Elements of Biological Factors Influencing Infant and Child Mortality among the Zou of Manipur, Northeast India

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ABSTRACT: A schedule based cross-sectional study was executed among 533 mothers aged 17- 49 years to find out the influence of biological societal elements such as age at marriage, birth order, consanguinity, same clan marriage, blood group compatibility, admixture rate, etc. on infant and child mortality among the Zou, a tribal population of Manipur state of Northeast India. The findings show that age at marriage, age group of the mother and ABO incompatible have shown significant associations with infant and child mortality

INTRODUCTION

An overall biological well-being of individuals results into the development of healthy offspring to certain degrees. The World Health Organization (1971) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". This statement cuddles the importance of biosocial and psychological aspects that can influence the health of an individual entirety. Biological factors in the health aspect of parents can induce infant and child mortality rate if any erroneous hereditary traits pass to the subsequent generations.

Biological factors such as age of the mother, birth order, births intervals, etc. influence the formation of the fetus which eventually results into the birth weight, multiple births, premature births, etc. It has been reported that prenatal and postnatal mortality rates are high at the lower age group of the mother i.e., below 19 years of age, after which this rate declines up to 29 years and then again starts increasing as the age of the mother increases (Farooq, 2013).

Obesity, which is one of the main causes of hypertension, is a condition that develops from a chronic quantitative imbalance between energy intake and energy expenditure which leads to an excessive accumulation of adipose tissue within the body (Bray and Bellanger, 2006). The increasing pattern of obesity is differed by age and sex (Matijasevich *et al.*, 2009). Obesity is more common in the middle-age group, mainly people from higher socio-economic status. Though obesity is caused mainly due to socio-economic factors, it is also influenced by family genetic history in varying degrees.

In 2014, the WHO reported that there were more than 1.9 billion individuals of ages 18 years and older who were overweight, while 462 million were underweight and more than 600 million were obese. In the same year, 42 million children under the age of five were overweight or obese but 156 million were affected by stunting (low height-for-age). About 50 million children were affected by wasting (low weight-for- height). Poor nutrition continues to cause nearly half of deaths in children under five, while low and middle- income countries now witness a simultaneous rise in childhood overweight and obesity increasing at 30% faster rate than in richer nations.

Kabir *et al.*, ('95) defines infant mortality as

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"mortality or death during the first year of life" and child mortality as "mortality or death during the age of 1 to 4 years". UNICEF also defines infant mortality rate as "the probability of dying between birth and exactly one year of age expressed per 1000 live births". On the other hand, child mortality is "the probability of dying between birth and below five years of age expressed per 1000 live births".

Mortality is the permanent disappearance of all evidences of life at any time after birth has taken place. Infant and child mortality has received renewed attention as part of the United Nation's Millennium Development Goals. 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). Till 2013, about 4.6 million infant deaths accounting roughly 74% occurred within the first year of life. Globally, the infant mortality rate has decreased from an estimated rate of 63 deaths per 1000 live births in 1990 to 34 deaths per 1000 live births in 2013.

With this end in view, a study was undertaken among the Zou of Manipur with the following objectives: i) to assess the influence of biological factors on the Zou infant and child mortality of Manipur and ii) to compare the same between Behiang (rural) and Lamka (urban) populations.

METHODOLOGY

The data for present study was collected from 533 married Zou women of Churachandpur District, Manipur, aged between 17 and 49 years during the year 2016-2017. Zou literally meaning hill people belongs to the Mongoloid stock speaks Tibeto-Burman language. The Zou is an indigenous community living along the frontier of India and Burma, they are a sub-group of the Zo people (Mizo-Kuki-Chin).The present study was conducted in Behiang village and the adjoining areas to represent the rural population and Lamka town to represent the urban population where the Zou is predominant. Information on infant and child mortality has been recorded cautiously from all the Zou mothers included in the present study irrespective of the time of occurrence.

