Original Research Article

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20183998

Epidemiological predictor variables in relation to the outcome of pregnancy in an urban setting

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Received: 24 July 2018 Revised: 29 August 2018 Accepted: 14 September 2018

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ABSTRACT

Background: Fetal weight at birth is the singular parameter resonant of maternal health and is measured with reasonable precision, while measuring preterm birth or IUGR requires a valid estimate of gestational age. Notwithstanding the relevance of mortality and morbidity as measures of adverse pregnancy outcome, proxy markers like low birth weight (LBW), preterm birth, intrauterine growth restriction (IUGR) and congenital anomalies have been used in the past. This exercise aims to study the epidemiological predictor variables in pregnant women attending ante-natal clinic and its association with birth outcome.

Methods: This prospective study was carried out over a one-year period at a tertiary care teaching hospital. Data was collected using structured questionnaire, investigation reports and ante-natal cards. The outcome of delivery in all registered women was recorded by following them up till delivery.

Results: The variables having a statistically significant association with an adverse pregnancy outcome were maternal and paternal education, family income, socioeconomic status (SES), gravidity, maternal complications, level of physical activity, rest during pregnancy, trimester of initiation of ANC visits, diet, iron supplementation, maternal weight gain, exposure to tobacco/environmental tobacco smoke and gestational age.

Conclusions: Parental education, good antenatal care, early detection of high risk pregnancy, light physical activity and adequate rest, adequate nutrition with supplementation and exposure to ETS markedly influence the pregnancy outcome and intervention in these areas would result in an improved birth outcome. Factors having marginal scope of intervention include age of the pregnant women, adequate inter-pregnancy interval, maternal weight gain and socioeconomic status.

Keywords: Pregnancy, Adverse birth outcome, Low birth weight

INTRODUCTION

Children can be ensured a healthy start in life if women start pregnancy healthy and go through pregnancy and child birth safely. Adverse outcomes including death are far more frequent in the developing world. Factors affecting pregnancy outcomes in mothers are maternal, fetal and environmental. While in most advanced countries, perinatal problems, congenital malformations, genetic and behavioral problems assume importance, in developing countries, the primary concern is reduction of maternal and child mortality and morbidity, birth spacing, family size limitation, nutritional improvement and promoting acceptance of health practices.

At birth, fetal weight is accepted as the single parameter directly related to the health and nutrition of the mother and can be measured with excellent validity and precision. Measuring preterm birth or IUGR requires a valid estimate of gestational age, which is often difficult in developing countries. Nearly 80% of all low birth weight (LBW) newborns at term are born in Asia, with LBW rates from 30% to 40% in India. The best available global estimates of prevalence of LBW are by WHO (2005) wherein 20 million infants worldwide (15.5% of all births) are born with LBW, 95.6% of them in developing countries. The level of LBW in developing countries (16.5%) is more than double that in developed regions (7%).² Other frequent occurrence of adverse outcomes includes stillbirths and perinatal mortality. Much of the published research in this area are based on proxy outcomes as LBW, preterm birth, intrauterine growth restriction (IUGR) and congenital anomalies.¹

Therefore, this study was planned with the aim to study the epidemiological predictor variables in pregnant women attending ante-natal clinic in an urban setting and its association if any with the birth outcome. The objectives were to assess the epidemiological profile of pregnant women attending ante-natal clinic, the outcome of their pregnancy and to determine association if any.

METHODS

This study was carried out at a tertiary care teaching hospital in urban Maharashtra (Pune) where 58 maternity beds were available for antenatal and postnatal cases, and incidence of LBW being 30% during the period of study. All mothers were registered during pregnancy for delivery. The study population comprised of all pregnant women attending ante-natal clinic in their third trimester at Obstetrics and Gynecology Department of the Hospital. The unit of study for birth outcome was the babies borne by these women. The sample populations were all mothers in their third trimester registered for ANC at the hospital, who consented to participate in the study and were recruited serially till required sample size was completed. The exclusion criteria included mothers whose last menstrual period (LMP) was not exactly known, mothers not delivering in the hospital in the follow up period, HIV positive mother and unconsenting women. The nature of study was a prospective (follow up) study over a one-year period from July 2017 to June 2018.

