

## Journal Pre-proof

A cross sectional study to evaluate antenatal care service provision in three hospitals in Nepal



Dr Abi MERRIEL , Ms Nashna MAHARJAN ,  
Dr Gemma CLAYTON , Dr Miriam TOOLAN , Ms Mary LYNCH ,  
Ms Katie BARNARD , Prof Tina LAVENDER , Dr Michael LARKIN ,  
Dr Nisha RAI , Dr Meena THAPA , Dr Deborah M. CALDWELL ,  
Dr Christy BURDEN , Dr Dharma S MANANDHAR ,  
Prof Abigail FRASER

PII: S2666-5778(21)00013-7  
DOI: <https://doi.org/10.1016/j.xagr.2021.100015>  
Reference: XAGR 100015

To appear in: *AJOG Global Reports*

Received date: 24 November 2020  
Revised date: 3 May 2021  
Accepted date: 15 June 2021

Please cite this article as: Dr Abi MERRIEL , Ms Nashna MAHARJAN , Dr Gemma CLAYTON , Dr Miriam TOOLAN , Ms Mary LYNCH , Ms Katie BARNARD , Prof Tina LAVENDER , Dr Michael LARKIN , Dr Nisha RAI , Dr Meena THAPA , Dr Deborah M. CALDWELL , Dr Christy BURDEN , Dr Dharma S MANANDHAR , Prof Abigail FRASER , A cross sectional study to evaluate antenatal care service provision in three hospitals in Nepal, *AJOG Global Reports* (2021), doi: <https://doi.org/10.1016/j.xagr.2021.100015>

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2021 Published by Elsevier Inc.  
This is an open access article under the CC BY-NC-ND license  
(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

**A cross sectional study to evaluate antenatal care service provision in three hospitals in Nepal**

Dr Abi MERRIEL, Academic Women's Health Unit, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Centre, Bristol, UK.

Ms Nashna MAHARJAN, Mother and Infant Research Activities (MIRA) Kathmandu, Nepal.

Dr Gemma CLAYTON, Population Health Sciences, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Centre, Bristol, UK.

Dr Miriam TOOLAN, Academic Women's Health Unit, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Centre, Bristol, UK.

Ms Mary LYNCH, Academic Women's Health Unit, Bristol Medical School, University of Bristol and North Bristol NHS Trust.

Ms Katie BARNARD, Academic Women's Health Unit, Bristol Medical School, University of Bristol and North Bristol NHS Trust.

Prof Tina LAVENDER, Liverpool School of Tropical Medicine, Liverpool, UK.

Dr Michael LARKIN, Department of Psychology, Aston University, UK.

Dr Nisha RAI, Hetauda Hospital, Nepal.

Dr Meena THAPA, Kathmandu Medical College Public Limited, Nepal.

Dr Deborah M. CALDWELL, Population Health Sciences, Bristol Medical School, University of Bristol.

Dr Christy BURDEN, Academic Women's Health Unit, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Centre, Bristol, UK.

\*Dr Dharma S MANANDHAR, Mother and Infant Research Activities (MIRA)Kathmandu, Nepal.

\* Prof Abigail FRASER, Population Health Sciences, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Centre, Bristol, UK.

\*Joint senior author

Corresponding Author:

Abi Merriel

Academic Women's Health Unit ,Bristol Medical School, Learning and Research Building,  
North Bristol NHS Trust, Westbury-on-Trym, BS10 5NB

Email: [abi.merriel@bristol.ac.uk](mailto:abi.merriel@bristol.ac.uk) Tel: 07740334922

**Source of Funding:** This study is funded through a University of Bristol Global Challenges Research Fund Pump Priming Award. The funder played no role in the study design

Abi Merriel is funded by a National Institute for Health Research (NIHR), Academic Clinical Lectureship for this research project.

Miriam Toolan is funded by a National Institute for Health Research (NIHR), Academic Clinical Fellowship for this research project.

