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Pregnancy Behavior Of Pakistani Women Over Their Reproductive Life Span

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Abstract: *Objective:* To understand pregnancy behavior of Pakistani women over their reproductive life span so as to generate baseline data on prevalence of pregnancy loss and to generate hypotheses for future research. Examination of events over the reproductive life span of a woman rather during a single pregnancy or child birth may be more useful in understanding the birth outcomes. *Methods:* Data of National Health Survey of Pakistan 1992-94 was used for this analysis as this is the only data available with information on diseases and exposures. Stata Version 9 for complex survey analysis was used with survey weights that reflected the over-sampling of urban areas and the three smaller provinces. *Results:* 2,947 reproductive age women reported 16,833 pregnancies. More urban (12.6%) than rural (9.2%) and high-middle income (11%) than low-income (9.2%) women reported abortions. Stillbirth rate was almost similar among rural (54/1000) and urban (53/1000) women. After adjusting, hypertension (AOR 1.33; 95% CI 1.02, 1.75) and BMI≥23 kg/m^2 (AOR 1.46; 95% CI 1.18, 1.80) remained significantly associated with stillbirth, while middle income (AOR 1.28; 95% CI 1.01, 1.63) and women with BMI≥23 kg/m^2 (AOR 1.50, 95% CI 1.19, 1.90) had significantly higher abortion rates. *Conclusions:* We found a high lifetime adverse pregnancy outcome rates, four-fold that of many developed countries.
Key words: perinatal mortality, stillbirth, abortion, Pakistan

Introduction

A number of correlates have been identified for fetal loss such as low socioeconomic status, low maternal education, limited accessibility to health care services, poor health seeking behaviors, and inadequate antenatal care [1-4]. However, these factors were studied in relation to last pregnancy outcome. It has been suggested that considering birth outcomes, examination of events over the reproductive life span of a woman rather during a single pregnancy or child birth may be more useful in understanding the mechanisms affecting birth outcomes in relation to racial, ethnic and socio-economic groups and to exposures to various risk factors [5]. In some developing countries such as Pakistan, which have been unable to prevent many of the avoidable deaths, repeat pregnancies at short intervals, maternal malnutrition and unsafe birthing practices, we presume that proportion of women experiencing undue fetal loss is much higher than more developed countries. Stillbirth is one of the most common adverse outcomes of pregnancy. Ninety seven percent of the 3.9 million stillbirths that occur annually are in developing countries, and are mainly *intrapartum* i.e occurring during labor and delivery, and are generally considered preventable with appropriate obstetrical care [4,6-9]. Available data suggests there has not been a significant change in the Pakistani stillbirth rates over the last several decades [10-11].

Two recent population-based studies had still birth rates of 34 per 1000 and both studies found that the majority of the stillbirths were intrapartum stillbirths.[12-13] These are potentially preventable with appropriate obstetric care, including access to cesarean section. The recent Pakistan Demographic and Health Survey (PDHS, 2006-07) found that only four in ten births (39%) in Pakistan are delivered by a health professional and only one-third of deliveries (34%) take place in a health facility. The remaining births occur at home, attended by untrained birth attendants or relatives. [12].

Due to persistently high maternal and early neonatal mortality in Pakistan, efforts of government and various international donor agencies remained focused in reducing these; however other adverse outcomes of pregnancy, such as early pregnancy loss and stillbirth, largely remained neglected and not viewed as integral to the reproductive health outcomes of women. Because of the large number of births occurring in home settings, one of the greatest barriers to improving pregnancy outcomes is the lack of reliable data. To address the paucity of data, we examined a subset of National Health Survey of Pakistan conducted from 1992-94 on pregnancy outcomes and their association with socio-demographic factors and selected health conditions such as obesity, diabetes, hypertension, palpable thyroid and life time exposures to tobacco and pesticides.[13] The purpose of these analyses was to generate baseline data on prevalence of pregnancy loss over the reproductive life span in order to generate hypotheses for future research and comparison.

