International Journal of Clinical Medical Research

The impacts of antenatal care on maternal mortality among women aged 15-49 years old in Afghanistan

Abdullah Faizi[1,2], Sohee Park[1]

Correspondence:
Abdullah Faizi
Department of global health policy and financing, Division of global health policy and financing program, the graduate school of public health, Yonsei University, Seoul, 03722, South Korea
Email: Hefd.faizi@gmail.com

1 Department of global health policy and financing, Division of global health policy and financing program, the graduate school of public health, Yonsei University, Seoul, 03722, South Korea

2 Ministry of Public health Afghanistan Health Economics and financing program officer, Sehat-e-Ama Square, Wazir Akbar khan Road, Kabul, Afghanistan

Volume number 3
Issue number 2
Pages 37-44

10.61466/ijcmr3020005

Received: 07.01.2025
Accepted: 03.03.2025
Published: 04.03.2025
0nline: 01.04.2025

Abstract

Background: Afghanistan is among the countries which have the highest maternal mortality in the world. The inadequate utilization of antenatal care (ANC) services increased the risk of maternal mortality in Afghanistan.

The goal of this study is to understand key associated factors with antenatal care and its impact on maternal mortality in Afghanistan. It also elaborates on the impacts and utilization of antenatal care services among women in Afghanistan.

Methods: For this research, data from the Afghanistan Demographic Health Survey 2015 has been used, the study participants were 18139 reproductive-aged women. The relevant variable was chosen, and data was analyzed for general descriptive, Chi-square, and logistic regression tests. Analysis was carried out using JAMOVI 2.2.5. **Results:** The overall number of ANC visits among women was 10040 (55.4%) and 8099 women (44.6%) never used ANC visits. The utilization of one ANC visit was 11.2% and two ANC visits were most frequent among women with 17%. Women who undertook three or four and more than four were 11.6%, 7.1%, and 4.3% respectively. In this study, we examined the socio-economic and demographic backgrounds of 18139 reproductive-aged women attending ANC clinics. The highest age group (30-39 years) represented 32.3% (OR=0.947, 95%CI: 0.885-1014), followed by the age group of over 40 which was 25.1% (OR=0.919, 95%CI: 0854-0.990) compared to age group under 29 among women. According to residency, urban areas represented 77.2% of the total (18139) women, and 22.8% were from rural areas (OR=1.097, 95%CI: 1.023-1.177) compared to urban areas. In terms of education, 86% of women had received no education, 6.5% received primary education (OR=1.159, 95%CI: 1.020-1.316), the number of secondary educations was 5.7% with (OR=0.981, 95%CI: 0.828-1.163) and higher education was 1.8%with (OR=0.917, 95%CI: 0.712-1.181) compared to not education women group in Afghanistan. ANC visits were used more frequently by Pashtuns, 38.8%, followed by Tajiks, 35.1%. (OR=0.192,95% CI:0.852-0.977), Uzbek was 10% (OR=1.224, 95% CI:0.869-1.068) followed by Hazara at 6.6% (OR=0.963, 95% CI:0.869-1.068) the Turkmen at 5.4% (OR=2.571, 95% CI:2.208-2.924), the percentage by Aimaq was 1.2% (OR=1.574, 95% CI:1.196-2.072) and for Baloch 0% (OR=1.917, 95% CI:0.320-11.4812.072) followed by others with 2.6% (OR=0.910, 95% CI:0.753-1.099) compared to Pashtun ethnic group. For media exposure the number of not listening to the radio per week was 58.1% and one time per week was 16% (OR=0.974, 95%CI: 0.897-1.058), for two times per week it was 25.8% (OR=0.854, 95%CI: 0.797-0.915) and more than three plus times per week was 0.1% (OR=0.970, 95%CI: 0.402-2.343) compared with the zero time of listening to radio per week. Also, for not watching TV was 56% and one time per week was 11.3% (OR=0.888, 95%CI: 0.807-0.977) also for two times per week it was 32.6% (OR=0.913, 95%CI: 0.856-0.974) and the number of three plus times of watching TV was 0.2% OR=1.188, 95%CI: 0.617-2.286) compared with zero time of watching the TV.

Conclusion: The most important key associated factors were residency, education level, ethnic groups, and media exposure. We suggest that the Afghanistan government and with international community improve their health policy, increasing accessibility of health care and equal distribution of health services in rural and urban areas in Afghanistan.