This paper presents independent research funded by the National Institute for Health Research (NIHR) and the University of Bristol GCRF fund. The views expressed are those of the author(s) and not necessarily those of the University of Bristol, the NHS, the NIHR or the Department of Health and Social Care.

**Conflict of interests:** The authors report no conflict of interest.

**Word Count:** 4078

**Short title:** The current quality of antenatal care in Nepal

**AJOG At a Glance:**

*A. Why was the study conducted?* To understand antenatal care delivery measured against Nepali National Medical Standards to identify ways to improve care.

*B. What are the key findings?* Three-quarters of women attend the minimum four contacts, and over three-quarters seek care after the first trimester. All clinical care is delivered at appropriate time points in just over 40% of cases. Most women get information about pregnancy danger signs, but women don't remember them all. Almost half of women would prefer more privacy and over 1/3 did not participate much in decisions about their care.

*C. What does this study add to what is already known?* Key areas for quality improvement include encouraging women to access services in the first trimester, improving communication around key health messages and respectful care.

**Keywords:** Accessing Care, Antenatal care, Developing Countries, Nepal, Pregnancy care, Quality improvement, Service Evaluation.

## **Abstract**

**Background:** Globally too many mothers and their babies die during pregnancy and childbirth, a key element of optimizing outcomes is high-quality antenatal care (ANC). The Government of Nepal have significantly improved ANC and health outcomes through high-level commitment and investment, but still only 69% attend four recommended antenatal appointments.

**Objective:** To evaluate the quality and perceptions of ANC in Nepal to understand the compliance with Nepalese standards.

**Study Design:** This cross-sectional study took place at a tertiary referral and private hospital in Kathmandu, and a secondary hospital in Makwanpur. It recruited 538 female inpatients on postnatal wards during the two-week data collection period in May/June 2019. A case note review and verbal survey of women to understand the pregnancy information they received and their satisfaction with ANC was performed. We created a summary score of the completeness of ANC services received ranging 0-50 (50 indicating complete accordance with standards) and investigated the determinants of attending 4 ANC visits and patient satisfaction.

**Results:** The median ANC attendance was 4 visits at the secondary and referral hospitals and 8 at the private hospital. 24% attended less than 4 visits. 22% (117/538) attended a first trimester visit and 12% (65/538) attended visits at all points recommended in the standards. Over 90% of women had blood pressure monitoring, hemoglobin estimation, blood grouping and Rhesus typing, HIV and syphilis screening. 50% of women had urinalysis at every visit (IQR 20 to 100). 95% (509/538) reported receiving pregnancy information, but retention was variable: 93% (509/538) received some information about danger signs, 58% (290/502) remembered headaches whereas 98% (491/502) remembered fluid leaking. The ANC completeness score revealed the private hospital offered the most complete clinical services (mean 28.7, SD=7.1) with the secondary hospital performing worst (mean 19.1, SD=7.1). The factors influencing attendance at 4 ANC visits in the multivariable model were beginning ANC in the first trimester (OR 2.74 (95% CI 1.36, 5.52) and having a lower level of education (no-school OR 0.46 (95% CI 0.23, 0.91), Grades 1-5 OR 0.49 (95% CI 0.26, 0.92)). Overall 56% (303/538) of women were satisfied with ANC. The multivariable analysis revealed satisfaction was more likely in women attending the private hospital compared to the referral hospital (OR 3.63 95% CI 1.68 to 7.82) and lower in

women who felt the ANC facilities were not adequate (OR 0.35 95% CI 0.21 to 0.63) and who wanted longer antenatal appointments (OR 0.5 95% CI 0.33 to 0.75).

**Conclusions:** Few women achieved full compliance with the Nepali ANC standards, however, some services were delivered well. To improve, each antenatal contact needs to meet its clinical aims and be respectful. To achieve this communication and counselling training for staff, investment in health promotion and delivery of core services is needed. It is important that these interventions address key issues, such as attendance in the first trimester, improving privacy and optimizing communication around danger signs. However, they must be designed alongside staff and service users and their efficacy tested prior to widespread investment or implementation.

