a total 157 mothers only 98 (62.42%) have visited ANC during their pregnancy, whereas, in Jowai town, out of a total of 276 mothers, almost all (i.e., 99.28%) are reported to have visited ANC.

18. The number of ANC visit in Jowai is high i.e., 56.16% mothers have visited for 6 or more times, whereas, only 4.46% mothers from Sanaro village have visited the same.

19. It is observed that the highest number of mothers (35.67%) in Sanaro village visited ANC during the 2nd trimester and the least visit (8.92%) in the 3rd trimester. But, in Jowai town, majority of the mothers (59.06%) have visited ANC during 1st trimester followed by 2nd trimester (38.77%) and then 3rd trimester (1.45%). The difference between the two study areas in respect of their visit to ANC is statistically significant ($\chi^2 = 25.60$, df = 2, $p < 0.005$).

20. The above observation reveals that place of residence also influences significantly on the frequency of ANC visit of the mothers. Present study shows that 38.22% of mothers of Sanaro village and 72.87% of Jowai town have received tetanus toxoid injection.

21. Nearly equal percentages of mothers who received (50.95%) and did not received (49.04%) iron and folic acid tablets during their pregnancies were reported in Sanaro village. But in Jowai town almost all (i.e., 99.28%) were reported to have received the same.

22. In Sanaro village, 26.11% of mothers were reported to have checked their blood pressure during pregnancy. In Jowai town, almost all, i.e., 99.28% of mothers got

their blood pressure checked. The difference between the two study areas is statistically significant as well (χ^2 = 152.02, df = 1, p < 0.005). So, it may be concluded that, mothers in Jowai town are much more advanced than their Sanaro counterparts in respect of ANC characteristics.

23. The χ^2 test between live births and infant mortality (χ^2 = 21.26, df = 1, p < 0.005) and child mortality (χ^2 = 12.08, df = 1, p < 0.005) in respect of ANC visit shows significant association in Jowai town whereas the same is not significantly associated in Sanaro village.

24. The association between mother's health problem and infant mortality is statistically not significant among the Pnars of Jowai town (χ^2 = 3.04, df = 1, p > 0.05) but found significant association in respect of child mortality (χ^2 = 15.60, df = 1, p < 0.005).

25. Place of delivery significantly influences the infant and child mortality in Sanaro village, whereas in Jowai town, it significantly influences only the infant mortality.

26. The χ^2 test shows significant association between the infant mortality and child mortality with feeding of colostrums in both Sanaro village and Jowai town.

27. The percentage of overall morbidity of mothers in Sanaro village is found much higher (80.89%) than that of their Jowai counterparts (52.17%). Of the many health problems, weakness/tiredness (74.52%), other types of health problems (47.77%), visual disturbance (49.68%), convulsion (45.22%) and swelling of hands and legs (38.85%) are the main health problems faced by mothers in Sanaro village during pregnancies. On the other hand, swelling of hands and legs (19.93%), other health

problems (18.12%) and weakness/tiredness (17.39%) are the major health problems faced by mothers in Jowai town during pregnancies. Obstetric morbidity rate in Sanaro village found higher than in Jowai town.

28. The overall reported morbidity rate is found much higher in Sanaro village (78.98%) than in Jowai town (26.37%). In Sanaro village, the most common health problems faced by mothers during the first week after delivery are other types (65.61%) followed by headache (49.04%), cold/fever (36.94%), excess bleeding (29.94%), dizziness/vomiting (24.20%) and low abdominal pain (5.09%). In Jowai town, the common health problems faced by the mothers during the first week after delivery were cold/fever (11.17%) followed by headache (6.99%), other types (6.59%), excess bleeding (4.51%), low abdominal pain (2.21%) and dizziness/vomiting (1.47%).

29. Among all the independent factors, number of live births, residence (rural/urban) and paternal education are significantly associated with mother's health problems after delivery. The prevalence of health problems found higher among those mothers who were having higher number of children. It is also observed that urban residence and higher parental education is associated with their lower morbidity rate in the present populations.