Keywords: Antenatal Care, Afghanistan, Maternal Mortality, Maternal and Child Health.

Introduction

According to the demographic health survey of Afghanistan in 2015, the maternal mortality ratio (MMR) was 365 per 100000 in 1990. It gradually decreased to 216 per 100000 in 2015, however, the Sustainable Development Goals (SDGs) set the target for the MMR to 70 per 100000 live births. One of the global goals of the United Nations' SDGs is to cover early ANC to cut down on maternal and neonatal mortality by 2030. The World Health Organization (WHO) statistics show that MMR in 2015 was 239 per 100000 live births in developing countries and 12 per 100000 live births in developed countries [1, 2]

Based on the Ministry of Public Health (MoPH) remarks, acts of violence like suicide bombings, and armed conflicts are now the nation's third-leading cause of death and disability. These forces spending financial resources on the treatment of injuries and trauma rather than improving health care for women and children, one of the goals of the MoPH. Meanwhile, access to health care was 60% in 2018. Based on the WHO's recommendations, midwives are an evidence-based approach to reducing maternal mortality. However, Afghanistan suffers from a scarcity of female health workers. The issue is particularly severe in remote areas like Nuristan, Paktika, Zabul, and Uruzgan, where no female providers work at all. [3]

Afghanistan has experienced significant improvements in maternal and child health in the last two decades. However, the utilization of health care services was affected by socio-economic and regional inequities in the country postponing the road map of universal health coverage and further progress in maternal and child health. Some of the socio-economic inequities in maternal-child health (MCH) interventions have been explored at national and regional levels in the country [2]

Maternal mortality refers to deaths due to complications during and after pregnancy. The most common complications include severe bleeding, infections, high blood pressure, unsafe abortions, drug overdose, and complications from delivery. Between 2003 and 2009, hemorrhage, hypertension, and sepsis were the causes of more than half of all maternal deaths worldwide. Based on the study, these factors are preventable in developing countries but unfortunately, the inequity that exists globally makes it hard to access equal health care. Sub-Saharan as well as South Asian and Middle Eastern countries including Afghanistan account for 87% of maternal deaths. According to the findings, the maternal death ratio has declined by 35% worldwide from 2000 to 2017. ANC in women is one of the factors that can reduce the number of deaths [4]

ANC, skilled birth attendants (doctors, nurses, and midwives), and the accessibility of emergency obstetric care are important components of basic MCH that can help to reduce maternal and child mortality, allowing pregnant women to have a safe childbirth. Early and timely ANC visits ensure improved health results regarding MCH and provide the opportunity to detect diseases associated with higher risk during pregnancy and delivery (e.g., anemia, eclampsia, gestational diabetes) [5]

According to research, nearly 830 women lose their lives due to pregnancy and child-related causes every day worldwide, and 99% of these deaths occur in developing countries. A study on the trend of maternal mortality in low and middle-income countries exposed that minor implementation of ANC services approximately doubles the MMR [6]

According to the quantitative analysis, there has been an increase in the coverage of the majority of *reproductive maternal, newborn, child, and adolescent health* (RMNCAH) services, including ANC, facility delivery, SBA, and vaccinations (BCG, DPT3, and TT coverage) even during the conflict in Afghanistan [7]

The reason for choosing this topic is my interest in researching maternal and child health in my country. As shown by the quantitative impact, this has been an important health challenge during the last decades, also the importance of maternal and child health is one of the SDGs targets of the UN for 2030. Therefore, I decided to study maternal health in Afghanistan and use experience and strategies from developed countries to efficiently reduce maternal mortality.

Previously studies exploring this research question have not been done in Afghanistan. Now it is time to do research for improving the future of families in my country.

The goal of studying ANC in women is to find out the usage and accessibility of health centers to complete ANC visits recommended by the WHO for women. Moreover, the aim is to identify factors associated with implementing antenatal care visits in Afghanistan and review policy changes and guidelines for reducing maternal mortality. The implementation of ANC visits may lead to an increase in women's and children's health that can positively affect families as well as whole communities in Afghanistan.

Our research objectives were to determine the factors that are associated with antenatal care in women aged 15-49 and to determine the relationship between antenatal care and MM in women aged 15-49. Our research questions were what are the factors associated with antenatal care among women aged 15-49? And is ANC associated with MM in Afghanistan?

Methods

Study design

This thesis relies on a cross-sectional study framework. The focus is on the secondary Afghanistan demographic health survey done in 2015, in which around (29,000) participants were asked. After cleaning the data, (18,139) participants were eligible for the study topic.