## Introduction

Reducing maternal and neonatal morbidity and mortality is a key element of the Sustainable Development Goals. The maternal mortality ratio in Nepal has dropped from 553 per 100,000 live births in 2000 to 186 in 2017,<sup>1</sup> whilst the neonatal mortality ratio has halved from 40 per 1000 livebirths in 2000 to 20 in 2015.<sup>2</sup> Nepal has achieved this, despite a shortage in midwives,<sup>3</sup> through high level political commitment and significant investment in free maternity care, incentivised attendance at four antenatal appointments, and promotion of skilled attendance at birth.<sup>4</sup> Attendance at antenatal appointments and skilled health personnel have been shown to have a significant impact on reducing perinatal mortality,<sup>5</sup> and incentivisation has shown that

although women are no more likely to initiate care, they attend more frequently<sup>6</sup> which is important as reduced care results in increased perinatal death.<sup>5</sup>

Antenatal care (ANC) provides an opportunity to identify and manage risk, educate about pregnancy and birth and improves pregnancy outcomes.<sup>7,8</sup> The Nepali standards at the time of this study<sup>9</sup> recommended that women are seen four times during pregnancy, however recent WHO guidelines recommend eight contacts,<sup>7</sup> as do the new Nepali standards.<sup>10</sup> A summary of Nepali recommendations at the time, based on the reproductive health standards (2007) is presented in supplementary file 1.<sup>9</sup> According to the Nepal Demographic Health Survey, the first antenatal visit is attended by 84 % of women, but only 69 % attend all four.<sup>11</sup>

Attended birth is one of the most effective interventions for reducing perinatal mortality in low and middle income countries.<sup>5</sup> ANC has been shown to facilitate this,<sup>12,13</sup> and Nepalese ANC focuses on encouraging skilled attendance at delivery, preferably in a facility. In the most recent demographic health survey, 57% of women delivered at a facility, an increase from 36% in 2011.<sup>11</sup> Poor interactions with healthcare workers are thought to discourage women from delivering at a facility.<sup>14</sup> Therefore the quality of ANC, in addition to the coverage is likely to be important.<sup>15</sup> However, until recently there were few studies focusing specifically on the quality of ANC.<sup>15,16</sup>

Our aim was to perform a cross-sectional service evaluation of women delivering hospitals (thus likely to have attended ANC), to assess current ANC practices in Nepal, and women's perceptions of them. We measured the clinical services according to the Nepali standards at the time (the National Medical Standards 2007)<sup>9</sup> to identify targets for improvement. Alongside



this, we assessed some key elements of respectful care<sup>17</sup> and asked general questions about satisfaction with ANC.

## **Materials and Methods**

This study took place in three hospitals in Nepal: a tertiary referral hospital in Kathmandu with 19,000 deliveries annually, a private secondary care teaching hospital in Kathmandu with 3,600 deliveries per year and a district secondary care hospital in Makwanpur with 2500 deliveries. All have routine ANC run by doctors, as is the norm in Nepal, and comprehensive emergency obstetric care. All accept referrals from surrounding smaller health facilities, and the referral and secondary hospital participate in the incentive scheme for attending four antenatal visits. The referral hospital receives country-wide referrals. These three sites were selected to access a diverse group of patients and represent different elements of Nepal's health system to provide a diverse snapshot of current antenatal care.

A cross-sectional study of women on the postnatal ward over a two-week period in May/June 2019 were eligible for inclusion in the survey. We obtained written informed consent and then study data collectors examined each woman's handheld maternity record and extracted the information contained within it onto a proforma. The data collected covered the core elements of ANC included in the Nepali National Standards<sup>9</sup> This included data on the woman, her history, what care she received and the information she was provided with. The English version of the data collection tool is available in supplementary file 2.

