Determinants and Impact of Health Insurance on Utilization of Maternal Health Care in Nepal: Evidence from Multiple Indicator Cluster Survey Data

Research Brief Prepared by

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Research Brief

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Nepal has been able to decrease pregnancy-related maternal mortality ratio (PMR) at the rate of reduction of 3.7% per year (from 543 per 100,000 live births in 1996 to 259 per 100,000 live births in 2016). However, there is lot more to do to attain sustainable development goal (SDG) to bring this further down to 70 per 100,000 live births by 2030. We can address this challenge by improving the quality and coverage of antenatal, delivery and postnatal care and by reducing socio-economic disparity in utilization of these maternal health services. We examined the level of utilization of the maternal health services (four or more visits for antenatal care, delivery by skilled birth attendants, delivery by caesarean section and postnatal care for baby) and related factors determining the disparity with the help of modified Andersen Behavioral Model. We also examined the impact of health insurance coverage on utilization of the maternal health services. The conceptual framework groups the factors determining utilization of maternal health services in to predisposing (age, education, and ethnicity), enabling (household wealth, place of residence, province, and health insurance coverage) and need (parity, fertility risk, prior use of maternal health services) factors. Multiple logistic regression analysis was performed among 1950 respondents giving birth in last two years preceding the Nepal Multiple Indicator Cluster Survey conducted in 2019. Key findings of the analysis is summarized below. We also provided policy recommendations to improve utilization of the maternal and newborn health services in Nepal.

Key findings:

1. Over three-fourth (78%) women received four or more antenatal care (ANC), 77% women gave birth with support from skilled birth attendants (SBA), mode of delivery was caesarean section (CS) among 15% women, and 68% women received postnatal care (PNC) for their baby within 48 hours of delivery.
2. Education was the strongest predisposing factor predicting ANC 4 visit, delivery by SBA and PNC for baby, while ethnicity was associated with ANC 4 visit, delivery by SBA and delivery by caesarean section (CS) and age was associated with delivery by CS and PNC for baby.
3. Household wealth was most important enabling factor for predicting all the four maternal health services, while place of residence significantly predicted only for delivery by SBA and health insurance coverage was associated only with delivery by SBA and CS.
4. Parity significantly predicted ANC 4 visit, delivery by SBA and delivery by CS, while fertility risk was independent predictor for ANC 4 visit and delivery by SBA.
5. At least one ANC was associated with delivery by SBA and CS as well as PNC for baby and institutional delivery was significantly associated with PNC for baby.
6. Impact of health insurance coverage was 10% for delivery by SBA and 5% for delivery by CS but did not predict antenatal and postnatal care significantly.

Background

Maternal mortality (MM) continues to be the major cause of death among women of reproductive age in many developing countries, more than 80% of which could be prevented. Global maternal mortality ratio (MMR) has been dropped by 38% over the last two decades from 342 per 100,000 live birth (LB) in 2000 to 211 per 100,000 LB in 2017 [1]. In Nepal, pregnancy related mortality ratio (PMR) has been decreased substantially from 543 per 100,000 LB in 1996 [2] to 259 per 100,000 LB in 2016 [3]. This is equivalent to the annual rate of reduction (ARR) of 3.7% per year. To achieve sustainable development goal (SDG) target of 70 per 100,000 LB in 2030 [4], Nepal has to increase the average ARR of MMR to 9.3% per year during 2016 and 2030. To address this challenge, improvement in the quality and coverage of ANC, delivery by SBA and PNC are required. For this, understanding about the socio-demographic determinants of maternal and newborn health services is an important programmatic initiative. This assessment is an examination of the determinants of four important aspects of maternal health care seeking (ANC 4 visit, SBA delivery, CS delivery and PNC for baby) in Nepal using nationally representative data from the 2019 Nepal Multiple Indicator Cluster Survey (NMICS).

Analytic framework

Based on the previous literature and with the help of Andersen Behavior Model of health service use [5] and framework for determinants of maternal health care seeking used by Mbugua and MacQuarrie (2018) [1], we developed analytic framework for this study. The framework is developed to examine variations in utilization of maternal health services by individual women across different socio-demographic characteristics. The framework assumes that decisions on use of the maternal health services (outcome factors) are influenced by various determinant factors, which are grouped into three factors called predisposing, enabling and need factors. Predisposing factors include demographic, social structural (age, education and ethnicity) variables. These demographic variables are intimately related to health and illness [1]. Different age groups have different types of illness and require different pattern of medical care. The social structure variables such as education and ethnicity suggest the life style and status of the individual in the society, which lead them to use particular health care [33].

Although individual may be predisposed to use health service, some means must be available for them to do so. A condition, which permits a family to act on a value or satisfy a need regarding health service use, is defined as enabling. Enabling conditions make health service resources available to the individual. Household income, health insurance coverage, place of residence and provinces are defined as enabling factors [6]. Presence of predisposing and enabling conditions help an individual or his family perceive need for the use of health services. The need factor consist of both perceived need and evaluated need. Perceived need are self-judgement of urgency and operationalized through self-reported symptom, perception of disability or a self-support of owns general state of health. Evaluated needs are those based on a physical exam, clinical diagnosis or external objective criteria of the need for medical care [6]. We have considered the parity, fertility risk and previous maternal health care experience as need for factors for this analysis.

