

The Association Between Prenatal Care And Pregnancy Outcome Among Postnatal Mothers In Mizoram

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Abstract:

Background: World Health Organization (WHO) recommends a four visit Antenatal care schedule for low risk pregnancies. (Black.R., 2016). The principal aim of antenatal care is the early recognition and management of high risk. The components of Antenatal care (ANC) include antenatal history and examination, weight check, blood pressure measurement, administration of two doses of injection tetanus toxoid vaccine, calcium and iron folic acid supplementation, and health education related to pregnancy and detection of problems that make the pregnancy high risk, (WHO, 2016). In most countries, planned and organized information, in the antenatal period are given to the pregnant women. The value of antenatal care (ANC) in enhancing perinatal care is widely known. To protect their own and their unborn children's health, all women have a fundamental right to high-quality prenatal care that offers opportunities for risk factor intervention.

Materials and Methods

The study is a descriptive Cross sectional design to evaluate the association between prenatal care ie the time of initiation of antenatal check up and pregnancy outcome of postnatal mothers in Mizoram. The study is undertaken in the sub health centre facilities under Aizawl West and Aizawl South Main centre during

Population consist of Women who had been pregnant before but were not pregnant at the time of study. All postnatal mothers who had delivered their babies in the past 6 months, who attended Postnatal check up at SubHealth centre

Sampling Procedures: A multistage sampling technique has been used to obtain a representative sample. Aizawl district was chosen from a total of 11 district of Mizoram. Out of four Main Centre in Aizawl district, two main Centre i.e. Aizawl South and Aizawl West were chosen. Out of the total 44 Sub Health Centre (SHC) ,11 was chosen by simple random sampling by selecting every 4th Sub health Centre. All postnatal mothers who delivered babies in the last 6 months, who attended Postnatal check up/vaccination day were selected.

Time of data collection: February 2023 and September 2023.

Results: There was significant association between time of initiation of antenatal care with pregnancy outcome i.e mode of delivery

Conclusion: The results point to positive birth outcomes for most participants, with the majority of deliveries taking place at term and majority of babies with normal birth weight. Early ANC registration did not significantly influence the time of delivery, condition of the baby, or birth weight, it was significantly associated with a more favorable mode of delivery outcome.

Keywords: Prenatal care, Antenatal check up, Pregnancy outcome, Aizawl

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I. Introduction

International human rights law includes fundamental commitments of states to enable women and adolescent girls to survive pregnancy and childbirth as part of their enjoyment of sexual and reproductive health and rights and living a life of dignity .The World Health Organization (WHO) envisions a world where “every pregnant woman and newborn receives quality care throughout the pregnancy, childbirth and the postnatal period” (WHO).¹Antenatal care is the systemic supervision of women during pregnancy to monitor the progress of pregnancy and to ascertain the wellbeing of mother and the foetus. The World Health Organization recommends minimum eight antenatal visits during pregnancy for developed countries .and four antenatal visits for developing countries during pregnancy.²Pregnant women must register at Sub Health Centres or Ayushman Bharat Health and Wellness Centre (AB-HWCs) during first trimester. Components of Prenatal care are providing Mother and Child Protection card, calculations of Last Menstrual Period and expected date of delivery according to Naegeles Rule, weight checking, blood pressure check in the first visit. With regards to medications, administration of 100 tablets of Iron Folic acid supplementation at 14 weeks of gestation, administration of Calcium supplements ,two

dose of Injection tetanus toxoid and one booster dose if the women has received injection Tetanus vaccine in the last five years. ³Birth preparedness of the women and family by helping to plan for birth, deciding on the place of delivery and the presence of attendant at the time of delivery and advise on the advantages of institutional deliveries. Complication readiness of the women and family by giving advise where to go if emergency arises, how to arrange for transportation, money and blood donors in case of emergency and educating the women and family members on danger signs of obstetric complications. Advise on diet and rest during pregnancy, promoting Family Planning and inform them about breastfeeding and exclusive breastfeeding. Emphasise on the importance of antenatal and Postnatal check up and inform the woman about the incentives offered by the government(Guidelines for Skill birth attendant ,2021).⁴

