ORIGINAL ARTICLE

Impact of Antenatal Care on Maternal and Perinatal utcome: A Study at Nepal Medical College Teaching Hospital

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Aims: To identify the determinants of antenatal care (ANC) attendance and its impact on maternal / perinatal outcome.

Methods: Prospective descriptive study of women delivered at Nepal Medical College Teaching Hospital (NMCTH), a 700 bedded tertiary care hospital situated at periphery of Kathmandu.

Results: Among 322 women delivered during period of four months, majority (87%) reported of attending more than 4 antenatal visits, only 21 (6.5%) women had not attended ANC. The most preferred place of ANC was hospital (71.6%). Women with secondary education and above, business/service holders, 20-29 years age group, primigravida and Brahmin / Chhetri caste were more likely to attend ≥ 4 visits, while those living further than 6 km. from a health facility were less likely to attend. Financial problem (52.4%) followed by ignorance (28.6%) were the most commonly stated reasons for not attending ANC. Women attending attending more than 4 antenatal visits have more chance of full immunization with tetanus toxoid and iron supplementation. Most of the women started attending ANC from their second trimester (75.8%), only 21.9% had first ANC visit during first trimester. Overall Cesarean section rate was 17.4% with increased rates in women who had attended ANC, because of the fact that all elective cesarean section were planned in these women only. Also, all inductions of labor (9.3%) were performed among them. Maternal complications like anemia and pregnancy induced hypertension occurred more commonly in women without ANC. The proportion of low birth weight and preterm babies was higher in women with inadequate or no ANC. Special care baby unit (SCBU) admission was also higher among them due to various reasons like neonatal sepsis, birth asphyxia, jaundice etc. While there were no neonatal deaths during the study period, 3 still births have occurred. Perinatal mortality rate was similar in no ANC and inadequate ANC groups; it was 16 times higher than that in the group with more than 4 visits. Maternal and perinatal outcomes were found to be better in women who attended regular ANC.

Conclusions: Although the attendance of ANC is quite encouraging, the proportion of women attending ANC from first trimester is low. The quality of antenatal care needs to be strengthened. The health system needs to ensure the availability of ANC in primary care level and to establish mobile clinics for those living far from the health facilities.

Keywords: Antenatal care, delivery, maternal complications, perinatal outcome

INTRODUCTION

The importance of antenatal care (ANC) for improving perinatal outcomes is well established. High quality antenatal care is seen as a fundamental right of all women to safeguard their health and that of their infants, providing opportunities for risk factor intervention.[1] The high maternal and perinatal mortality rates in Nepal continue to be issues of concern as they are indicators of the poor state of health services with the implication that relevant health-related millennium development goals may not be achieved in the country. Maternal complications and poor perinatal outcome are highly associated with non-utilisation of antenatal and delivery care services and poor socioeconomic conditions of the patient, with poorer outcomes in unbooked than booked patients.[2-5]

The principal aim of antenatal care is the early recognition and management of the high risk patient. Illiteracy and poverty both contribute to poor antenatal care.[6-8] Literacy is probably more important than the degree of affluence, and a low maternal educational standard is associated with a lower application of maternity care routines and a lower perceived value of antenatal care.[9]

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There have been a number of studies in developing and transitional countries that have shown positive effects of ANC on perinatal outcomes, including reduced rates of pre-term labour, low birthweight and also perinatal death.[10-12] However much of the research debate has been on the optimal number of ANC visits, which health-care professionals should provide care and the content of the ANC visits.[13-18] The WHO now recommends four ANC visits for low risk pregnancies.[19]

The antenatal period clearly presents opportunities for reaching pregnant women with a number of interventions that may be vital to their health and well-being.[20] The putative benefits of antenatal care to babies include increased growth, reduced risk of infection and increased survival.[21] Some elements of the ANC package (tetanus toxoid, screening for pre-eclampsia, screening and treatment of asymptomatic bacteriuria and syphilis) have been shown to be cost-effective in a Sub-Saharan African context.[22] Although it cannot be claimed that ANC is *the* solution to high maternal and perinatal mortality in the developing world, ensuring the provision of ANC may help progress to the Millennium Development Goals for maternal and child mortality.[23]

