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Z. Ahmed

*Aga Khan Health Service Chitral*

S. Khoja

*Aga Khan University*

Suha S. Tirmizi

*Aga Khan University*

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## Antenatal care and the occurrence of Low Birth Weight delivery among women in remote mountainous region of Chitral, Pakistan

Zafar Ahmed<sup>1</sup>, Shariq Khoja<sup>2</sup>, S. Suha Tirmizi<sup>3</sup>

### ABSTRACT

**Objective:** Low birth weight (LBW) is closely associated with perinatal morbidity and bears an increased risk for subsequent infant morbidity. The study aimed to assess low birth weight delivery factors among women in Chitral, Pakistan.

**Methodology:** Mixed Methodology was adopted. Structured data collection tool was used to collect information from medical records of 1316 mothers, followed by interviews and focus group discussions to understand the causes and their remedies. The main outcome measure was infants born with low birth weight LBW (<2.5kg).

**Result:** There was a significant association between the occurrence of low birth weight and maternal education, paternal education, and paternal occupation. Mothers who received antenatal care were more likely to deliver normal weight babies compared to those who did not. Women with more than four antenatal visits were six times as likely to deliver normal weight babies. Key facilitators for using antenatal services include information received from health center staff during home visits, advice from mothers and mother in-laws, and programs on media. Barriers include high cost for antenatal care, non-availability of transport, particularly in emergencies, and lack of awareness about benefits of antenatal care.

**Conclusion:** The study suggested proper strategies for antenatal care to increase the awareness among women living in remote locations. The limitations are needed to be identified and considered when designing interventions to reduce LBW deliveries in Pakistan.

**KEY WORDS:** Antenatal care, Low birth weight. Maternal health, Chitral.

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1. Zafar Ahmed, MBBS. MCommH (Master of Community Health), General Manager, Aga Khan Health Service Chitral, Mountain Inn Chitral, Pakistan.
2. Shariq Khoja, MBBS. MSc. PhD (eHealth), Director- AKDN eHealth Resource Centre The Aga Khan University, Nairobi, Kenya.
3. S. SuhaTirmizi, BS. Bio-Medical Engineering, Research Officer-AKDN eHealth Resource Centre, The Aga Khan University, Karachi, Pakistan.

#### Correspondence:

Shariq Khoja, MBBS. MSc. PhD (eHealth), Director, AKDN eHealth Resource Centre, Assistant Professor, The Aga Khan University. 3<sup>rd</sup> Parklands Ave. P. O. Box 30270-00100, Nairobi, Kenya. Adjunct Faculty - University of Calgary, Calgary, AB. Canada. E-mail: shariq.khoja@aku.edu nida.imtiaz@aku.edu

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### INTRODUCTION

Periodic health check-ups during pregnancy (antenatal visits) are important for maternal and child health. Three main reasons have been advanced to explain the importance of antenatal care for pregnant women<sup>1</sup>: (1) promotion of health during pregnancy through counseling and educational activities; (2) screening, identification and referral of women with risk factors; and (3) health monitoring throughout pregnancy. The WHO Technical Working Group on antenatal care recommends a minimum of four antenatal visits for a woman with a normal pregnancy.<sup>2</sup>

Low birth weight (LBW) (weight of less than 2500gms, irrespective of gestational age)<sup>3</sup> is closely

associated with perinatal morbidity and bears an increased risk for subsequent infant morbidity, and several developmental disorders.<sup>4,5</sup> Regular antenatal care is the first step in preventing the occurrence of LBW infants.<sup>6</sup>

The main objective of this study was to determine causes of low birth weight (LBW) delivery among women living in Chitral, Pakistan. The study dwells on the reasons behind less number of antenatal visits and possible steps to improve antenatal visit rates.