The National Family Health Survey is a national survey which generates data on population and health indicators especially on mother and child health ,which is conducted across India. According to NFHS5, 67-97 percent of women who received ANC for their most recent live birth in the past five years had their weight measured, a blood sample taken, a urine sample taken, their abdomen examined, and their blood pressure measured). More than half of the women received information on specific pregnancy complications, namely convulsions (60%), vaginal bleeding (61%), prolonged labour (66%), high blood pressure (67%), and severe abdominal pain (68%). Four-fifths (80%) were told where they could go if they experienced pregnancy complications. Eighty-eight percent of women with a birth in the past five years were given or purchased iron and folic acid (IFA) tablets during the pregnancy for their most recent birth, but only 44 percent took the tablets for at least 100 days.

Table 1: ANTENATAL CARE COMPONENTS (NFHS5 2019-2021)

Sl No	INDICATORS	NFHS 5 Mizoram %	NFHS 5 India%
1	Mothers who had 1 antenatal check-up (%)	79.4	92.6
2	Mothers who had an antenatal check-up in the first trimester (%)	72.7	70.0
3	Mothers who had at least 4 antenatal care visits (%)	58.0	58.5
4	Mothers who received 2 doses of Inj TT(%)	72.6	83.1
5	Mothers who consumed iron folic acid for 100 days or more when they were pregnant (%)	61.9	44.1
6	Mothers who consumed iron folic acid for 180 days or more when they were pregnant (%)	10.5	26.0
7	Percentage of mother receiving care from Dr	69.4	62.6
8	Percentage of mother receiving care from Nurse/ANM	20.4	25.8

Source:NFHS 4&NFHS 5

From Table 1,the proportion of women age 15-49 in India who received ANC has risen from 84 percent in NFHS-4 (2015-16) to 94 percent in NFHS-5 (2019-2021), and 85 percent received ANC from a skilled provider in NFHS-5. Seventy percent of women had their first Prenatal care visit (ANC) during the first trimester and 58 percent had four or more ANC visits, an increase from 51 percent in 2015-16.

Pregnant women are more likely to have their weight measured (97%), their blood pressure measured (96%), and a blood sample taken (94%), than to take iron and folic acid (IFA) tablets for at least 100 days (44%) or to take an intestinal parasite drug (31%). A urine sample was taken for 94 percent of women and 67 percent of women had their abdomen examined. 92% women's last live births were protected against neonatal tetanus.(NFHS% 2019-2021)

Pregnancy outcome also called birth outcome, is the final result of fertilization events that occur to the newborn infant from the age of viability (28 weeks) to the first weeks of life. These outcomes vary from pregnancy to pregnancy and include live birth (full-term or preterm birth), stillbirth/intrauterine fetal death, spontaneous abortion, induced abortion, and early neonatal death ⁴ Birthweight is an important indicators for early exposure to childhood mortality and morbidity.Children who weigh less than 2.5 kg are considered to have higher than average risk of early childhood death.According to NFHS 5, 18% of infants in India had a low birth weight of less than 2.5 kg. Low birth weight decreases with an increase in the mother's schooling and household wealth status.(NFHS 5) Adverse pregnancy outcome is a broad term comprising health problems that occur to the mother, the newborn, or both during pregnancy, labor and delivery, and the postpartum period.⁵

Institutional deliveries have increased markedly from 39 % in 2005-06 to 79 % in 2015-16 and 89 % in 2019-21. The rate of C-section deliveries increased from 17% in 2015-16 to 22 % in 2019-21. C-sections are particularly common in private sector health facilities (48% of deliveries). 82% of newborns had a postnatal check within 2 days of birth. 73% of newborns had their cord examined, while 76 percent had their temperature measured.(NFHS5)⁵