As well as the direct effect of ANC on perinatal outcomes (i.e. health benefits arising from the care itself), there may also be an indirect benefit associated with it, since women attending ANC are more likely to have their delivery assisted by a professional health care provider or in a health facility.[20,24]

This study attempts to analyze the situation of ANC attendance in one of the teaching hospital located at suburban area of Kathmandu and the effect of ANC attendance on maternal and perinatal outcome. The findings from such studies will be helpful in order to establish a strategy for ANC in the national reproductive health program and also have implications for planning and implementing interventions that are relevant for maternal and perinatal mortality reduction.

METHODS

In a prospective study over a four month period (16th April-16th August, 2010) , outcomes of pregnancies of women with adequate ANC (≥ 4 visits) and without / inadequate ANC (< 3 visits) were compared, who delivered in Nepal Medical College Teaching Hospital. The approval of the hospital's ethics and research committee was obtained prior to the commencement of the study. Informed consent was obtained from each woman recruited into the study. All patients were managed according to the departmental protocol. All deliveries during the study period were included in the study. The women were interviewed on admission into the labour ward using a standardised questionnaire. They were thereafter followed-up until the day of discharge. The women were divided into three groups for the purpose of comparison. Technically, adequate ANC was defined as ≥ 4 antenatal care visits, inadequate ANC as 1-3 visits irrespective of the place and timing of ANC. Women without ANC encompassed those who have had no antenatal care at all throughout the index pregnancy. Sociodemographic information obtained included age, parity, occupation, educational status and ethnic group. Distance from their residence to place of ANC and reasons for not attending ANC were also enquired. Maternal outcome measures of interest included the number of antenatal visits, trimester at first visit, data relating to care activities such as hematological investigations, serological screening for VDRL, HIV, HBsAg, ultrasound scans performed, immunization with tetanus toxoid, iron supplementation, pregnancy complications like anemia, pregnancy induced hypertension (PIH), eclampsia, antepartum hemorrhage, mode of delivery and any complications during labor. Neonatal outcome measures, such as gestational age, birth weight, Apgar scores, special care baby unit (SCBU) admission and perinatal mortality were also documented. Data analysis was done by simple tabulations.

RESULTS

During the study duration (16th April-16th August, 2010), total 322 women had delivered at Nepal Medical College Teaching Hospital. Overall, 301 (93.5%) of the women had attended at least one ANC and 280 (87%) had four or more antenatal visits. Twenty one women (6.5%) had no antenatal care.

Hospital was the most preferred site for ANC.

Adolescent and elderly mothers attended antenatal care less often. Similarly, multigravida, laborer women, *Lasheta* caste and illiterate women were less likely to attend adequate ANC. The impact of educational staus and occupation on ANC attendance was quite prominent.

The most common reason for not attending ANC was financial problem followed by ignorance.

Most of the women started to attend ANC only from their 2nd trimester. Only 21.9% had started from 1st trimester. Immunization with tetanus toxoid and iron supplementation was complete in women who attended

more than 4 visits. Routine antenatal investigations were also performed in most of the women who attended adequate ANC. More than 90% of these women also had at least one ultrasound obstetric scan, screening for VDRL, HIV, HBsAg, hemoglobin estimation and blood grouping and Rh typing which shows the evidence of satisfactory quality of the care.

