Research Article

Epidemiological determinants of pregnancy outcome in urban slums of Jammu city-a prospective study

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ABSTRACT

Background: In the backdrop of continuing high child and maternal mortality, eight millennium development goals (MDGs) were spelt out by United Nations in 1990 setting targets for reduction in child mortality (MDG-4) by two-thirds and reduction in maternal mortality ratio (MDG-5) by three-quarter by 2015. Knowledge about the biosocial determinants, place of delivery and presence of complications in the present and past pregnancy are important factors to predict pregnancy outcome. **Objectives:** To study the epidemiological determinants of pregnancy outcome in the urban slums of Jammu city. **Materials and Methods:** A prospective study for 1 year was conducted on pregnant women living in urban slums. Expectant mothers who were registered with Anganwadis in slums and were in their third trimester (>28 weeks of gestation) were enrolled and followed until 7 days after delivery. After collecting preliminary sociodemographic information, each woman was evaluated employing Indian council of medical research antenatal risk scoring system and presence or absence of selected epidemiologic determinants. Results: Results revealed multifactorial determinants of pregnancy outcome. Among them, individual factors were literacy status and occupation of pregnant women. Health system determinants of pregnancy outcome were delivery by an untrained birth attendant, home delivery, and obstetric complications in the current pregnancy and unfavorable pregnancy outcomes in previous pregnancies. **Conclusion:** Our study reiterates the need of combining scoring variables which conventionally include clinical parameters, with epidemiologic determinants to predict the pregnancy outcome so that high-risk pregnancies can be detected and managed accordingly.

KEY WORDS: Urban Slums; Indian Council of Medical Research Antenatal Scoring; Prospective Study; Neonatal Morbidity; Neonatal Mortality

INTRODUCTION

Urbanization throughout the developing world is resulting in changing proportion of urban to the rural population and has led to increase in a number of the urban poor population many of whom live in slums and other squatter settlements. In 1988 for the 1st time the percentage of urban poor surpassed the rural poor.[1] Population residing in urban areas in India, according to 1901 census, was 11.4%.[2] This count increased to 28.53% as per 2001 census and reached 31.16% according to 2011 census.[3,4]

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The urban slums are deprived human settlements, which are demographically, economically, and environmentally vulnerable. They are described as compact areas with a population of at least 300 (60–70 households), living in poorly built, congested dwellings in an unhygienic environment. Infrastructure, sanitary, and drinking water

amenities are usually lacking. In 2003, a United Nations expert group recommended a provisional operational definition based on inadequate access to safe water, inadequate access to sanitation and other infrastructure, poor structural quality of housing, overcrowding, and insecure residential status.[5]

Urban health in the slums presents serious public health concerns and challenges; predominant among them is the health of the pregnant mother and her neonate which form the vulnerable sector of urban slums. With the decline of infant mortality rate to low levels in many developed and developing countries, perinatal mortality has assumed greater significance as a yardstick of obstetric and pediatric care before and around the time of birth. The perinatal period comprises <0.5% of average lifespan, yet accounts for more deaths than the next 30–40 years. This period truly reflects the real value of reorganization and grading of high-risk pregnancies.

Survival of newborn continues to be a global priority. UNICEF in its report of enormous progress in child survival reports 6.3 million children deaths before their 5th birthday in 2013, out of which 1 million (16%) died on the day they were born, accounting for 36% of all neonatal deaths. A total of 2 million newborns died within the 1st 7 days after birth, representing 73 percent of all neonatal deaths.[6]

Irrespective of the primary cause of death over two-third of deaths occur in low birth weight (LBW) infants.[1] Over two-thirds of deaths take place in the 1 week of life as a result of perinatal asphyxia and sepsis. The principal causes of neonatal mortality are sepsis, perinatal asphyxia, and prematurity. Late recognition of neonatal illnesses and delay in seeking medical help are also responsible for increased neonatal mortality.