Sample size was calculated to be 323, although the minimum sample size was determined to be 291 with the anticipated proportion of LBW babies to be 30% of the total no. of deliveries (N=3000/yr). Therefore, p=0.30 and q=(1-p)=1-0.30=0.70 with absolute error of margin=5% i.e. d=0.05 and 95% CI. Since finite population correction could not be disregarded and assuming a 10% loss to follow-up or no responses, the sample size was increased to 323.

Methodology for data collection

A pretested questionnaire was prepared, subjects explained about the study and an informed written consent obtained. Pregnant women in their third trimester attending ante-natal clinics at Obstetrics and Gynecology OPD of the hospital, were registered in a continuous manner till achieving the targeted sample size. Data for the study was collected personally by the investigator using structured questionnaire by interview technique. Investigation reports and ante-natal cards were also utilized. The outcome of delivery in all registered women was recorded by following them up till delivery. All babies were weighed immediately at birth on UNICEF deteto beam type weighing machine up to 20 g accuracy. The other relevant details with respect to birth outcome were also recorded. Mother's height was measured up to the accuracy of 0.5 cm and weight recorded on Spring balance weighing machine up to the accuracy of 0.5 kg. Modified Kuppuswamy Scale was used for assessing the socioeconomic status.

Recording of data

Data pertaining to each subject was recorded on a pretested Performa consisting of the following parts: Part-I: General identification data and Socioeconomic status; Part-II: antenatal care findings, obstetric history, nutritional history, anthropometry and miscellaneous details; Part-III: Information from the antenatal card regarding progress of pregnancy and details of newborn. The performa was mainly completed during the antenatal visit of the subjects and were checked for errors and omissions if any, which were rectified during the next visit. The details of the birth outcome were obtained as and when the subjects delivered. Some responses were coded and data was entered, followed by data validation. Data was analysed using Epi Info Ver 7.2 software tool for Windows.

Definitions

Low birth weight (LBW): Birth of less than 2.5 kg (up to and including 2499 g), the measurement being taken preferably within the first hour of life, before significant postnatal weight loss has occurred.³

Gestational age: Duration of gestation was estimated based on first day of LMP, expressed in completed days and weeks.⁴

Classification of babies based on gestational age

Pre-term: Babies born before the end of 37 weeks gestation (less than 259 days).

Term: 37 completed weeks to less than 42 completed weeks (259 to 293 days).

Post-term: 42 completed weeks or anytime thereafter (294 days or over).⁵

Stillbirth: Fetus born dead, and weighing 1000 g or more, more frequently associated with a gestation period of 28 weeks.⁶

Educational status

The highest qualification acquired by mother. Education level was classified into seven groups as Illiterate, Primary, Middle/Secondary, High school, Graduate and Post Graduate.

Physical work during pregnancy

Classification as by Pachauri and Marvah ir "Socioeconomic factors in relation to birth weight". 7

- a) Light: Work done by housewife with one or two children or having a home help, if she is having a large family.
- b) Moderate: Work done by housewife with a large family and not having home help or having a home help but also working outside.
- c) Hard: Work done by housewife with a large family and not having home help and also working outside.

Birth spacing

Interval in years/ months present and preceding delivery, irrespective of any conception which was aborted.

Socioeconomic status

Kuppuswamy's Scale (Urban) was used for assessing the socioeconomic status.

RESULTS

Out of 323 subjects, 319 had singleton while 04 had twin delivery with total number of newborns being 327. 319 were live born (171 males and 148 females), and 08 (04 males and 04 females) were stillbirths. The adverse outcomes (35.3% of the total outcomes) were categorized into LBW, Preterm, IUGR, Stillbirths and Congenital anomalies. However, the primary outcome of interest was LBW (both term and preterm), accounting for 30.5% of the total pregnancy outcomes, with only 4.8% having other form of adverse outcomes.