Data on anthropometric measurements such as height and body weight were collected using anthropometer and a portable weighing machine. Anthropometer was used to measure the height (cm) with a precision of 1 cm. Weight was recorded to the nearest 0.1kg by weighing machine with minimum clothing. Body Mass Index (BMI) was calculated using the formula: BMI= Weight (Kg) / Height (Meter)2. To calculate the value of BMI, the value of height and weight were taken using standard protocols given by WHO for Asian population cut-off points (Normal BMI >18.5; overweight BMI>23; obese BMI>27.5) (WHO, 2000). Data on physiological parameter like blood pressure was collected using digital sphygmomanometer. The subject sat relaxed in a chair with her arm supported comfortably and the pressure cuff was applied close to the upper arm. The blood pressure of each participant was recorded after taking twice or thrice in about five-minute intervals. For the classification of blood pressure, the 'Seventh Report of the Joint National Committee' (2003) on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (normal BP is <120/80 mmHg, Pre-hypertension is between 120-139/80-89 mmHg, Hypertension Stage I as 140-159/90-99 mmHg, and Hypertension Stage II as e"160/100 mmHg) has been used as a standard protocol for the present study.

Information on blood group of the subjects was recorded based on the medical records available at the time of data collection. However, in case of unavailability of such records, ABO blood group testing was done following the standard slide method after taking consent from the concerned subject.

STATISTICAL ANALYSIS

For statistical analysis, correlation test, t-test, regression analysis etc. have been employed. Besides calculating manually, most of the analyses were performed in MS-excel software (Microsoft Company, 2010 version) and IBM developed software SPSS version 20.

RESULTS

Certain biological factors influencing infant and child mortality in various degrees among the study population have been discussed from the following tables-

Table 1. Infant and child mortality by age group of the mother

Age group (years)	No. of live birth	Mortality no. and %		
Behiang		Infant (%)	Child (%)	Total (%)
≤25	42	2 (4.76)	0 (0.00)	2 (4.76)
26-35	322	14 (4.35)	6 (1.86)	20 (6.21)
36-45	310	8 (2.58)	8 (2.25)	16 (5.16)
≥46	120	4 (3.33)	1 (0.83)	5 (4.16)
Correlation coefficient (r)		-.007	.150*	.084
Lamkad				
≤25	160	1 (0.62)	1 (0.62)	2 (1.25)
26-35	308	7 (2.59)	4 (0.64)	11 (3.57)
36-45	277	8 (2.52)	3 (0.72)	11 (3.97)
≥46	132	7 (5.30)	6 (3.78)	13 (9.84)
Correlation coefficient (r)		.148*	.138*	.206**

Source: fieldwork data
*Correlation significant at 0.05 level (2 tailed)
**Correlation significant at 0.01 level (2 tailed)

The percentage frequencies of infant and child mortality according to the age groups of the Zou mothers are displayed in Table 1.In Behiang village ,the percentage of infant mortality was found highest in ≤25 years age group (4.76%) followed by 26-35 years (4.35%), and then in ≥46 years (3.33%) and least in the age group 36-45 years (2.58%) . In Lamka town, the highest percentage of infant mortality was observed in ≥46 years age group (5.30%), followed by 26-35 years (2.59%), and then in 36-45 years (2.52%) and lowest in the age group ≤25 years (0.62%). In Behiang, child mortality was found highest in the age group 36-45 years (2.25%), followed by 26-35 years (1.86%), then in ≥46 years (0.83%) and absent in the age group ≤25 years. In Lamka, prevalence of child mortality was observed highest in the age group≥46 years (3.78%), followed by 36-45 years (0.72%), then in the26-35 years (0.64%), and least in the age group ≤25 years (0.62%). In Behiang, the highest percentage of infant and child mortality (combined) was observed in the age group 25-35 years (6.21%), followed by 36-45 years (5.16%), then in the age group ≤25 years (4.76%) and least in the age group ≥46 years (4.16%). In Lamka infant and child mortality (combined) was found highest in the age group≥46 years (9.84%) followed by 36-45 years (3.97%), then in the age group 26-35 years (3.57%) and least in the age group≤25 years (1.25%). A significant correlation at $p<0.05$ level was observed between the mother's age and infant mortality in Behiang village. In Lamka both the infant and child mortality show significant positive correlation at $p<0.05$ level individually and a strong association with infant and child mortality (combined) at $p< 0.01$ level.