30. Among all the reported morbidities, cold and/or respiratory disorder is the most common health problem faced by the male children up to 14 years of age in both Sanaro village (20.20%) and Jowai town (11.45%). In Sanaro village, 11.01% and 15.61% suffer from intestinal disorder and other types of health problems (i.e., diarrhoea and dysentery) respectively. In Jowai town the above two health problems

occurred is 2.70% each. Between the two study areas, the overall prevalence of morbidity among males is higher in Sanaro village (31.65%) than in Jowai town (15.82%).

31. Other type of health problem is the main cause of morbidity among the female children in Sanaro village (17.03%). But, in Jowai town, cold and/or respiratory disorder is the main health problem faced by 12.41% individuals. The other health problems in Sanaro are cold and/or respiratory disorders (14.31%) and intestinal disorder (5.50%). In Jowai town, intestinal disorder and other health problems affected 4.91% and 4.51% individuals respectively. As in the case of males, the overall prevalence of morbidity in females is also found higher in Sanaro village (29.67%) than their Jowai counterparts (21.05%).

32. Higher percentage of child morbidity in the present populations is significantly associated with smaller family size.

33. In Sanaro village, among the children aged between 1 and 14 years, polio recorded the highest percentage of immunization (85.00%) followed by BCG (53.50%), then whooping cough (31.00%) and least was the measles (4.50%). But, in Jowai all the children are reported to have immunized with all the given vaccinations. The overall immunization rate among the males in Sanaro village is 88.00%, which is lower than that of the Jowai town. The above observation also shows that 79.01% of females in Sanaro village were immunized for polio, whereas, 48.76%, 22.22% and 8.02% were immunized for BCG, whooping cough and measles respectively. Like in the case of males, all the female children of Jowai town were immunized with each of the above

vaccinations. The overall rate of immunization among females children in Sanaro village is 82.11%, whereas, the same is 100.00% in Jowai town.

34. Higher rate of immunization was recorded among the Pnar children of Jowai town than the Sanaro village. There is also a significant negative correlation between immunization and the age of children ($B = - 0.005 \pm 0.002$, $p < 0.01$) and sex of the children ($B = - 0.028 \pm 0.015$, $p < 0.05$). Therefore, residence and age are the most important factors influencing the immunization of children in the present populations.

CONCLUSION

The impact of various bio-social factors on infant and child mortality in the present study is recorded more among the Pnars of Sanaro village than the Jowai town. The mean age at marriage is found to be about five years less in Sanaro village as compared to their Jowai town counterparts. Similarly, the age at first child birth is also recorded about five and half year earlier to the Jowai town. The average number of live births is found almost double in Sanaro than in Jowai town. In spite of such differences, the average number of surviving children, by and large, remains same in both the study areas. In the present population, education, occupation, family type and birth spacing have influenced the age at marriage and age at first child birth. The frequencies of mothers visiting ANC, taking tetanus injection, iron folic acid in Jowai town is almost double than in Sanaro village. The overall morbidity of the mothers in Sanaro village is found almost three times higher than in Jowai town. In Sanaro, children are immunized mostly for polio only, whereas, in Jowai, 100% children are immunized for polio, BCG, whooping cough, measles, etc. In the light of the present findings, it may concluded that poor socio-economic and

biological factors like the household income, mother's education, types of family, parent occupation, low birth spacing, low age at marriage and age at first child birth, poor antenatal care, etc., are the factors that are influencing high infant and child mortality in the present study populations.

The decline in child mortality in urban areas has been slowed than in rural areas, and as a result urban-rural mortality differentials have become smaller. The factors contributing to this slowing decline include the lower social, cultural and health status of women. Thus, improving female education and health services during pregnancy and delivery would lower child mortality. Necessary policies and programme interventions have to be developed to tackle the factors which are responsible for high infant and child mortality. Health education programmes should be designed for the families who have experienced infant and child deaths so that the further risk of death may be substantially reduced. The effect of birth order and younger maternal age is mediated through short birth interval. Young mothers at high parity, those bearing children at short birth intervals, and mothers who had suffered child loss before are the vulnerable to excessive infant and child mortality. This may be used for future planning and policy decisions aimed at reducing infant and child mortality. Policies should be formulated with keeping in mind the factors like, age at marriage, timing of child bearing, birth spacing, educational and infrastructural facilities.