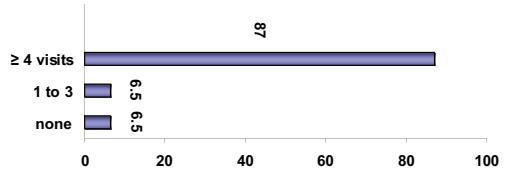

Figure 1. Number of ANC visits

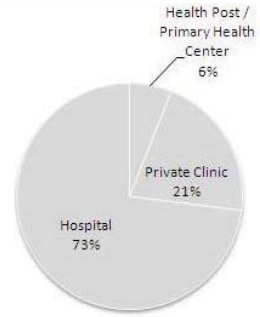

Figure 2. Place of ANC attendance

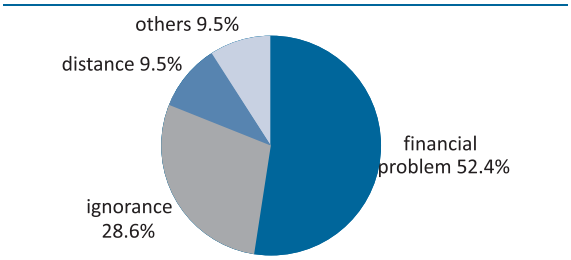

Figure 3. Reasons stated for non-attendance of ANC

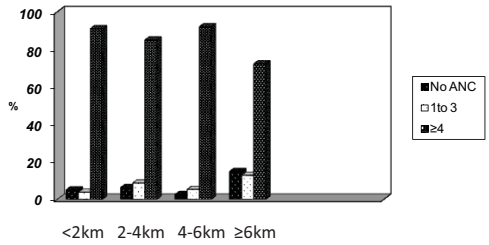

Figure 4. Effect of distance from residence to place of ANC on number of visits

Table 1. Sociodemographic profile of the study population and pattern of ANC attendance (n=322)

Characteristics/ No.of ANC visits	None (n=21, 6.5%)	1-3 visits (n=21, 6.5%)	≥ 4 visits (n=280, 87%)	Total No. (n=322)
Age Group (years)				
15-19	4 (11.1%)	5 (13.9%)	27 (75.0%)	36
20-24	8 (5.0%)	9 (5.6%)	143 (89.4%)	160
25-29	6 (6.3%)	4 (4.2%)	85 (89.5%)	95
30-34	3 (13.6%)	1 (4.5%)	18 (81.9%)	22
35+	0	2 (22.2%)	7 (77.8%)	9
Parity				
Primi	8 (4.9%)	11 (6.8%)	143 (88.3%)	162
Multi	13 (8.1%)	10 (6.3%)	137 (85.6%)	160
Occupation				
Housewife	18 (6.3%)	16 (5.6%)	248 (87.0%)	285
Laborer	3 (23.0%)	2 (15.4%)	8 (61.5%)	13
Service	0	0	15 (100%)	15
Business	0	0	9 (100%)	9
Ethnic group				
Brahmin/Chhetri	1 (0.9%)	4 (3.6%)	105 (95.5%)	110
Lama/Sherpa/Tamang	15 (14.4%)	8 (7.7%)	81 (77.9%)	104
Newar	0	3 (6.4%)	44 (93.6%)	47
Magurali	2 (9.1%)	2 (9.1%)	18 (81.8%)	22
Others	3 (7.7%)	4 (10.2%)	32 (82.0%)	39
Educational status				
Illiterate	15 (21.1%)	8 (11.3%)	48 (67.6%)	71
Primary	4 (4.6%)	5 (5.8%)	77 (89.6%)	86
Secondary	2 (2.0%)	5 (5.1%)	91 (92.9%)	98
Intermediate+	0	3 (4.5%)	64 (95.5%)	67