Table 2. Infant and child mortality by age at marriage

Age at marriage (years)	No. of live births	Mortality no. and %		
		Infant (%)	Child (%)	Total (%)
Behiang				
≤19	536	18 (3.35)	11 (2.05)	29 ((5.41)
20-23	197	7 (3.55)	1 (0.51)	8 (4.06)
≥24	61	3 (4.91)	3 (4.91)	6 (9.84
Correlation coefficient (r)		.018	.150*	.098
Lamka				
≤19	429	10 (2.33)	10 (2.33)	20 (4.66)
20-23	227	10 (4.41)	2 (0.880)	12 (5.28)
≥24	155	4 (2.58)	1 (0.64)	5 (5.16)
Correlation coefficient (r)		.148*	.138*	.206**

Source: fieldwork data
*Correlation is significant at the 0.05 level (2-tailed)
*Correlation is significant at the 0.01 level (2-tailed)

The influence of age at marriage on infant and child mortality is given in Table 2. Maternal age at marriage correlates positively with infant mortality in both the study areas i.e., Behiang (.018) and Lamka (.148*) and is found significant in Lamka. Maternal age at marriage shows a significant positive correlation with Child mortality in both Behiang (.150*) and Lamka (.138*).However, the overall infant and child mortality shows highly significant correlation only in Lamka(.206**).

Table 3. Infant and child mortality by BMI categories of the mother

BMI Categories	No. of mothers	Live birth	Mortality no. and %		
			Infant (%)	Child (%)	Total (%)
Behiang					
Underweight	19	63	2 (3.17)	2 (3.17)	4(6.35)
Normal weight	150	526	19 (3.61)	9 (1.71)	28(5.32)
Overweight	43	135	4(2.96)	2(1.48)	6(4.44)
Obese	19	70	3(4.28)	2 (2.85)	5(7.14)
Coefficient correlation (r)			-.003	-.015	-.013
Lamka					
Underweight	24	60	4 (6.66)	0 (0.00)	4 (6.66)
Normal weight	142	394	10 (2.54)	10 (2.54)	20 (5.07)
Overweight	99	283	7 (2.47)	2 (0.71)	9 (3.14)
Obese	37	122	2 (1.64)	2 (1.64)	4 (3.27)
Coefficient correlation (r)			-.035	-.009	-.032

Source: fieldwork data

Table 3 shows the prevalence of infant and child mortality by BMI categories of the Zou mother. In Behiang, infant mortality was found highest among the obese mothers (4.28%) followed by the normal weight (3.61%), then in the underweight (3.17%), and least in the overweight category (2.96%). In Lamka infant mortality was observed highest among the underweight mothers (6.66%) followed by the normal weight (2.56%), and then in the overweight (2.47%) and least in the obese category (1.64%). Highest percentage of child mortality was observed among the underweight mothers (3.17%) followed by the obese (2.85%), then in the normal weight (1.71%) and least among the overweight category (1.48%). In the Lamka, it was found highest among the normal weight category (2.54%) followed by the obese (1.64%), then in the overweight (0.71%) and absent in the underweight mothers. In Behiang, the percentage of overall infant and child mortality was highest among the obese category mothers (7.14%) followed by the underweight (6.35%), then in the normal weight (5.32) and least among the overweight category (4.44%). In Lamka, the occurrence of infant and child mortality was found highest among the underweight mothers (6.66%) followed by the normal weight (5.07%), then in the obese (3.27%) and least among the overweight category (3.14%). The above table also shows a negative association between mothers BMI categories and infant and child mortality. The calculated values are statistically not significant.