LIMITATIONS AND POLICY IMPLICATIONS

The present study has highlighted on the various factors that influence the infant and child mortality among the Pnars of Jaintia Hills. This study is restricted to only two

populations of Jaintia Hills District, Meghalaya. More studies are needed to be carried out in different parts of the region. Despite the efforts of the government through its vast networking, some of them are still ignorant of education, ANC visit and immunization of children which are the main causes of high infant and child mortality. Further the study suggests that future generations should strive to enforce compulsory education for the village women in particular to reduce child mortality. In addition, this study would like to bring the attention of the policy makers and regional administrators that they should educate and bring awareness among the women particularly in villages about the immunization of mothers and children, birth spacing and provide health care facilities to them and their children.

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APPENDIX

INTERVIEW SCHEDULE

For the Doctoral Thesis on

STATUS AND DETERMINANTS OF CHILD MORTALITY AMONG THE PNARS OF JAINTIA HILLS DISTRICT, MEGHALAYA

Department of Anthropology

North-Eastern Hill University, Shillong

DEMOGRAPHY

Sl. No. ..... Date of Investigation.....

Name of Locality/Village ..... District .....

State .....

1. Name of the informant .....

Age ..... Date of Birth ..... Sex .....

Age at marriage ..... Place of birth .....

Place of residence ..... Religion .....

Occupation ..... Education .....

Tribe ..... Sub-tribe ..... Monthly income .....

2. Name of the spouse of informant .....

Age ..... Date of birth ..... Sex .....

Age at marriage ..... Place of birth .....

Place of residence ..... Religion .....

Occupation ..... Education .....

Tribe ..... Sub-tribe ..... Monthly income .....

3. HOUSEHOLD CENSUS

Total number of the family members ..... (i) Males ..... (ii) Females .....

Please specify the following

Sl No.	Names	Sex	Age in (yrs)	Relation to Head	Marital Status	Age at Marriage	Religion	Education	Occupation	Place of Occupation	Place of Birth	Age at death	Income/ Wage/ Salary
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

**UM=Unmarried, M=Married, W=Widow, S=Separated, D=Divorce*

BIO-SOCIAL DETERMINANTS

1. Household Income

(a) Income from salary per month (if any) .....

(b) Income from rental per month (if any) .....

(c) Pension per month (if any) .....

(d) Income from total crop harvested .....

(e) Income per year/month from any other sources .....

(f) Total household income per year (cash/kind) .....

(g) Total household expenditure per year .....

2. Household Characteristics

(a) Types of family: Nuclear family/Joint family/Extended family

(b) Residence: Own/Rented/Others

(c) Type of residence: Kaccha/Pucca/Semi-pucca/Assam type/Others

(d) Materials used: Walls .....Roof .....Floor .....

(e) Kitchen separated: Yes/No

(f) Number of bedrooms: .....

(g) Food habits: .....

(h) Main fuel for cooking: Firewood/Kerosene/LPG/Charcoal/Electricity/Any others

(i) Types of toilet: Open field/Septic tank/Own pit/Public toilet/Others

(j) Source of drinking water: Unprotected well/Hand pump/Pond reservoirs/Streams/ Canals/Rivers/Protected well/Pipe water/Others

(k) In your opinion, what should be the ideal size of your family?
Mention number of boys and girls: Boys ..... Girls .....

(l) Are you satisfied with the number of sons you have? Yes/No

(m) If no, how many sons do you desire to have?

(n) Are you satisfied with the number of daughters you have? Yes/No

(o) If no, how many daughters you desire to have?

(p) Do you have any preference to male child/female child? Yes/No

(q) If yes, please give reasons in order of preference.

(r) If no, why?

(s) Do you know that the sex of the fetus can be medically known accurately? Yes/No

(t) If yes, then in order to have a child of desired sex, would you approve abortion of fetus?

(u) If no, why? (i) non-ethical (ii) immoral (iii) against religion (iv) fear of criticism (v) you can afford the child (vi) it does matter

(v) Under what circumstances, would you approve of abortion? (i) medical advice (ii) limiting family size (iii) try to have a child of desired sex

(w) Is there any physical deformity in any member of your family? Yes/No
If yes, please specify.