Materials and Methods

From 1990-1994, the Pakistan Medical Research Council (PMRC), with the technical guidance of the US National Center for Health Statistics (NCHS), conducted the National Health Survey of Pakistan modeled after the US National Health and Nutrition Examination Survey (NHANES). The survey sample had a two-stage stratified design. The urban and rural areas of each of the four Pakistani provinces, Punjab, Sindh, North West Frontier Province (NWFP) and Baluchistan, were stratified according to 1981 population censes. Based on the master sampling frame of the Federal Bureau of Statistics Pakistan, enumeration blocks (EBs) of approximately 200 households in the urban strata and villages in the rural strata were taken as primary sampling units (PSUs). An urban area was defined as an area with the following local government institutions at the time of the census: Metropolitan Corporation, Municipal Corporation, Municipal Committee, Town Committee or Cantonment Board. All other geographic areas were defined as rural. Eighty PSUs were selected for the survey and 30 households in each were sampled using a systematic sampling technique. The residents of the 2,400 household were included with the number of households per region linked to its relative proportion of the total national population; Punjab 1200 (50%), Sindh 540 (22.5%), Northwest Frontier Province (NWFP) 360 (15%), and Baluchistan 300 (12.5%). Following informed consent, 18,315 persons were interviewed. Analyses were restricted to the 2947 women ages 15-52 with a history of at least one pregnancy. The reproductive history questions addressed the number of live births and of pregnancies terminating as

abortions and stillbirths. A mobile team of physicians conducted the physical examinations, obtained the blood pressure, did anthropometric examinations, and took blood samples. Overweight/obesity was defined as a BMI of 23 kg/m^2 or greater, based on the revised criteria for Asian populations. Ethnicity was defined as "mother tongue" specified for the five major ethnic subgroups of Pakistan, Punjabi, Sindhi, Pashtun, Baluch, and Muhajir. Literacy was defined as an ability to read. Hypertension was defined as a systolic blood pressure of 140 mm Hg or greater or a diastolic blood pressure of 90 mm Hg or greater (based on the mean of the 2 readings) or current therapy with antihypertensive medication. Diabetes was defined as a non-fasting blood glucose concentration of 140 mg/dL (7.8 mmol/L) or greater or a history of diabetes. Tobacco use was assessed as life time exposure to tobacco for smoking at least 100 cigarettes or biddies (hand rolled cigarettes) during life time, or chewing tobacco or using snuff at least 100 times during life time. Thyroid status was assessed as palpable thyroid by the mobile team physician at the time of interview. Exposure to pesticide was assessed by self-report of ever being exposed to pesticides. Socioeconomic status (SES) was categorized as high, medium or low, based on ownership of household goods such as iron, fan, radio, refrigerator, television, air conditioning, car, livestock etc.

Data were analyzed using Stata Version 9 for complex survey analysis with survey weights that reflected the over-sampling of urban areas and the three smaller provinces. Pregnancy outcomes such as live births, stillbirths and abortions were calculated as the percentage of total pregnancies. These were estimated for the overall sample used for current analysis, for four provinces and according to urban and rural dwelling. Stillbirth rates were calculated for reproductive life span with total births (stillbirths plus live births) in the denominator. Stillbirths and abortions were as reported by the respondents, irrespective of academic definitions. Differentiation of induced vs. spontaneous abortion was not available.

The prevalence of clinical and other conditions were calculated for women. Two separate multivariate models were developed to explore for predictors of pregnancy loss where dependent variables used were stillbirths and abortions, respectively. The candidate predictor list included sociodemographic variables (urban vs. rural dwelling, province, literacy status, economic status and ethnicity); clinical and other conditions included were palpable thyroid gland, hypertension, obesity/overweight, and diabetic status and lifetime exposure to tobacco and pesticides. The multicolinearity among predictor variables was assessed by using Phi statistics for nominal variables. Strong colinearity was found between province and ethnicity; since the model was more stable with province, it was retained in the final model. Variables associated with the primary outcomes (stillbirths and abortions) with $p< 0.2$ in the univariate analysis were considered for selection in the multivariate model. We performed logistic regression analysis specific for complex survey designs that accounted for the clusters (primary sampling units), strata (provinces) and data weighted to the general population of Pakistan in 1990, with weights calculated by the Pakistan Federal Bureau of Statistics and confirmed by the US NCHS.

