Mortality Status of the Slum Dwellers of Assam

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Abstract

Slum dwellers are an inevitable part of urban society, but due to their poor economic condition they are far, far away from enjoying the basic amenities of life, which ultimately affect on their health status. Therefore, through this paper an attempt has been made to analyse the level of mortality and the factors responsible for determining the mortality level of the slum dwellers of Assam. It is found from the study that the mortality level of the slum dwellers of Assam is higher than the state average. Among the various determinants, only two determinants i.e. place of delivery (PD) and starting time of breast feeding (BF) are found to be significant factors in determining infant mortality.

Key Words: Slum Dwellers, Poverty, Dilapidated Living Condition, Level of Mortality, Determinants of Infant Mortality.

Introduction: The study of mortality deals with the effects of death on population. A death can occur only after a live birth, and the span between birth and death is life. The study of mortality is useful for analysing current demographic conditions as well as for determining the prospects of potential changes in mortality conditions of the future (Bhende and Kanitkar, 1994). Mortality figures also help in finding out how far the society is healthy and the causes of mortality reveal the direction in which society is moving e.g., how far social evils, economic strains, negligence, providing of adequate facilities etc., been responsible for the occurrence of death (Raj, 1995).

Those who live in neat and clean environments and atmosphere are less prone to death as compared with those who habitually live in dirty atmosphere. Several surveys conducted have established that those living in 'jhuggis' and shanties under unhygienic conditions die earlier than their counter- parts in cleaner environments (Raj, 1995).The death rates especially the infant and child mortality rates are high in developing countries as compared to those of the developed countries. In this paper an attempt has been made to study the mortality level and the determinants of mortality of the slum dwellers of Assam.

According to Encyclopedia of Social Sciences (Vol-4, s-z) the term "slum" indeed is always relative. It connotes the worst structural and sanitary conditions and the most degraded occupancy, usually by the lowest income groups, of any given period. As per 2001 census 42.6 million people of India live in slums which constitute 4% of the total population and 15% of the total urban population of India. According to the latest census 2011, slum population of India has increased and it is 65.5 million which constitute 5% of the total population and 17.4% of the total urban population of India. According to 2011 census Slum population is the highest in Maharashtra constituting 18.09% of the total slum population of India. Assam also is not free from the slums and it is 0.30% of the total slum population of India.

The present status of the slum dwellers of Assam: As per census, 2011, out of 88 statutory towns, thirty one (31) towns in Assam are slum reporting towns. According to the latest census (2011), the slum population of Assam stands at 197,266 of which 101,424 are males and 95842 females. The slum population accounts for 0.63% of the total population and 4.5% of the total urban population of the state.

According to 2011 census, slum population is the highest in Dibrugarh i.e. 13.73% of the total slum population of Assam. In Guwahati, Silchar, Dhubri and Nagaon the percentage of slum population to the total slum population of Assam are 13.05%, 11.53%, 9.38% and 9.18% respectively.

Significance of the Study: As the slum dwellers are living in a very congested and dilapidated situation due to their low income, therefore there is a great impact of socio – economic and demographic factors on their mortality level. The present study is an attempt to analyze the mortality level and the various socio – economic and demographic factors responsible for determining the mortality level of the slum dwellers of Assam.

Objectives of the Study:

1. To study the mortality level of the slum dwellers of Assam.
2. To study the factors responsible for determining the mortality level of the slum dwellers of Assam.

Scope of the Study: Three (3) towns of Assam where the slum dwellers are in highest number are selected for intensive study. These three towns are Dibrugarh with 27089 slum dwellers, Guwahati with 25739 slum dwellers and Silchar with 22749 slum dwellers. The proportions of slum population in the three towns (Dibrugarh, Guwahati and Silchar) to the total slum population of Assam as per 2011census are 13.73%, 13.05% and 11.53% respectively. Ten percent (10%) of the slum pockets (subject to a minimum of 2) of each sample town having the highest number of slum households have been taken as sample slum pockets. Hence total 26 slumpockets were selectedfrom the three sample towns (22 from Guwahati, 2 from Dibrugarh and 2 from Silchar). Five percent (5%) of slum households of each sample slum pocket have been randomly selected for intensive study. Hence a total of 945 slum households were selected from 26 sample slum pockets.