Data Source

The Afghanistan demographic health survey is based on the Demographic and Health Surveys (DHS)[1] Program. It has collected, analyzed, and disseminated accurate and representative data on population, health, HIV, and nutrition through more than 400 surveys supported by USAID in over 90 countries. This study used data from the 2015 AFDHS, a nationally representative survey conducted by the Central Statistics Organization and Ministry of Public Health Afghanistan, publicly available at https://dhsprogram.com. The data was downloaded after obtaining permission from the Demographic and Health Survey (DHS) team. The AFDHS is one of many globally authorized and publicly available studies on the DHS program. These surveys are conducted, funded, and supported by the United States Agency for International Development. The AFDHS is the first standard demographic and health survey in the country. It collected information on a broad range of basic demographic and health indicators such as family planning, maternal and child health, the nutritional status of women and children, as well as knowledge and attitudes about HIV/AIDS and domestic violence.

Variables

The following independent and dependent variables have been defined to find an answer to the research questions.

Dependent Variable

The outcome variable was Antenatal care (ANC) visits during pregnancy among women of reproductive age (15-4 years). When they did not utilize ANC, they were coded as (0) and the rest were coded numeral (1.2.3.4+) as clarified in the descriptive table.

Independent Variables

The independent variables which were socio-economic factors associated with the research topic are based on the work of previous scholars. They are summarized below.

A. Age (15-49) is accepted in most of the surveys.
B. Education levels are categorized as follows:(No education, Primary education, Secondary education, and Higher education)
C. Ethnicity groups were (Pashtun, Tajiks, Uzbeks, Hazara, Turkmen, Aimaq, Baloch, and others)
D. Area of residence (urban, local)
E. Times of watching television (per week)
F. Times of listening to the Radio (per week)

Statistical Analysis

Analyses were conducted via the JAMOVI 2.2.5 version. In this study, the Chi-square test was used to analyze categorical variables (age, birth, and Number of ANC visits). To find out the p-value, we conduct a t-test, to get a confidence interval. The binominal logistic regression test serves to find out the outcome variable.

Limitation of the data set

This dataset was from AFDHs 2015, which had several limitations, including a lack of variables as well as questions asked to the participants. More future studies in this realm are needed to allow for a more nuanced analysis.

There are many associated factors related to maternal and child health in Afghanistan. However, access to the full data for analysis of this study was limited due to unsophisticated explanations and definitions. Further studies are required to investigate the factors of MM in Afghanistan.

Results

Descriptive statistics

A total number of (18139) participants from the Afghanistan Demographic Health Survey (AFDHS) 2015 were used for this research. This study has one dependent variable, which is ANC among pregnant women aged 15-49 years. The percentage of women who had ANC visits was 10040(55.4%), and the total percentage of women who had at least one ANC in pregnancy was (11.2%). Most of the participants using ANC were aged above 19 (42.6%). The remaining (32.3%) were older than 30 years.

The general characteristics of this study subject are given in Table 1. The percentage of women who had ANC visits was 10040 (55.4%), the total percentage of women who had at least one ANC during pregnancy was (11.2%), and most of the participants using ANC were in the age group of >19 (42.6%). The remaining (32.3%) were older than 30 (Table 2). In rural areas, there were 4134 (22.8%) participants and in urban areas, there were 14005 (77.2%) participants. Also, for education level the percentage for no education was 86%, primary education 6.5%, secondary education 5.7%, and 1.8% for higher education (Table 2). Studies of ethnic groups show 7044 people 38.8% Pashtun, and 6370 participants with 35.1% for Tajik, respectively 10.2% for Uzbeks, 6.6% for Hazara, and the others. Following the result of Table 1 for media exposure, 10534 participants (58.1%) never listened to the radio, followed by 2904 (16%) one-time listeners (per week). There were 4681 two-time listeners with 25.8 %, and only 20 women listened three or more times to the radio (0.1%) (Table 2). 10154 (56%) did not watch TV during an average week, 2041 (11.3%) watched one time per week, 5908 (32.6%) two times, and only 36 (0.2%) three times or more (Table 1).

