

## Pregnancy Outcomes among Women with an Unintended Pregnancy: Findings from a Prospective Registry in Rural Pakistan

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### Abstract

**Background:** Unintended pregnancies are an important public health issue in both developed and developing countries. An unintended pregnancy may affect maternal health seeking behavior during the antenatal and postpartum periods, which can adversely affect perinatal outcomes.

**Aim:** The specific aim of our study was to measure antepartum, intrapartum, and postpartum pregnancy outcomes among women with unintended pregnancies in a rural Pakistani population.

**Methods:** Using a prospective maternal and newborn health registry in Thatta Pakistan, we evaluated temporal associations between unintended pregnancy and several dimensions of health seeking behavior including: antenatal care, preference for private versus government facility for antenatal care, and use of tetanus toxoid (TT) vaccine during the current pregnancy. We performed logistic regressions to analyze the data.

**Results:** In a multivariable model, we found that women who claimed their pregnancies as unintended were 1.27 times more likely to not utilize any facility for antenatal care as compared to women with intended pregnancies [OR = 1.27; 95% CI (1.11 - 1.46)]. Likewise, women with unintended pregnancies were 1.23 times more likely to not receive tetanus toxoid vaccine during the antenatal period [OR = 1.23; 95% CI (1.06 - 1.41)] and were 1.20 times more likely to utilize a government facility compared to private facilities for the antenatal care as compared to their counterparts with intended pregnancies [OR = 1.20; 95% CI (1.04 - 1.38)].

**Conclusions:** Women with unintended pregnancies were less likely to seek antenatal care and preferred government facilities when they did enroll; these facilities are known for providing subsidized but suboptimal care. Our results show that women who decide to carry unintended pregnancies should be considered a high-risk group that requires focused counseling on adherence to antenatal care and delivery planning. Prevention of unintended and unplanned pregnancies in rural areas through provision of family planning services should be encouraged.

**Keywords:** Unintended Pregnancy; Outcomes; Thatta; Pakistan

### Quick Points

- This study determined outcomes of unintended Pregnancy among married women of rural Pakistan.

- Findings of this research may contribute and help policy makers for making strategies to address the issue of unintended pregnancy.
- Policy makers should pay particular attention to promoting the effective and efficient use of contraceptives that directly reduce unintended pregnancy.
- Interventions for safe motherhood are needed to pay special attention to underprivileged and vulnerable women who may not access ANC

### Introduction

An unintended pregnancy can affect maternal behavior in the antenatal and postpartum periods, which can subsequently affect health outcomes of the mother and infant [1]. Unintended pregnancies have been considered as an important public health issue both in developed as well as in developing countries. Unintended pregnancies pose a significant burden not only on the woman herself but also for the entire family and have substantial long-term social and economic consequences for the whole society [2]. An unintended pregnancy can lead to various health outcomes regarding the maternal behavior during the antenatal period and after delivery, outcomes of birth, and well-being of infant and child [1]. It has been observed that women who experience unintended pregnancies are less likely to pursue appropriate antenatal care (ANC) [3], are more likely to experience unsafe abortions [3,4], and are more likely to deliver low birth weight babies [5]. With respect to maternal antenatal and postpartum behaviors, it has been found that women with unintended pregnancies are less like to consume the recommended amount of folic acid, are more likely to smoke during the antenatal and postnatal periods, are less likely to breastfeed their children [6], and are more likely to report postpartum depression [7]. A study in Ecuador found that women with unintended pregnancies were 25% less likely to initiate care in the first trimester, 32% less likely to seek prenatal care, and 29% less likely to receive an adequate number of antenatal visits than women with planned pregnancies [8]. With respect to the birth outcomes, findings from a systematic review showed that there were increasing odds of low birth weight (LBW) and preterm birth (PTB) among unintended pregnancies ending in a live birth [10]. Findings from one study conducted in the United States showed that women with unintended pregnancies were more likely not to initiate breastfeeding, were more likely not to continue breastfeeding, and were more likely not to breastfeed than the intended ones [11].