63.2% were aged between 20 to 24 yrs, 74.9% Hindus, 10.8% illiterate and 54.8% educated beyond Middle School with husband's education level slightly better. The mean income was Rs.5029.8. With respect to the head of the family, 40.2% were employed in skilled occupation and 61.9% belonged to the lower middle class (Class III). All women included were married, 42.4% Primigravida and 76.8% with no history of abortions. 58.2% had no live child and 43.7% were married between 20 to 24 yrs of age. 61.9% had their first child between 20 to 24 yrs. Amongst the 57% excluding Primigravida, 25.7% had an interval between 2 to 3 yrs. 79.6% had no pregnancy related complications and 5.9% had nonobstetric complications. 62.2% were involved in only light work during pregnancy with only 8% reporting rest of less than 8 hrs during a day. 58.2% initiated their ANC visits in first trimester but all had minimum of 3 visits. Maternal education was found to have a significant effect on initiation of ANC in the first trimester (p<0.01) and progressively increased with higher education. The detailed distribution is shown in Table 1.

Table 1: Distribution of woman's education and initiation of ANC.

Education	Trimester	Initiation of ANC			
Education	First	Second	Third	Total	in first trimester
Illiterate	16	18	01	35	
Row (%)	45.7	51.4	2.9	100.0	1
Col (%)	8.5	13.6	33.3	10.8	
Up to middle school	60	50	01	111	
Row (%)	54.1	45.0	0.9	100.0	1.18
Col (%)	31.9	37.9	33.3	34.4	
Middle school – intermediate	76	55	01	132	
Row (%)	57.6	41.7	0.8	100.0	1.26
Col (%)	40.4	41.7	33.3	40.9	
Grad/PG	36	09	0	45	
Row (%)	80.0	20.0	0.0	100.0	1.75
Col (%)	19.1	6.8	0.0	13.9	
Total	188	132	03	323	
Row (%)	58.2	40.9	0.9	100.0	
Col (%)	100.0	100.0	100.0	100.0	
Chi Square for linear trend		df		P value	
9.205		6		0.002 (p<	0.01)

Note: Number of visits for all the pregnant women were ≥ 3 .

Table 2: Distribution of maternal height and pre-pregnancy weight.

Maternal height	Pre-pregnar	Pre-pregnancy weight (in kg)				
(In cms)	<50	50-59	≥60	Total		
<140	02	0	0	02		
Row (%)	100.0	0.0	0.0	100.0		
Col (%)	1.6	0.0	0.0	0.6		
140-149	50	32	02	84		
Row (%)	59.5	38.1	2.4	100.0		
Col (%)	39.1	19.8	6.1	26.0		
≥150	76	130	31	237		
Row (%)	32.1	54.9	13.1	100.0		
Col (%)	59.4	80.2	93.9	73.4		
Total	128	162	33	323		
Row (%)	39.6	50.2	10.2	100.0		
Col (%)	100.0	100.0	100.0	100.0		

Table 3: Distribution of total weight gain during pregnancy.

Weight gain (in kg)	Number	Percentage (%)	95% CI
<8	03	0.9	0.2% - 2.9%
8-10	136	42.1	36.7% - 47.7%
11-<12	97	30.0	25.1% - 35.4%
≥12	87	26.9	22.2% - 32.2%
Total	323	100.0	
Mean	10.7	SD	2.71

Table 4: Distribution of pregnancy outcome.

Outcome	Number	Percentage (%)	95% CI
Normal	209	64.7	59.2% - 69.9%
Term LBW	64	19.8	15.7% - 24.7%
Preterm LBW	30	9.3	6.5% - 13.1%
Preterm	06	1.9	0.8% - 4.2%
Stillborn	08	2.5	1.2% - 5.0%
Congenital anomaly	03	0.9	0.2% - 2.9%
IUGR	03	0.9	0.2% - 2.9%
Total	323	100.0	

71% consumed a mixed diet, 96.3% had at least 3 meals, 85% consumed milk and 72.4% consumed eggs. 79.6% had consumed 100 or more Iron and folic acid tablets during pregnancy, while 77.4% had at least 100 tablets of Calcium. SES had a significant association with the dietary pattern. The mean height was 152.5 cms and the mean weight was 50.8 kg. The distribution is as per Table 2.