Results

The distribution of population of Pakistan is well represented in our selected sample of women of reproductive age group. The ethnicity distribution represented 41.1% from the Punjabi group, 12.7% Muhajirs, 18.5% Sindhi, 10.2% Pashtun and 1.0% Baluchi and the remaining (16%) were from other ethnic groups. Approximately one-third (34.3%) were in the low socio-economic group, 48.3% and 17.3% were in the middle and high socioeconomic groups, respectively. Most of the women (86.5 %) were illiterate. [Table 1]

Table1: Socio-Demographic Characteristics of Ever Pregnant Women, National Health Survey Pakistan 1990-94 (n= 2947)

Characteristics	n	Weighted percentage
Pakistan		
Urban	1037	32.2
Rural	1910	67.7
Province		
Punjab	1396	57.2
Sindh	675	25.4
NWFP	471	12.4
Baluchistan	405	4.8
Ethnicity		
Punjabi	1024	40.8
Sindhi	586	19.1
Pashtun	382	8.9
Muhajirs	485	15.4
Baluchi	83	0.84
Other	387	14.7
Literacy		
Illiterate	2540	86.5
Literate	407	13.4
SES		
Low	973	33.7
Middle	1463	50.6
High	511	15.6

We report results for 2,947 women, 15-52 years old who conceived at least one pregnancy. Of these, 1,261 (42.8%) reported having had at least one stillbirth or abortion; 518 (17.6%) women reported having one or more stillbirths, with or without an abortion and 743 (25.2%) reported having had only abortions. The mean number of pregnancies conceived over reproductive life span was 5.8 and a parity of 4.9. [Table 2].

Table 2: Prevalence of Pregnancy Loss and Selected Clinical Conditions N=2,947

Mean age (years) of the respondent :	33.5 (SD 9.3)
Pregnancy History	
History of pregnancy loss (SB+AB)	42.8%
Stillbirth with or without an abortion	17.6%
Abortion only	25.2%
Mean number of pregnancies	5.8
Mean number of live birth	4.9
Prevalence of Clinical Conditions	
Overweight/obesity	31.7 %
Hypertension	16.2 %
Palpable Thyroid gland	8.4 %
Diabetes	2.7 %
Lifetime exposure to pesticides	33.6%
Lifetime use of tobacco	18.9%

The mean age of the women in our sample was 33.5 years (SD 9.3 years),
Regarding selected clinical conditions and exposures prevalence of women with BMI $\geq$ 23 kg/m^2 or greater was 31.7%, hypertension 16.2%, palpable thyroid 8.4% and diabetes 2.7%. Lifetime exposure to pesticides and tobacco were 33.6% and 18.9% respectively. A total of 16,833 pregnancies were reported by the 2,947 women, almost 85 percent of the pregnancies resulted in live births, 4.8 percent as stillbirths and 10.3 percent as abortions [Table 3].

Table 3: Reproductive Outcomes as Percentage of Lifetime Pregnancies (n= 16833)

	Live Birth (%)	Abortion (%)	Stillbirth (%)	Stillbirth rate per 1000 births
Pakistan - Total	84.7	10.3	4.8	54
Urban	82.6	12.6	4.7	53
Rural	85.8	9.2	4.9	54
Province				
Punjab	84.7	10.6	4.5	50
Sindh	83.0	10.7	6.2	69
Northwest Frontier Province	87.0	8.6	4.2	46
Baluchistan	88.1	9.1	2.7	30
Ethnicity				
Punjabi	84.8	10.5	4.6	75
Sindhi	82.0	11.2	6.7	52
Pashtun	86.6	9.6	3.7	47
Mohajir	85.8	9.8	4.2	41
Baluchi	94.9	3.7	1.3	14
Others	85.5	10.1	4.2	47