Table 4. Infant and child mortality by ABO blood group compatibility

ABO blood group compatibility	No. of couples	No. of live births	Mortality no. and %		
			Infant (%)	Child (%)	Total (%)
Behiang					
Compatible	127	421	11 (2.61)	6 (1.42)	17 (4.04)
Not known***	15	48	1 (2.08)	0 (0.00)	1 (2.08)
Incompatible	89	325	16 (4.92)	9 (2.76)	25 (7.69)
Correlation coefficient (r)			.123	.063	.139*
Lamka					
Compatible	162	428	5 (1.16)	2 (0.46)	7 (1.63)
Not known***	17	63	1 (1.58)	0 (0.00)	1 (1.58)
Incompatible	123	368	17 (4.62)	12 (3.26)	29 (7.88)
Correlation coefficient (r)			.132*	.140*	.193**

Source: fieldwork data

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

***Spouse unavailable/not willing to donate blood sample

Table4 shows infant and child mortality by ABO blood group compatibility. Positive correlation is observed in both Behiang (.123) and Lamka (.132*), however, statistically significant was only in the later. The child mortality also shows positive correlation in both Behiang (.063) and Lamka(.140*), however, it is statistically significant only in Lamka..The overall infant and child mortality shows positive correlation with mother's ABO blood group and is statistically significant in both the study areas i.e., Behiang(.139*) andLamka(.193**).

Table 5. Infant and child mortality by blood pressure of the mother

Blood Pressure Categories	No. of mothers	Live birth	Mortality no. and %		
			Infant(%)	Child (%)	Total (%)
Behiang					
Systolic Blood pressure (SBP)					
Normal (<120 mmHg)	188	625	19 (3.04)	10 (1.60)	29 (4.64)
Prehypertension (120-139 mm Hg)	35	136	4 (2.94)	4(2.94)	8 (5.88)
Hypertension stage I (140- 159 mmHg)	4	17	5 (29.41)	0 (0.00)	5 (29.41)
Hypertension stage II (≥160 mmHg)	4	16	0 (0.00)	1 (6.25)	1 (6.25)
Coefficient correlation (r)			-.006	.038	.021
Diastolic Blood Pressure (DBP)					
Normal (<80 mmHg)	164	529	15 (2.84)	8(1.51)	23 (4.35)
Prehypertension (80-89 mm Hg)	50	187	7(3.74)	3 (1.60)	10(5.35)
Hypertension stage I (90- 99 mmHg)	13	58	5 (8.62)	2 (3.44)	7 (12.06)
Hypertension stage II (≥100 mmHg)	4	20	1 (5.00)	3 (10.0)	3 (15.00)
Coefficient correlation (r)			.132*	.156*	.209**
Lamka					
Systolic Blood pressure (SBP)					
Normal (<120 mmHg)	219	626	17 (2.72)	10 (1.59)	27 (4.31)
Prehypertension (120-139 mm Hg)	74	201	6 (2.98)	4 (1.99)	10 (4.97)
Hypertension stage I (140- 159 mmHg)	6	20	0 (0.00)	0 (0.00)	0 (0.00)
Hypertension stage II (≥160 mmHg)	4	12	0 (0.00)	0 (0.00)	0 (0.00)
Coefficient correlation (r)			-.029	-.071	-.062
Diastolic Blood Pressure (DBP)					
Normal (<80 mmHg)	203	563	17 (3.02)	8 (1.42)	25 (4.44)
Prehypertension (80-89 mm Hg)	64	174	1 (0.57)	2 (1.15)	3 (1.72)
Hypertension stage I (90- 99 mmHg)	23	78	3 (3.84)	3 (3.85)	6 (7.69)
Hypertension stage II (≥100 mmHg)	12	44	2 (5.54)	1 (2.27)	3 (6.82)
Coefficient correlation (r)			.022	.074	.059