The Total Fertility Rate(TFR) in Mizoram is 1.9 children per woman. Fertility has decreased by 0.4 children between NFHS-4(2.3) and NFHS-5(1.9). The Total Fertility Rate TFR in urban areas is 1.6 children per woman and 2.2 in rural areas. Women with no schooling will have an average of 1.4 more children than women with 12 or more years of schooling. The proportion of woman who has started childbearing rises sharply from 3% at age 15-17 years to 15% among women age 19 years. According to NFHS-5, 73% of women received Antenatal care during the first trimester as is recommended.58% of mothers had four or more antenatal visits.88% of mothers received IFA supplements but only 62% consumed for the recommended 100 days or more and only 11 % consumed them for the newly recommended 180 days or more. Anemia is a major health problem among the women and children.35% of women in Mizoram have anemia,an increased of 10% since NFHS 4.80% of last births were protected against neonatal tetanus. Among the registered pregnancies,96% received a Mother and Child Protection Card(MCP).94% of received advise on breastfeeding,92% on keeping their baby warm,90% on the importance of institutional delivery and 81% on family planning.

The research gap is that this study aims to address the previously unexplored questions of association between prenatal care and pregnancy outcome of postnatal mothers in Mizoram

Research Question

Is there a significant association between the antenatal care status of mothers with reference to their time of initiation of Antenatal care and pregnancy outcome?

II. Materials And Methods

The study is a descriptive Cross sectional design to evaluate the association between prenatal care i.e the time of initiation of antenatal check up and pregnancy outcome of postnatal mothers in Mizoram. The study is undertaken in the sub health centre facilities under Aizawl West and Aizawl South Main centre during February 2023 and September 2023.

Study Design: Cross Sectional study

Study Settings: Sub Health Centre under Aizawl South and Aizawl West Main centre ,Aizawl District Mizoram

Study period: February 2023 and September 2023.

Sample Size: 285

Population: All postnatal mothers who had been pregnant before but were not pregnant at the time of study. All postnatal mothers who had delivered their babies in the past 6 months

Calculation of Sample size :NHM Monthly data Item wise reported new pregnant women in Aizawl district during 6 months(April 2023-September 2023) as 3567.(HMIS 2023).16Aizawl district have 4 main centre which means each main centre have 892 new pregnant mother per six months. This indicates that there are 148.6 new pregnant mother per centre in six months. There are 1.6 new registered pregnant mother every month in every sub health centre which is in concordance with the record of sub health centre evaluated by the investigator. Using Yamane (1967) formula and taking 892 as the population with 0.05 margin of error,the calculated sample size is 276.16.

Sampling Procedures: A multistage sampling technique has been used to obtain a representative sample.Aizawl district was chosen from a total of 11 district of Mizoram. Out of four Main Centre in Aizawl district,two main Centre i.e. Aizawl South and Aizawl West were chosen. Out of the total 44 Sub Health Centre(SHC) ,11 was chosen by simple random sampling by selecting every 4th Sub health Centre. A complete list of all postnatal mothers who had delivered in the past 6 months was prepared and the study subjects(N=285) who attended postnatal check up/vaccination day were selected .

The study population comprised 285 post natal mothers registered in Sub Health Centre. Mothers who delivered, either through normal vaginal delivery or caesarean section, within the previous six months and who attended their postnatal check up/vaccination day in the sub health centre were recruited. Data was collected from both primary and secondary sources. Field survey using pre tested interview schedule was administered among post natal mothers registered under Sub Health Centre of Aizawl Secondary data was drawn from safe motherhood, maternal and child protection card issued to the mother by Sub Health centre.

Inclusion Criteria

All postpartum women who had given birth within the previous six months, registered at a subhealth center, could read and write in Mizo, and were ready to take part met the inclusion requirements.

Exclusion Criteria

Mothers who were known to have chronic illnesses, women employed in the medical or health sector were not included.