The distribution of mean weight gain is as per Table 3.

Only 6.2% had exposure to tobacco/ETS. The mean hemoglobin level was 10.6 g/dl with 48.3% being anemic. Amongst women who had less than 100 iron tablets, 53% had anemia. Presence of anemia increased with lowering of SES. 62.8% had a full term normal delivery (FTND), 17.6% had a lower segment caesarean section (LSCS) and 15.2% had a preterm delivery. The

mean gestational age was 38.6 weeks. 64.7% (95% CI 59.2%-69.9%) were normal outcomes and 35.3% (95% CI 30.1%-40.8%) were adverse pregnancy outcomes. The distribution is shown in Table 4.

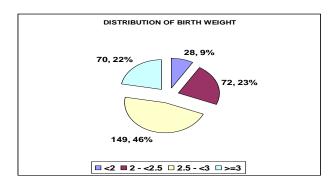


Figure 1: Break down of birth weight.

Amongst the 319 live births (including twin deliveries), 31.3% were LBW with a mean birth weight of 2.674. The distribution is shown in Figure 1.

Factors and their association with birth outcome

The risk of an adverse outcome was maximum for those aged less than 20 yrs and 30 yrs or more (p>0.05). No significant association (p>0.05) was found between religion and outcome. Risk of adverse outcome progressively decreased with higher education and decreased progressively with increase in educational status of husband (p<0.01). A significant association was found between monthly family income and birth outcome. The risk of adverse outcome increased progressively with decrease in SES. An increasing trend of an adverse outcome was observed with increase in gravidity (1.5 times for Gravida 3 or more). There was no significant linear trend between adverse outcome and Birth order. There was an increased risk of an adverse

outcome with decrease in age at marriage, being maximum for those married before 18 yrs (p>0.05). High risk of an adverse outcome with age at first pregnancy less than 18 yrs was observed. On considering only primigravida, similar results were found. There was no significant linear trend (p>0.05) in incidence of adverse outcome with respect to inter-pregnancy interval. The risk of an adverse outcome increases with maternal complications and level of physical activity in the third trimester. The risk is 1.8 times for moderate activity and rises further to 3.9 times for heavy activity (p=0.000). A 33% reduction in incidence of adverse outcomes is observed with rest of 8 to 9 hrs a day when compared with those taking less than 8 hrs of rest. The risk of an adverse outcome decreases by 20% if ANC visit is initiated in the first trimester. If only LBW is considered, then a statistically significant trend (p<0.05) is observed with an increase in the incidence of LBW babies with delay in initiation of ANC visits. Table 5 shows the association.

Table 5: Distribution of trimester of ANC initiation and birth weight.

ANC initiation	Birth weig	ght (in kgs)	Total	Relative risk
	<2.5	≥2.5	Total	Kelative Fisk
First trimester	49	135	184	
Row (%)	26.6	73.4	100.0	1
Col (%)	51.0	61.6	58.4	
Second trimester	45	83	128	
Row (%)	35.2	64.8	100.0	1.3
Col (%)	46.9	37.9	40.6	
Third trimester	02	01	03	
Row (%)	66.7	33.3	100.0	2.5
Col (%)	2.1	0.5	1.0	
Total	96	219	315	
Row (%)	30.5	69.5	100.0	
Col (%)	100.0	100.0	100.0	
Chi square for linear trend		df	P value	
4.292		2	p=0.03 (p<0.05)	

Note: 08 Still births and the second twin (04 in number) were excluded for analysis of association of initiation of antenatal visit by the subject with birth weight.

Table 6: Distribution of gestational age at delivery and outcome.