## METHODOLOGY

**Study setting:** Chitral district is located in the North-Eastern part of Pakistan, comprising of about 193 small scattered villages. The Aga Khan Health Service, Pakistan (AKHS, P) is one of the major health service providers in the district with twenty five health centers, serving an estimated population of 352,000. Each health center is staffed with two lady health visitors (LHVs) with one year midwifery training for providing antenatal care to expectant mothers at the health centers according to the WHO protocol, while trained birth attendants provide antenatal care at community level. The total number of deliveries conducted by LHVs either at the health centers or at home are 733 per year (50% of total deliveries recorded in the district). The prevalence of LBW deliveries in Chitral district during 2002 was estimated at 25% of all deliveries with a 90% utilization of antenatal services.<sup>7</sup>

The quality of antenatal care provided is monitored using two main indicators: (1) number of trimesters of care; (2) birth weight ( $\geq 2.5$  kg or  $< 2.5$  kg). Mothers receiving antenatal care were registered in the second or third trimester of their pregnancy and advised to complete at least three antenatal visits for routine checkups and health education.

**Study Design:** The study employed mixed-methods design, using retrospective data of pregnant women over the period of three years. The quantitative study was followed by qualitative data (focus-group discussions FGDs and in-depth interviews) to determine the reasons for not availing antenatal services.

**Inclusion/Exclusion Criteria:** Included in this study were all mothers aged 15-40 years who received antenatal care at the health center but were delivered at home or at the health center by LHV. Mothers who delivered at the health center, but did not receive any antenatal care throughout their pregnancy were also considered.

Mothers who received antenatal care outside AKHS, private health facilities; grand multipara (parity  $> 5$ ); mothers who delivered babies with congenital malformations; and preterm deliveries were excluded. Multiple gestations and grand multipara were excluded because of their own distinct obstetric complications.<sup>7</sup>

**Sample Size:** With the predicted incidence of LBW babies as 18% among mothers completing 4 antenatal visits (compared to 25% among mothers with less than four visits), and estimated 50% mothers completing their antenatal visits, the sample size was calculated to be about 1148 mothers with 80% power and the 5% level of significance. The study achieved sample size of 1316 women.

For the qualitative component, in-depth interviews with the community (community leaders and volunteers) and focus-groups were conducted with pregnant and delivered women until saturation of ideas was achieved.

### Data Collection:

**Quantitative Data:** Quantitative data regarding socio-demographic variables and their influence on antenatal care were collected from health center antenatal care records using a standard, pretested questionnaire. Basic descriptive data included educational attainment, parity, number of antenatal care visits during pregnancy, and birth weight of the newborn.

**Qualitative Data:** To get in-depth understanding of the reasons for not availing antenatal services and the proposed solutions, 30 FGDs were conducted with users and non-users of antenatal care services (15 with each group) with separate discussion guides including questions for antenatal services; the reason for availing/not availing the service, etc. In addition, 40 in-depth interviews were held with the leaders in the community.

**Data Analysis:** Quantitative data was analyzed using the Statistical Package of the Social Sciences (SPSS) version 11.5.<sup>8</sup> Univariate statistics were used to assess patterns of responses to the questionnaire. Chi square test was employed to assess differences between categories. The magnitude of association was assessed using odds ratios and 95% confidence intervals.

The subject matter categories approach to content analysis was used to analyze data arising from focus group discussions.<sup>9</sup> The transcripts were first coded and broken down into manageable categories on a variety of levels and then examined using a

conceptual analysis method. The first author and the local research assistant independently examined data generated by the first two focus group sessions, and based on these, developed coding schemes that were compared, validated, and applied to the remainder of the group sessions.

## RESULTS

Results are presented separately for the quantitative and qualitative components of the study:

**Quantitative Study:** The mean age of the mothers was 26 years, range 15-40 years. Approximately 26% (n=347) were first-time mothers, while 74% (n=969) were multigravidas. A majority of participants delivered at home (82%), had no formal education (63%), and were full time housewives (68%). More than a third of fathers were laborers (40%) and the majority of households had monthly income in excess of Rs. 4,000 (US\$70). A total of 1,253 mothers (95%) used antenatal care during their last pregnancy. The incidence of LBW infants in the study cohort was 16% (n = 213). A history of previous adverse obstetric events was elicited from 95 mothers (7%); 4% experienced stillbirth, 2% had early neonatal death (death before 7 days), and 1% experienced death of a child under 5 years of age. (Table-I)

When compared to mothers of less than 35 years, mothers aged 35 years and over were twice as likely to have a LBW delivery (OR=2.0; 95% CI=1.0-3.9). The higher the level of education of a mother, the greater the chance that she will deliver normal weight babies (OR=1.5; 95% CI=1.1-2.1). Infants born to educated fathers were also more likely to be of normal weight as compared to those born to uneducated fathers (OR=1.48; 95% CI=1.1-2.0). Households with monthly income less than Rs. 3,000 (US\$ 50) were more likely to have a LBW child as households with income of at least Rs 3,000 (OR=1.62; 95% CI=1.2-2.2).