Ethical considerations

The study obtained Ethical approval from Mizoram University Ethics Committee No MZU/ HEC/ 2022/ 012 dated March 8, 2022. Permission was taken from Chief Medical officer, Aizawl west, to interview postnatal mothers registered under Aizawl West main centre. Informed consent was obtained from respondents before conducting interview. A script of questions was written in local language to ensure uniformity and reliability of data collection.

Instrument: A pre-tested interview schedule with two sections was used to collect data. Section A includes the sociodemographic characteristics of the mother, such as age, number of pregnancies, postpartum mother's educational attainment, and the time of the first prenatal checkup. Section B includes questions about the pregnancy outcome, such as the time of delivery, the mode of delivery, and whether the baby is alive.

After being translated from English to Mizo, the tool was translated back to English. An analysis of reliability revealed a Cronbach's Alpha coefficient of 0.822. After entering the data into Microsoft Excel, the Statistical Package for Social Sciences (SPSS) version 22 was used for analysis.

III. Results:

Baseline characteristics of Postnatal mothers:

Table 2: Socio demographic characteristics of postnatal mothers

Variables	Category	Frequency	percentages
Age in years	18-25	25	8.3
	26-35	162	59.1
	36-45	91	30.2
	Above 45	7	2.4
	Total	285	100
No of pregnancy	Primigravida	97	33.3
	2 children	117	42.3
	More than 3 children	71	24.4
	Total	285	100
Education	Primary	4	1.05
	Middle school	12	12.9
	High school	84	22.8
	Higher secondary school and above	182	63.15
	Total	285	100

Source: Field Study, 2025

Table 2 shows that majority of the postnatal mothers (59.9%) are from the age group of 26 to 35 years. 42.3%, of postnatal mothers had two children, and 63.15% of postnatal mothers had higher secondary education and above.

Table 3: Antenatal Care (ANC) Utilization Among Postnatal Mothers

Timing of First ANC Visit	Frequency	Percent	Cumulative Percent
After 4 months	25	9.2	9.2
1-3 months	260	91.2	100.0
Total	285	100.0	
Number of ANC Visits			
Less than 4 ANC	24	8.4	8.4
4 ANC	11	3.8	12.2
More than 4 ANC	250	87.7	100.0
Total	285	100.0	
Place of ANC Received			
Both private and government health centre	83	29.1	29.1
Government health centre	105	36.8	65.9
Private clinics	97	34.0	100.0
Total	285	100.0	

Source: Field Study, 2023

Table 3 shows that 91.2% of postnatal mothers had started prenatal visits in the first trimester, and 87.7% of them had more than four ANC visits. Majority (65.9%) of mothers had antenatal care visits at government health care facilities

Pregnancy Outcome:

Table 4: Distribution of Birth Status, Birth weight, Delivery Time and mode of delivery among Postnatal mothers

Variables	Category	frequency	percentage
Birth status of newborn	Needs medical attention	28	9.8
	Alive and well	257	89.8
	Total	285	100
Birth weight of newborn	2.5 kg	8	2.80
	2.5 kg and above	264	92.6
	Less than 2.5kg	13	4.56
	Total	285	100
Time of delivery	Term delivery(37 weeks gestation)	214	75.08
	Pre term delivery(<37 weeks gestation)	48	16.84
	Post dated delivery(>40 weeks gestation)	23	8.07
	Total	285	100
Mode of delivery	Induced vaginal labor	47	16.4
	Spontaneous vaginal	161	56.4
	Cesarean Section	77	27.2
	Total	285	100

Source: Field Study, 2023

Table 4 shows that a significant percentage of newborns (89.8 %) were alive and well at birth, while 9 % of newborn needed medical attention. A positive intrauterine growth pattern was indicated that the majority of newborns (92.6%) weighed 2.5 kg or more at birth. While 4.56% of the babies were categorized as low birth weight (<2.5 kg). In terms of gestational age at delivery, most births occurred at term (37–40 weeks), accounting for 75.1% while 16.8 % were preterm (<37 weeks) and 8.1% were post-dated (> 40 weeks). The majority of participants had favorable birth outcomes, with the majority of deliveries occurring at term and the majority of infants born with normal birth weight. 56 % of postnatal mothers had spontaneous vaginal delivery, 16 % had induced vaginal delivery and 27 % had cesarean section.

