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Socio-demographic Determinants of Pregnancy Wastage

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OBJECTIVE – To find out whether socio-demographic determinants are risk factors for pregnancy wastage. **METHODS** – Retrospective study was done on women more than 44 years old, of low socio economic status and living in an urban community. Sample size was determined as 3236 pregnancies. The subjects were selected by systematic random sampling . To obtain the desired sample size 476 women had to be interviewed. The different types of pregnancy wastage (PW) were analyzed according to some variables viz. age, literacy, occupation of the mother, birth order, and birth interval between pregnancies. Z test of proportion was employed where applicable. Predictive models were prepared for PW according to some of the studied variables. **RESULTS** – PW was observed to be maximum in the women above 35 years of age (16.58%) and minimum in 20-24 year age group (7.73%). A second degree parabola was fitted in the curve obtained: $y = 0.382859867 - 0.02378328x + 0.00048543x^2$, where y is the percentage of PW and x is the age in years. Lowest percentage was obtained at 3rd order of birth(6.62%) and highest at 8th and above (22.60%). A second degree parabola was fitted: $y = 0.1330678 - 0.031077x + 0.0053374x^2$, where y is the percentage PW and x the birth order . PW amongst the illiterate mothers (12%) was significantly higher ($Z = 2.90$, $p < 0.001$) than that in literate mothers (8.01%). PW amongst women employed during pregnancy (17%) was significantly higher ($Z = 5.98$, $p < 0.001$) than that amongst pregnancies where the mother was not employed (9.30%). **CONCLUSION** – Socio-demographic factors play a major role in causing pregnancy wastage.

Key words : socio-demographic determinants, pregnancy wastage

Introduction

Poor pregnancy outcome indicates poor maternal and child health (MCH) care. Most countries, including India, are spending large sums of money on MCH programmes to improve pregnancy outcome. Of all the adverse outcomes, most serious is pregnancy wastage (PW) which includes early preclinical loss of conception, spontaneous first trimester abortion (SAB) and perinatal mortality (PNM), the last variety combining stillbirth (SB) and early neonatal death (END).[1]

Often, in spite of good health care, such wastage may occur due to association of a spectrum of various other factors which, if taken care of, can alleviate the problem and prevent wastage in terms of food and finance, and more importantly the depletion of maternal stores.

This study was designed to assess the risk of different types of PW due to certain socio-demographic variables.

Material and methods

A retrospective study was done on women beyond the reproductive age group (i.e.≥44 years) of low socioeconomic status and living in an urban community. Taking prevalence of pregnancy wastage to be 0.11 from the predictive model of reproductive success and failure as shown by Cunningham et al[1] and taking an allowable error of 10 per cent and 95 per cent confidence level, the sample size for pregnancies was calculated to be 3236. Considering age specific marital fertility rate in the age group 45-49 years to be 5.9 [2] and prevalence of pregnancy wastage as 0.11 [1] the mean pregnancy in this age group was calculated as 6.63. This implied that the number of women to be covered for taking 3236 pregnancies was 488.

The women were selected by systematic random sampling and interviewed by house to house visit. Data was obtained on the pregnancy outcome of the entire reproductive life of the women till the date of interview. On covering 476 women, 3236 pregnancies were completed and further interview was stopped. The subjects were studied for pregnancy wastage according to some socio - demographic variables. All the different types of pregnancy wastages viz. spontaneous abortion, stillbirth and early neonatal death, were analyzed according to the variables under consideration. Z test of proportion was employed where applicable. Predictive models were prepared for pregnancy wastage according to some demographic variables.

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Results

Overall pregnancy wastage was found to be 11.19 per cent, though there were ups and downs in between (Table I). Maximum number of women viz., 16.58% were above 35 years of age and minimum viz., 7.73% were in 20-24 year age group. Observing the nature of the curve, a second degree parabola was best fitted (Figure 1) : $y=0.382859867 - 0.02378328x + 0.00048543x^2$, where y is the percentage pregnancy wastage and x the age in years. Estimated values of the pregnancy wastages are shown in Table I.