A conceptual framework (Figure 1) developed based on Andersen behavioral model was used to examine the factors determining four maternal and newborn health care (ANC 4 visits, SBA delivery, CS delivery and PNC for baby).

Figure 1. Conceptual framework for examining determinant of maternal health care in Nepal: Modified from the Andersen Behavioral Model of Health Services Use (Andersen and Newman 2005)

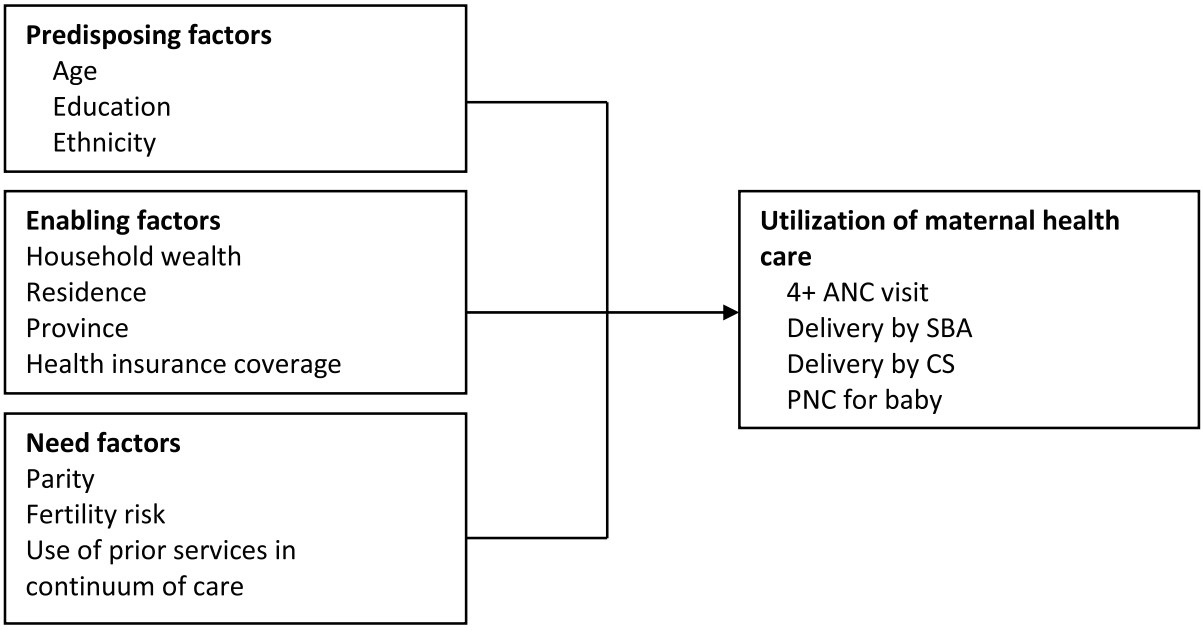
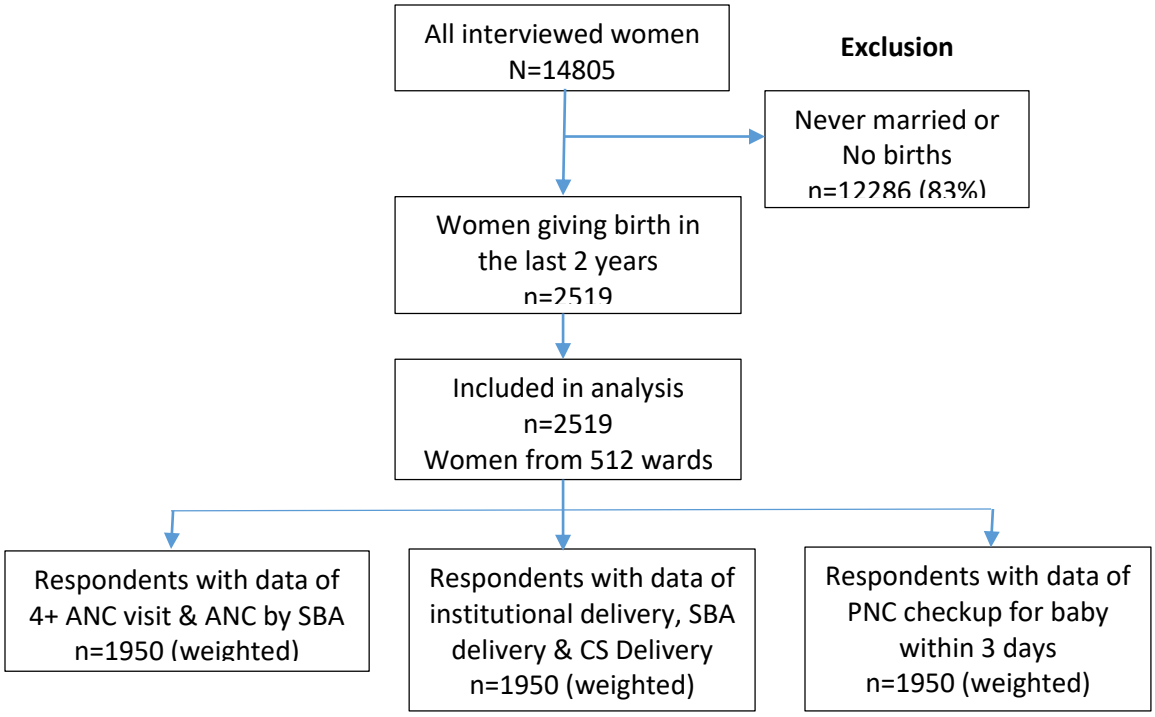