Methodology: The study is primarily based on primary data, however secondary data also need wherever necessary. Primary data are collected from the 945 sample slum households. Primary data are collected from the slum dwellers by administering a set of questionnaire prepared for the purpose. Secondary data are collected from the records of Municipal Corporation/Boards, publications of the department of Economics and Statistics, Govt. of Assam, census reports, websites, books, journals, newspapers etc.

Measures of Mortality: Demographers have mentioned different measures of finding out death rates. Some of such rates are - Crude Death Rate (CDR), Age Specific Death Rates (ASDRs), Maternal Mortality Rate (MMR), Infant and Child Mortality Rate (IMR), (CMR), Cause Specific Death Rates (CSDRs) and Sex Specific Death Rate (SSDR).

The **crude death rate** is the most simple and the most commonly used measure of mortality. It provides one of the bases for computing the rate of natural increase in population. It is a ratio of the total registered deaths (D) of a specified year to the total mid – year population (P), multiplied by 1000. It is computed as follows:
CDR = D/P × 1000

A total of 245 deaths have been taken place in the sample households during the five years (2009–2013). Thus the annual average number of death is found to be 49 which is accepted to be the number of deaths in the survey year 2013. **The total population is 4798 and crude death rate is 10.2 which is higher than the state average of 7.8 for the year 2013 (Sample Registration System Statistical Report, RGI).**

Though crude death rate is a very simple method of measuring mortality but the drawback is that it completely ignores the age and sex distribution of the population. Mortality is different in different segments of the population. Children in the early ages of their life, and the older generation are exposed to higher risk of mortality as compared to younger people. Moreover mortality rate is also different for females irrespective of age groups, than their male counterparts.

Age Specific Death Rate is another method of finding out death rate. Mortality rate among the children is usually high. Thereafter pressure of death gradually decreases. But when old age comes then the pressure of death again increases. It may be defined as the number of deaths of persons of a given age per 1000 population during a specified year. Table: 1. i shows the age specific death rates of the sample population.

Table: 1.i
Age specific death rates of the sample population in 2013

Age group	Population of each age group	No. of deaths in each age group	A. S. D. R.
0 - 4	456	15	32.89
5 - 9	837	3	3.58
10 - 19	1078	5	4.64
20 - 29	670	2	2.99

30 - 39	941	4	4.25
40 - 49	525	3	5.71
50 - 59	233	12	51.50
60+	58	5	86.21
Total	4798	49	

Source: Compiled from field survey data.

Table: 1.i shows higher death rates among the youngest (under age 5) and the oldest age group (60+). In the youngest age group i.e. 0 - 4 years, the death rate is 32.89 per 1000 sample population and it declined substantially with higher age groups and from age group 50 - 59, death rate again starts increasing.

Maternal Mortality Rate measures number of women aged 15 − 49 years dying due to maternal causes (D_m) per 100000 live births (B). Maternal mortality rate is high in the countries where the women are illiterate, the orthodoxy has deep roots, interval between the births of two children is rather less, inadequate medical facilities, pregnant women cannot be provided with nutritive food, early marriage etc. Maternal mortality rate is computed as follows:

$$MMR = Dm/B \times 100000$$

The annual average number of death of mother due to child birth related problems in the sample slum areas in the surveyed year 2013 is 1. The total number of live birth being 92 in the year 2013, the maternal mortality rate is found to be 1087 per 100000 live births which is much higher than the state and national average of 300 and 167 respectively (SRS, July 2011 − 13). The maternal mortality rate is very high among the surveyed slum women as majority of them are illiterate, due to poverty they are unable to take proper medical facilities and cannot afford nutritious food at the time of pregnancy, majority of the deliveries are home deliveries in an unhygienic condition with the help of an untrained dhai etc.