Table 1 General characteristics for ANC visits from AFDHS

Variable	Number	Percentage
Residence		
Rural	4,134	22.8
Urban	14,005	77.2
Education level		
No education	15,598	86
Primary	1,181	6.5
Secondary	1,031	5.7
Higher education	329	1.8
Ethnicity Group		
Pashtun	7,044	38.8
Tajik	6,370	35.1
Uzbek	1,850	10.2
Hazara	1,206	6.60
Aimaq	212	1.20
Turkmen	983	5.40
Baloch	5	0
Others	469	2.60
Number of times listening to radio (per week)		
0	10,534	58.1
1	2,904	16.0
2	4,681	25.8
3+	20	0.10
Number of times watching TV (per week)		
0	10,154	56
1	2,041	11.3
2	5,908	32.6
3+	36	0.2
Antenatal care visits		
0	8,099	44.6
1	2,023	11.2
2	3,082	17.0
3	2,099	11.6
4	1,285	7.10
5	778	4.30
6	421	2.30
7	221	1.20
8	131	0.70

8099 women (44.6%) never used ANC. 2023 (11.2%) completed one ANC visit, for two ANC the numbers were 3082 (17%), and three ANC amounts to 2099 (11.6%). Only 1285 participants (7.1%) did four ANC visits and 1551 participants (8.5%) used ANC 5 to 7 times (Table 1).

Table 2. Chi-square test result for ANC visits

Variable	Visits (Yes) N (%)	Visits (No) N (%)	X2	P
Age group				
<19	0(0)	0(0)		
20-29	4,207(23.2)	3,527(19.4)	5.54	0.063
30-39	2,365(18)	2,593(14.3)		
>40	2,568(14.2)	1,979(10.9)		
Residence				
Rural	2,361(13)	1,773(9.8)	6.72	0.01
Urban	7,679(42.3)	6,326(34.9)		
Education level				
No education	8,544(47.1)	7,054(38.9)	15.3	0.002
Primary	695(3.8)	486(2.7)		
Secondary	602(3.3)	429(2.4)		
Higher	199(1.1)	130(0.7)		
Ethnicity groups				
Pashtun	3,952(21.8)	3,029(17)	238	<.001
Tajiks	3,717(20.5)	2,653(14.6)		
Uzbek	1,055(5.8)	795(4.4)		
Hazara	616(3.4)	590(3.3)		
Aimaq	95(0.5)	117(0.6)		
Turkmen	329(1.8)	654(3.6)		
Baloch	2.000(0)	3.000(0)		
Others	274(1.5)	195(1.1)		
Number of times listening to the Radio (per week)				
0	5,714(31.5)	4,820(26.6)	20.1	<.001
1	1,594(8.8)	310(7.2)		
2	2,721(15)	1,960(10.8)		
3 +	11.00(0.1)	9.000(0)		
Number of times watching TV (per week)				
0	5,513(30.4)	4,641(25.6)	11.4	0.01
1	1,168(6.4)	873(4.8)		
2	3,341(18.4)	2,567(14.2)		
3+	18(0.1)	18(0.1)		

Among the age groups, women from 20-29 years had a total of 4207 (23.2%) ANC visits followed by 3527 (19.4%) for women aged 30-39. Only 2568 women older than 39 (14.2%) used ANC (Table 3). On the contrary, 3527(19.4%) women aged 20-29 did not visit ANC, for women aged 30-39 the number was 2593(14.3%) and for women older than 39 it was 1979 (10.9%). The result of X^2 =5.54 and the p-value of 0.063 shows that age was not significantly associated with the utilization of antenatal care in the country (Table 2).

Following the result of the Chi-square test, the utilization of ANC visits between urban and rural had some differences as in rural the number of women receiving ANC was 2361(13%), and the number of not receiving ANC was 1773 (9.8%). Also, in urban areas, the utilization of ANC was 7679 (42.3%) and the number of women not receiving ANC was 6326 (34.9%) with X2 =6.72 and a p-value of (p=0.01*). This was significantly associated with the use of antenatal care in Afghanistan (Table 2).

The number of non-educated women receiving ANC was 8544(47.1%) and not receiving 7054(38.9%), respectively. For primary education 695(3.85%) women enjoyed ANC, 486(2.7%) did not. The ANC average use for women with secondary education was 602(3.3%) and women not participating in ANC amounted to 429(2.4%). Lastly, the higher educated women receiving ANC were 199(1.1%), with 130 (0.7%) women not receiving ANC. In total X2 =15.3 and (p=0.002*) was statistically significant. Thus, the level of education was identified as an important factor for receiving ANC among women of reproductive age in Afghanistan (Table 2).