Mothers who did not receive antenatal care were comparatively more likely to deliver LBW babies to those who received care (OR=4.3; 95% CI=2.6-7.3). Mothers with 1-3 visits during their pregnancy were more likely to deliver LBW babies as compared to their counterparts with at least 4 previous visits (OR=5.54; 95% CI=3.8-8.1). The maternal occupation and parity were not significantly associated with the delivery of a LBW infant. (Table-II).

**Qualitative Study:** Majority of mothers indicated that they attend antenatal services to: a) have the position of the baby checked; b) treat symptoms

Table-I: Characteristics of Respondents.

Parameter	N=1316 No (%)
<b>Age of Mother</b>	
15-19	106 (8)
20-24	380 (29)
25-29	383 (37)
30-34	233 (18)
35+	114 (9)
<b>Parity</b>	
Primigravida	347 (26)
Multigravida	969 (74)
<b>Mother's Education</b>	
No school education	840 (63)
Primary School	82 (6)
Secondary School	315 (24)
Post-secondary School	79 (6)
<b>Mother's Occupation</b>	
Work from home	362 (28)
Agriculture	3 (0.2)
Trader	3 (0.2)
Office professional	48 (4)
Housewives	900 (68)
<b>Father's Education</b>	
No school education	366 (28)
Primary school	192 (15)
Secondary school	575 (44)
Post-secondary school	183 (14)
<b>Father's Occupation</b>	
Agriculture	92 (7)
Trader	190 (14)
Office professional	268 (20)
Scouts/ police	249 (19)
Laborer	517 (40)
<b>Income (Rs)</b>	
<1500	247 (19)
1501-2000	141 (11)
2001-3000	154 (12)
3001-4000	273 (20)
>4000	501 (38)
<b>Adverse obstetric history had</b>	
Still birth	50 (4)
Early neonatal death	29 (2)
Death of a child under 5 years of age	16 (1)
Number of living children	1221 (93)
<b>Used antenatal care last pregnancy</b>	
Yes	1253 (95)
No	63 (5)
<b>TT vaccination</b>	
Yes	1176 (89)
No	140 (11)
<b>Birth weight</b>	
>2.5 kg	1103 (84)
2.5 kg	213 (16)

of morning sickness; c) receive treatment for other symptoms; d) check blood pressure; e) assurance on the baby condition in the uterus and identify fetus age; f) know the exact date of delivery; g) receive tetanus toxoid vaccination. Home visits by health care staff, advice from family, and media (television and radio) promotes antenatal visits among pregnant women.

Limitations included perceived high cost for antenatal care (including fee and travel expenses), unavailability of transport, particularly in emergencies suggesting that health center fee should be abolished or reduced for such women. Cultural or religious tenets did not seem to be a barrier; however, few participants mentioned that in some villages a strict *pardah* (veil) system may hinder women to access antenatal services. Most of the non-users had no problem during the

pregnancy, suggesting that antenatal care was sought for treatment of problems, rather than for prevention. Antenatal care hindrance factors proposed by community included heavy work load; male dominance; financial difficulties; false beliefs; lack of awareness; and cultural restrictions associated with the first pregnancy (a first-time mother is expected to be shy of the first child and not openly display affection).

During in-depth interviews majority of the opinion leaders proposed that utilization of antenatal care services can be increased through regular awareness programs in the community for the importance of antenatal care by LHVs, and Trained Birth Attendants (TBAs). Other suggestions included setting up mobile antenatal clinic in each village and increasing the number of home visits by LHVs to avoid travel cost of mothers.

Table-II: Factors Influencing Birth Weight.