We also carried out a structured interview, in Nepali, to determine the information women recalled about pregnancy and danger signs and their satisfaction with ANC. The English version of the tool is available in supplementary file 3.

Data collection was piloted with 5-10 women and refinements made for ease of understanding and usability. Four research assistants were trained to collect the data. We offered participation to every woman delivering in the private and secondary hospitals, and from every other woman on the postnatal ward in the referral hospital (due to logistic constraints on staff time).

Data were recorded on paper forms and entered into EpiData version 3.1<sup>18</sup> by trained research assistants. Data monitoring was performed by the local project manager to ensure accuracy and integrity. It was then transferred to Stata V.15.1<sup>19</sup> to conduct all data checking, cleaning and analyses. Continuous and categorical data were summarized using means, SD, medians, IQR, ranges, counts and percentages by hospital and overall as appropriate. To test differences by hospital we used ANOVA to test means, the Kruskal Wallis test to investigate medians and Fishers exact test to assess whether proportions differed by hospital. P-values are reported.

We also developed an ANC completeness score based on Nepalese standards, indicating whether clinical services were delivered and whether they were delivered at the recommended time.<sup>9</sup> Details of the score that ranges from 0-50, with 50 indicating better performance. We acknowledge that there is much debate on the development of a score to measure ANC utilization<sup>20</sup> and that there are also many scoring systems to measure ANC quality<sup>21</sup> however, with this completeness score we were aiming to provide a quantitative estimate of the extent to

which the Nepali standards were followed. We therefore felt that it was possible to develop a score, specifically for this study, and present its composition in supplementary file 4.

We used logistic regression to identify whether demographic features, time to travel to the appointment, attendance in the first trimester, satisfaction or hospital were associated with a woman's likelihood of attending four or more antenatal visits. All variables hypothesized to have an impact on attending four antenatal visits were included in both univariable and multivariable models. We also assessed whether demographic features, completeness of ANC, and whether women were happy with the duration of appointments, privacy, level of decision making, facilities, and the number of appointments were associated with overall satisfaction. Any univariable determinants with a p value  $<0.2$  were included in a multivariable model, whilst retaining hospital, ANC completeness, parity and time to travel to appointment regardless of statistical significance.

The Family Welfare Division of Nepal, the government department responsible for implementing maternal and child health policy, and the heads of the obstetric departments of each of the hospitals were involved in setting the priorities for this study. The study was reviewed and refined by the University of Bristol and Nepal Health Research Council's peer review process during ethical review.

## **Results**

A total of 538 women participated in the study across all three sites (371 referral, 98 secondary, 69 private). 545 were interviewed, however 7 did not have their ANC cards (4 from the private

















