The underlying socioeconomic causes of mortality among pregnant in urban slums are the poor living conditions, illiteracy, ignorance, and poverty resulting in women not paying attention to pregnancy and health. Chronic maternal illness such as anemia, hypertension, and diabetes reduces placental blood flow, thereby leading to bad outcome of pregnancy or of the fetus. Despite the availability of public hospitals, up to 90% of deliveries in certain slums take place at home, and antenatal care is minimal. Only fewer births in urban slum 50% were attended by a trained professional than were births in rural areas 65%.[1] This is an important issue in the context of urban slums as traditional practices, lack of awareness of the need for antenatal care, fear of hospitals, attitude and behavior of the staff, and the cost of hospitalization are deterrents to accessing hospital care.

Keeping this in mind, the authors endeavored to determine epidemiological determinants of adverse pregnancy outcome in urban slums of Jammu city.

MATERIALS AND METHODS

The present prospective study was conducted among pregnant women living in urban slums that were followed up for a period of 1 year to determine the outcome of pregnancy. The urban slums of Jammu city are divided into eight zones. A list of all functional AWCs (Anganwadi Centre) from these zones was procured from the department of social welfare. After seeking approval from Institutional Ethical Committee Government Medical College Jammu, the investigators, mapped all slums and Jhuggi Jhompri in the study zone. Out of the 224 functional AWCs, 7 AWCs from each zone were selected by simple random sampling using the table of random numbers. Therefore, a total of 56 AWC were included finally in the study which contributed approximately 25% of the total AWCs.

A total of 303 expectant mothers who were registered with these AWCs and were in their third trimester (>28 weeks of gestation as confirmed from their antenatal cards) were enrolled after obtaining written informed consent from them. All enrolled women were followed until 7 days after delivery. The frequency of contacts with the enrolled women at AWCs depended on the timing at registration. The mothers were contacted thrice if they were enrolled at 28 weeks, twice if they were enrolled at 32 weeks, and once if their expected date of delivery was within a week after date of registration. Irrespective of the timing and frequency of antenatal contact, two postnatal contacts were made to assess the outcome of delivery, with the first visit made as soon as possible after delivery and second within the next 7 days. Each woman was evaluated employing Indian council of medical research (ICMR)[7] antenatal risk scoring system and presence or absence of epidemiologic determinants as per questionnaire. Birth weight of newborn was recorded during the first postnatal contact. The outcome was considered adverse if pregnancy ended in illness or death of early neonate. The results pertaining to the maternal outcome and their categorization according to ICMR scoring system is published elsewhere.[8]

Statistical Analysis

The analysis was performed with the help of computer software MS Excel and SPSS 17.0 for windows (Chicago Inc.). Epi-info version 6.0 (disease control and prevention Atlanta) was used to calculate risk estimates and corresponding 95% confidence intervals (CI) for odds ratio

Table 1: Outcome of current pregnancies

Pregnancy outcome	Number of females (%)
Favorable outcome	233 (76.9)
Adverse outcome*	70 (23.1)
Total	303 (100)

*Includes neonatal mortality, neonatal morbidity

(OR). Categorical variables were analyzed and presented as proportions. All variables found significant on univariate analysis were entered into a multivariate logistic regression model and adjusted OR with corresponding 95% CIs were reported. Two-tailed *P* were used to denote statistical significance. $P < 0.05$ was considered as statistically significant.

RESULTS

Table 1 depicts that out of a total of 303 expectant mothers registered with AWC's, three quarter (76.9%) reported favorable pregnancy outcome. As evident in Table 2 neonatal morbidity was most common adverse pregnancy outcome (84.2%), followed by stillbirths (10%), and early neonatal death (END) (5.8%). Nearly, two-thirds (61.0%) neonatal morbidity was observed in mothers having moderate or severe risk. Stillbirths and END were exclusively observed in mothers having moderate to severe risk. Table 3 summarizes distribution of socioeconomic determinants with pregnancy outcome. It is clearly evident that adverse neonatal outcome was observed more frequently among mothers belonging to lower castes (27% vs. 18%), illiterate (22% vs. 29%), labor class (42.9% vs. 20.5%), delivered by untrained birth attendant (51.4% vs. 19.4%), and at home (50.9% vs. 16.9%) and among three fourth mothers doing heavy work while being pregnant.