Source: fieldwork data
*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

The prevalence of infant and child mortality among the Zou mothers by blood pressure is given inTable 5. Infant mortality shows a negative correlation with Systolic Blood Pressure (SBP) in both Behiang (-.006) and Lamka (-.029). The Diastolic Blood Pressure (DBP) shows positive correlation in both Behiang (.132*) and Lamka (.022), however, it is significant only in Behiang. SBP shows positive correlation in Behiang (.038) and negative in Lamka (-.071) and both are statistically insignificant. The DBP shows a positive correlation in both Behiang (.156*) and Lamka (.074). It is statistically significant only in Behiang. The SBP shows positive association with the overall infant and child mortality in Behiang (.021) and negative association in Lamka(-.062). The DBP shows a positive correlation in both Behiang (.209**) and Lamka.(.059) but is highly significant only in Behiang.

Table 6: Infant and child mortality by consanguinity

Marriage patterns	Behiang			Lamka		
	No. of mothers	Live birth	Infant and child mortality (%)	No. of mothers	Live birth	Infant and child mortality (%)
Consanguineous*	42	174	18 (10.34)	35	116	4 (3.44)
Non- consanguineous	189	620	25 (4.03)	267	743	33 (4.44)
Chi-square (χ^2)	11.8845, df=1, P <0.001			0.0119 , df=1, P>0.1		

Source: fieldwork data

*Including 1st, 2nd, 3rd cross-cousin and parallel cousins marriages

The percentage frequency distribution of infant and child mortality by consanguineous marriages is outlined in Table 6. In Behiang village, the occurrence of infant and child mortality is found high (10.34%) in the consanguineous marriages than the non-consanguineous marriages (4.03%).However, in Lamka, the occurrence was little higher (44.4%) in non-consanguineous marriages than the consanguineous marriages (3.44%). The Chi-square (÷^{2}) test between consanguinity and infant and child mortality found statistically significant in Behiang (11.8845, df=1, p<0.001) but the same is not true for Lamka(0.0119, df=1,p>0.1).

Table 7: Infant and child mortality by clan endogamy

Clan endogamy	Behiang			Lamka		
	No. of couples	Live birth	Infant and child mortality (%)	No of couples	Live birth	Infant and child mortality (%)
Yes	48	168	12 (7.14)	49	149	12 (8.05)
No	183	626	31 (4.95)	253	710	25 (3.52)
Chi-square (χ^2)	1.0769, df=P>0.1		5.867, df=1, P<0.05			

Source: fieldwork data

Table 7 shows the percentage frequency distribution of infant and child mortality by clan endogamy. It is observed that in both the study areas i.e., Behiang and Lamka, the percentages of infant and child mortality found higher in clan endogamy than the exogamy with the values(7.14%) and (4.95%) in Behaing and (8.05%) and (3.52%) in Lamka respectively. When tested, the ÷2 found statistically significant (5.867, df=1, p<0.05) in Lamka but not in Behiang (1.0769, df=1, p>0.1).The percentage frequencies of infant and child mortality

Table 8: Infant and child mortality by birth order

Birth order	Behiang			Lamka		
	No. of live birth	Mortality		No. of live birth	mortality	
		Infant (%)	Child (%)		Infant (%)	Child (%)
1	208	9 (1.44)	2 (0.96)	282	4 (1.42)	3 (1.44)
2	186	5 (2.68)	4 (2.15)	233	6 (3.22)	0 (0.00)
3	146	8 (5.47)	1 (0.68)	162	6 (4.11)	3 (2.05)
4	105	4 (3.81)	1 (0.95)	91	3 (2.86)	3 (2.85)
5	71	2 (2.82)	0 (0.00)	39	2 (2.82)	0 (0.00)
6+	40	2 (5.00)	3 (7.50)	23	3 (7.50)	3 (7.50)
Correlation coefficient (r)		.854*	.300	-	.678	.017