Summary statistics by hospital	Referral Hospital (N=371)	Secondary Hospital (N=98)	Private Hospital (N=69)	Overall (N=538)	P value
Number of routine antenatal visits Median (IQR)	4 (3 , 6)	4 (4 , 5)	8 (7 , 9)	5 (4, 6)	<0.001
% (n)who attended a visit in the 1 <sup>st</sup> trimester	15% (57)	27% (26)	49% (34)	22% (117)	<0.001
Weeks of gestation at first contact Median (IQR)	20 (15 , 26)	16 (13 , 16)	13 (8 , 17)	18 (13, 23)	<0.001
%(n) who attended all within the specified time frames*	7% (25)	15% (15)	36% (25)	12% (65)	<0.001
Percentage of visits bp was taken (Median, IQR)	100 (88 , 100)	100 (75 , 100)	90 (83 , 100)	100 (80, 100)	0.001
Percentage of visits urine dip stick was taken (Median, IQR)	89 (43 , 100)	25 (17 , 25)	13 (10 , 17)	50 (20, 100)	<0.001
Hemoglobin estimation at least once %(n)	100% (369)	100% (98)	100% (69)	100% (536)	1.000
Blood grouping and Rh typing % (n)	100% (369)	100% (98)	100% (69)	100% (536)	1.000
All supplements offered on 1st visit %(n)	88% (328)	81% (79)	71% (49)	85% (456)	0.001
Screening tests (HIV/Syphilis) %(n)	98% (364)	100% (98)	99% (68)	99% (530)	0.458
Had VRDL taken at least once	98% (364)	93% (91)	99% (68)	97% (523)	0.023
Tetanus vaccination %(n)	95% (354)	80% (78)	96% (66)	93% (498)	<0.001
Had medical history taken on 1st visit %(n)	90% (332)	11% (11)	96% (66)	76% (409)	<0.001
Pattern of Fetal movements discussed %(n)	96% (367)	72% (71)	94% (65)	92% (492)	<0.001
Fetal heart rate – at percentage of visits (>=20 weeks (Median, IQR))	86(67, 100)	100 (67, 100)	80 (57, 100)	88 (67, 100)	0.009
Symphysis fundal height – at percentage of visits(>=20 weeks (Median, IQR))	100 (50, 100)	67 (33, 100)	100 (83, 100)	100 (50, 100)	0.001
Ultrasound scan prior to 24 weeks	52% (191)	27% (26)	81% (56)	51% (273)	<0.001
ANC completeness score* (Mean (SD))	20.6 (6.5)	19.1 (7.1)	28.7 (7.1)	21.3 (7.3)	<0.001

Table 3: Documented advice received by women at antenatal care

<b>% receiving (n)</b>	<b>Referral Hospital (N=371)</b>	<b>Secondary Hospital (N=98)</b>	<b>Private Hospital (N=69)</b>	<b>Overall (N=538)</b>	<b>P value</b>
advice on danger signs	64% (236/371)	14% (14/98)	64% (44/69)	55% (294/538)	<0.001
nutrition counselling	1% (3/371)	1% (1/98)	61% (42/69)	9% (46/538)	<0.001
STI counselling	0% (1/371)	0% (0/98)	52% (36/69)	7% (37/538)	
birth preparedness counselling	8% (29/371)	5% (5/98)	3% (2/69)	7% (36/538)	0.326
contraceptive counselling	1% (2/371)	0% (0/98)	48% (33/69)	7% (35/538)	<0.001
breastfeeding counselling	0% (1/371)	0% (0/98)	51% (35/69)	7% (36/538)	<0.001
advice on nausea and vomiting	21% (78/371)	3% (3/98)	49% (34/69)	21% (115/538)	<0.001
advice on constipation	1% (3/371)	0% (0/98)	12% (8/69)	2% (11/538)	<0.001
advice on back and pelvic pain	5% (18/371)	10% (10/98)	51% (35/69)	12% (63/538)	<0.001
advice on heartburn	0% (0/371)	0% (0/98)	0% (0/69)	0% (0/538)	n/a
advice on oedema and varicose veins	74% (275/371)	1% (1/98)	73% (50/69)	61% (326/538)	<0.001
advice on smoking	1% (4/371)	1% (1/98)	54% (37/69)	8% (42/538)	<0.001

Table 4: Women's perceptions of antenatal care.