Figure 2. Figure 2. Sample selection flow diagram: ANC, delivery and PNC



Methodology

This assessment used data from 2019 NMICS. NMICS 2019 survey used a standard questionnaire, based on multi-stage cluster sampling design to gather nationally representative data. More specific information on the sampling design can be explored in NMICS 2019 final report [7]. Figure 2 shows the sample selection criteria used for this assessment. The respondents for this assessment were 2519 women of reproductive age 15-49 year with live births in last two years preceding the survey. Final weighted sample used for the analysis were 1950. The sample for NMICS 2019 was designed to provide estimates at the national level and urban-rural of seven provinces.

The operational definition of the outcome and independent variables and the corresponding population base are summarized in Table 1.

Table1. Description of outcome and independent variables

Indicator	Description	Population base
Outcome variables		
ANC 4 or more visit	Women who have at least four ANC visits during their most recent pregnancy	Women age 15-49 year with a live birth in the two years preceding the survey
Delivery by SBA	Women who were assisted by Doctor, Nurse of Midwives for their most recent pregnancy	Women age 15-49 year with a live birth in the two years preceding the survey
Delivery by CS	Women who were delivered by CS for their most recent pregnancy	Women age 15-49 year with a live birth in the two years preceding the survey
Postnatal care for baby	Women who received PNC checkup for their baby after the	Women age 15-49 year with a live birth in the two years preceding the survey

	delivery before leaving health facility	
Independent variables		**Variable grouping**
Predisposing factors		
Age of woman	Completed age of women at the time of survey	1) <20 2) 20-34 3) 35-49
Woman's education	Completed level of education of woman	0) None 1) Basic, grade(1-8) 2) Secondary, grade(9-12) 3) Higher
Ethnicity of head of household	Ethnic categories that an individual falls into	1) Bahun/Kshetri/Thakuri 2) Janjati (including Newar) 3) Dalit 4) Other (including Muslim)
Enabling factors		
Household wealth	Quintiles based on household wealth index	1) Poorest 2) Second 3) Middle 4) Fourth 5) Richest
Place of residence	Urban and rural	1) Urban 2) Rural
Province	Geographical origin of the women	1) Province1 2) Madhesh 3) Bagmati 4) Gandaki 5) Lumbini 6) Karnali 7) Sudurpaschim
Health insurance coverage	Women was covered health insurance	0) No 1) Yes
Need factor		
Parity	Number of children ever born	1) One or less 2) Two or more
Fertility risk	Women in high risk group (age <20 and >=35 and CEB>= 4)	0) No 1) Yes
Use of prior services in continuum of care	Received antenatal care (at least one)	0) No 1) Yes
	Institutional delivery	0) No 1) Yes

Data analysis

Data are analyzed using Stata SE15 [8]. Statistics are presented mainly as frequency, percentages, and 95% confidence interval (CI). We fitted an unadjusted and adjusted logistic regression model to assess whether there are any association between each of the four outcomes (ANC 4 visit, SBA delivery, CS delivery and PNC for baby) and the independent variables. The model for each outcome specify a common set of predisposing, enabling and need factors.

In our analysis, we adjusted for the complex sampling design using the weights provided in the women's data set in 2019 NMICS, which account for sampling probability and non-response. We also measured

the impact of health insurance coverage on four-outcome variable using statistical simulation. In the simulation approach, the predicted probabilities of women using four maternal health services were compared under alternative scenarios concerning health insurance coverage for respective maternal health services, when the observed effects of the other covariates used in the analysis were held constant at their observed level. In the base line simulation, the value of the health insurance coverage was set at their observed levels. In the second simulation, the health insurance coverage were set equal to zero (0), simulating the scenario of minimum health insurance impact (that is none of the women included in the sample has health insurance coverage). In the final simulation the health insurance coverage was set to one (1) to represent their maximum theoretical value (that is all the women included in the sample had health insurance coverage), to assess hypothetical effects of an optimal health insurance impact. Difference of the predicted probability of maternal health care between the second and final simulation was considered as impact of health insurance for maternal health care [9].