Source: fieldwork data

*Correlation is significant at the .05 level (2 tailed)

by birth order is shown in Table8.The descending order of infant mortality by birth order in Behiang and Lamka are 3rd>6th+>4th>5th>2nd>1st and 6th+>3rd>2nd>4th>5th>1st respectively and child mortality, is 6th+>2nd>1st>4th>3rd> and 6th+>4th>3rd>1st in Behiang and Lamka respectively. The correlation coefficient (r) shows a positive association between the birth order and infant and child mortality in both the study areas and found statistically significant at .05 level in Behiang only.

Table 9. Regression of infant and child mortality by independent variables

Models	Coefficient of regression (B) and its standard error (S.E.) B ± S.E.		t-value	p-value
Infant and child mortality				
Age at marriage	-.013	.005	-2.692	Significant at 1%
Age group of the mother	.007	.002	3.274	Significant at 1%
Systolic Blood Pressure	.001	.001	.776	Insignificant
Diastolic Blood Pressure	.004	.002	1.900	Insignificant
Body Mass Index	-.005	.004	-1.260	Insignificant
Consanguinity	-.138	.052	-2.677	Significant at 1%
Similar clan marriage	-.077	.047	-1.627	Insignificant
Inbreeding rate	-.135	.045	-2.971	Significant at 1%
ABO compatibility	.085	.030	2.853	Significant at 1%
Constant	.400	.256	1.564	Insignificant

Source: fieldwork data

regression analysis of the infant and child mortality by independent variables in both the study areas is shown in Table 9. Of all the independent variables included in the model, infant and child mortality were significantly influenced by age at marriage, age group of the mother, consanguinity and ABO blood group compatibility. It also illustrates that infant and child mortality is positively associated with the age group of the mother ($B = .007 \pm .002$, $p < 0.01$) and the ABO compatibility ($B = .085 \pm .030$, $p < 0.01$), but negatively associated with age at marriage ($B = -.013 \pm .005$, $p < 0.01$) and consanguinity ($B = -.138 \pm .052$, $p < 0.01$). In other words, infant and child mortality decreases with the increase in mother's age, at marriage and consanguinity. Similarly, it increases with the increase in mother's age and the ABO blood group incompatibility of the parents.

DISCUSSION

The present study is an attempt to investigate the influence of biological factors on the Zou infant and child mortality of Churachandpur district, Manipur. In the present population, the incidence of infant and child mortality increases with the increase in mother's age, particularly in Lamka. The lowest and the highest age groups show high rate of infant and child mortality in both the study areas than the intermediate ages. These values found highly significant in the urban population. Dabral and Malik (2005) observed that Gujjar women from Delhi region experienced higher incident of infant mortality with advancing age. The Kabui Naga of Manipur also shows similar result. Inexperienced young mothers often find difficulties in pregnancies and deliveries due to their physical immaturity. Similarly, the older mothers again may have several complications during childbirth which may indirectly influence the health of the child. Either of these extreme age conditions seems to be more risky for child birth.

The prevalence of obesity and its related cardiovascular diseases are mostly due to the consumption of nutritious food, uncontrolled dietary habits and the heredity conditions. On the contrary, under nutrition effects maternal well-being which can indirectly influence the child's health from pregnancy to delivery and thereafter. In the study population, BMI is negatively associated with infant and child mortality, however, found statistically not significant in both the study areas. The influence of biological factors such as mother's obesity, hypertension and morbidity were observed among the Zou children and found statistically not significant. Several chronic diseases affecting women's health also cause risk factors for poor pregnancy outcomes. These factors may have hereditary and environmental predispositions that affect women across generations. Barker *et al.* ('89) identified an inverse relationship between fetal/placental size and hypertension and ischemic heart disease.