The **infant mortality rate** is especially important in the analysis of mortality because infant deaths account for a substantial number of all deaths, especially in those countries where health conditions are poor. It is generally computed as a ratio of infant deaths (deaths of children under one year of age, d_o) registered in a calendar year to the total number of live births (B) registered in the same year. This rate is computed as follows:

$$IMR = d_o/B \times K$$
$$\text{Where, } K = 1000$$

The infant mortality rate among the surveyed slum dwellers is found to be 119.57 per thousand live births in 2013 (annual average number of infants deaths being 11 and annual average number of live birth being 92), which is significantly higher than the state average of 54 for the year 2013 (Sample Registration system Statistical Report, RGI). The NFHS−4 (2015 − 16) has found infant mortality rate for Assam as 48 per thousand live births.

Child mortality rate is measured in terms of death of the number of children less than 5 years old (D_{0-4}) taking place per 1000 children of $0-4$ years of age (C_{0-4}). It is computed as follows:

$$CMR = D_{0-4}/C_{0-4} \times 1000$$

Child mortality rate among the surveyed population is found to be 32.89 per thousand children under 5 years of age in 2013 (annual average number of death of children less than 5 years being 15 and the number of children between $0-4$ years of age being 456) which is much higher than the state average of 15.8 for the year 2013 (Sample Registration system Statistical Report, RGI).

Deaths can occur due to any reason e.g. on account of prolonged illness, brief illness, accident, malnutrition, food poisoning etc. every society is quite keen that it should know the cause of death so that it can apply necessary checks. **Cause specific death rate** helps to find out what are the causes of death of male and female and the infants in a population.

It is defined as the number of deaths due to a particular cause (D_c) in a year per 1000 population (P). It is computed as follows:

$$CSDR = D_c/P \times 1000$$

Table: 1.ii shows the number of deaths due to a particular cause in the sample population for the surveyed year 2013.

Table: 1.ii
Cause Specific Death Rates

Causes of death	No. of persons died			CSDR = D_c/P ×1000 P = 4798
	Male	**Female**	**Total**	
Tuberculosis	2	1	3	0.63
Liver damage	12	0	12	2.50
Diarrhea	7	2	9	1.88
Jaundice	8	7	15	3.13
Asthma	3	1	4	0.83
Heart Problem	1	0	1	0.21
Cancer	1	1	2	0.42
Malaria	1	1	2	0.42
Delivery related problems	N. A.	1	1	0.21
Total	35	14	49	

Source: Compiled from Field Survey data.
N.A. - Not Applicable.

It is clear from the table that death due to jaundice (15) is the highest followed by liver damage (12) and diarrhea (9). This is mainly because of unhygienic and dilapidated living

condition, absence of proper sanitation facility, lack of pure drinking water, alcohol consumption etc.

Sex Specific Death Rate - Usually it is observed that mortality among both the sexes is not the same. It is higher among the men as compared with the women. In other words, death pressure among the men is higher than the women, though there are some countries of the world where pressure on women is higher (Raj, 1995). In her survey, Nath, Rubi has found higher death rate for the female than for the male among the kaibarta population of Assam (Nath, 2008).

In the surveyed slum areas, out of total 49 deaths, the number of male death is 35 and female death is 14.The total male and female numbers being 2488 and 2310, the male and female death rates are 14.07 and 6.06 per thousand populations respectively. Male death rate is higher than female death rate which may be due to hard labour, so much consumption of alcohol, poverty, illiteracy, inability to take proper medical treatment, unhygienic living condition etc.

From the explanation it is found that all the major mortality rates of the sample slum dwellers of Assam are higher than those of the state averages.

Determinants of infant mortality: Infant mortality rate is very high in some societies and in others it is low, but there is no society which is free from this. In fact, the pressure of death is maximum on the infants. Different factors are responsible for infant mortality, both biological and socio –economic. The independent variables (explanatory variables) have been identified as given below.