Association between time of initiation of ANC and Pregnancy outcome

The association between time of initiation of antenatal care (ANC) and variables of pregnancy outcome (time of delivery, mode of delivery and birth status /condition of baby, birth weight) was assessed.

The null hypothesis H0 (there is no statistically significant association between time of initiation of ANC and variables of pregnancy outcome) and alternative hypothesis H1 (there is statistically significant association between 1st ANC and variables of pregnancy outcome) are stated and tested.

Table 5: Association between Time of initiation of ANC and time of delivery. The higher (reddish), mid (white), and lower (bluish) values are indicated using heatmap

Variables	Time of delivery			Contribution of Point of Inertia of Dimension		Chi square	P value
	Post dated	Pre term	Term	Dimension 1	Dimension 2		
1st ANC							
First trimester	19	56	179	0.907	-	0.061	0.970
After first trimester	6	6	14	0.093	-		

Between Time of initiation of ANC and time of delivery, there is no statistically significant association ($p > 0.05$) where the null hypothesis H_{01} is accepted (Table 7). The association between the time of the first antenatal care (ANC) visit and the time of delivery was analyzed using the Chi-square test. The result showed no statistically significant association between the two variables ($\chi^2 = 0.061$, $p = 0.970$). This indicates that the timing of ANC registration, whether in the first trimester or after, did not have a significant influence on whether delivery was term, preterm, or post-dated. However, mothers who registered for ANC during the first trimester contributed the most to the variation in the data distribution (Dimension 1 = 0.907). Overall, the majority of mothers who initiated ANC in the first trimester had term deliveries.

Table 6: Association between Time of initiation of ANC and condition of baby. The higher (reddish), mid (white), and lower (bluish) values are indicated using heatmap.

Variables	Condition of baby		Contribution of Point of Inertia of Dimension		Chi square	P value
	Needs medical care	Alive	Dimension 1	Dimension 2		
1 st ANC					1.185	0.276
First trimester	1	25	0.908	-		
After first trimester	27	229	0.092	-		

Between time of initiation of ANC and condition of baby, there is no statistically significant association ($p > 0.05$) where the null hypothesis H_{02} is accepted (Table 8). The association between the time of the first antenatal care (ANC) visit and the condition of the baby at birth was analyzed using the Chi-square test. The result showed no statistically significant association between the two variables ($\chi^2 = 1.185$, $p = 0.276$). This suggests that the timing of ANC registration, whether in the first trimester or after, did not significantly influence the baby's condition at birth. However, mothers who registered for ANC during the first trimester contributed more to the variation in the data (Dimension 1 = 0.908) compared to those who registered later. Overall, the majority of babies were born alive, irrespective of the timing of the first ANC visit.

Table 7: Association between Time of initiation of ANC and birth weight of the baby. The higher (reddish), mid (white), and lower (bluish) values are indicated using heatmap.

Variables	Birth weight			Contribution of Point of Inertia of Dimension		Chi square	P value
	Less than 2.5 kg	2.5 kg	More than 2.5 kg	Dimension 1	Dimension 2		
1 st ANC						1.148	0.563
First trimester	3	1	22	0.908	-		
After first trimester	18	5	233	0.092	-		

Between Time of initiation of ANC and birth weight, there is no statistically significant association ($p > 0.05$) where the null hypothesis H_{03} is accepted (Table 7). To investigate the relationship between the baby's birth weight and the time of the first antenatal care (ANC) visit, the Chi-square test was used. With $\chi^2 = 1.148$ and $p = 0.563$, the analysis showed no statistically significant correlation between the two variables. The baby's birth weight was not significantly affected by the time of the first ANC registration. Mothers who started ANC in the first trimester, however, were more responsible for the data's variation (Dimension 1 = 0.908) than those who registered later. Most babies weighed more than 2.5 kg at birth, regardless of when ANC was started.