Table 4 summarizes that females are having breathlessness and antepartum haemorrhage (APH) in the present pregnancy had 49.3% versus 71.4% risk of an adverse outcome with OR of (5.10 vs. 8.88). The difference was found to be statistically significant (*P* 0.0001 vs. *P* 0.0008) in both the complications. On relating past complications with pregnancy outcome, it was observed that women having bad obstetric history were at 8.55 times and women with past operative deliveries had

Table 2: Distribution of adverse outcome of pregnancies using ICMR scoring

Adverse outcome	Risk score				Total
	Number of risk *n* (%)	Mild risk *n* (%)	Moderate risk *n* (%)	Severe risk *n* (%)	
Stillbirth	0 (0.0)	0 (0.0)	2 (28.5)	5 (71.5)	7
END	0 (0.0)	0 (0.0)	2 (50.0)	2 (50.0)	4
Neonatal morbidity*	6 (10.1)	17 (28.9)	24 (40.6)	12 (20.4)	59
Total	6 (8.6)	17 (24.3)	28 (40.0)	19 (27.1)	70

*Includes LBW, septicemia, preterm, pneumonia, birth asphyxia, ICMR: Indian council of medical research, END: Early neonatal death, LBW: Low birth weight

Table 3: Distribution of pregnancy outcome (neonatal) according to socioeconomic determinants

Socioeconomic determinants	Outcome		Crude OR CI	*P*
	Favorable *n* (%)	Adverse *n* (%)		
Caste				
Lower	122 (73.0)	45 (27.0)	1.63 (0.94–2.84)	<0.10 NS
Upper	111 (81.6)	25 (18.4)		
Literacy				
Illiterate	73 (70.1)	31 (29.9)	1.74 (1.00–3.01)	<0.04 S
Literate	160 (80.4)	39 (22.6)		
Birth attendant				
Untrained	17 (48.6)	18 (51.4)	4.39 (2.12–9.11)	<0.0002 HS
Trained	216 (80.6)	52 (19.4)		
Place of delivery				
Home	27 (49.1)	28 (50.9)	5.08 (2.72–9.49)	<0.001 HS
Hospital	206 (83.1)	42 (16.9)		
Occupation				
Labor class	20 (57.1)	15 (42.9)	2.90 (1.39–6.04)	<0.003 HS
Other class	213 (79.5)	55 (20.5)		
Physical activity				
Heavy	5 (25.0)	15 (75.0)	24 (2.37–242.3)	<0.001 HS
Moderate	220 (80.3)	54 (19.7)	1.96	
Sedentary	8 (88.9)	1 (11.1)	1.00 (0.24–16.03)	<0.10 NS

CI: Confidence interval, NS: Non significant, S: Significant, HS: High significant, OR: Odds ratio

Table 4: Pregnancy outcome in relation to present and past complications

Complications	Outcome		Crude OR (CI)	P
	Favorable *n* (%)	Adverse *n* (%)		
Present complications				
Breathlessness				
Present	33 (50.7)	32 (49.3)	5.10 (2.80–9.27)	<0.001 HS
Absent	200 (84.0)	38 (16.0)		
APH				
Present	2 (28.6)	5 (71.4)	8.88 (1.68–46.8)	<0.001 HS
Absent	231 (78.0)	65 (22.0)		
Past complications				
Bad obstetric history				
Present	21 (47.7)	23 (52.3)	8.55 (3.89–18.81)	<0.001 HS
Absent	125 (88.6)	16 (12.4)		
History of operative delivery				
Present	12 (33.3)	6 (66.7)	2.03 (0.70–5.81)	<0.01 HS
Absent	134 (80.2)	33 (19.8)		

CI: Confidence interval, APH: Antepartum hemorrhage, HS: High significant, OR: Odds ratio

8.12 times higher risk of adverse outcome in comparison to women with no such past obstetric history and this was also statistically highly significant.