Parameter	Birth weight		Odds Ratio	p-value
	≥2.5 Kg N=1103 No (%)	<2.5 Kg N=213 No (%)		
<b>Age of Mothers</b>				
<35 Years	1071 (84)	201 (16)		
≥35 Years	32 (72)	12 (28)	2.0 (1.0-3.9)	0.05*
<b>Mothers' education</b>				
School Education	415 (87)	61 (13)		
No School Education	688 (82)	152 (18)	1.5 (1.1-2.1)	0.01*
<b>Mothers' occupation</b>				
Office professional/Trader	44 (86)	7 (14)		
Home maker/Farmer	1059 (84)	206 (16)	1.22 (0.5-2.7)	0.63
<b>Husband's education</b>				
School education	811 (85)	139 (15)		
No school education	292 (80)	74 (20)	1.48 (1.1-2.0)	0.01*
<b>Husband's Occupation</b>				
Office professional	371 (88)	51 (12)		
Farmer/Laborer	732 (82)	162 (18)	1.61 (1.1-2.3)	0.005*
<b>Received Antenatal Care</b>				
Yes	1067 (85)	186 (15)		
No	36 (57)	27 (43)	4.3 (2.6-7.3)	<0.001*
<b>Antenatal care visits</b>				
≥ 4 visits	609 (94)	36 (6)		
1-3 visits	458 (75)	150 (25)	5.54 (3.8-8.1)	<0.001*
<b>Parity</b>				
Primigravida	290 (84)	57 (16)		
Multigravida	813 (84)	156 (16)	0.98 (0.7-1.4)	0.89
<b>Household monthly Income (Rs)</b>				
≥ 3000	670 (87)	104 (13)		
< 3000	433 (80)	109 (20)	1.62 (1.2-2.2)	0.001*
<b>Received TT vaccine</b>				
Yes	996 (85)	180 (15)		
No	107 (76)	33 (24)	1.71 (1.1-2.6)	0.01*

## DISCUSSION

Low Birth Weight is a global problem with an incidence ranging from as low as 3% in Norway to as high as 30% in Asia Africa.<sup>10</sup> In this study we demonstrated a strong relationship between antenatal care and LBW.<sup>11-16</sup>

The quality of antenatal services should be in line with WHO guidelines, which is an encouraging finding, as it shows that receiving fewer components of antenatal care is associated with increased perinatal death.<sup>17</sup>

In this study, a positive association was found between advanced maternal age and occurrence of LBW which supports findings from other studies.<sup>18,19</sup> However, some investigators have attributed the positive association between maternal age and LBW to the confounding effect of other important factors, such as parity.<sup>20,21</sup> Parental education increases self-awareness and acceptance of modern medical practices. Evidence from previous research also suggests that maternal education is one of the strongest determinants of birth weight.<sup>15,16,22</sup>

Data regarding the relevance of parity with LBW is inconsistent. Some investigators report a greater percentage of LBW infants among grand multiparas compared to infants of lower parity mothers, whereas others do not.<sup>23-27</sup> In this study we were not able to demonstrate an independent relationship between parity and LBW.

**Limitations:** The information on anthropometric measures, like mothers' weight and height were not available from the existing records with a probability of selection bias because mothers in distant villages cannot easily visit health center to receive antenatal care. Similarly, families with financial constraints, lack of education and awareness about importance of antenatal care are less likely to present for antenatal care.

## CONCLUSION

Pregnancy care is an integral part of primary health care. This becomes even more important in countries with extremely high infant mortality like Pakistan. The strategy for antenatal care at program level needs to be reviewed in order to provide effective pregnancy care. Information on anthropometric measurement and increased awareness of the importance of regular antenatal visits is also desirable. The inclusion of the female member in the community, including TBAs are required to contact pregnant mothers during first trimester of pregnancy to ensure better nutrition of

mothers, reduce psychosocial pressure regarding any risk associated and prepare her for safe delivery. In addition, good maternal education and good antenatal care have a preventative effect against LBW. Therefore, improving maternal health; quality of antenatal care (especially to women who had high risk for LBW); and socioeconomic status of women is essential.

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**Ethical Consideration:** Ethics approval was sought from the Aga Khan Health Service, Pakistan's Scientific and Ethical Review Committee. Informed verbal consent was obtained from pregnant mothers included in the study.

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***Author`s Contribution:***

ZF conceived and designed the study and participated in the data analysis. SK performed the data analysis and interpretation of data. SST was involved in coordinating the study and drafting the manuscript.