Table 8 : Association Between time of initiation of ANC and mode of delivery

Variables	Mode of delivery			Contribution of Point of Inertia of Dimension		Chi square	P value
	Induced labor	Ceserean Section	Normal spontaneous	Dimension 1	Dimension 2		
1 st ANC						22.477	<0.001
First trimester	40	47	132	0.908	-		
After first trimester	7	20	26	0.092	-		

The relationship between ANC registration and the mode of delivery was statistically significant ($\chi^2 = 22.477$, $p < 0.001$), and Dimension 1 = 0.908. The null hypothesis H_{04} is rejected and the alternate hypothesis H_4 is accepted stating that there is statistically significant association between time of initiation of ANC and the pregnancy outcome i.e mode of delivery (Table 8). First trimester is the variable contributing highest in the association with an inertia of 0.908. This means that mothers who registered for ANC in the first trimester contributed more to the variation in delivery outcomes (normal spontaneous deliveries vs. operative deliveries) than those who registered later. These findings suggest that early ANC registration is positively associated with favorable delivery outcomes.

IV. Discussion

The present study was carried out in an urban field under Aizawl South and West main centre to find the association between time of initiation of ANC and pregnancy outcome among postnatal mothers. The strength of our study to find the association was the primary data collected from the study participants. In National Family Health Survey-5 (NFHS 5) 70% of mothers had registered at 1st trimester. The overall rate of 92% of mothers in our study who had begun prenatal care during the first trimester seems to be quite encouraging which is higher than 81% in Vishakhapatnam⁶ while it is only 35.3 % in Lucknow (Deepak C 2018)

The study observed that 87 % of postnatal mother had more than four ANC visits in the present study which is lower than 93% in Vishakhapatnam⁶ In NFHS 5, mother who had more than 4 ANC visit is 58.5%. Only 15.3% of mothers had more than 4 ANC in a study conducted in Lucknow⁷ Anju Ade et al found that only 44% of women were aware about minimum 4 ANC in 2016 among antenatal mothers in urban slum in Raichur.⁸

The study is in line with similar studies by Jogia *et al.* in 2017⁹ and by Jaiswal *et al.* in 2022¹⁰ where a high percentage of mothers had more than four ANC visits during pregnancy which is also comparable to a research of a similar nature conducted by Danasekaran *et al.* in 2017¹¹ Tuladhar and Dhakal in 2010¹² and while less percentage of mother had more than four ANC visit in study conducted in Lucknow, India, by Chopra *et al.* in 2018⁷

A chi-square test of independence was conducted to examine the relationship between the timing of the time of initiation of antenatal check-up (ANC) and selected maternal outcomes.

Although a greater number of women who registered after the first trimester delivered at term (n = 175) compared to those who registered during the first trimester (n = 18), this difference did not reach statistical significance.

In contrast, a significant association was observed between timing of the first ANC and mode of delivery, $\chi^2(2, N = 282) = 22.477, p < .001$. These findings suggest that delayed initiation of ANC was significantly associated with an increased likelihood of cesarean section.

Lower education status, late registration, multigravida, less than four ANC and preterm birth were significantly at higher risk of having low birth weight babies.⁹

Senol KD., (2018) while investigating the effect of health literacy levels of pregnant women on receiving Prenatal care in Turkey, finds that Poor quality ANC was significantly associated with poor Fetal Outcomes

The strength of our study conducted to find the association was the primary data collected from the study participants. Given the comparatively high percentage of cesarean sections, more research is necessary to identify the obstetric and clinical factors that underlie the delivery method.

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