Age (in weeks)	Outcome		Total	Relative risk
	Adverse	Normal		
<37	48	04	52	
Row (%)	92.3	7.7	100.0	3.63 (2.92 – 4.50)
Col (%)	40.7	1.9	15.9	_
37-<42	70	203	273	_
Row (%)	25.6	74.4	100.0	
Col (%)	59.3	97.1	83.5	- - 1
≥42	0	02	02	1
Row (%)	0.0	100.0	100.0	
Col (%)	0.0	1.0	0.6	
Total	118	209	327	
Row (%)	36.1	63.9	100.0	
Col (%)	100.0	100.0	100.0	

Continued.

Chi Square		df	P value	
Uncorrected	84.74	1	0.000 (p<0.01)	
Yates corrected	81.87	1	0.000 (p<0.01)	

Note: For analysis "37 - <42 & ≥42 weeks" were considered together since numbers were very less in ">=42" category

An increased risk of an adverse outcome with a vegetarian diet and a progressive reduced risk with increase in milk intake was observed (p<0.01). The risk of an adverse outcome reduced significantly with intake of at least 100 tablets of iron and folic acid during pregnancy (p=0.000). A risk of 1.17 times for an adverse outcome with maternal height of less than 150 cms compared with a height of 150 cms or more was observed. There was no significant linear trend (p>0.05) in incidence of adverse outcome with respect to maternal pre-pregnancy weight. The risk of an adverse outcome increased with deviation on either side from the ideal weight gain i.e. between 11 to 12 kg during pregnancy. The risk of an adverse outcome increased to 6.5 times with a weight gain of 10 kg or less as compared to ideal weight gain (p=0.000). Tobacco/ETS exposure during pregnancy was associated with an increased risk of 1.95 times for an adverse outcome (p<0.01). Risk of an adverse outcome increases by 1.11 times with presence of anemia during third trimester (p>0.05). Amongst the 327 births, there was an increased risk of 3.63 times for an adverse outcome with a gestational age of less than 37 weeks. Table 6 shows the association.

DISCUSSION

Out of the 323 newborns, 64.7% (95% CI 59.2%-69.9%) were normal outcomes and 35.3% (95% CI 30.1%-40.8%) were adverse pregnancy outcomes. Amongst the 35.3% adverse outcomes, 29.1% were LBW babies (19.8% term LBW and 9.3% preterm LBW). Other adverse pregnancy outcomes included 08 stillbirths, 06 preterm with normal birth weight, 03 IUGR and 03 congenital anomalies. On comparing the outcome with WHO Collaborative study, the incidence of LBW was similar to that reported by them in India (Pune) being 28.2% and preterm deliveries being 9.7%.8 According to SRS estimates (2006), the incidence of Stillbirths was 8 per 1000 live births (0.8%) for urban India which is less compared to our findings.9 Incidence of congenital anomalies was lower than the study conducted by Verma I.C. showing it to be 2.5%. ¹⁰ Incidence of LBW were however marginally lower than UNICEF 2001 annual report (incidence of LBW in India being 33%) and UNICEF-ICMR report (1987) (39.3% incidence of LBW in three slums of Madras, Delhi, Calcutta and rural areas near Chandigarh, Varanasi and Hyderabad). 11,12 The incidence of LBW has therefore, shown a declining trend.

An association was revealed between the age of the subject and pregnancy outcome. 44% of women less than 20 yrs and 56% of those who were 30 yrs or more, had an adverse outcome, explaining the U-shaped relationship between maternal age and adverse outcome. ¹³ Findings