With respect to preventive and curative care, findings from a study conducted in India showed that unintended births were 1.38 times as likely as wanted births to receive inadequate childhood vaccinations and similarly births that were identified as unintended had an 83% higher risk of neonatal mortality as compared to wanted births [13]. Findings from eleven countries and one large Indian state showed that unintended children are between 10% and 50% more likely to become ill than are wanted children [14]. Longitudinal study findings from the United States showed that women who reported their pregnancy as unintended were more than two times more likely to deliver infants who died within the first 28 days of life than were women reporting accepted pregnancies [15]. A study conducted in Bangladesh indicated that unintended infants may be significantly more likely to die in the neonatal or postneonatal periods than wanted infants [16]. With respect to the nutritional status of the child, study findings from Bolivia showed that children 12 - 35 months of age from mistimed pregnancies were at about 30% higher risk for stunting than children from intended pregnancies [17].

Most of the published literature has focused on the antenatal, intrapartum, and postpartum outcomes of unintended pregnancy through cross-sectional or case-control studies. Our study is unique in its use of a nested case-control methodology within the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD)-funded Global Network (GN) for Women's and Children' Health Research prospective Maternal Neonatal Health Registry (MNHR), which collects data on pregnancy interventions and outcomes. This prospective registry enrolls women during the antenatal period, delivery, and postpartum period and allows for temporal associations to be measured between antepartum characteristics, such as intended pregnancy, and various pregnancy outcomes. Thus, the specific aim of our study was to measure antepartum, intrapartum, and postpartum pregnancy outcomes among women with unintended compared to intended pregnancies in a rural Pakistani population.

## Methods

This analysis was conducted using data from a prospective study conducted in communities in Thatta, Pakistan. These clusters are in the GN, a network of institutions that conducts research on pregnancy care and maternal and newborn outcomes, funded by the National Institute of Child Health and Human Development (NICHD) in the United States of America, a governmental organization.

The GN's prospective MNHR includes outcomes from rural or semi-urban geographical areas. MNHR is a multi-country research network funded by the NICHD. Study sites in each country (Democratic republic of Congo (DRC), Guatemala, India, Kenya, Pakistan, and Zambia) have established research infrastructure in 6 - 24 distinct geographic areas (clusters), appropriate for long-term registry data collection and ongoing Global Network research. The methods of the MNHR have been published [18]. In general, each cluster represents the catchment area of a primary healthcare center; 300 to 500 births take place annually in each cluster. The objective of the MNHR is to enroll pregnant women by 20 weeks' gestation and to obtain data on pregnancy outcomes for all deliveries of registered women, regardless of birth location (i.e., home, health clinic, or hospital). Each cluster employs a registry administrator who identifies and tracks pregnancies and their outcomes in coordination with community elders, birth attendants, and other health care workers.

The primary purpose of the MNHR is to quantify and analyze trends in pregnancy outcomes in defined low-resource geographic areas over time in order to provide population-based statistics on pregnancy outcomes, including stillbirths, neonatal mortality, and maternal mortality. This analysis utilizes the MNHR at one GN site, Pakistan, to determine maternal and fetal outcomes in the setting of unintended pregnancy.

In 2011, the MNHR in Pakistan also assessed each pregnancy during the enrollment for whether it was intentional or unintentional. The pregnancy intention of each individual is based on the assessment at the time of enrollment into the MNHR. The MNHR used a validated series of questions from the PDHS (Pakistan Demographic Health Survey) and DHS (Demographic Health Survey) to assess pregnancy intention. The questions were, "At the time you became pregnant, did you want to become pregnant, did you want to have a baby later on, or did you not want to become pregnant at all?" The three allowed options were wanted (planned), wanted the pregnancy to happen later (mistimed) and did not want at all (unwanted) [19,20]. For this study, an unintended pregnancy was defined as a pregnancy which was either mistimed or unwanted, while intended pregnancy was defined as the pregnancy which was reported by the mother as wanted at the time of interview. Responses of the women who reported their pregnancy as mistimed or unwanted were merged together to form a single variable named as unintended pregnancy while those who reported their pregnancy as wanted were categorized as having an intended pregnancy [21].