(1) Ante - Natal Medical Care (ANMC)
(Using dummy variables, 1 for those who had taken ante – natal care and 0 for those who did not)
(2) Place of Delivery (PD)
(Using dummy variables, 1 for hospital delivery and 0 for home delivery)
(3) Post – Natal Non Medical Care, Breast Feeding (BF)
(4) Post- Natal Preventive Medical Care, Vaccination (VC)
(Using dummy variables, 1 for taking vaccination and 0 for not taking)
(5) Housing Condition (HC)
(Using dummy variables, 1 for good housing condition and 0 for bad housing condition)
(6) Mother's Education (ME)
(Using dummy variables, 1 for the illiterate and 0 for the literate mothers)
(7) Mother's Age at Birth (MAB)
(8) Birth Interval (BI)
(9) Type of Family (TF)
(Using dummy variables, 1 for nuclear families and 0 for joint families)
(10) Wife's Labour Force Participation (WLFP)
(Using dummy variables, 1 for working women and 0 for non – working women)
(11) Total Family Income (TFI)

(12) Birth Attendant (BA)

(1) Ante – Natal Medical Care (ANMC): Ante –natal medical care is one of the important determinants of infant mortality. Ante –natal medical care refers to pregnancy related health care provided by a doctor or a health worker in a medical station or at home. In the surveyed slum areas it is found that only 28 (30%) women have received ante – natal check-up during the last delivery. Table: 2.i shows the relation between ante- natal check-up of the mothers and infant death among the sample women.

Table: 2.i
Ante- natal medical care and number of infant deaths

Ante- natal check-up		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Taken by the mothers	No. of babies born	26	2	28	7.14
	No. of infant died	0	2	2	
Not taken by the mothers	No. of babies born	55	9	64	14.06
	No. of infant died	0	9	9	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.i shows that the number of infant death per 100 women is higher (14.06) among the women who have not received ante-natal check-up than the women who have received ante-natal check-up (7.14). Thus a negative relation is observed between ante- natal check-up and infant death.

(2) Place of Delivery (PD): Place of delivery is another important factor responsible for high infant mortality. Deliveries under unhygienic condition increases infant mortality. Ante-natal check-up and place of delivery have a positive relationship. The women who receive greater number of antenatal check-up are likely to deliver in a health centre and vice-versa.

In the surveyed slum areas, it is found that 55% deliveries are home deliveries while 45% deliveries take place in public hospitals. On the other hand, 28% deliveries were assisted by nurses, 43% by indigenous dhai, and 12% by relatives/neighbours and remaining 16% were assisted by the doctors.

Place of delivery is taken as a dummy variable in mortality determinants and place of delivery is grouped into–home delivery and hospital delivery. Table: 2.iishows the relationship between place of delivery and number of infant deaths.

Table: 2.ii
Place of delivery and number of infant deaths

Place of delivery		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Home delivery	No. of babies born	43	8	51	15.69
	No. of infant died	0	8	8	
Hospital delivery	No. of babies born	38	3	41	7.32
	No. of infant died	0	3	3	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.ii shows that the number of infant death per 100 women is much lower (7.32) in case of hospital deliveries as compared to home deliveries among the sample slum women. Thus a strong relation between place of delivery and infant death is observed.

3) Post – Natal non medical care, Breast Feeding (BF): The practice and length of breast feeding is one of the important determinants of infant mortality, which have significant effects on the mothers and their new born babies. Although breast feeding is universal in Assam, only 64.4% of children under age 3 years breast feed within 1 hour of birth as estimated by NFHS - 4 (2015-16). The immunity of the new born babies increases if they were breast feed immediate after birth.

In the surveyed slum areas infant breast feeding is found to universal. About 47% (43) of the children were breast feed immediate after birth, 25% (23) of them were breast feed within one hour of birth while 28% (26) began it within first day of life. Table: 2.iii shows the association between starting time of breast feeding and infant death experience among the sample slum women.

Table: 2.iii
Starting time of breast feeding and number of infant deaths

Time of breast feeding		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Immediate after birth	No. of babies born	40	3	43	6.98
	No. of infant died	0	3	3	
Within one hour	No. of babies born	21	2	23	8.70
	No. of infant died	0	2	2	
Within one day	No. of babies born	20	6	26	23.08
	No. of infant died	0	6	6	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.iiishows that infant death is higher (23.08) among those babies who were breast feed within one day of birth. But infant death is lower (6.98) among the babies who breast feed immediate after birth. Thus there is a strong positive relation is observed between breast feeding and infant mortality among the sample slum women of Assam.