Key finding 1. Among predisposing factors, women's Education was found to be a strong positive predictor of ANC 4 plus visit, SBA delivery and PNC for baby but it is not associated with CS delivery

Women with higher education were 5.3 times more likely to get ANC 4 visit, 4.9 times more likely to receive delivery service by SBA and 1.9 times more likely to use PNC for baby compared to women with no education

Key finding 2. Women's age was significant predictor for CS delivery and PNC for baby but it was not associated with ANC 4 plus visit and SBA delivery

Older women were more likely to receive delivery service by CS compared to younger women. For example women aged 20-34 year had 2.4 times and women aged 35-49 year had 4.2 times higher odds of CS delivery compared to women aged below 20 years. Similarly, women aged 35-49 year were 1.6 times more likely to receive PNC for baby

Key finding 3. Women from Brahmin/Kshetri/Thakuri ethnic groups were relatively advantaged in terms of utilizing ANC 4 visit, SBA delivery and CS delivery compared to Dalit, Janjati (including Newar) and other (including Muslim) women.

Women living in household with other (including Muslim) ethnicity had 0.7 times lower odds of getting ANC 4 plus visit compared to Brahmin/Kshetri/Thakuri women. Similarly, Janjati (including Newar) and Other (including Muslim) had respectively 0.7 times and 0.5 times lower odds of getting SBA delivery. Likewise, Dalit and Other (including Muslim) women had respectively 0.4 times and 0.6 times lower odds of CS delivery compared to Brahmin/Kshetri/Thakuri women. However, there was no significant difference in using PNC for baby across the ethnic groups

Key finding 4. Among enabling factors, household wealth was found to be most consistent and strong positive predictor for all four maternal and newborn health care.

Women belonging to richest household were 5 times more likely to receive ANC 4 visit, 9.2 times more likely to get SBA delivery, 7.4 times more likely to get CS delivery and 2.2 times more likely to get PNC for their baby compared to women belonging to poorest household wealth.

Key finding 5. Urban-rural difference was observed only for SBA delivery but not in getting other maternal and newborn health services.

Women living in rural areas were 0.6 times less likely to get SBA delivery compared to women living in urban areas.

Key finding 6. There was significant provincial variation in using maternal health service. Madhesh province was disadvantaged and Sudurpaschim province was better off compared to Bagmati province in ANC 4 visit and SBA delivery. Lumbini province was disadvantaged and Province 1 was better compared to Bagmati in CS delivery. Province 1 was better compared to Bagmati in PNC for baby

Women living in Madhesh province were 0.3 times less likely to get ANC 4 visit and 0.5 times less likely to receive SBA delivery compared to women living in Bagmati province. The odds of ANC 4 visit was 2.3 times higher and the odds of SBA delivery was 2.8 times higher in Province 7 compared to Bagmati province. The odds of CS delivery was 2.2 times higher in Province 1 and 0.6 times lower in Lumbini province compared to Bagmati province. The odds of getting PNC for baby was 1.9 times higher in Province 1 compared to Bagmati.

Key finding 7. Health insurance coverage as enabling factor was significantly associated only with SBA delivery and CS delivery.

Women covered by health insurance were 2.5 times more likely to receive SBA delivery and 1.6 times more likely to receive CS delivery compared to women not covered by health insurance. Impact of health insurance was 10% for SBA delivery and 5% for CS delivery.

Key finding 8. Parity as need factor was consistently negatively associated with ANC 4 plus visit, SBA delivery and CS delivery but not with PNC for baby

Women with two or more children ever born were 0.8 times less likely to get ANC 4 plus visit, 0.4 times less likely to receive SBA delivery and 0.7 times less likely to had CS delivery compared to women with one or less children ever born.

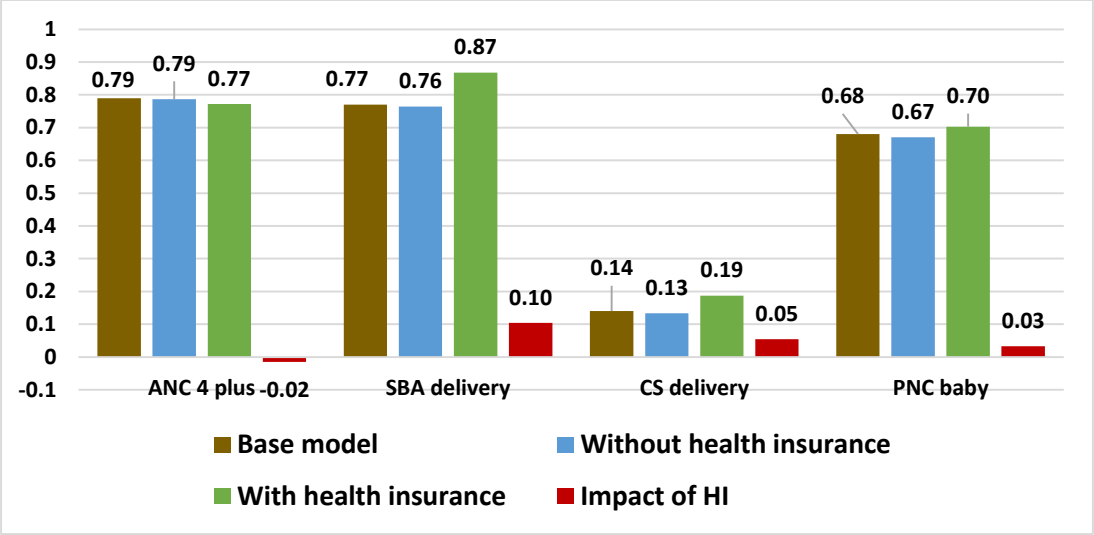
Key finding 9. Fertility risk, a composite measure generated from two or more parity, age less than 20 year and age more than 34 year was found to be significant positive determinant for ANC 4 plus visit and SBA delivery but not associated with CS delivery and PNC for baby.