(x) Is there any consanguineous relation with your husband/wife? Yes/No
If yes, please specify whether: first cousin/second cousin/any other

3. Antenatal and Post-natal care *(women having pregnancy in the past years)*:

(a) When you have last pregnancy? No pregnancy/before 2006/2007/2008/2009

(b) Outcome of last pregnancy: Abortion/Still birth/Live birth

(c) Month of delivery: Jan/Feb/March/April/May/June/July/Aug/Sept/Oct/Nov/Dec

(d) During pregnancy did you go for check up? Yes/No/No response

(e) If Yes, Hospital/Private Doctor/Dai/ANM/Other

(f) During pregnancy number of visit of hospital: 1/2/3/4/5/6/7/8/9/10/11 (times)

(g) Who advised you for check up? Medicine facilities/Any health centre/Clinic/ Other

(h) How many month of pregnancy you were when you go for the first check up? 1/2/3/4/5/6/7/8/No response

(i) Reasons for no antenatal check up: lack of knowledge/no visits of ANM/financial burden/socio-cultural barriers/far distance of hospital/non availability of doctor/no distribution of medicines/prefer private doctor/did not feel necessary/not permitted by husband, family members/other/no response

(j) Is your weight taken during pregnancy? Yes/No/Not remember

(k) Is your blood pressure measured? Yes/No/Not remember

(l) Did you consume iron/folic acid tablets: Yes/No

(m) Do you avail tetanus injection: Yes/No/Not remember

(n) If yes, from whom/where do you get injection: Health Worker/ANM/Govt. Doctor/Private Doctor/Other

(o) During pregnancy did you face any health problems: swelling of hand, feet/paleness/weakness/tiredness/dizziness/visual disturbance/bleeding/convulsions/ no movement of fetus/not feeling comfortable/other/none

(p) Did you consult doctors for the treatment: Yes/No

(q) If yes, Govt. Doctor/Private Doctor/Auxiliary Nurse Midwife/Dai/Aganwadi worker/Traditional man/Self/Medical shop/Other

(r) Place of delivery: Home/Hospital/Doctor.

(s) Who conducted delivery: Doctor/Auxilliary Nurse Midwife/Dai/Elderly ladies/ Other

(t) Was the delivery normal: Yes/No

(u) If no, what are the problems: pre-mature birth/obstructed labor/prolonged labor/breach presentation/other

(v) Instrument used for cutting placenta: New Blade/Knife/Other

(w) During first week after delivery are you suffering from any health problems: fever/excess bleeding/dizziness/severe headache/low abdominal pain/other/none

(x) Are you given treatment: No/Govt Doctor/Private Doctor/ANM/Dai/Traditional man/Aganwadi worker/Other

(y) Was birth weight of new born taken: Yes/No

(z) If yes, when? Immediately/with two days/not remember

(aa) What was the weight? .....

(bb) Did you take any additional diet during pregnancy: Yes/No

(cc) Any special diet after delivery: Yes/No

4. Immunization and child care (*mother having child born in the last 5 years*):

(a) Name of the Index child: .....

(b) Sex of the child: Male/Female

(c) Year of Birth: 2004/2005/2006/2007/2008

(d) Month of Birth: Jan/Feb/March/April/May/June/July/August/September/October/ November/December

(e) Are you fed colostrums: Yes/No

(f) Is your child presently in breast feeding? Yes/No

(g) How long your child is breastfeed: 6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26 (months)

(h) In which age you start to give semi-solid food: 4/5/6/7/8/9/10/11/12/13 (months).

(i) In which age you start to give solid food: 4/5/6/7/8/9/10/11/12/13 (months).

(j) Do you have vaccination card? Yes (seen)/Yes (not seen)/No

(k) In case of diarrhoea, what did you do? Nothing/Home remedy/ORS/Consult a Doctor/Any other

(l) In case of pneumonia, what did you do? Nothing/Home remedy/Health worker/ Medicine man/Any other

(m) Was the following vaccine given to your child: Yes/No

If not, then give reasons for not vaccinated.