	Referral Hospital (N=371)	Secondary Hospital (N=98)	Private Hospital (N=69)	Overall (N=538)	P value
<b>General antenatal care</b>					
Attending antenatal appointments is important	100% (370/371)	100% (98/98)	97% (67/69)	99% (535/538)	0.041
for own health	97% (360/370)	99% (97/98)	88% (59/67)	96% (516/535)	0.001
for baby's health	98% (361/370)	100% (98/98)	100% (67/67)	98% (526/535)	0.216
for incentive	35% (131/370)	43% (42/98)	2% (1/67)	33% (174/535)	<0.001
If No is it because you couldn't take time off work?	100% (2/2)	100% (1/1)	0% (0/2)	60% (3/5)	0.200
<b>Antenatal Appointments</b>					
Received enough antenatal appointments:					
Yes	57% (212/371)	67% (66/98)	81% (56/69)	62% (334/538)	<0.001
Want more	26% (97/371)	32% (31/98)	4% (3/69)	24% (131/538)	
Want less	5% (18/371)	0% (0/98)	7% (5/69)	4% (23/538)	
Unknown	12% (44/371)	1% (1/98)	7% (5/69)	9% (50/538)	
Time spent with health care provider (Median, IQR, Range)	10 (5, 15) (2, 30)	10 (5, 10) (2, 25)	15 (10, 20) (5, 30)	10 (5, 15) (2, 30)	<0.001
Happy with the duration of your appointments:					
Yes	63% (235/371)	64% (63/98)	68% (47/69)	64% (345/538)	0.877
Want longer	34% (126/371)	34% (33/98)	29% (20/69)	33% (179/538)	
Want shorter	1% (2/371)	0% (0/98)	1% (1/69)	1% (3/538)	
Unsure	2% (8/371)	2% (2/98)	1% (1/69)	2% (11/538)	
Opinion about level of privacy					
privacy was ok	15% (57/371)	9% (9/98)	77% (53/69)	22% (119/538)	<0.001
prefer more privacy	46% (172/371)	89% (87/98)	6% (4/69)	49% (263/538)	
there was a lot of privacy	38% (141/371)	2% (2/98)	17% (12/69)	29% (155/538)	
Opinion about your involvement in decisions made about your delivery plans					
actively participated in plans	29% (107/371)	1% (1/98)	29% (20/69)	24% (128/538)	<0.001
moderate participation	32% (118/371)	68% (67/98)	38% (26/69)	39% (211/538)	
involvement not high	39% (143/371)	28% (27/98)	32% (22/69)	36% (192/538)	
I do not know	1% (3/371)	3% (3/98)	1% (1/69)	1% (7/538)	
<b>Information received during pregnancy</b>					
Had own copy of notes	100% (371/371)	100% (98/98)	88% (61/69)	99% (530/538)	<0.001
If yes were they helpful	93% (343/371)	67% (65/97)	90% (55/61)	88% (463/529)	
Received information about the reasons why investigations are carried out	94% (350/371)	95% (93/98)	93% (64/69)	94% (507/538)	0.374
Information was Too little	36% (127/350)	67% (62/93)	55% (35/64)	44% (224/507)	
Information was Moderate	44% (155/350)	33% (31/93)	38% (24/64)	41% (210/507)	
There was a lot of information	16% (57/350)	0% (0/93)	6% (4/64)	12% (61/507)	
I do not know	3% (11/350)	0% (0/93)	2% (1/64)	2% (12/507)	
Received test results	99% (367/371)	99% (97/98)	99% (68/69)	99% (532/538)	0.266
Information was too little	46% (170/367)	90% (87/97)	50% (34/68)	55% (291/532)	
Moderate	34% (124/367)	9% (9/97)	37% (25/68)	30% (158/532)	
A lot of information	14% (50/367)	0% (0/97)	13% (9/68)	11% (59/532)	
I do not know	6% (23/367)	1% (1/97)	0% (0/68)	5% (24/532)	
Received written information after ANC appointments	59% (217/371)	14% (14/98)	65% (45/69)	51% (276/538)	<0.001
If yes useful?	93% (202/217)	86% (12/14)	89% (40/45)	92% (254/276)	0.195
If not would you like to	74% (114/155)	86% (71/83)	35% (8/23)	74% (193/261)	<0.001

Supplementary file 1: Nepal Antenatal Care Standards

Supplementary file 2: Data collection tool

Supplementary file 3: Structured interview form

Supplementary file 4: Composition of ANC completeness score

Supplementary file 5: Factors influencing attendance at 4 ANC visits

Supplementary file 6: Factors influencing satisfaction with ANC

Journal Pre-proof