Other covariates were defined in accordance with the World Health Organization (WHO) definitions, described elsewhere [22]. Body mass index (BMI) was categorized into normal (18.5 - 25.0 kg/m<sup>2</sup>), underweight (< 18.5 kg/m<sup>2</sup>) and overweight (> 25.0 kg/m<sup>2</sup>) [22]. Gestational age (GA) at delivery was classified as term (> 37 weeks gestation) or preterm (< 37 weeks) for all deliveries, based on last menstrual period (LMP) or ultrasound, when available. Birth weight was the weight of the live birth or stillbirth taken at delivery for institutional births or as soon as possible after delivery for home births.

Data were collected and entered into research computers in Pakistan. All analyses including descriptive statistics and logistic regression were done with SPSS version 19. Adjusted odds ratios (AOR) with their 95% confidence intervals (CIs) were computed using logistic regression. Associations were measured between unintended pregnancy and various outcomes including utilization of ANC, utilization of tetanus toxoid, post-partum hemorrhage (PPH), and adverse outcomes such as miscarriage, stillbirth, and neonatal death. Four different models were developed keeping ANC utilization, tetanus toxoid utilization, and utilization of a government facility for ANC and postpartum hemorrhage as different outcomes of unintended pregnancy. For all models, pregnancy intention was kept as main exposure variable and these models were adjusted for different independent variables. The first model on the utilization of facilities for ANC was adjusted for mother's age and educational status of the mother. The second model on the utilization of tetanus toxoid vaccine during ANC was adjusted for mother's age, the educational status of mother and, type of facility visited for and trimester at first ANC visit. The third model

for utilization of a type of facility is adjusted for the educational status of mother. The fourth model on the association of unintended pregnancy and postpartum hemorrhage is adjusted for the educational status of the mother, BMI, ANC utilization, mode of delivery and breastfeeding. Adjusted ORs with their 95% CIs were computed and interpreted using logistic regression.

The appropriate institutional review boards/ethics research committee of Aga Khan University and the Ministries of Health approved the MNHR. Prior to initiation of the study, approval was sought from the participating communities. Individual informed consent for study participation was requested and obtained from each study participant.

### Results

Altogether, 6911 women were included in this analysis. Table 1 shows the maternal characteristics of women with unintended versus intended pregnancy, including age, parity, height and weight, BMI, gestational age at the time of the first antenatal visit, and maternal education. Pregnancies were more likely to be unintended in women who were older, more parous, and who entered later into prenatal care.

Characteristic	Intended Pregnancy, Mean ± SD (n = 4575)	Unintended Pregnancy, Mean ± SD (n = 2336)	P- value
Age (Years)	26.4 ± 4.4	30.7 ± 4.3	< 0.05
Parity	1.9 ± 2.1	4.8 ± 2.7	< 0.05
Nulliparous	1492 (32.6%)	49 (2.1%)	< 0.001
1 - 2	1728 (37.8%)	428 (18.3%)	
> 2	1355 (29.6%)	1859 (79.6%)	
BMI	20.8 ± 3.6	20.8 ± 3.4	0.86
Gestational Age at time of first ANC Visit	22.3 ± 9.4	23.7 ± 9.0	< 0.05
<b>Educational Status</b>			
No Education	3797 (83.0 %)	2066 (88.4%)	< 0.05
Primary Level	315 (6.9%)	135 (5.8%)	
Secondary Level	274 (6.0%)	86 (3.7%)	
Higher Education	189 (4.1%)	49 (2.1%)	

**Table 1:** Demographic characteristics of pregnant women of reproductive age in Thatta, Sindh, Pakistan.

Table 2 focuses on utilization of ANC among women who planned their pregnancies as compared to those who did not. The table illustrates that adjusting for the age of the mother and her educational level, with intended pregnancies as the referent group; women with unintended pregnancies were more likely (AOR 1.27, 1.11 - 1.46) to be non-users of ANC. As women aged, with each increasing year, they were also more likely to not use ANC (AOR 1.02, 1.01 - 1.04). When women with higher education were considered as reference group, the risk of non-utilization of ANC was very high in women with no education (AOR 5.67, 2.99 - 10.72), increased in women with only a primary school level of education (AOR 2.38, 1.17 - 4.82), and was no different in women with a secondary level of education.