The percentage pregnancy wastage shows a J shaped curve when plotted according to birth order. Lowest percentage was observed at 3rd order of birth (6.62 %) and highest at 8th and above (22.60 %). Keeping this in view a second degree parabola was fitted (Figure 2): $y = 0.1330678 - 0.031077x + 0.0053374x^2$, where y is the percentage PW, and x the birth order. The estimated percentage PW is shown in Table II.

Pregnancy wastage according to interval between births in 2649 pregnancies (after excluding 587 first births) is given in Table III. This shows PW to be maximum at two extremes of spacings i.e. at the interval of 1 year between births (15.29%) and ≥ 8 years (14.29%). Prevalences of PW for all other spacings lie in between.

Among the socio-economic variables literacy and occupation were considered in this study (Table IV and V). Pregnancies among illiterate mothers (79.57%) were observed to outnumber those among literate mothers (20.43%). The pregnancy wastage rate among illiterate women (12.00%) was found to be more than that among literate women (8.01%) and this difference was statistically highly significant ($p<0.001$). Out of the sampled pregnancies 24.54% occurred while the women were working and the rest, (75.46%), while they were not working. Percentage of PW among employed mothers (17.00 %) was found to be statistically highly significant ($p<0.001$) in comparison to that among unemployed mothers (9.30%).

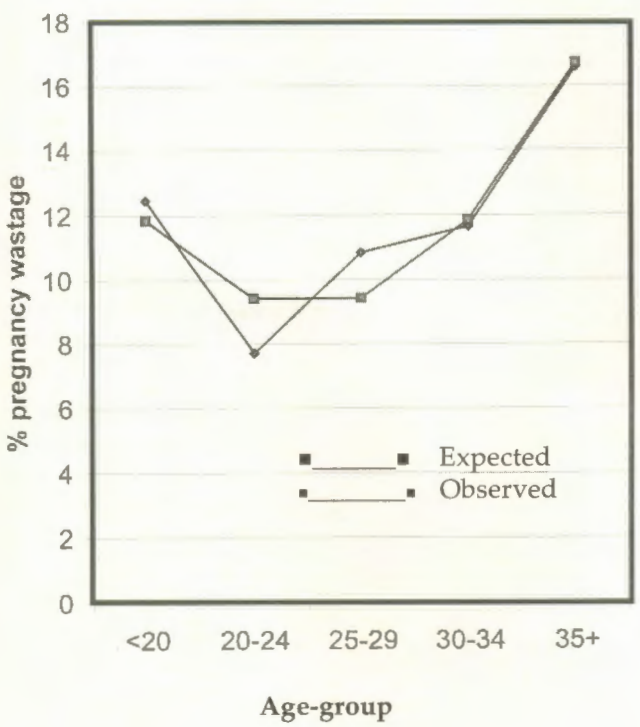

Fig. 1 : Observed vs Expected pregnancy wastage (in percentage) accordiang to age group

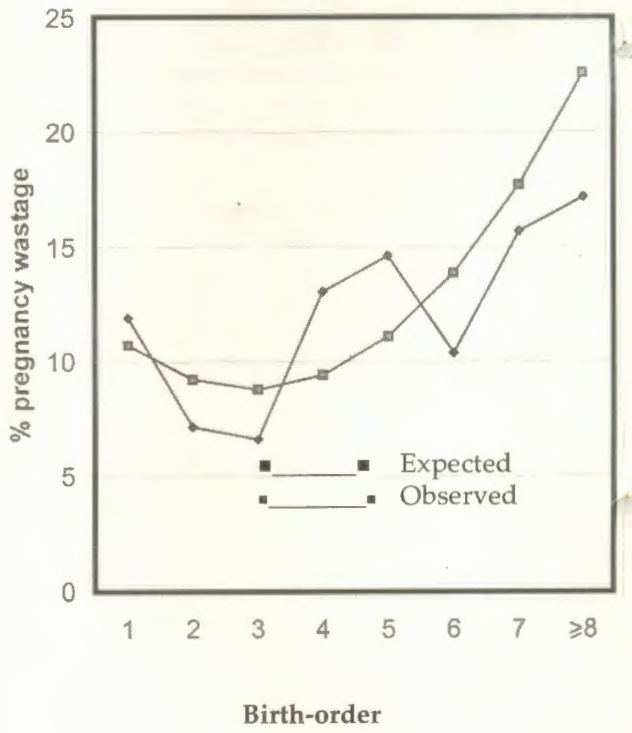

Fig. 2 : Observed vs Expected pregnancy wastage (in percentage) accordiang to age group