The percentage of abortions was significantly higher in urban (12.6%) compared to rural (9.2%) dwellers (p<0.000). Women in the high and middle income groups reported more abortions (11%) compared to those in the low income group (9.2%). A higher proportion of abortion were noted in Punjab (10.6%) and Sindh (10.7%), as compared to NWFP (8.6%) and Baluchistan (9.1%). The lifetime stillbirth rate for Pakistan was 54 per 1,000 births. The highest stillbirth rate of 69 per 1,000 births was observed in Sindh province and lowest of 30 per 1,000 in Baluchistan. The stillbirth rates differed significantly between the provinces (p< 0.000). Across all regions, rural dwellers had higher stillbirth rates as compared to urban, and these urban vs. rural differences were statistically significant (p<0.000) within each province except Baluchistan. Sindhi women had the highest stillbirth rate (75 per 1,000 births) followed by Punjabi and Pashtun. Baluchi women had significantly better pregnancy outcomes; 95 percent of pregnancies ended as live births. Women of the low and middle income status had higher stillbirth rates (51 and 60 per 1000 births respectively) compared to those of higher socioeconomic status (44 per 1000 births). After adjusting, hypertension (OR 1.33; 95% CI 1.02, 1.75) and overweight/ obesity (OR 1.46; 95% CI 1.18, 1.75) remained significantly associated with stillbirth. [Table 4]

Table 4: Socio-demographic and Clinical Factors Associated with Still Birth

	Stillbirths n=518	No Pregnancy loss n= 1,686	Adj. OR	95% CIs
Province				
Punjab	261	777	1	
Sindh	145	350	1.21	0.94,1.54
NWFP	74	280	0.70	0.52,0.95
Baluchistan	38	279	0.38	0.26,0.56
H/o Hypertension	107	277	1.33	1.02,1.75
Overweight/obesity	184	1,167	1.46	1.18,1.75

Adjusted for literacy status, province, ethnicity, diabetes, palpable thyroid, pesticide exposure and tobacco exposure

Overweight/obesity was also associated with abortion (AOR 1.50, 95% CI 1.19, 1.90). Women residing in rural areas were at less risk of having abortion as compared to women in urban areas (AOR 0.65; 95% CI 0.51, 0.84). [Table 5]

Table 5: Socio-demographic and Clinical Factors Associated with Abortion

	Abortions n=743	No Pregnancy loss n= 1,686	Adj. OR	95% CIs
Pakistan				
Urban	319	532	1	
Rural	424	1,154	0.65	0.51, 0.84
SES				
Low	211	604	1	
Middle	387	790	1.28	1.01, 1.63
High	145	292	1.41	0.95, 2.09
Overweight/Obesity	286	1,167	1.50	1.19, 1.90

Adjusted for literacy status, province, ethnicity, diabetes, palpable thyroid, pesticide exposure and tobacco exposure

Discussion

To the best of our knowledge, national, population-based data on pregnancy outcomes including live births, stillbirths and abortions have not been reported previously from Pakistan. Our results are an eye opener as 48 percent of the women reported one or more pregnancy loss which is almost the double of what has been reported from the developed part of the world. Price et al reported that 25 percent of childbearing women in the United States experience one or more fetal deaths prior to achieving a live birth, a singular pregnancy loss was reported by 16.7 percent of women and multiple losses by 8.4 percent. [5]