Table 2. Details of ANC

No. of ANC visits	No ANC	1-3 visits	≥4 visits	Total
TT immunization				
Full	1 (4.8%)	15 (71.4%)	280 (100%)	296
Partial	3 (14.3%)	3 (14.3%)	0	6
None	17 (80.9%)	3 (14.3%)	0	20
First ANC visit.(trimester)				
1st		0	66 (23.6%)	66 (21.9%)
2nd		17 (81%)	211 (75.4%)	228 (75.8%)
3rd		4 (19%)	3 (1.0%)	7 (2.3%)
Iron supplementation				
Full	4 (19.0%)	15 (71.4%)	280 (100%)	299
Partial	1 (4.8%)	1 (4.8%)	0	2
None	16 (76.2%)	5 (23.8%)	0	21
Total	21	21	280	322
Antenatal investigations				
Screening for VDRL, HBsAg, HIV		18 (85.7%)	265 (94.6%)	283
Hb, blood gr. Rh		16 (76.2%)	271 (96.5%)	287
Ultrasonogram		11 (47.6%)	255 (91.1%)	266

Table 3. Type of delivery, maternal and perinatal outcome according to ANC visits

Delivery/ANC	No ANC	1-3 visits	≥ 4 visits	Total
Vaginal	18 (85.7%)	17 (80.9%)	231 (82.5%)	266 (82.6%)
Cesarean section	3 (14.3%)	4 (19.1%)	49 (17.5%)	56 (17.4%)
Maternal outcome				
Healthy	15 (71.4%)	18 (85.7%)	262 (93.6%)	295
Anemia (Hb <10gm%)	5(23.8%)	2 (9.5%)	26 (9.3%)	33
PIH	0	0	2 (0.7%)	2
Eclampsia	1 (4.8%)	0	1 (0.4%)	2
APH	0	0	2 (0.7%)	2
Hand prolapse	1 (4.8%)	1 (4.8%)	0	
Rupture uterus	0	0	1 (0.4%)	1
Retained placenta	2 (9.5%)	0	3 (1.1%)	3
PPH	1 (4.8%)	1 (4.8%)	2 (0.7%)	4
Perinatal outcome				
Normal	12 (57.1%)	15 (71.4%)	267 (95.0%)	294 (91.3%)
Low birth weight	4 (14.3%)	3 (14.3%)	7 (2.5%)	14 (4.3%)
Preterm	2 (9.5%)	0	2 (0.7%)	4 (1.2%)
Still birth	1 (4.8%)	1 (4.8%)	1 (0.3%)	3 (9.3/1000births)
Neonatal death	0	0	0	0
SCBU admission	4 (19.0%)	2 (9.5%)	5 (1.8%)	12 (3.7%)
Perinatal mortality rate	48/1000	48/1000	3/1000	9.3/1000

Women were less likely to attend ANC when the place is ≥6km away from their residence. But still, 5.1% women residing at less than 2 km. distance have not attended ANC due to various other reasons.

The overall rate of cesarean section was 17.4%, the rate seems to be higher among the women with ANC, this higher rate could be due to the fact that all cases of elective cesarean section (n=15) could be planned only in these women. Planned induction of labor was done in 26 women who had more than 4 visits. Maternal complications occurred more commonly in women without ANC. The proportion of low birth weight and preterm babies was higher in women with inadequate or no ANC. Special care baby unit (SCBU) admission was also higher among them due to various reasons like neonatal sepsis, birth asphyxia, jaundice etc. While there were no neonatal deaths during the study period, 3 still births have occurred. Perinatal mortality rate was similar in no ANC and inadequate ANC groups, it was 16 times higher than that in the group with more than 4 visits. There was no maternal mortality during the study period.

DISCUSSION

Various studies have confirmed the positive influence of antenatal care on maternal and perinatal outcomes irrespective of other maternal characteristics, such as age and parity. Few life-threatening complications can be prevented antenatal, most requiring interventions at the time of delivery and the immediate postpartum period. Most safe motherhood programs therefore currently stress ensuring access to emergency obstetric care and attendance by a skilled health care professional during delivery. Yet there is ample evidence that care during the antenatal period represents an opportunity to deliver interventions that will improve maternal and perinatal health. Moreover, the HIV/AIDS epidemic has directed more attention to the antenatal period as an entry point for HIV prevention and care initiatives.