All the variables found significant were entered into a multivariate model, the results of which indicate that place of delivery and past obstetric history remained independent predictors after controlling the effect of other variables. However, the predictive ability of the model only marginally improved.

DISCUSSION

In our medical set up different parameters are used to identify high-risk mothers. Detection of high-risk pregnancies using risk scoring system prioritizes the action for needy individuals especially in developing countries with scanty resources. In the present study according to ICMR antenatal scoring method out of the total pregnant females studied, 13.2% were graded as having no risk, 80.8% were having mild or moderate risk, and 6% of the mothers were in the category of severe risk. 76.9% had favorable outcome, and 23.1% of pregnancies had adverse outcome with 19.5% neonatal morbidity, 2.3% stillbirths, and 1.3% early neonatal mortality. The results showed that according to ICMR antenatal scoring methods breathlessness, APH in the present pregnancy, previous bad obstetric history and history of operative deliveries were significantly associated with adverse pregnancy outcome. Out of other epidemiologic determinants studied physical activity, occupation, home deliveries, delivery by untrained birth attendant were also observed to be significantly associated with adverse pregnancy outcome. However caste, economic status, literacy of pregnant female did not show any significant statistical association with pregnancy outcome. Logistic regression analysis showed place of delivery as significant risk factors for adverse pregnancy outcome.

Various authors have categorized the mothers into different risk categories using different variables. The percentage of mothers in risk categories ranges from as high as 59% in high-risk category to 31% in no risk category to as low as 7.9 % in high-risk category to as low as 25%.[9,10] In another study conducted by Reddaiah and Kapoor,[11] 9.6% of pregnant females had one or more risk factors. Same ICMR antenatal score was employed by Lala and Talsania[7] in classifying pregnant women, and they classified 0.73% women in a severe risk category and 18.34% women in no risk category. The wide range of scoring is due to the inclusion of a different set of clinical or other risk factors in scores formulations, sample size and difference in study settings (hospital based vs. Community-based).

Risk of adverse outcomes that is LBW, septicemia, pneumonia, preterm births, birth asphyxia, and neonatal mortalities, namely, stillbirths, ENDs, increases with the increase in risk score in our study. There was no stillbirth in no risk and mild risk category mothers, whereas it was 71.5% in those who had severe risk (≥7) and the results were in accordance with studies conducted by other authors.[12,7] Gupta *et al*[13] in their study observed that stillbirths were strongly associated with the presence of maternal risk factors. However, some authors have also reported a higher stillbirth rate than observed in our study.[14-16] Neonatal morbidity was 19.47% in the present study, well compared with a study conducted by Lala and Talsania.[7] 61% of neonatal morbidity was seen among women with moderate and severe risk in a study conducted by Gupta *et al*.[13] However, Das *et al*[17] had reported early neonatal morbidity of 66.85% in their study.

Socioeconomic determinants such as literacy, occupation, physical activity, caste, place of delivery and delivery by trained, and untrained attendant are studied independently or with maternal risk factors by many authors[18-23] and most of them showed similar results as shown by our study that the females belonging to labor class, females who are engaged in physical activity and females from the lower strata have higher risk of neonatal morbidities. Ghosh *et al.*[24] Trivedi and Mavalankar[25] observed that occupation had no relation with adverse pregnancy outcome. Literacy especially maternal education is known to influence people perception and disposition toward health activities like utilization of health services. This is reflected in our results as the adverse outcome was maximally observed in illiterate women as compared to literate ones, but the association was not statistically significant. This was in accordance with the studies conducted by others.[26,27]

The assessment of previous pregnancy history is very critical to avoid adverse pregnancy outcome in the current pregnancy. Our study also supported the similar findings of a higher incidence of adverse outcome with bad obstetrical history and history of obstetric complications. These results are similar to those made by Malvanker *et al.*[12] who reported that poor obstetric history was an independent risk factor for both term and preterm LBW infants while Soltani *et al.*[28] observed that abnormal birth during previous pregnancy along with other factors were associated with LBW deliveries in subsequent pregnancies history of adverse outcome was also found to be significantly associated with adverse outcome in the present pregnancy.