(4) Post- Natal Preventive Medical Care, Vaccination (VC): Post natal medical care against six vaccine preventable diseases is another important determinant of infant mortality. In Assam NFHS-4 (2015-16) has found that only 47.1% of the children of age 12-23 months are fully vaccinated. In the surveyed slum areas among the 92 infants born in 2013, only 15.22% (14) are found to be fully vaccinated 21.74% (20) are partly vaccinated while 63.04% (58) have not received any vaccination.

In mortality analysis vaccination is taken as a dummy variable and babies are grouped into two- (i) vaccinated and (ii) not vaccinated. Table: 2.ivshows the relationship between vaccination given to the infants and number of infant deaths.

Table: 2.iv
Vaccination given to the infants and number of infant deaths

Status of vaccination given to babies		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Given	No. of babies born	31	3	34	8.8
	No. of infant died	0	3	3	
Not given	No. of babies born	50	8	58	13.8
	No. of infant died	0	8	8	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.iv shows that the number of infant deaths per 100 babies is higher (13.8) among those who had not vaccinated. Thus a negative relationship between immunization of the infants and infant mortality is observed.

(5) Housing Condition (HC): Housing condition is another important determinant of infant mortality. The condition of the house, the materials used for its construction, availability of light, drinking water facility, drainage system, sanitation facility etc. are important factors which determine infant mortality to a great extent.

The housing condition of the sample slum areas is far from satisfactory. It is found that 88.1% (833) families live in kutcha houses (made of mud, thatch, plastic and bamboo), 3.3% (31) in semi pucca houses and only 8.6% (81) families live in pucca houses.

Housing condition is a qualitative variable and in the study of mortality, it is taken as a dummy variable. It is also found that the pucca and semi pucca houses in the sample slum areas have minimum basic amenities of life as compared to the kutcha houses. So, the

housing condition of the pucca and semi pucca houses are assumed as good housing condition and the kutcha houses are taken as bad housing condition. Table: 2.v shows the relationship between housing condition of the sample population and number of infant death.

Table: 2.v
Housing condition of the sample population and number of infant deaths

Condition of house where babies were born		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Good condition	No. of babies born	10	1	11	9.09
	No. of infant died	0	1	1	
Bad condition	No. of babies born	71	10	81	12.35
	No. of infant died	0	10	10	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

It reveals from the table that the number of infant death per 100 houses is higher (12.35) in bad condition houses while it is lower (9.09) in good condition houses. Thus a negative relation is observed between housing condition and infant mortality among the sample slum dwellers of Assam.

(6) Mother's Education (ME): Among the different determinants of infant mortality, mother's education is regarded to be the most important. Educated mothers are more conscious about the health of their children, nutrition and hygiene and may adopt appropriate steps for recovering diseases.

The association between educational attainment of the mothers and infant death is shown in table: 2.vi.

Table: 2.vi
Mother's education and number of infant deaths

Educational attainment of mothers		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Illiterate	No. of babies born	41	6	47	12.77
	No. of infant died	0	6	6	
Literate	No. of babies born	40	5	45	11.11
	No. of infant died	0	5	5	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

It is seen from the table that the number of deaths per 100 babies is higher among the illiterate mothers (12.77) than those of the literate mothers (11.11). Thus a negative relation is observed between educational attainment of the mothers and infant death.

(7) Mother's Age at Birth (MAB): Mother's age at birth is one of the important demographic factors which influence infant mortality. Children of the youngest and oldest mothers experiencing higher mortality than those children whose mothers are in their prime reproductive age. The mean age at marriage of the sample respondents is found to be 19 years. The relationship between age at birth of the mothers and infant mortality experience is shown in table: 2.vii.

Table: 2.vii
Mother's age at birth and the number of infant deaths

Age of the mothers when the babies were born		No. of infant died			
		0	1	Total	No. of infant deaths per 100 mothers
Upto – 20 Years	No. of babies born	19	3	22	13.64
	No. of infant died	0	3	3	
21 - 25	No. of babies born	30	6	36	16.67
	No. of infant died	0	6	6	
25+	No. of babies born	32	2	34	5.88
	No. of infant died	0	2	2	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.vii shows that mothers whose age at birth is more than 25 years have experienced lowest number of infant death (5.88) than those of the others. But it is relatively stable in other age groups. So no significant relationship is emerged.