Women belonging to fertility risk group were 1.7 times more likely to receive ANC 4 plus visit and 1.4 times more likely to get SBA delivery compared to women not belonging to fertility risk group.

Key finding 10. Independent of the other factors, use of at least one ANC was direct determinant of SBA delivery, CS delivery and PNC for baby. Similarly, institutional delivery is direct determinant for PNC for baby

Women receiving at least one ANC during pregnancy had 9 times higher odds of SBA delivery, 3.1 times higher odds of CS delivery and 3 times higher odds of PNC for baby compared to those who did not receive any ANC during pregnancy. Similarly, women giving birth in health facility were 34.5 times more likely to get PNC for baby compared to those who did not give birth in health facility.

Figure 3 Predicted probability of maternal health care, base model, with health insurance coverage and without health insurance coverage in 2019 NMICS, (N=1950)



Limitations:

This study has few limitations. Although the data used in the analysis were nationally representative, the analysis used cross-sectional data and the survey included only limited variables, the results therefore cannot establish causality but it shows association between the variables in the analysis. In this survey, the questions were asked to women with a live birth in two years before the survey, which might introduce recall bias. Unmeasured predisposing, enabling and need based factors not included in the analysis might affect coverage of the four maternal health services. Medical and health facility related factors that might influence maternal health were not collected in survey.

Policy Recommendations

SN	Key findings	Recommendations
1	Women with at least basic level of education were more likely to utilize ANC 4 visit, SBA delivery and PNC for baby	• GoN should implement education and health promotion interventions intensively, particularly in the areas where literacy is low • Ministry of Education should address barriers to education faced by women • Ministry of Health and Population should create awareness about benefit of seeking adequate ANC, SBA delivery and timely PNC service for women and child in these areas
2	Household wealth was strongest predictor, as it was independently associated with all four maternal health outcomes	• GoN should develop a cost effective intervention to improve financial status of women to advance their maternal health need among poor and disadvantaged communities • Implement women's empowerment program such as, income generation activities and social security scheme to help women to fight against poverty • Remove barrier of getting timely and adequate incentive provided to women through Aama program • Strictly implement Aama program as per the guideline

		• Create awareness about the provision of maternity incentive scheme provided through Aama program among the poor and disadvantaged communities
3	Having health insurance has been found as an important enabling resource, which had positive association with SBA and CS delivery	• Expand health insurance program to all the districts and communities to increase the population covered with health insurance.
4	Dalit, Muslim and Janjatis were less likely to utilize ANC 4 visit, SBA delivery and CS delivery compared to Brahmin/Kshetri/Thakuri	• Increase access to quality maternal health services to these ethnic group by removing cultural, racial and ethnic barrier • Health care providers should provide respectful maternity care to these disadvantaged groups • Implement Social mobilization and community awareness campaign to change the existing discriminating social and cultural norms towards Dalit and Muslim • Empower Dalit and Muslim women through education and income generating activities
5	Women living in rural area and Madhesh Province were relatively disadvantaged towards utilization of maternal health service in Nepal	• Improve quality of maternal health services provided through the health facilities of rural and disadvantaged provinces • Implement innovative programs such as relocation of hospitals, birthing centers and maternity waiting homes at strategic places • Strengthen health system with effective supply side interventions such as supply of infrastructure, logistic and trained service providers as per minimum service standards • Create community awareness about birth preparedness through mothers groups and community health volunteers to increase demand of maternal health services in these areas
6	Multiparous women were less likely to utilize maternal health services such as ANC 4 plus visit, SBA and CS delivery	• To improve utilization of maternal health services program interventions should also pay more attention to older and multiparous women.

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Annexes

Annex 1. Sample Profile: Percent distribution of socio-demographic characteristics of respondents (n=1,950)

Characteristics	N	Percent
Predisposing factors		
Mother's age		
<20	201	10.3
20-34	1610	82.5
35-49	139	7.2
Mother's education		
none	405	20.8
basic grade(1-8)	600	30.7
secondary grade(9-12)	775	39.8
higher	171	8.8
Ethnicity		
Bahun/Kshetri/Thakuri	540	27.7
Janjati (including Newar)	680	34.8
Dalit	305	15.7
Other (including Muslim)	425	21.8
Enabling factors		
Household wealth		
Poorest	442	22.7
Second	414	21.2
Middle	384	19.7
Fourth	384	19.7
Richest	327	16.7
Residence		
Urban	1277	65.5
Rural	673	34.5
Province		
Province-1	306	15.7
Madhesh	417	21.4
Bagmati	384	19.7
Gandaki	153	7.9
Lumbini	371	19.0
Karnali	132	6.8
Sudurpaschim	187	9.6
Health insurance coverage		
no	1856	95.2
yes	94	4.8
Need factors		
Parity		
one or less	851	43.7
two or more	1099	56.4
Fertility risk		
no	479	24.6
yes	1471	75.4
Received ANC		
no	87	4.5
yes	1863	95.5
Institutional delivery		
no	438	22.5
yes	1512	77.5
Total	**1950**	**100.0**