Only 2.3% of the females presented with the history of APH in the present study and out of them 71.8% had adverse pregnancy outcome which was also statistically significant. The findings are in accordance with the other studies.[15,17,28,29] Delivering at medical institutions or at home with professional medical assistance has been shown to promote safe motherhood and child survival. In our study risk of adverse outcome was higher both in women delivering at home as compared to the hospital (3) times and in deliveries conducted by untrained birth attendants (4.4) times higher with the statistically significant association. Similar findings were substantiated by others also.[29-31]

The strength of our study was our study settings that are an urban slum which is first of its kind in our Jammu region, but since the time period of study and sample size was small, the results cannot be generalized. Therefore, more and more such studies are needed to validate our findings.

CONCLUSION

Screening of high-risk women using only clinical parameters will no doubt help in categorization of pregnant women, but unless epidemiologic determinants are given due importance, and substantial measures are taken to improve them, we will not be able to achieve our goal of reducing neonatal morbidity and mortality. The knowledge of obstetric complications, adverse pregnancy outcomes, causes, and prevention feasibility are the key inputs to be given to women in India. Improvement of maternal and child health-care especially with regard to registration of pregnant mothers, detection of high-risk cases and timely intervention, which can be ensured by a minimum of four antenatal visits, institutional delivery, delivery by trained personnel will help in improvement of pregnancy outcome. If these deaths have to be reduced, we need to improve the health of mothers during pregnancy and upgrade services for delivery as neonatal survival depends on maternal well-being during pregnancy.

If these maternal factors are combined with epidemiologic determinants, for risk formulations it will be of immense help in planning and management, both at district and peripheral levels.

REFERENCES

1. Fernandez A, Mondkar J, Mathai S. Urban slum-specific issues in neonatal survival. Indian Pediatr 2003;40:1161-6.
2. Singh KN. Urban Development in India. Abhinav Publications; 1978. [Last retrieved on 2012 Jun 13].
3. Business Standard. Victims of Urbanization: India, Indonesia and China. Available from: http://www.Rediff.com. [Last retrieved on 2012 Jun 15].
4. Pranati D. Urbanisation in India. Available from: http://www.Infostat.sk. [Last retrieved on 2012 Jun 13].
5. Khan Z, Mehnaz S, Khalique N, Ansari MA, Siddiqui AR. Poor perinatal care practices in urban slums: Possible role of social mobilization networks. Indian J Community Med 2009;34:102-7.
6. Wardlaw T, You D, Hug L, Amouzou A, Newby H. UNICEF report: Enormous progress in child survival but greater focus on newborns urgently needed. Reprod Health 2014;11:82.
7. Lala KM, Talsania NJ. Study of evaluation and prediction of neonatal morbidity and mortality using ICMR antenatal scoring method. Indian J Community Med 2001;26:176-82.
8. Bala K, Kumar T, Kumar D, Mengi V. Study of pregnancy outcome using ICMR antenatal scoring method. Indian J Mater Child Health 2012;14:8-10.
9. Jain S, Anand S, Aherwar R. High risk scoring for prediction of pregnancy outcome: A prospective study. Int J Reprod Contracept Obstet Gynecol 2014;3:516-22.
10. Krishnan V, Idris MZ, Srivastava VK, Bhushan V, Chandra MR. Scoring of high risk mothers and related outcome. Indian J Community Med 1988;13:176-9.
11. Reddaiah VP, Kapoor SK. Risk approach in maternal care: How beneficial is this approach in reality? Indian J Pediatr 1985;52:61-5.
12. Malvanker DV, Gray RH, Trivedi CR. Risk factors for pre-term and term low birth weight in Ahmedabad, India. Int J Epidemiol 1992;21:263-72.
13. Gupta N, Jani KK, Kumari S, Sood M. Early neonatal morbidity and mortality in 'at-risk' and 'normal' term pregnancies. Indian J Pediatr 1997;64:523-7.