Table I. Pregnancy wastage according to age of the mother

Age group (years)	Total pregnancy	Pregnancy wastage				Expected pregnancy wastage in percent[a]
		Abortion	Stillbirth	Early neo-natal death	Total	
≤ 20	497	26 (5.23)	9 (1.81)	26 (5.23)	61 (12.27)	11.86
20-24	802	32 (3.99)	3 (0.37)	26 (3.24)	61 (7.60)	9.43
25-29	893	50 (5.60)	26 (2.91)	21 (2.35)	97 (10.86)	9.44
30-34	652	48 (7.36)	12 (1.84)	18 (2.76)	8.78 (11.96)	11.86
≥ 35	392	50 (12.76)	3 (0.77)	12 (3.06)	65 (16.58)	16.72
Total	**3236**	**206 (6.36)**	**53 (1.64)**	**103 (3.18)**	**362 (11.19)**	

[a] = $(y\text{-}0.382859867 - 0.02378328\ x + 0.00048543\ x^2) \times 100$

Figures in parenthesis indicate percentages.

Table II. Pregnancy wastage according to birth order.

Birth order	Total pregnancies	Pregnancy wastage				Expected pregnancy wastage in percent[a]
		Abortion	Stillbirth	Early neo-natal death	Total	
1	587	35 (5.96)	12 (2.04)	23 (3.92)	70 (11.93)	10.73
2	573	20 (3.49)	12 (2.09)	9 (1.57)	41 (7.16)	9.23
3	529	15 (2.84)	3 (0.57)	17 (3.21)	35 (6.62)	8.79
4	459	39 (8.50)	2 (0.44)	19 (4.14)	60 (13.07)	9.42
5	362	29 (8.01)	12 (3.31)	12 (3.31)	53 (14.64)	11.11
6	279	15 (5.38)	3 (1.08)	11 (3.94)	29 (10.39)	13.88
7	191	14 (7.33)	6 (3.14)	10 (5.23)	30 (15.71)	17.71
≥8	256	39 (15.23)	3 (1.17)	2 (0.78)	44 (17.19)	22.60
Total	3236	206 (6.36)	53 (1.64)	103 (3.18)	362 (11.19)	

[a] = $(y - 0.1330678 - 0.031077\ x + 0.0053374\ x^2) \times 100$ (y = observed pregnancy wastage as percentage, x = birth order)

Figures in parenthesis indicate percentages

Table III. Pregnancy wastage according to birth interval

Birth interval (in years)	Total pregnancies	Pregnancy wastage			
		Abortions	Stillbirths	Early neonatal deaths	Total
1	497	38 (7.65)	12 (2.41)	26 (5.23)	76 (15.29)
2	938	65 (6.93)	11 (1.17)	27 (2.88)	103 (10.98)
3	758	32 (4.22)	15 (1.98)	18 (2.37)	65 (8.58)
4	209	21 (10.05)	0 -	3 (1.44)	24 (11.48)
5	150	9 (6.00)	0 -	6 (4.00)	15 (10.00)
6	41	4 (9.76)	0 -	0 -	4 (9.76)
7	20	2 (10.00)	0 -	0 -	2 (10.00)
8	21	0 -	3 (14.29)	0 -	3 (14.29)
9	6	0 -	0 -	0 -	0 -
10	9	0 -	0 -	0 -	0 -
Total excluding first order births	2649	171	42	80	292
First order births	587	35	12	23	70
Total	3236	206 (6.36)	53 (1.64)	103 (3.18)	362 (11.19)

Table IV. Pregnancy wastage according to literacy.

