

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

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 schedule 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 \leq

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

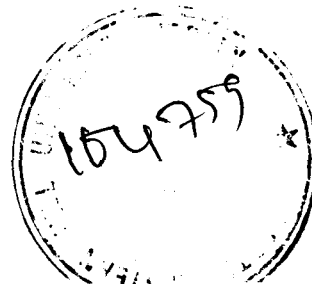
child mortality and mother's age group in Sanaro village but they show significant association in Jowai town ($\chi^2 = 8.05$, $df = 3$, $p < 0.05$).

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 ($\chi^2 = 8.69$, $df = 2$, $p < 0.025$). 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 ($\chi^2 = 152.02$, $df = 1$, $p < 0.005$). So, it may be



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

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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