Annex 2. Distribution ANC 4 visit across predisposing, enabling, and need factors, 2019 NMICS (n=1950)

Characteristics	N	Percent	95% CI
Predisposing factors			
Mother's age			
<20	201	78.5	(72.3-83.6)
20-34	1,610	78.3	(76.2-80.2)
35-49	139	70.9	(62.8-77.8)
Mother's education			
None	405	53.4	(48.6-58.3)
Basic grade(1-8)	600	76	(72.5-79.3)
Secondary grade(9-12)	775	87.5	(84.9-89.6)
Higher	171	97.7	(93.9-99.1)
Ethnicity			
Bahun/Kshetri/Thakuri	540	87.6	(84.5-90.1)
Janjati (including Newar)	680	83.7	(80.7-86.3)
Dalit	305	71.2	(65.9-76.0)
Other (including Muslim)	425	60.7	(55.9-65.2)
Enabling factors			
Household wealth			
Poorest	442	69.6	(65.2-73.7)
Second	414	73.3	(68.8-77.4)
Middle	384	75.4	(70.8-79.4)
Fourth	384	80.2	(75.9-83.9)
Richest	327	94.5	(91.4-96.5)
Place of Residence			
Urban	1,277	80.7	(78.4-82.7)
Rural	673	72.3	(68.8-75.6)
Province			
Province-1	306	80.3	(75.5-84.4)
Madhesh	417	56.8	(52.0-61.5)
Bagmati	384	87.2	(83.5-90.2)
Gandaki	153	91.2	(85.6-94.8)
Lumbini	371	80.7	(76.4-84.4)
Karnali	132	72.3	(64.0-79.2)
Sudurpaschim	187	88	(64.0-79.2)
Covered by health insurance			
No	1,856	77.2	(75.2-79.0)
Yes	94	89.8	(81.9-94.5)
Need factors			
Parity			
One or less	851	84	(81.4-86.3)
Two or more	1,099	73	(70.3-75.5)
Fertility risk			
No	479	67.5	(63.2-71.6)
Yes	1,471	81.1	(79.0-83.0)
Total	**1,950**	**77.8**	**(75.9-79.6)**

Annex 4. Distribution of SBA delivery across predisposing, enabling, and need factors, 2019 NMICS (n=1950)

Characteristics	N	Percent	95% CI
Predisposing factors			
Mother's age			
<20	201	79.7	(73.6-84.7)
20-34	1,610	77.4	(75.3-79.4)
35-49	139	71.3	(63.2-78.2)
Mother's education			
None	405	53.0	(48.1-57.8)
Basic grade(1-8)	600	75.3	(71.6-78.6)
Secondary grade(9-12)	775	86.7	(84.2-89.0)
Higher	171	98.3	(94.7-99.4)
Ethnicity			
Bahun/Kshetri/Thakuri	540	87.1	(84.0-89.7)
Janjati (including Newar)	680	79.4	(76.2-82.3)
Dalit	305	71.5	(66.2-76.3)
Other (including Muslim)	425	65.2	(60.6-69.6)
Enabling factors			
Household wealth			
Poorest	442	57.7	(53.0-62.2)
Second	414	72.4	(67.9-76.5)
Middle	384	80.5	(76.2-84.2)
Fourth	384	87.0	(83.3-90.0)
Richest	327	94.4	(91.3-96.4)
Place of Residence			
Urban	1,277	83.2	(81.1-85.2)
Rural	673	65.8	(62.1-69.3)
Province			
Province-1	306	79.2	(74.3-83.4)
Madhesh	417	63.6	(58.9-68.1)
Bagmati	384	86.6	(82.8-89.6)
Gandaki	153	86.4	(80.1-91.0)
Lumbini	371	77.2	(72.7-81.2)
Karnali	132	65.8	(57.3-73.3)
Sudurpaschim	187	85.5	(79.7-89.9)
Covered by health insurance			
No	1,856	76.3	(74.3-78.2)
Yes	94	95.3	(88.7-98.2)
Need factors			
Parity			
One or less	851	87.2	(84.8-89.3)
Two or more	1,099	69.5	(66.7-72.1)
Fertility risk			
No	479	68.8	(64.5-72.7)
Yes	1,471	80.0	(77.8-81.9)
Received ANC			
No	87	16.9	(10.4-26.2)
Yes	1,863	80.1	(78.2-81.8)
Total	**1,950**	**77.2**	**(75.3-79.0)**

Annex 5. Distribution of CS delivery across predisposing, enabling, and need factors, 2019 NMICS (n=1950)