Characteristics	Adjusted OR	95% Confidence Interval
<b>Mother's Age (Years)</b>	1.02	1.01-1.03
<b>Pregnancy Intention</b>		
Intended pregnancy	1	
Unintended pregnancy	1.27	1.11 - 1.46
<b>Educational Status</b>		
Higher Education	1	
No Education	5.67	2.99 - 10.72
Primary Level	2.37	1.71 - 4.82
Secondary Level	0.74	0.31 - 1.76

**Table 2:** Unintended pregnancy and non-utilization of facilities for ANC.

*This model is adjusted for mother's age, pregnancy intention and Educational status of mother*

Table 3 observes how unintended pregnancy and tetanus toxoid administration, a service provided free of charge from the government, was associated with age, educational status, place of ANC, and trimester of pregnancy. Women with unintended pregnancies were more likely to not receive the tetanus toxoid vaccine (AOR 1.22, 1.06 - 1.41). This was also seen as women aged; for each year of age, they were also more likely not to receive the vaccine (AOR 1.01, 1.01 - 1.03). When observing how this service was utilized by women of varying educational levels, as compared to women with higher education, those with no or a primary level of education were more likely to not have tetanus toxoid administered (AOR 4.16, 2.78 - 6.22; OR 2.13, 1.34 - 3.38). Of note, private facilities were actually more likely not to administer tetanus toxoid to patients compared to government facilities (AOR 1.76, 1.49 - 2.07).

Characteristics	Adjusted OR	95% Confidence Interval
<b>Mother's Age (Years)</b>	1.01	1.01 - 1.03
<b>Pregnancy Intention</b>		
Intended pregnancy	1	
Unintended pregnancy	1.22	1.06 - 1.41
<b>Educational Status</b>		
Higher Education	1	
No Education	4.16	2.78 - 6.22
Primary Level	2.13	1.34 - 3.38
Secondary Level	1.55	0.95 - 2.52
<b>Type of facility visited for ANC</b>		
Government Facility	1	
Private Facility	1.76	1.49 - 2.07
<b>Trimester at first ANC visit</b>		
0 - 12 weeks of GA	1	
13 - 24 weeks of GA	0.95	0.79 - 1.13
> 24 weeks of GA	1.25	1.06 - 1.47

**Table 3:** Unintended pregnancy and non-utilization of tetanus toxoid vaccine during ANC.

*This model is adjusted for mother's age, pregnancy intention, Educational status of mother, type of facility visited for ANC, and trimester at first ANC visit*

Utilization of ANC is important in itself, but we also wanted to observe if the intention of the pregnancy was associated with the types of facilities at which women were seeking care. Generally, despite the findings regarding tetanus toxoid, private healthcare services are considered to deliver a higher quality of care than government facilities. The analysis is shown in table 4, where, with women with intended pregnancy as the referent group, women with unintended pregnancies were 1.2 times more likely (95% CI = 1.04 - 1.38) to seek ANC from a government facility, after controlling for educational status. When we evaluated how educational status may be associated with site of delivery when controlling for pregnancy intention, we found that women with no education or a primary level of education, as compared to women with higher education, were more than two times more likely to seek ANC from a government facility (AOR 2.09, 1.34 - 3.27; 2.08, 1.26 - 3.47). Even women with a secondary level of education, if they had an unintended pregnancy, were more likely to deliver at a government facility (AOR 1.70, 1.01 - 2.88).