(8) Birth Interval (BI): Birth interval is a powerful variable influencing the survival chances of the infants. Short birth interval may adversely affects mothers health and their infants chance of survival. Table: 2.viii shows the association between births interval and the number of infant deaths.

Table: 2.viii
Births interval and number of infant deaths

Births interval (in months)		No. of infant died			
		0	1	Total	No. of infant deaths per 100 mothers
Upto - 18	No. of babies born	53	8	61	13.11
	No. of infant died	0	8	8	
19 - 24	No. of babies born	20	2	22	9.09

	No. of infant died	0	2	2	
25 and above	No. of babies born	8	1	9	11.11
	No. of infant died	0	1	1	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

It reveals from the table that mortality is the highest (13.11) per 100 infants who were born with the interval of 18 months. But it is relatively stable in other birth interval groups. So, no significant relationship has emerged.

(9) Type of Family (TF): It is generally thought that in joint families, children are not taken care of which results into high mortality. S. Goswami has found high mortality in joint families among the tea garden labours of Assam. Rupjyoti has also found significant relationship between infant mortality and family type among the Adis of Arunachal Pradesh (Nath, 2008)

In the sample slum areas 78.2% (739) of the families are found to be nuclear while 21.8% (206) belong to joint families. The association between family type and infant death experience is shown in table: 2.ix.

Table: 2.ix
Family type and number of infant deaths

Type of families where the babies were born		No. of infant died			
		0	1	Total	No. of infant deaths per 100 mothers
Nuclear	No. of babies born	52	7	59	11.86
	No. of infant died	0	7	7	
Joint	No. of babies born	29	4	33	12.12
	No. of infant died	0	4	4	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

It is found from the table that the mothers living in the joint families have experienced higher infant deaths (12.12) than those of the nuclear families (11.86).

(10) Wife's Labour Force Participation (WLFP): Work force participation among the sample women is very poor. Only 25.8% (244) of the mothers are engaged in different activities while 74.2% (701) are simple housewives. The relationship between infant mortality experience and working status of the sample mothers is shown in table: 2.x.

Table: 2.x
Wife's labour force participation and number of infant deaths

Working status of the wives		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Working	No. of babies born	19	2	21	9.52
	No. of infant died	0	2	2	
Non - working	No. of babies born	62	9	71	12.68
	No. of infant died	0	9	9	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table shows that the number of death per 100 working women is lower (9.52) than those of the non working women (12.68). The non working women generally belong to low income families, illiterate and unaware about the health care measures of the infants. So, infant death among them increases.

(11) Total Family Income (TFI): The relationship between family income and infant death experience among the sample families is shown in table: 2.xi.

Table: 2.xi
Total family income (annually) and number of infant deaths

No. of families having annual income (in Rs.)		No. of infant died			
		0	**1**	**Total**	**No. of infant deaths per 100 mothers**
Upto 60,000	No. of babies born	47	8	55	14.55
	No. of infant died	0	8	8	
60,001–120,000	No. of babies born	25	3	28	10.71
	No. of infant died	0	3	3	
120,001–180,000	No. of babies born	6	0	6	0
	No. of infant died	0	0	0	
180,001 and above	No. of babies born	3	0	3	0
	No. of infant died	0	0	0	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

Table: 2.xi shows that infant mortality experience among the families belong the income categories of Rs. 60,000 (annually) is the highest (14.55) and the families with annual income Rs. 60,001 and more upto Rs. 120,000 is the lowest (10.71). While no infant death

is found among the families whose incomes are 120,001 and above. So no significant relationship is observed between total family income (annually) and number of infant death.

(12) Birth Attendant (BA): Birth attendant is an important determinant of infant mortality. The relationship between birth attendant and number of infant death among the sample slum dwellers is shown in table: 2.xii.

Table: 2.xii
Birth attendant and the number of infant deaths

Birth attended by		No. of infant died			No. of infant deaths per 100 mothers
		0	**1**	**Total**	
Doctor	No. of babies born	14	1	15	6.67
	No. of infant died	0	1	1	
Nurse	No. of babies born	24	2	26	7.69
	No. of infant died	0	2	2	
Indigenous dhai	No. of babies born	33	7	40	17.50
	No. of infant died	0	7	7	
Relatives/neighbours	No. of babies born	10	1	11	9.09
	No. of infant died	0	1	1	
Total	No. of babies born	81	11	92	11.96
	No. of infant died	0	11	11	

Source: Compiled From Field Survey data.