Characteristics	N	Percent	95% CI
Predisposing factors			
Mother's age			
<20	201	9.1	(5.8-14.0)
20-34	1610	15.4	(13.7-17.2)
35-49	139	23.0	(16.8-30.7)
Mother's education			
None	405	8.3	(6.0-11.4)
Basic grade(1-8)	600	10.9	(8.6-13.6)
Secondary grade(9-12)	775	18.6	(16.0-21.5)
Higher	171	32.3	(27.7-39.7)
Ethnicity			
Bahun/Kshetri/Thakuri	540	18.9	(15.8-22.4)
Janjati (including Newar)	680	17.4	(14.7-20.4)
Dalit	305	8.4	(5.7-12.0)
Other (including Muslim)	425	12.4	(9.6-15.9)
Enabling factors			
Household wealth			
Poorest	442	5.2	(3.5-7.7)
Second	414	8.1	(5.8-11.2)
Middle	384	11.7	(8.9-15.4)
Fourth	384	21.1	(17.3-25.5)
Richest	327	35.5	(30.4-40.8)
Place of Residence			
Urban	1277	19.1	(17.1-21.4)
Rural	673	8.0	(6.2-10.3)
Province			
Province-1	306	22.3	(18.0-27.3)
Madhesh	417	12.1	(9.3-15.6)
Bagmati	384	24.5	(20.4-29.0)
Gandaki	153	19.2	(13.7-26.2)
Lumbini	371	9.0	(6.5-12.4)
Karnali	132	7.0	(3.7-12.8)
Sudurpaschim	187	7.1	(4.2-11.7)
Covered by health insurance			
No	1856	14.7	(13.1-16.4)
Yes	94	27.5	(19.4-37.4)
Need factors			
Parity			
One or less	851	17.9	(15.5-20.7)
Two or more	1,099	13.2	(11.4-15.4)
Fertility risk			
No	479	12.2	(9.5-15.4)
Yes	1471	16.3	(14.5-18.3)
Received ANC			
No	87	2.3	(1.0-8.7)
Yes	1863	15.9	(14.3-17.6)
Total	1950	15.3	(13.8-17.0)

Annex 6. Distribution of PNC for baby across predisposing, enabling, and need factors, 2019 NMICS (n=1950)

Characteristics	N	Percent	95% CI
Predisposing factors			
Mother's age			
<20	201	65.9	(59.2-72.2)
20-34	1,610	68.6	(66.3-70.8)
35-49	139	66.5	(58.3-73.9)
Mother's education			
None	405	46.4	(41.6-51.3)
Basic grade(1-8)	600	64.4	(60.5-68.1)
Secondary grade(9-12)	775	77.4	(74.3-80.2)
Higher	171	90.9	(85.6-94.4)
Ethnicity			
Bahun/Kshetri/Thakuri	540	75.7	(71.9-79.2)
Janjati (including Newar)	680	69.0	(65.5-72.4)
Dalit	305	63.6	(58.1-68.8)
Other (including Muslim)	425	60.4	(55.7-64.9)
Enabling factors			
Household wealth			
Poorest	442	48.0	(43.4-52.7)
Second	414	64.4	(59.6-68.8)
Middle	384	70.1	(65.3-74.4)
Fourth	384	76.3	(71.8-80.3)
Richest	327	88.5	(84.5-91.5)
Place of Residence			
Urban	1,277	73.7	(71.2-76.1)
Rural	673	57.6	(53.9-61.3)
Province			
Province-1	306	75.0	(69.8-79.5)
Madhesh	417	56.8	(52.0-61.5)
Bagmati	384	79.2	(74.8-83.0)
Gandaki	153	79.7	(72.6-85.4)
Lumbini	371	64.9	(59.9-69.6)
Karnali	132	49.0	(40.6-57.5)
Sudurpaschim	187	70.1	(63.1-76.2)
Covered by health insurance			
No	1,856	67.1	65.0-69.2)
Yes	94	88.1	(79.9-93.3)
Need factors			
Parity			
One or less	851	75.7	(72.7-78.5)
Two or more	1,099	62.3	(59.4-65.1)
Fertility risk			
No	479	59.7	(55.3-64.0)
Yes	1,471	70.9	(68.5-73.2)
Received ANC			
No	87	13.4	(7.7-22.2)
Yes	1,863	70.7	(68.6-72.7)
Institutional delivery			
No	438	9.2	(6.8-12.2)
Yes	1,512	85.1	(83.4-87.0)
Total	**1,950**	**68.2**	**(66.1-70.2)**

Annex 8. Adjusted odds ratios for ANC 4 visit & delivery by SBA: Results from binary logistic regressions, 2019 NMICS (n=1,950)