14. Fauveau V, Wojtyniak B, Mostafa G, Sarder AM, Chakraborty J. Perinatal mortality in matlab, Bangladesh: A community-based study. Int J Epidemiol 1990;19:606-12.
15. Kaushik SL, Parmar VR, Grover N, Kaushik R. Neonatal mortality rate: Relationship to birth weight and gestational age. Indian J Pediatr 1998;65:429-33.
16. Misra PK, Bajpai PC, Tripathi TK, Gupta R, Kutty D. Perinatal mortality: A hospital study. Indian Pediatr 1973;10:545-50.
17. Das PK, Basu K, Chakraborty S, Basak M, Bhowmik PK. Early neonatal morbidity and mortality in a city based medical college nursery. Indian J Public Health 1998;42:9-14.
18. Fikree FF, Gray RH. Demographic survey of the level and determinants of perinatal mortality in Karachi, Pakistan. Paediatr Perinat Epidemiol 1996;10:86-96.
19. Gray RH, Ferrz EM, Amorium MS, Demelo LF. Levels and determinants of early neonatal mortality in Natal, North eastern Brazil: Results of surveillance and case control study. Int J Epidemol 1991;20:467-73.
20. Deswal BS, Singh JV, Kumar D. A study of risk factors for low birth weight. Indian J Community Med 1999;24:127-31.
21. Mohammad IZ, Anuradha G, Udhay M, Srivastava AK, Vinita D. Maternal health and low birth weight among institutional deliveries. Indian J Community Med 2000;25:10-2.
22. Naik JD, Kumar R, Mathurkar MP, Jain SR, Jailkhani S, Thakur MS. Sociodemographic determinants of pregnancy outcome: A hospital based study. Int J Med Sci Public Health 2016;5:1937-41.
23. Shailini C, Dharmendra RS, Chakladbar K, Lalitha K, Nair SN. Perinatal mortality rate in a rural district of South India. Indian J Paediatr 1998;65:709-15.
24. Ghosh S, Hooja V, Mitta SK, Verma RK. Bio-social determinants of birth weight. Indian Pediatr 1977;14:107-14.
25. Trivedi CR, Mavalankar DV. Epidemiology of low birth weight in Ahmadabad. Indian J Pediatr 1986;53:795-800.
26. Gawande UH, Pimalgaonkar MS, Bethariya SH. Bio-social determinants of birth weight in rural Urban Nagpur. Indian J Community Med 1994;21:64-7.
27. Malik SJ, Mir NA. Perinatal mortality in high risk pregnancy: A prospective study of preventable factors. Asia Oceania J Obstet Gynaecol 1992;18:45-8.
28. Soltani MS, Guediche MN, Bachir A, Ghanem H, Beddek F, Demmouche A. Factors associated with low birth weight in Tunisian Sahel. Arch Fr Pediatr 1991;46:405-6.
29. McDermott J, Steketee R, Wirima J. Perinatal mortality in rural Malawi. Bull World Health Organ 1996;74:165-71.
30. Garg SK, Mishra VN, Singh JV, Bhatnagar M, Chopra H, Singh RB, *et al*. Neonatal mortality in Meerut district. Indian J Med Sci 1993;47:222-5.
31. Kapoor RK, Srivastava AK, Misra PK, Sharma B, Thakur S, Srivastava KI, *et al*. Perinatal mortality in urban slums in Lucknow. Indian Pediatr 1996;33:19-23.

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