The present finding seems to be consistent with the substantial occurrence of underweight mothers. Accordingly, infant mortality seems to be highest among the underweight mothers and the least is found among the obese category. A negative association between BMI and infant mortality was observed. The overall infant and child mortality also shows a negative correlation with the higher BMI categories. Rai *et al.*, (2017) reported similar finding

that there is no significant association between infant mortality and the obese mothers, but found maternal underweight was the risk factor for neonatal mortality. The present study among the Zou mothers also shows a similar association with infant mortality. In other words, underweight mothers from the study population have a considerable negative influence on infant and child mortality.

Dadelszen *et al.,* (2000) meta-analysis finding demonstrated that women with chronic hypertension have an increased risk of low birth weight and preterm birth. Anti-hypertensive treatment was shown to exacerbate these risks, and for every 10 mmHg reduction in blood pressure due to treatment, an

average reduction of 145 gram in fetal growth was observed. Similar observation could be seen among hypertensive Taiwanese women who had higher risk of delivering low birth weight infants giving rise to a higher rate of mortality. It appears that the observed decreased mortality in infants born to mothers with hypertension is not related to hypertension, but is due to increased risk resulting from other causes of growth restriction and preterm birth (McBride, 2016). Chen (2006) showed that pregnancy-induced hypertension appeared to effectively reduce infant mortality rate. The present finding among the Zou shows that blood pressure of the mother could have a potential contribution to infant and child mortality. The higher number of infant mortality was found among the mothers who fall in the hypertension category. However, except in the case of diastolic blood pressure (DBP) in Behiang, it is statistically not significant in both the study populations. However, there is a tilt towards positive correlation between infant and child mortality with higher blood pressure level.

The present study also shows occurrence of a sizeable number of consanguinity in the Zou society. This type of marriage changes genotype frequencies by increasing the proportion of homozygote. The inclusion of such studies aimed to illustrate the relationship of deleterious genes prone to occur within genetically related couples as endogamous marriages is one of those elements and the probability of more homogenous traits is likely to occur in their offspring. Interestingly, statistical analysis shows a significant positive correlation between increasing frequency of consanguinity and infant and child mortality in both the study areas. Many studies have revealed that generally offspring of the consanguineous marriages increase the levels of morbidity, congenital anomalies and structural birth defects. According to WHO (2012), an estimated 13 percent of neonatal deaths in Indonesia during 2012 was due to congenital abnormalities, being the third-highest percentage next to prematurity followed by birth asphyxia and birth trauma. In India, the prevalence of congenital defects has been studied extensively by Hussain and Islam. (2001).Their finding reveals that consanguinity-associated deaths including multiple deaths are largely concentrated during the first year of life.

A positive correlation between birth order and infant and child mortality is observed in Behiang. Mishra *et al.,* (2017) tried to find out the relationship between birth order and infant mortality in India. They showed modest J-shaped relationship between birth order of children and their risk of dying in the neonatal period suggesting that although both first-born and last-born children are at a significantly greater risk of dying compare to those in the middle, the last-born children (fourth and higher-order) were at the worst risk.In this respect, their finding is similar to the finding of the present study. They also illustrated that the neonatal periods of first-borns were not as vulnerable but the risk increased steadily with the addition of successive birth and last-born child were

at a greater risk. Although the strength of the relationship between birth order and mortality is attenuated after the potential confounders are taken into account, the relationship between the two variables remains curvilinear in the neonatal periods and direct in the post-neonatal period. There are interesting marked differences in these patterns by child sex as well. Female child is less prone to the risk of dying in the neonatal period in comparison with male children, while the converse is true in the post-neonatal period. Female children not only run higher risks of dying in the post-neonatal periods but also become progressively more vulnerable with an increase in birth order.