	Pregnancies	Pregnancy wastage			
		Abortions	Stillbirths	Early neonatal deaths	Total
Literate	661	35 (5.30)	6 (0.90)	12 (1.82)	53[a] (8.01)
Illiterate	2575	171 (6.64)	47 (1.83)	91 (3.53)	309[a] (12.00)
Total	3236	206 (6.36)	53 (1.64)	103 (3.18)	362 (11.19)

a $z = 2.90$, $p<0.001$ Figures in parenthesis indicate percentages

Table V. Pregnancy wastage according to occupation

	Pregnancies	Pregnancy wastage			
		Abortions	Stillbirth	Early neonatal deaths	Total
Employed	794	103 (12.97)	24 (3.02)	9 (1.13)	135[a] (17.00)
Unemployed	2442	103 (4.22)	29 (1.19)	94 (3.85)	227[a] (9.30)
Total	3236	206 (6.36)	53 (1.64)	103 (3.18)	362 (11.19)

[a] z 5.98, $p < 0.001$ Figures in parenthesis indicate percentages

Discussion

Extremes of age have been shown to result in unfavourable outcomes of pregnancy[2]. Rao and Inbaraj[3] observed PNM to be highest for youngest and oldest age groups of mothers, with maximum mortality occurring at ages under 20 years in rural women and over 35 years in urban women. In the present study, total PW, and abortion when considered individually, were higher in women less than 20 years of age, falling to a minimum in the 20-24 year age group and rising thereafter. Other authors have made similar observations regarding PNM as a whole[4,5] ,and SB[6,7] and END[8,9] considered individually. On the other hand, Heisterberg[10] reported significantly lower risk of spontaneous abortion in women older than 33 years than that in the younger women. Rachootin and Olsen[11], using logistic regression analysis, found that age was not significantly associated with a history of spontaneous abortion.

Parity, too, was seen to be associated with PW by many authors[3-7,9,12,13]. The general trend shown by them was that, risk is highest in the first pregnancy, falls to a minimum between two to four birth orders, to rise again with 4th and 5th pregnancies. James[14] explained this rising risk in multiparas as "reproductive compensation". He said that because abortion prone women have more pregnancies than other women, this reproductive compensation rather than a real birth order effect is a major reason why abortion rates are higher at high maternal ages and higher birth ranks. In the present study there appeared to be lowest risk in the 3rd birth order and higher in 1st and in 4th onwards, thereby producing a parabolic curve (Fig.1).

Pregnancies spaced too close are of risk to the mother as well as the infant. It was seen in this study that all the different types of PW occurred more frequently when inter-pregnancy interval was two years or less, but none were found to be statistically significant. Rao and Inbaraj[3] observed, in both urban and rural areas, that SB rate and END rate, both individually and considered together, were highest when interval since last pregnancy termination was less than one year. The mortality declined fairly steadily up to an interval of 5 years, beyond which it increased dramatically[3]. However, Kumar and Singhi[7] reported that, short inter-pregnancy interval (less than 24 months) was not associated with stillbirth.

Among the variables within the socio economic status, literacy and occupation were considered in this study. It was observed that though total PW was significantly higher ($p<0.001$) among illiterates than among literates, none of the subtypes of PW, considered individually, were found to be statistically significant. Singhal et al[15] found perinatal deaths to be significantly higher ($p<0.01$) in illiterate mothers. But Kumar and Singhi[7] did not find parental literacy to have any influence on the risk of SB. Other authors have shown perinatal mortality to be inversely proportional to socio-economic class[5,6,13].

Employment during pregnancy has often been seen to result in adverse outcomes, including pregnancy loss. Senturia[16] reported that certain work factors directly correlated with miscarriage and/or perinatal death. Chamberlain[17] stated that McDowall et al[18] showed an increased SB rate among women who worked during pregnancy as compared to that in non-working women of England and Wales in the 1970s. In the present study though PW in case of mothers employed during pregnancy was significantly higher ($p < 0.001$) than that in pregnancies where the mother had not been employed none of the subtype of PW, considered individually, were statistically significant. Some authors, however, have reported conflicting results. Marbury et al[19] observed that working women were more likely to say that their previous pregnancy had ended in miscarriage. In the study by Najman et al[20] PNM rate in

employed mothers was 10.5/1000 pregnancies, while that in housewives was 9.4/1000. Savitz et al[21] reported that employment, overall or in specific jobs, around the time of conception or early pregnancy was not associated with SAB.