	ANC 4 visit		Delivery by SBA	
Characteristics	**odds ratio**	**95% CI**	**odds ratio**	**95% CI**
Predisposing factors				
Mother's age				
<20	Ref.		Ref.	
20-34	0.7	(0.4 - 1.1)	0.9	(0.5-1.6)
35-49	1.1	(0.7 - 1.8)	1.5	(0.8-2.8)
Mother's education				
None	Ref.		Ref.	
basic grade(1-8)	1.6***	(1.2 - 2.1)	1.3*	(1.0-1.8)
secondary grade(9-12)	2.5***	(1.8 - 3.6)	1.8***	(1.3-2.5)
higher	5.3***	(2.5 - 11.4)	4.9***	(2.0-12.4)
Ethnicity of head of household				
Bahun/Kshetri/Thakuri	Ref.		Ref.	
Janjati (including Newar)	1.0	(0.7 - 1.4)	0.7**	(0.5-0.9)
Dalit	0.9	(0.6 - 1.3)	0.8	(0.5-1.1)
Other (including Muslim)	0.7*	(0.5 - 1.0)	0.5***	(0.4-0.8)
Enabling factors				
Household wealth				
Poorest	Ref.		Ref.	
Second	2.1***	(1.5 - 3.0)	2.6***	(1.8-3.8)
Middle	2.5***	(1.7 - 3.6)	5.2***	(3.0-7.0)
Fourth	2.4***	(1.6 - 3.7)	6.1***	(3.5-9.1)
Richest	5.0***	(2.6 - 9.4)	9.2***	(4.1-15.3)
Place of residence				
Urban	Ref.		Ref.	
Rural	1.0	(0.7 - 1.3)	0.6***	(0.5-0.8)
Province				
Province-1	0.8	(0.5 - 1.2)	1.1	(0.7-1.8)
Madhesh	0.3***	(0.2 - 0.5)	0.5***	(0.3-0.8)
Bagmati	Ref.		Ref.	
Gandaki	1.5	(0.9 - 2.6)	1.2	(0.7-2.0)
Lumbini	0.9	(0.5 - 1.4)	0.9	(0.5-1.5)
Karnali	1.1	(0.6 - 1.9)	1.1	(0.6-2.1)
Sudurpaschim	2.3***	(1.3 - 4.1)	2.8***	(1.5-5.3)
Covered by health insurance				
No	Ref.		Ref.	
Yes	0.9	(0.5 - 1.7)	2.5**	(1.1-5.9)
Need factors				
Parity				
One or less	Ref.		Ref.	
Two or more	0.8**	(0.6 – 1.0)	0.4***	(0.3-0.6)
Fertility risk				
No	Ref.		Ref.	
Yes	1.7***	(1.2 - 2.4)	1.4*	(1.0-1.9)
Received ANC				
			Ref	
			9.0***	(5.3-15.5)

**** p<0.01, ** p<0.05, * p<0.1*

Annex 8. Adjusted odds ratios for Delivery by CS & PNC for baby: Results from binary logistic regressions, 2019 NMICS (n=1,950)

	ANC 4 visit		Delivery by SBA	
Characteristics	**odds ratio**	**95% CI**	**odds ratio**	**95% CI**
Predisposing factors				
Mother's age				
<20	Ref.		Ref.	
20-34	2.4**	(1.0-5.5)	1.1	(0.6-1.9)
35-49	4.2***	(2.1-8.4)	1.6*	(0.9-3.0)
Mother's education				
None	Ref.		Ref.	
basic grade(1-8)	1.0	(0.7-1.6)	1.5**	(1.1-2.2)
secondary grade(9-12)	1.1	(0.7-1.8)	1.7***	(1.1-2.4)
higher	1.4	(0.7-2.5)	1.9**	(1.1-3.4)
Ethnicity of head of household				
Bahun/Kshetri/Thakuri	Ref.		Ref.	
Janjati (including Newar)	0.9	(0.7-1.2)	0.8	(0.6-1.1)
Dalit	0.4***	(0.3-0.7)	1.3	(0.9-1.9)
Other (including Muslim)	0.6***	(0.4-0.9)	1.2	(0.8-1.8)
Enabling factors				
Household wealth				
Poorest	Ref.		Ref.	
Second	2.0***	(1.2-3.3)	1.4*	(1.7-3.1)
Middle	2.7***	(1.6-4.5)	1.6**	(1.1-2.4)
Fourth	4.3***	(2.6-7.4)	1.5**	(1.1-2.3)
Richest	7.4***	(4.1-13.6)	2.2***	(1.3-3.8)
Place of residence				
Urban	Ref.		Ref.	
Rural	0.8	(0.6-1.1)	1.0	(0.8-1.3)
Province				
Province-1	2.2***	(1.5-3.4)	1.9**	(1.2-3.2)
Madhesh	0.9	(0.5-1.5)	0.8	(0.5-1.3)
Bagmati	Ref.		Ref.	
Gandaki	1.3	(0.8-2.0)	1.6	(0.8-3.0)
Lumbini	0.6**	(0.4-0.9)	0.7	(0.5-1.1)
Karnali	1.1	(0.6-2.1)	0.7	(0.4-1.3)
Sudurpaschim	0.7	(0.4-1.2)	1.0*	(0.6-1.7)
Covered by health insurance				
No	Ref.		Ref.	
Yes	1.6**	(1.1-2.4)	1.3	(0.7-2.5)
Need factors				
Parity				
One or less	Ref.		Ref.	
Two or more	0.7**	(0.5-1.0)	1.1	(0.9-1.5)
Fertility risk				
No	Ref.		Ref.	
Yes	0.9	(0.5-1.7)	1.1	(0.7-1.7)
Received ANC				
	Ref.		Ref.	
	3.1*	(0.9-10.8)	3.0***	(1.5-5.8)
Institutional delivery				
No			Ref.	
Yes			34.5***	(24.5-48.6)

**** p<0.01, ** p<0.05, * p<0.1*