It reveals from the table that the number of infant death per 100 babies is higher among those who were attended by indigenous dhai (17.5) at the time of birth. While it is lower when the babies were attended by doctors (6.67) or nurses (7.69). Thus a negative relation is observed between birth attendant and infant death.

From the above observation, it is found that there is some kind of association (positive and negative) between the 12 independent variables and the infant mortality among the sample slum dwellers of Assam. But, in order to observe the long run impact of the independent variables and the level of significance of such impact on the dependent variable (IM), Binomial Logit Regression analysis has been applied.

Binomial Logit Regression Analysis:

The binomial model applied here can be written as:

$IM_i = In(P_i/1-P_i) = \beta_0 + \beta_1 ANMC_i + \beta_2 PD_i + \beta_3 BF_i + \beta_4 VC_i + \beta_5 HC_i + \beta_6 ME_i + \beta_7 MAB_i + \beta_8 BI_i + \beta_9 TF_i + \beta_{10} WLFP_i + \beta_{11} TFI_i + \beta_{12} BA_i + U_i$

Where,

P is the predicted probability of infant mortality (IM) which is coded as 1 and 1-P is the predicted probability of survival of infant which is coded as 0.

β_0 is the intercept term which gives the mean or average value of IM, when all the independent variables are set equal to zero.

β_1, β_2………………. β_{12} are regression co-efficient for each of the explanatory variables, U_i is the stochastic error term.

Findings of the regression analysis: Results summarizing the effects of all the twelve variables on infant mortality have been presented in table: 3.

Table: 3
Determinants of infant mortality: Binomial Logit Regression Results
Dependent variable: Infant Mortality

Regressor	Coefficient (β)	Wald	Exp. (β)
ANMC	-.255	.184	.775
PD	-4.689	11.466[*]	.009
BF	.989	30.018[*]	2.688
VC	2.827	5.615	16.887
HC	.194	.079	1.214
ME	-.126	.150	.882
MAB	-.074	1.935	.928
BI	-.141	.496	.868
TF	.111	.099	1.117
WLFP	-.097	.058	.908
TFI	.000	.432	1.000
BA	-.283	.598	.753
Constant	.471	.090	1.601

Cox & Snell R^2 = 0.112,   Negelkerke R^2 = 0.212
Hosmer and Lemeshow goodness of fit test statistic = 9.506
Convergence achieved after five iterations.
*Significant at 1% level.

Estimated results of the logistic regression model (Table:3) show that out of the 12 influencing variables included in the model, only 2 variables such as place of delivery (PD) and breast feeding (BF) are found to be significant factors determining variations in infant mortality among the sample slum population.

Place of delivery (PD) is found to have negative significant association with infant deaths. It is being found that hospital delivery decreases the risk of infant deaths by 4.689 units than home delivery.

So far as the relationship of breast feeding (BF) on infant mortality is concerned, it can be seen that it is a significant variable. The β coefficient for breast feeding being 0.989

reveals that increasing the starting time of breast feeding increases the risk of infant mortality by 0.989 units.

On the contrary, other variables such as ante-natal medical care (ANMC), vaccination (VC), housing condition (HC), mother's education (ME), mother's age at child birth (MAB), birth interval (BI), type of family (TF), wife's labour force participation (WLFP), total family income (TFI) and birth attendant (BA) are not found to be significant factors determining the variation in infant mortality among the sample slum dwellers of Assam.

Conclusion: From the observation, it is found that all the major mortality rates of the sample slum dwellers of Assam are higher than those of the state averages i.e. the mortality of the slum dwellers is found to be higher than the state average. For the reduction of the number of mortality level among the slum dwellers, the government must provide basic amenities of life like electricity, pure drinking water, drainage facility; sanitary latrines, medical facilities etc. to them, so that they can live in a clean environment and secure their financial condition by providing them permanent source of earning.

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