Characteristics	Adjusted OR	95% Confidence Interval
<b>Pregnancy Intention</b>		
Intended pregnancy	1	
Unintended pregnancy	1.20	1.04 - 1.38
<b>Educational Status</b>		
Higher Education	1	
No Education	2.09	1.34 - 3.27
Primary Level	2.08	1.26 - 3.47
Secondary Level	1.70	1.01 - 2.88

**Table 4:** Unintended pregnancy and utilization of a government facility for ANC. This model is adjusted for pregnancy intention and Educational status of mother

Table 5 illustrates the association of unintended pregnancy with post-partum hemorrhage. Unintended pregnancy was not found to be associated with post-partum hemorrhage (AOR 0.95, 0.75 - 1.32) while adjusting for age, BMI, mode of delivery and breastfeeding. Underweight women were 1.41 times more likely to experience post-partum hemorrhage as compared to normal weight women (AOR 1.41, 1.07 - 1.86).

Characteristics	Adjusted OR	95% Confidence Interval
<b>Mother's Age (Years)</b>	1.09	1.06 - 1.13
<b>Pregnancy Intention</b>		
Intended pregnancy	1	
Unintended pregnancy	0.95	0.75 - 1.32
<b>BMI</b>		
Normal (18.5 - 25.25kg/m <sup>2</sup> )	1	
Over weight (> 25kg/m <sup>2</sup> )	0.79	0.49 - 1.27
Underweight (< 18.5kg/m <sup>2</sup> )	1.41	1.07 - 1.86
<b>Antenatal Care</b>		
Yes	1	
No	0.72	0.51 - 1.01
<b>Mode of delivery</b>		
C-Section	1	
Vaginal	2.55	1.24 - 5.24
<b>Breastfeeding</b>		
No	1	
Yes	0.71	0.54 - 0.93

**Table 5:** Unintended pregnancy and its association with postpartum hemorrhage. This model is adjusted for pregnancy intention, BMI, ANC utilization, mode of delivery and Breastfeeding

Women who had a vaginal delivery were 2.55 times more likely to experience post-partum hemorrhage as compared to those who were delivered by cesarean section (AOR 2.55, 1.24 - 5.24). Women who breastfed their babies were less likely to experience post-partum hemorrhage as compared to those who did not breastfeed their babies (AOR 0.71, 0.54 - 0.93).

## Discussion

This study reviewed the association between unintended pregnancy and health seeking behavior of rural Pakistani women during ANC, specifically on the source of ANC and the utilization of particular services during the antenatal period. One of the important individual level factors associated with ANC use was maternal education which was significantly and positively associated with the use of ANC services, i.e. more educated women utilized ANC services more as compared to less educated women. Using a large prospectively collected sample, our study found that women who had unintended pregnancies were at higher risk of not utilizing ANC compared to their counterparts. Furthermore, the risk for nonuse of antenatal services was higher for older and less educated women.

Women who conceived an unintended pregnancy might not recognize the pregnancy immediately [23]. Even if a woman suspects or knows she is pregnant, if the pregnancy is unintended, she may not seek ANC or follow good health practices out of fear that her pregnancy will be recognized by others or even out of hopes that she will spontaneously abort [24]. The aforementioned association might also be explained by maternal attitude and behavior; her feelings about having an unintended pregnancy might contribute to the conscious or unconscious neglect of her own health care. Another explanation could be that women with unintended pregnancy might get less familial or husband support (economic or emotional) for health care during pregnancy [25]. Women might also be emotionally and financially less prepared for an unintended pregnancy and childbearing, resulting in less care for themselves and the fetus during pregnancy [8].

Furthermore, we found that women with secondary or higher education are more likely to utilize ANC services than uneducated women, which could be due to educated women's greater awareness of the benefits of antenatal services. This finding is supported by other studies which suggest that maternal education is the strongest predictor of ANC use [26]. Moreover, educated women tend to be more autonomous [27], hold more household decision-making power [28], and have more confidence and capability to make decisions regarding their own healthcare [29].

Moreover, older women were found to be less likely to utilize ANC in this study as compared to the younger women. Other studies also found a reduction in the proportion of women obtaining ANC services with increasing age [30-33]. The possible explanation could be that expectant mothers' use of ANC may be influenced by their previous experience. This may be positive (a pleasant experience at the health center) increasing the use of the service or negative (an unpleasant experience at the health center), thereby reducing her use of ANC.