Lu and Halfon observed that pregnancy outcome should be examined under "early programming mechanism" and "cumulative pathway mechanism". [14]The former suggests that exposures and experiences during particular sensitive developmental periods in early life may encode the function organs or systems that become manifest in health and disease later in life. The later perspective, the "cumulative pathway mechanism," suggests that wear and tear can add up over time to affect health and function. They further discuss that these two perspectives are not mutually exclusive and are at play in shaping health outcomes. Thus a woman's reproductive potential is seen as the product of the developmental trajectory over her life course. The outcomes are sensitive to protective factors and risk factors. They conclude that protective and risk factors should not only be examined during pregnancy but over the life course of women. In our analyses, pregnancy outcomes, i.e., stillbirth and abortion varied according to the province, urban and rural residence and economic status. Women residing in Baluchistan and also belonging to the Baluchi ethnic group had best outcomes compared to other provinces and ethnic groups. Considering these mechanisms, we speculate that some interactive effect of better social status of women in Baluchi families and indigenous care practices during pregnancy and delivery may have contributed to better outcomes, irrespective of economical status. The interplay of protective and risk factors for the Baluchi women may have been more advantageous compared to those factors in other ethnic groups. In light of the above discussion, it is worth further exploring the reproductive behaviors related to different ethnicities and province of residence.

It is interesting to note that in our analyses, the factors associated with stillbirths and abortions differed. Women living in Baluchistan and NWFP were at less risk of having stillbirth compared to those living in Punjab and Sindh. Socioeconomic status also did not affect still birth status, but women belonging to middle economic group reported more abortions. Urban dwellers were more likely to have had an abortion as compared to rural dwellers. Data regarding whether the pregnancy terminated as spontaneous or induced abortions were unavailable from this survey however, pregnancies terminated in unsafe conditions are not uncommon in Pakistan and approximately 890,000 pregnancies are terminated as unsafe abortion.[15] The documented sociodemographic factors associated with induced abortions are grand multiparity, literate status of the woman, age group 26-35, and contraceptive failure.[16-17] NHSP data had no information on how these pregnancies were terminated, we recommend that this information should also be collected as part of pregnancy history during routine antenatal care or when conducting national surveys.

The NHSP data which has been used for this analysis have revealed a high rate of obesity, diabetes, and hypertension in the adult population of Pakistan. [18] Hypertensive disease of pregnancy is one of the major direct causes of maternal mortality and a contributing factor to stillbirths [19]. We were interested in exploring the association of these morbidities with the risk of having stillbirths and abortions. Women who had stillbirths were more likely to have hypertension and BMI of equal to or more than 23 kg/m^2. Similarly, a higher BMI was associated with having abortions as well. We acknowledge the limitation of this survey being cross-sectional; however, 47.4 percent of the women who had had a stillbirth were in the prime of their reproductive life, having age less than 35 year at the time of interview and, of these, 12 percent had hypertension and 21 percent had BMI equal to or more than 23 kg/m^2. Moreover, the probability of developing diabetes in later years in these women cannot be overlooked. Again, these results should be explored as risk factors over the life span and examined under the mechanism of early programming and cumulative pathway wear and tear theory for adverse birth outcomes.

This study has a number of weaknesses and strengths. The reproductive outcomes were reported as lifetime events since the time of occurrence was unavailable. Stillbirth and abortion data were self-reported and unverified, since neither autopsy nor pathological examination is usually performed in Pakistan. NHSP also did not have information regarding type of still birth that is intrapartum or macerated. In addition, data on whether abortions were induced or spontaneous were not available. For certain exposures, such as tobacco and pesticides, recall bias may have altered the associations. The clinical and associated conditions were collected at the time of interview, and thus their association with the pregnancy outcomes should be further evaluated in prospective studies. Finally, the responses regarding the pregnancy losses were gleaned from mothers who survived pregnancy and childbirth. We do not have information on pregnancy outcomes of women who died or their pregnancy which could have been invaluable to understanding reproductive outcomes and associated factors over the lifespan.

Conclusion

We found that examining the birth outcomes over the reproductive life span to be informative to begin understanding the reproductive outcomes of women of various ethnicities and socioeconomic strata. In countries such as Pakistan, where basic health coverage is wanting, the encouraging outcomes of women residing in relatively poor province such as Baluchistan need to be explored further if we are to decrease the excessive adverse outcomes observed in other provinces.

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