were comparable with Raman et al and Negi et al. 14,15 Other studies conducted reported higher incidence of LBW, prematurity, neonatal mortality in children of young mothers, than in children born to mothers aged between 20 to 29 yrs. Obstetric complications are significantly high among young mothers. 16 Maternal education was found to have a significant effect on initiation of ANC in the first trimester (p<0.01) and progressively increased with higher education. The risk of adverse outcome progressively decreased with higher education status (p>0.05). Joshi et al and Dhar et al reported a linear reduction in the incidence of LBW with improved maternal education status.^{17,18} WHO critical review revealed that maternal education was associated with LBW even after investigators controlled for risk factors.⁴ A significant association (p<0.01) was detected between educational status of the subject's husband and birth outcome. The risk of adverse outcome decreased progressively with increase in educational status of husband (p<0.01), comparable to Parker et al who found positive associations between five indicators of SES (maternal education, paternal education, maternal occupation, paternal occupation and family income) and LBW among women in the 1988 National Maternal and Infant Health Survey.¹⁹ A significant association was found between monthly family income and outcome, similar to Parker et al and Joshi et al with maximum proportion of LBW (52.56%) in low-income group. 17,19 The risk of adverse outcome increased progressively with decrease in SES (p<0.01). The chances of consuming a mixed diet increased progressively with higher SES (p<0.01). A study in Mexico City (1996) showed that low socioeconomic level was the most important risk factor for LBW and was independent of other factors. 20 Joshi et al, Parker et al and Radhakrishnan et al also observed similar findings. 17,19,21

Obstetric history

An increasing trend of an adverse outcome with increase in gravidity was observed, comparable to Dhar et al, who found that gravidity was statistically associated with LBW. Amin et al revealed that 70% of primigravida delivered LBW babies. On considering only primigravida, an increased incidence of adverse outcome is associated with reduction of age at first pregnancy. Findings are similar to hospital-based study of Beydown et al with LBW incidence of 56.2%, with maternal age above 25 years at first birth as an independent risk factor for LBW, but not for preterm and Dhar et al. Reg. There was no significant linear trend (p>0.05) in incidence of adverse outcome with respect to birth order similar to Negi et al. Mavalankar et al in their case-control study observed that primiparous were more likely to have

term LBW than other women.24 There is a high risk of an adverse outcome with spacing between pregnancies of less than 3 yrs. This study did not find any significant association between pregnancy interval and birth outcome in contrast to Dhar et al and Mavalankar et al.18,24 The risk of an adverse outcome definitely increases with presence of maternal complications (p=0.000). Joshi et al revealed that 75% of newborns delivered by mothers suffering from pre-eclampsia and eclampsia during present pregnancy were LBW, followed by APH (53.85%) and malpresentation (46.75%). 17 Risk of an adverse outcome increased with level of physical activity in third trimester similar to Idris et al study but decreases with increase in amount of rest taken during pregnancy esp in third trimester similar to Sacchar et al. 25,26 The risk of an adverse outcome decreases by 20% if ANC visit is initiated in first trimester. If only LBW is considered, then a statistically significant trend (p<0.05) was observed with an increase in incidence of LBW with delay in initiation of ANC visits. Idris et al and Joshi et al in their study revealed similar findings. ^{17,25} The findings, however, were in contrast to the study by Ahmed in Bangladesh who concluded that 3 ANC visits were quite effective in reducing the proportion of LBW.²⁷

Nutritional history

Kramer concluded that maternal nutritional factors both before and during pregnancy, account for more than 50% of cases of LBW in developing countries. 28 There was an increased risk of an adverse outcome with a vegetarian diet which is 1.8 times the risk with a mixed diet (p=0.000). There was a progressive reduced risk with increase in the milk, with almost 40% reduction with daily intake of milk (p<0.01). The results were similar to Bhatia et al who showed that intrauterine growth improved significantly with increased intake of proteins.²⁹ Aurora et al observed that birth weight was best correlated with height and weight of the mother, and thus improving the nutritional status of the girl child during her period of growth can reduce the incidence of LBW.30 No significant association was found between dietary pattern and presence of anemia in pregnancy. Joshi et al found that out of 76 newborns delivered by anemic mothers, 61.84% were LBW, similar to findings by Mavalankar et al and Sharma et al. 17,24,31 The risk of an adverse outcome reduced with intake of at least 100 tablets of iron and folic acid during pregnancy (p=0.000). A nutrition policy paper by UNICEF reported that micronutrient can affect birth weight directly or indirectly by their interaction with each other.³²