Maternal education plays an important role in the uptake of tetanus toxoid immunization during the antenatal period, and we found that educated women were more likely to utilize tetanus toxoid vaccination as compared to their counterparts. This could be due to more uptake of prenatal care by the educated women resulting in more utilization of services including tetanus toxoid immunization. Pathways through which education may be associated include more knowledge and awareness of the benefits of immunization, more ability to travel outside the home to seek care, and perhaps a greater decision-making power at home [34]. Similarly, increased mother's age has been shown to be associated with less tetanus toxoid immunization uptake. Reasons ascribed for this include the experience women gain as she gets older and produces more children and the time and cost pressures associated with larger families, which decrease utilization [35,36]. Moreover, if an older and multiparous woman received tetanus toxoid previously, she will not need to be vaccinated again, thus resulting in decreased current utilization of tetanus toxoid in this group of women.

Furthermore, we found that women who receive prenatal care from government facilities were more likely to utilize tetanus toxoid vaccination than women who got prenatal care at private clinics, and these findings are consistent with other studies [36]. One possible explanation for this surprising result is that health care providers who practice in private clinics do not consider tetanus toxoid vaccination to be absolutely necessary during pregnancy or might charge women more for vaccinations [36]. This is the area which needs to be explored further.

Although we found no association between unintended pregnancy and postpartum hemorrhage (PPH), there were other factors that predicted PPH including higher maternal age, low BMI vaginal delivery, and breastfeeding. The first two factors were found to be positively and significantly associated with PPH, while the history of breastfeeding was found to be associated with less risk for PPH. Maternal age as a risk factor for PPH has been found to be controversial in previous studies. Some studies have shown a positive association while others have shown a negative association or no association [37-40]. Likewise, the literature on the relationship between BMI and PPH is conflicting, with some studies showing an increased risk of PPH among overweight and obese women [41] and other studies showing no excess risk [42]. Our findings can be explained as most of the underweight women at our site are anemic, and anemia is a known risk factor for PPH but was unfortunately not assessed in this study [43-45]. Regarding breastfeeding, we found that women who gave a history of breastfeeding had a lower risk of PPH as compared to those who did not breastfeed their child. These findings are consistent with other studies across the world [46,47] and have implications for postnatal care as these women may require greater support, education, and assistance in initiating and sustaining breastfeeding to prevent PPH.

There are certain strengths and limitations of this study. The important strength of this study was the assessment of pregnancy intention prospectively which minimized under-reporting of unintended pregnancy and reduced recall bias. Secondly, a validated questionnaire based on the standard demographic definition of unintended pregnancy was used to assess the pregnancy intention. Moreover, it was a longitudinal prospective study; therefore the temporal relationship between pregnancy intention and various outcomes could be made. In addition there was a large sample size of the studied population. On the other hand one important limitation of the study was that we could not study factors such as women's autonomy, accessibility, affordability, and quality of health services that are among the factors reported by different studies as important in the utilization of ANC services.

The findings of this study have important policy implications and far-reaching consequences for maternal care, particularly in rural areas of Pakistan.

We suggest several priorities. First, since unintended pregnancy is associated with poor ANC utilization, policy makers should pay particular attention to promoting the effective and efficient use of contraceptives that directly reduce unintended pregnancy. Second, interventions for safe motherhood are needed to pay special attention to underprivileged and vulnerable women who may not access ANC.

### Conclusion

To our knowledge, this study is the first longitudinal study to document that, in Pakistan, women with unintended pregnancies are at higher risk of receiving inadequate ANC. Our findings indicate that women with an unintended pregnancy were less likely to utilize prenatal care or receive tetanus toxoid vaccination and more likely to use a government facility if they received prenatal care.

### Competing Interests

Data and presentation of information have not been influenced by the personal or financial relationship with the authors with other people or organizations. Authors have no financial or otherwise competing interests to disclose.

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