Table 3 Logistic regression analysis for ANC visits

Variable	OR	95 % CI		p
		Lower	Upper	
Age group (Years)				
	1.000	(Ref)		
	0.947	0.885	1.014	0.120
	0.919	0.854	0.990	0.025
Residence				
	1.000	(Ref)		
	1.097	1.023	1.177	<.001
Education level				
No education	1.000	(Ref)		
Primary-No education	1.159	1.020	1.316	0.024
Secondary- No education	0.981	0.828	1.163	0.827
Higher education-No education	0.917	0.712	1.181	0.501
Ethnicity Group				
Pashtun	1.000	(Ref)		
Tajik- Pashtun	0.192	0.852	0.977	0.009
Hazara-Pashtun	0.963	0.869	1.068	0.477
Uzbek-Pashtun	1.224	1.083	1.383	0.001
Aimaq-Pashtun	1.574	1.196	2.072	0.001
Turkmen -Pashtun	2.541	2.208	2.924	<.001
Baloch -Pashtun	1.917	0.320	11.481	0.476
Other-Pashtun	0.910	0.753	1.099	0.327
Number of Times listening to the radio (per week)				
0	1.000	(Ref)		
1- 0	0.974	0.897	1.058	0.536
2 - 0	0.854	0.797	0.915	<.001
3 + -0	0.970	0.402	2.343	0.946
Number of Times watching TV (per week)				
0	1.000	(Ref)		
1 - 0	0.888	0.807	0.977	0.015
2 - 0	0.913	0.856	0.974	0.006
3+ -0	1.188	0.617	2.286	0.606

According to Table 3, the logistic regression results show that among the ethnic groups, 3952(21.8%) Pashtuns were attending to ANC respectively 3029(17%) not receiving ANC. For Tajiks, the results were 3717(20.5%) and 2653(14.6%), the other ethnic groups account for (5.8, 3.4, 1.8, 1.5 0%). The result of the Chi-square test $X^2 = 238$ and the p-value = <.001 shows that belonging to an ethnic group was statistically significant for ANC use (Table 2). Related to the above table, listening to the radio was statistically significant (X^2 =20.1 and p≤0.001) and associated

as a factor influencing the number of ANC visits. Moreover, watching TV per week was (X2 =11.4 and p=0.01) significantly associated with the ANC among women based on the result from (Table 2) media consumption has the potential to improve MMR.

As the result of the logistic regression analysis from Table 3 for age shows (OR=0.947, 95% CI) and p= 0.12, age was insignificant for ANC.

According to logistic regression, the odd ratio of urban and rural women was (OR=1.097, 95%CI) and the p-value was statistically significant <.001 with ANC in Afghanistan. For most of the participants from large ethnic groups like Pashtun and Tajiks (OR=0.192, 95% CI) with P=0.009, the results were not statistically significant. However, for Uzbek (OR=1.224, 95% CI) and Aimaq (OR=1.574, 95% CI) p= (0.001) showed statistical significance (Table 3).

Listening to the radio proved to be statistically significant (OR=0.854, 95%CI), and the p= <.001 for ANC use among women in Afghanistan (Table 3).

Discussion

From the total population (18139), 10040 women had antenatal care during pregnancy and about 8099 women did not. This study shows that the usage of ANC visits in urban areas was higher than in rural areas. Various factors influenced ANC utilization e.g., the distance to health centers, transportation fees, lack of female health workers or skilled birth attendants, and other socio-economic factors.

Studies from different countries address various factors that are associated with impacts on the reduction of MM and child health. In Ghana, for 14% of deaths, the root cause of MM was the lack of skilled birth attendants and midwives. Moreover, the percentage of ANC utilization differs in developed (98%) developing (68%), and low-income countries (54%). Also, women in low- and mid-income countries did not receive timely recommended prenatal care services [8]

The result of vouchers and incentives from Pakistan showed a five times higher Odds for ANC, based on the result of this research the travel time to find a health facility was also associated with the number of ANC visits. Women with primary education had 1.73 times higher odds, and higher education showed more than 3.97 times the odds regarding ANC utilization. Along with education, wealth's impact on ANC intake was 2.24 times regarding the middle class, while more affluent women showed 4.38 times higher odds for ANC [9]