Socio-demographic factors, most of which are preventable, are thus seen to play a major role in causing pregnancy wastage. Such adverse outcomes may be reduced dramatically, by preventing 'too many' or 'too close' births in 'too young' or 'too old' mothers. Improvement in the socio-economic condition of the country will also ensure a healthy mother and a healthy infant at the end of each pregnancy.

References

1. Cunnigham FG, MacDonald PC, Gant NF et al. Williams Obstetrics. 20th Ed. Norwalk (USA). *Appleton and Lange,1993:580.*
2. Park K. Park's Textbook of Preventive and Social Medicine. 16th ed. Jabalpur, (India) *M/S Banarsidas Bhanot Publishers, 2000:384.*
3. Rao PSS, Inbaraj SG. Extent of perinatal loss in South Indian urban and rural population. *Indian Pediatr 1975; 12: 221-7.*
4. Dutta Banik ND, Saha K. Factors related to perinatal mortality. *Indian J Pediatr 1975; 42: 310-5.*
5. Agarwal VK,Gupta SC, Roy Chowdhury S et al. Some observations on perinatal mortality. *Indian Pediatr 1982; 19:233-8.*
6. Damodar B, Mathur HN, Sharma PN. Some observations on perinatal mortality in rural health center. *Indian J pediatr 1983;50: 629-33.*
7. Kumar R, Singhi S. Risk factors for stillbirths in a rural community. *Indian J Pediatr 1992; 455-61.*
8. Khandait DW, Ambadekar NN, Zodpey SB et al. Maternal age as a risk factor for stillbirth. *Indian J Pub Hlth 2000; 44: 28-30.*
9. Das PK, Basu K, Chakrabarty S et al. Early neonatal morbidity and mortality in a city based medical college nursery. *Indian J Pub Hlth 1998; 442: 9-14.*
10. Heisterberg L. Factors influencing spontaneous abortion, dyspareunia, dysmenorrhoea and pelvic pain. *Obstet Gynecol 1993; 81: 594-7.*
11. Rachootin P, Olsen J. Prevalence and socio-economic correlates of subfecundity and spontaneous abortion in Denmark. *Int J Epidemiol 1982; 11: 245-9.*
12. Naylor AF, Warburton D. Sequential analysis of spontaneous abortion II. *Fertil Steril 1979; 31: 282-6.*
13. Indra S, Roy Chowdhury NN, Pal S. Profile of perinatal mortality. *J Obstet Gynecol 1982; 32: 20-6.*
14. James WH. Spontaneous abortion and birth order. *J Biosoc Sci 1974; 6: 23-41.*
15. Singhal PK, Mathur GP, Mathur S et al. Perinatal mortality: In ICDS urban slum area. *Indian Pediatr 1986; 23: 339-43.*
16. Senturia KD. A woman's work is never done: Women's work and pregnancy outcome in Albania. *Med Anthropol 1997; 11: 375-95.*
17. Chamberlain G. Effect of work during pregnancy. *Obstet Gynecol 1985; 65: 747-50.*
18. McDowell M, Goldblatt P, Fox J. Employment during pregnancy and infant mortality. *Pop Trends 1981;26:12.*
19. Marbury MC, Linn S, Monson RR et al. Work and pregnancy. *J Occup Med 1984; 26: 415-21.*
20. Najman JM, Morrison J, Williams GM, et al. The employment of mothers and the outcomes of their pregnancies: An Australian study. *Public Health 1989; 103: 189-98.*
21. Savitz DA, Brett KM, Dole N et al. Male and female occupation in relation to miscarriage and preterm delivery in central North Carolina. *Ann Epidemiol 1997; 7: 509-16.*