The overall rate (93.5%) of at least one ANC attendance in present study seems to be quite encouraging. This rate is definitely much higher than that mentioned in a WHO/ Unicef publication as it was only 28% in Nepal and in other South Asian countries ranges from 28% in Pakistan, 33% in Bangladesh, 60% in India, 81% in Maldives and 98% in Sri Lanka. In Nepal, for example, 28% of women reported at least one visit but only 9% reported four or more visits, with most women having two or three antenatal visits. Regional average of South Asia was 54 %, that of East Asia/ Pacific region was 82%, Latin America/Caribbean 86%, Middle East/North Africa 65%.[20] The high rate of ANC attendance may be due to hospital based study, as most of the women without ANC may be delivering at home.

Pattern of ANC attendance

WHO recommends that antenatal care for the majority of normal pregnancies should consist of four visits during pregnancy, and has outlined the key elements of the visits and their timing. Though the overall rate of adequate ANC attendance (87%) seems to be quite satisfactory in this study, most of the women had initiated the care in second trimester only. Kotelchuck developed the adequacy of prenatal care utilization (APCU) index.[25] It categorized ANC utilization by two independent and distinctive dimensions: adequacy of initiation of antenatal care and adequacy of received services. The adequacy of the timing of initiation of antenatal care is indicated by early initiation. WHO recommended that registration before or at 16 weeks of gestation is considered as "early initiation". A key objective of maternal health care programs has been to ensure that women present for antenatal care early in pregnancy in order to allow enough time for essential diagnosis and treatment regimens such as treatment of STIs and management of anaemia. Overall, this objective is being met: in Latin America and the Caribbean and in the Middle East and North Africa, two thirds of women present for antenatal care in the first trimester, while the figure for Asia is nearly half. The exception is sub-Saharan Africa, where women presenting for antenatal care are most likely to wait until the second trimester and a relatively substantial proportion present only in the third trimester. Our finding also showed similar results as most of the women attended first ANC only in 2nd trimester and only 21.9% of the women had initiated in 1st trimester.

Recent World Health Organization (WHO) reviews suggest that no adverse outcomes are associated with a reduced schedule of four visits.[26,27]

Quality of care in ANC

Immunization with tetanus toxoid, iron supplementation and screening activities for women attending adequate ANC is encouraging as 100% of them had full immunization and taken iron supplementation. Most of them (>90%) also had at least one obstetric ultrasound scan, hematological investigations and screening for VDRL, Hepatitis B and HIV. More effort needs to be put into blood and urine testing to identify conditions such as pre-eclampsia, severe anaemia and STIs. Antenatal care can be a privileged entry point for counseling to prevent mother-to-child transmission of HIV.

Determinants of ANC attendance

Clearly, age group, parity, occupation, ethnic group ,educational status of the women all interact and influence each other, so it is not possible to assess the individual contribution of each element to overall use of antenatal care. However, in this study the impact of educational status and occupation on ANC attendance was quite prominent. Adolescent and elderly mothers attended

antenatal care less often. Similarly, multigravida, laborer women, *Lasheta* caste and illiterate women were less likely to attend adequate ANC. The data in the study conducted by WHO/ Unicef also confirm that in developing countries as a whole, educated women are more likely to receive adequate antenatal care.[20] In most countries, the greatest proportionate difference occurs between women with no education and those with primary education. Nevertheless, there are ways to overcome the disadvantage of low educational levels; lack of education does not necessarily have to be a strong determinant for use of antenatal care, given appropriate program interventions to encourage women to make use of available antenatal services.

A significant finding of the regional analysis is that education appears to have less effect on use of antenatal care in sub-Saharan Africa than in other regions, particularly in the Middle East and North Africa and in Asia. But in all the developing regions, women with secondary schooling are at least twice as likely to present for antenatal care as women with no schooling.

It is generally assumed that use of antenatal care must be lowest in the youngest and oldest age groups, because many of the younger pregnant women may be unmarried and unable or unwilling to use maternal health services, and many of the older pregnant women will have ingrained cultural biases against formal health care.