CONCLUSION

The influence of various biological factors on infant and child mortality has already been well established. However, in respect of various influencing factors, studies have reported wide differences among the different populations of India. Therefore, the present study was conducted which has highlighted on various biological factors that has influenced infant and child mortality among the Zou population of Churachandpur district, Manipur. It may be concluded from the findings of the present study that the biological factors such as age at marriage, age of the mother, consanguinity and the ABO blood group incompatibility have significantly influenced on infant and child mortality among the Zou populations of Manipur. Government should organize Awareness programmes on low fertility, controlled blood pressure, late marriages and non-consanguineous marriages which could reduce the occurrence of infant and child mortality.

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REFERENCES CITED

Barker, D. J., P. D. Winter, C. Osmond, B. Margetts and S. J. Simmonds. 1989. Weight in Infancy and Death from Ischaemic Heart Disease. *Lancet, 2(8663):577-580.*

Bray, G. A., and T. Bellanger. 2006. Epidemiology, Trends, and Morbidities of Obesity and the Metabolic Syndrome. *Endocrine*. 29(1):109-117.

Chen, X., S. Wen, G. Smith, Q. Yang. and M. Walker. 2006. Pregnancy-induced Hypertension is Associated with Lower Infant Mortality in Preterm Singletons. *Int. Jr. Obstetr. Gynaecol*., 113:544-551.

Dabral, S., and S. L. Malik. 2005. Demographic Study of Gujjars of Delhi: VI. Factors Affecting Fertility, Infant Mortality and Use of BCM. *Jr. Hum. Ecol*., 17(2):85-92.

Dadelszen, P. V., M. P. Ornstein, S. B. Bul, A. G. Logan, G. Koren, G. and L. A. Magee. 2000. Fall in Mean Arterial Pressure and Fetal Growth Restriction in Pregnancy Hypertension: A Meta-analysis. *Lancet*, 355(9198):87-92.

Espo, M. 2002. *Infant Mortality an d Its Underlying Determinants in Rural Malawi.* Tampere University Press.

Farooq, U. 2013. Factors Affecting Infa nt Mortality Rate, Biological & Environmenta'. Retrieved from <*http://www.studylecturenotes.com/basics-of-sociology/factors- affecting-infant-mortality-rate-biological-environmental*>Data From Birth Cohort Studies in Brazil and the UK. *BMC Public Health*, 9:105-112.

Hussain, M. and M. Islam. 2001. Socio-economic Variables Affecting Infants and Children Mortality in Bangladesh. *The Internet Journal of Health,* 9(2)1-5.

Kabir, M., R. I. Chowdhury and R. Amin. 1995. Infant and Child Mortality Levels and Trends in Bangladesh. *Jr. Biosoc. Sci*., 27(2):179-192.

Matijasevich, A., C. G. Victoria, J. Golding, F. C. Barros, A. McBride, C. A. 2016. Maternal Hypertensio n Influences Mortality and Severe Morbidity in Infants Born Extremely Preterm'. *Graduate College dissertation and theses,University of Vermont.*

Mishra. S. K., B. Ram, A. Singh and A. Yadev. 2017. Birth Order, Stage of Infancy and Infant Mortality in India. *Jr. Biosoc. Sci*., 50(5):604-625.

M. Menezes, C. L. Araujo and G. D. Smith. 2009. Socio Economic Position and Overweight Among Adolescents: Rai, R. K., L. Singh and P. K. Singh. 2017. Is Maternal Body Mass Index Associated With Neonatal Mortality? A Pooled Analysis of Nationally Representative Data from Nine Asian countries. *Nutrition,* 41;68-72.

Whorld Health Organization.1971.Family planning in Health Services.*WHO Technical Report, Series 476.*Geneva: WHO.

World Health Organization. 2000. International Assiciation for the Study of Obesity (IASO) and International Obesity Task Force (IOTF). *The Asia-Pacific Perspective: Redefining Obesity and its Treatment.* Geneva: WHO.

World Health Organization. 2012. *Annex 11: Maternal a nd New-born Health and the Primary Health Care System.* United Nations.

Whorld Health Organization2014. Double burden of malnutrition. Retrieved from *https://www.who.int/nutrition /double-burden-malnutrition/en/*

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