Despite an article for vouchers in India, Skilled attendance at all births is the most critical intervention for ensuring safe delivery most vital intervention for ensuring safe motherhood is thought to be skilled attendance at every birth. The percentage of institutional deliveries increased from 26% to 41% during this time, and the percentage of skilled birth attendants rose from 33% to 47%.and also the voucher and cash transfer program in various countries like Mexico, Nicaragua, Columbia, Brazil, and Nepal had some positive impact on preventive care. [10]

An article describes the effect of pay for performance (P4P) in Afghanistan. The effect of the intervention was small, possibly as a result of communication difficulties with healthcare professionals and neglect of demand-side factors. P4P interventions must consider governance issues and community needs. The five indicators of maternal and child health care coverage. [11]

Based on results from three remote provinces in Afghanistan, the study highlights the barriers for women who are looking for facility-based births. Distance, cost of transport, and availability of transport were the main barriers [12]

Strengths and limitations

This study has many strengths, as most of the studies are conducted in urban as well as rural environments, migration situations, and displaced areas, following the needs of public health, millennium, and SDGs in the country, even though the number of health workers such as midwives and nurses increased in rural areas to reduce MM.

The purpose of my research was to determine the impact of ANC on MM among Afghan women of reproductive age. Time was limited as the study covered a large population. Certainly, future studies are required in this field.

However, the findings of this study offer new, useful information and political implications for maternal health care in Afghanistan.

Conclusion

Based on the outcome of research related to ANC utilization among women in Afghanistan,

The most important key associated factors were residency, education level, ethnic groups, and media exposure. However, the government of Taliban banned the school doors and some strict rules against women. Furthermore, still, the country still lacks health workers. Afghan maternal and child health will be negatively affected if these factors are not addressed.

We suggest that the Afghanistan government and with international community improve their health policy, increasing accessibility of health care and equal distribution of health services in rural and urban areas in Afghanistan.

References:

1. Azimi, M.D., Najafizada, S.A., Khaing, I.K., et al., *Factors influencing non-institutional deliveries in Afghanistan: secondary analysis of the Afghanistan mortality survey 2010.* Nagoya J Med Sci, 2015. **77**(1-2): p. 133-43.
2. Akseer, N., Bhatti, Z., Rizvi, A., et al., *Coverage and inequalities in maternal and child health interventions in Afghanistan.* BMC Public Health, 2016. **16 Suppl 2**(Suppl 2): p. 797.

3. *Afghanistan Health Survey*. 2018; Available from: https://www.kit.nl/wp-content/uploads/2019/07/AHS-2018-report-FINAL-15-4-2019.pdf.
4. Geller, S.E., Koch, A.R., Garland, C.E., et al., *A global view of severe maternal morbidity: moving beyond maternal mortality.* Reproductive Health, 2018. **15**(1): p. 98.
5. Tekelab, T., Chojenta, C., Smith, R., et al., *Factors affecting utilization of antenatal care in Ethiopia: A systematic review and meta-analysis.* PLoS One, 2019. **14**(4): p. e0214848.
6. Sebghati, M. and Chandraharan, E., *An update on the risk factors for and management of obstetric haemorrhage.* Women's Health, 2017. **13**(2): p. 34-40.
7. Mirzazada, S., Padhani, Z.A., Jabeen, S., et al., *Impact of conflict on maternal and child health service delivery: a country case study of Afghanistan.* Conflict and Health, 2020. **14**(1): p. 38.
8. Arthur, E., *Wealth and antenatal care use: implications for maternal health care utilisation in Ghana.* Health Economics Review, 2012. **2**(1): p. 14.
9. Agha, S., *Impact of a maternal health voucher scheme on institutional delivery among low income women in Pakistan.* Reproductive Health, 2011. **8**(1): p. 10.
10. Randive, B., Diwan, V., and De Costa, A., *India's Conditional Cash Transfer Programme (the JSY) to Promote Institutional Birth: Is There an Association between Institutional Birth Proportion and Maternal Mortality?* PLOS ONE, 2013. **8**(6): p. e67452.
11. Engineer, C.Y., Dale, E., Agarwal, A., et al., *Effectiveness of a pay-for-performance intervention to improve maternal and child health services in Afghanistan: a cluster-randomized trial.* Int J Epidemiol, 2016. **45**(2): p. 451-9.
12. Higgins-Steele, A., Burke, J., Foshanji, A.I., et al., *Barriers associated with care-seeking for institutional delivery among rural women in three provinces in Afghanistan.* BMC Pregnancy Childbirth, 2018. **18**(1): p. 246.