Higher-parity women have lower levels of antenatal care as reported by other studies also. Primigravida are the most likely to present for antenatal care. In Malawi, the percentage of mothers reporting four or more antenatal visits declines from 66% for first births to 59% for sixth or higher-order births). In a few countries, such as Egypt, India and Turkey, the drop-off with increasing parity is steep. For instance, antenatal care use in Egypt decreases from 41% for first births to 13% for sixth or higher-order births.[20] In our study, slightly more primigravida (88.3%) attended adequate ANC as compared to multigravida (85.6%).

The same study has also shown that use of antenatal care is heavily influenced by socioeconomic status. In Nepal 22% of poorest women and 67% of richest women have attended at least one ANC according to that study.[20]

This study found that educated, wealthy women living in urban areas were more likely to receive ANC than those who lived in rural areas and/or were poor financially. Similar findings with respect to residence and education are reported in the 2003 Kenya Demographic and Health Survey. [28] In their survey in rural Western Kenya, van Eijk *et al* reported that socio-economic status (SES) and education are also associated with uptake of ANC.[24]

Women living in poorest condition use antenatal services much less frequently than do those in the richest. Most of the women in our study have stated financial problem as the most common factor for non attendance of ANC followed by ignorance and long distance. Moreover, where women have to travel long distances and wait long hours for antenatal care, there are substantial financial and opportunity costs to the women in such frequent attendance.

In addition, increased attention is needed to ensure that particular groups of women, specifically those living in rural areas, the poor and the less educated, obtain better access to antenatal services.

Place of ANC

Most of the study participants had attended ANC at hospital (71.6%), followed by private clinic 20.4%. So the service providers were doctors mostly gyne/obstetricians Only a minority had attended in primary health centre or health posts where the service provider may be a staff nurse, auxiliary nurse midwife or health assistant. The majority of the antenatal interventions known to be effective can be delivered by a midwife or nurse or, indeed, lower-level health care workers such as auxiliary nurse/ midwives, primary health care workers and community health workers, provided they have the necessary training, equipment and supplies and are appropriately supervised. However, for complicated cases, it is important to be able to draw upon more specialized skills such as those of a doctor or even an obstetrician/gynaecologist. In all regions except sub-Saharan Africa, doctors are the most commonly used skilled providers of antenatal care.[20]

Maternal and perinatal outcome

Women reporting four or more antenatal visits are far more likely to have given birth with professional assistance than women reporting fewer visits. This is particularly the case in countries where the overall level of antenatal care use is low. However our study could not compare it, because we could not access the women who delivered at home.

Many elements of antenatal care, such as routine monitoring of height and weight gain, have not been shown to have any impact in reducing the risk of serious complications and maternal deaths.[29] However women with more than three ANC visits were more likely to have a good outcome.

There appears to be a significant proportion of women who live some way from the health facility and have no ANC. Hence lack of good roads or transport may be the barrier to attendance and this factor should be explored in qualitative research. If this is the case, women in distant areas could be encouraged to attend for ANC by providing transport or arranging an out-reach ANC service in certain areas. Alternatively, an attempt could be made to provide more health facilities to reduce the need for women to travel long distances while pregnant or to consider the use

of maternity waiting homes.[30] Variations in the content and quality of care received across health facilities should be investigated. The quality of care can be assessed through a survey of women who have received care.

CONCLUSIONS

Efforts to encourage women to attend ANC could be targeted at less educated women and could include formal (e.g. employment or school based) or informal education sessions for younger women which include information on ANC and childbirth.

Further studies on quality of ANC and its impact on obstetric outcome are needed. Within the limited resources, safe motherhood strategies need to be targeted to the rural area and to the poor in order to increase access to ANC and delivery care. Such interventions may include preparing community health workers to promote ANC, improving the quality of ANC offered by nurses at the primary health care level and strengthening health systems to ensure the availability of medical supplies.

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