Vaccination	Polio	BCG	Whooping Cough	Measles
	ICh, IICh, IIICh	ICh, IICh, IIICh	ICh, IICh, IIICh	ICh, IICh, IIICh
Yes				
No				
Not Remember				

FERTILITY AND MORTALITY

1. Reproductive history

Sl No.	Particulars		Name of the mother
1	Age at marriage (years)		
2	Age at menarche (years)		
3	Age at menopause		
4	Number of living children	Male	
		Female	
		Total	
5	Number of infant deaths (up to 1 year of age)	Male	
		Female	
8	Number of child deaths (1-4 completed years)	Male	
		Female	
9	Number of child deaths (5 years and above)	Male	
		Female	
10	Number of abortions		
11	Number of still births		
12	Total Number of pregnancies		
13	Duration between the last two pregnancies (years/months)		

**Abortion is expulsion of fetus before 28 weeks of pregnancies.*

2. Please specify the following

Sl. No.	Name of the children	Live Births							Fetal loss				
		Living Children			Deceased Children								
		Sex	Age	Marital Status	Sex	Age at death	Year of death	Cause(s) of death	Age	Sex	Date of loss	MC	SB
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

- *MC=Miscarriage, SB=Still Birth*

(i) Are you expecting a baby now? Yes/No/Don't know

(ii) If yes, in what month of pregnancy are you?

(iii) Do you think you can have more children? Yes/No/Don't know

(iv) If no, why?

DATA ON MORBIDITY

(Self-reported morbidity by parents of younger children).

1. Intestinal disorders:

a) Diarrhoea

b) Dysentery

c) Worms

d) Vomiting

e) Vomiting + fever

f) Bleeding from stool

g) Stomach pain

h) Chest pain

i) Any other

2. Cold/respiratory disorders:

a) Cough + running nose + headache

b) Cough + running nose + headache + fever

c) Cough + fever

d) Cough alone

e) Swollen glands + cold

f) Ear problem

g) Breathing problem/bronchitis/asthma

h) Chest problem

i) Sore throat

j) Tuberculosis

3. Injuries:

a) Cut

b) Burn

c) Snake bite

d) Any other

4. Miscellaneous disorders:

a) Sore/boils

b) Fever

c) Chicken pox

d) Typhoid

e) Scabies

f) Jaundice

g) All body pain

h) Malnutrition

i) Weakness

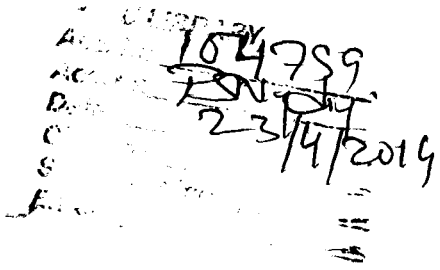
j) Any other

5. Any other:

a) Malaria

b) Fatigue (feeling weakness or tiredness)

(**Morbidity is the diseases or sickness that caused within a month or 28 days time*).



BIO-DATA

1. Name : Mr. Happystone Syngkon
2. Father's name : Shri. Ishmel Suna
3. Mother's name : Smt. Phram Syngkon
4. No. & date of Registration (PhD) : 1027 of 16/05/2006
5. Date of Birth : 07th January, 1980
6. Community : Pnar
7. Nationality : Indian
8. Religion : Christianity
9. Marital Status : Married
10. Educational Qualifications:

Name of Examinations	Year of Passing	Board/ University	Division/ Position	Percentage/ Grade
SSLC	1997	MBOSE	3rd Division	44.5%
HSSLC (Science)	1999	MBOSE	2nd Division	59%
Bsc (Hons) Zoology	2002	NEHU	2nd Division	52%
Msc (Anthropology)	2004	NEHU	1st Division, 8th Position	64%
PhD Course Work	2010	NEHU		B

11. Area of Research : Bio-social Anthropology
12. Participant: National Workshop on "Rainwater Harvesting, Flood Control and Integrated Water Management in Northeast India" (October 16-17, 2008) Organised by Department of Anthropology, North Eastern Hill University, Shillong in collaboration with the Society for Indian Medical Anthropology, Mysore.