Anthropometry

A risk of 1.17 times of occurrence of an adverse outcome with maternal height of less than 150 cms was observed (p>0.05). Kapur et al and Chhabra et al derived similar conclusions.^{33,34} WHO Collaborative Study concluded that indicators that predicted risk of an adverse outcome included pre-pregnancy weight, maternal height, pre-

pregnancy BMI and Mid upper arm circumference (MUAC).³⁵ There was a risk of an adverse outcome with maternal weight of less than 50 kg and 60 kg or more (p>0.05). WHO expert committee on nutrition in pregnancy and lactation reported that underweight mothers have babies 8% lighter.³⁶ Chhabra et al found that maternal weight of less than 50 kg and more than or equal to 50 kg, had significant difference in mean birth weight.³⁴ Similarly, WHO Collaborative study concluded that pre-pregnancy weight predicted the risk of LBW with an OR (per unit decrease in pre-pregnancy weight) of more than 2.35 In the present study, the risk of an adverse outcome increased with deviation on either side from the ideal weight gain i.e. between 11 to 12 kg during pregnancy (p=0.000), comparable with a case control study in Congo and Boerma. 37,38 There was an increased risk of an adverse outcome with maternal exposure to tobacco similar to findings of The Institute of Medicine, Gupta et al and Krishnamurthy and Joshi. 39-41

Newborn baby

There was an increased risk of 3.63 times for an adverse outcome with a gestational age of less than 37 weeks (p=0.000), comparable to Hirve and Ganatra and Bhatia and Tyagi. Alexanterial No significant association between the gender of the newborn and the risk of an adverse outcome seen. The male birth weight was 191 g more than the females, similar to Patric et al. The results of a Nepalese study revealed that sex of the newborn was an independent risk factor for low birth but the present study did not reveal this.

CONCLUSION

The incidence of adverse pregnancy outcomes esp LBW is very high in India and these babies besides having high mortality and morbidity, also remain handicapped in growth and development. The outcome of pregnancy is dependent on multiple factors. In the present study, the epidemiological predictor variables which were found to have a statistically significant association with an adverse pregnancy outcome were maternal education on initiation of ANC in the first trimester, paternal education, Family income, socioeconomic status (SES), gravidity, maternal complications during pregnancy, level of physical activity, rest taken during pregnancy, trimester of initiation of ANC visits, diet during pregnancy esp consumption of milk, iron supplementation during pregnancy, maternal weight gain, maternal exposure to tobacco/environmental tobacco smoke, gestational age. An association was revealed between the following factors and pregnancy outcome, although they were not statistically significant-age of the subject, maternal education, age of the pregnant women at marriage and at first pregnancy, birth order, inter-pregnancy interval, trimester of initiation of ANC visit, anemia during third trimester, iron supplementation during pregnancy, maternal height and pre-pregnancy weight. No association was revealed between religion of the subject, dietary pattern, presence of anemia in pregnancy, gender of the newborn and pregnancy outcome.

The findings indicate that parental education, good antenatal care, early detection of high risk pregnancy, light physical activity and adequate rest especially in the third trimester, adequate nutrition with nutritional supplementation and exposure to ETS markedly influence the pregnancy outcome and intervention in these areas would indeed result in an improved birth outcome.

Factors having marginal scope of intervention include age of the pregnant women including her age at marriage and at first pregnancy, adequate inter-pregnancy interval, maternal weight gain during pregnancy and socioeconomic status of the pregnant women. These however, can be addressed by better literacy, awareness and health promotive measures.

Factors which have no influence on pregnancy outcome and are also not susceptible to intervention include the religion of the women and the gender of the newborn.

Funding: No funding sources Conflict of interest: None declared Ethical approval: Not required

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Cite this article as: Shankar P, Pathania V. Epidemiological predictor variables in relation to the outcome of pregnancy in an urban setting. Int J Community Med Public Health 2018;5:4489-97.