

# Association between place of delivery, assistance during delivery and fistula occurrence in Afghanistan

Nandeeta Samad<sup>a,b</sup>, Pranta Das<sup>c</sup>, Bright Opoku Ahinkorah<sup>d</sup>, Abdul-Aziz Seidu <sup>e,f,g,\*</sup>, Aliu Mohammed<sup>h</sup>, James Boadu Frimpong<sup>h</sup> and Dipak Kumar Mitra<sup>a</sup>

<sup>a</sup>Department of Public Health, North South University, Dhaka 1229, Bangladesh; <sup>b</sup>Department of Population Health Sciences, King's College London, London SE11UL, United Kingdom; <sup>c</sup>Department of Statistics, University of Dhaka, Dhaka 1000, Bangladesh; <sup>d</sup>School of Public Health, Faculty of Health, University of Technology Sydney, Sydney, NSW 2007, Australia; <sup>e</sup>College of Public Health, Medical and Veterinary Sciences, James Cook University, QLD4811, Townsville, Australia; <sup>f</sup>Department of Estate Management, Takoradi Technical University, Takoradi, Box 256, Ghana; <sup>g</sup>Centre for Gender and Advocacy, Takoradi Technical University, Takoradi, Box 256, Ghana; <sup>h</sup>Department of Health, Physical Education and Recreation, University of Cape Coast, Cape Coast, PMB TF0494, Ghana

\*Corresponding author: Tel: +233244291198; E-mail: [abdul-aziz.seidu@stu.ucc.edu.gh](mailto:abdul-aziz.seidu@stu.ucc.edu.gh)

Received 13 June 2021; revised 25 August 2021; editorial decision 13 October 2021; accepted 18 October 2021

**Background:** Obstetric fistula is one of the most serious and devastating childbirth-related injuries women suffer worldwide. This study investigated the association between delivery characteristics and the occurrence of obstetric fistula in Afghanistan.

**Methods:** The study analysed data from the 2015 Afghanistan Demographic and Health Survey. The association between place of delivery and assistance during delivery with experience of fistula symptoms was investigated by fitting two binary logistic regression models.

**Results:** Findings from this study revealed that 23.4% of the women surveyed ever heard about obstetric fistula and 3% reported symptoms of fistula. Women whose deliveries were assisted by traditional birth attendants were significantly more likely to experience fistula compared with those whose deliveries were assisted by doctors. Similarly, women whose deliveries were assisted by others were significantly more likely to experience fistula compared with women whose deliveries were assisted by doctors. Regarding place of delivery, women whose deliveries took place at a government hospital were less likely to experience fistula compared with those whose deliveries took place at home.

**Conclusions:** This study highlights the importance of skilled delivery in reducing the risk for obstetric fistula among women in Afghanistan. Therefore, it is important for the various stakeholders in Afghanistan's healthcare delivery system, including healthcare providers, local authorities and international non-governmental organisations, to collaborate and institute measures that will promote health facility deliveries and improve access to skilled delivery.

**Keywords:** Afghanistan, birth injuries, maternal health, obstetric fistula, women.

## Background

Obstetric fistula is one of the most serious and devastating childbirth-related injuries women suffer worldwide.<sup>1–3</sup> The World Health Organization estimates that 50 000–100 000 women develop obstetric fistula each year and approximately 2 million young women worldwide live with untreated fistula.<sup>3</sup> Most

fistulas occur in countries in sub-Saharan Africa, Asia the Arab State region and Latin America,<sup>4–6</sup> where healthcare systems are poorly resourced.<sup>7</sup> Meanwhile, obstetric fistula is almost entirely preventable and has largely been eliminated in high-income countries due to the availability of emergency obstetric care and skilled delivery services.<sup>4–9</sup> Although Afghanistan is recognised as one of the countries with a high prevalence of obstetric

fistula,<sup>8,9</sup> the actual burden of the condition in Afghanistan remains unknown. However, a 2015 Demographic and Health Survey involving 29 461 ever-married women revealed that approximately 3% of the respondents had ever had obstetric fistula,<sup>10</sup> an indication that the prevalence of fistula could still be high in Afghanistan.

Obstetric fistula is a childbirth-related complication that results in tissue death and sloughing, creating a hole between the vagina and bladder, vagina and rectum or both.<sup>11</sup> The death of the tissue creates an abnormal connection (a hole) that allows for continuous and uncontrollable leakage of urine and faeces from the vagina.<sup>7,12</sup> Obstetric fistula is mostly caused by prolonged obstructed labour.<sup>12</sup> Other obstetric causes of fistula include instrumental delivery, obstetric manipulations<sup>13</sup> and caesarean section.<sup>14</sup> Physiological factors associated with prolonged labour such as malnutrition, poor health condition, breech presentation<sup>4</sup> and cephalopelvic disproportion<sup>11</sup> could also predispose women to obstetric fistula. Other predisposing factors include poor socio-economic status, negative cultural practices such as child marriages and lack of emergency or skilled obstetric care.<sup>15</sup> In India for instance, obstetric fistula was associated with rural dwelling, poverty, low education level, fewer antenatal visits and delay in seeking emergency care during labour.<sup>16</sup> Similarly, lack of decision-making power, financial constraints, non-availability or poor transportation network and low quality of obstetric care were some of the factors that predisposed Tanzanian women to obstetric fistula.<sup>17</sup>

Most available studies on obstetric fistula have focused on physical injuries associated with fistula and its debilitating effects on victims, however, the psychological impact of the condition is considered even more devastating.<sup>11</sup> Fistula patients experience a deep sense of loss, diminished self-worth, social isolation,<sup>18</sup> stigma, anxiety,<sup>11</sup> depression and post-traumatic stress disorder.<sup>19</sup> Meta-analysis of obstetric fistula studies showed that 90.1% of pregnant women who develop fistula also have a stillbirth, which compounds the psychological impact on the mothers.<sup>2</sup> Meanwhile, despite the availability of surgical repair for obstetric fistula, most women in low- and middle-income countries still face barriers to accessing fistula care.<sup>19</sup> In Afghanistan, more than half of women (56%) who ever reported having a fistula never received treatment,<sup>10</sup> notwithstanding the availability of fistula repair centres<sup>20</sup> and increased awareness.<sup>21</sup> Thus it is essential to improve access to and availability of high-quality skilled delivery services and emergency obstetric care in order to prevent fistulas.<sup>22</sup>

Although skilled delivery is essential to prevent birth-related complications and injuries,<sup>23</sup> there is a paucity of literature in the relationship between delivery characteristics and the occurrence of obstetric fistula in Afghanistan. Moreover, studies on predisposing factors for obstetric fistula have mainly focused on physiological, cultural, infrastructural and socio-economic factors.<sup>13</sup> Therefore, using a population-based cross-sectional survey design, this study investigated the association between delivery characteristics and the occurrence of obstetric fistula in Afghanistan using data from the 2015 Afghanistan Demographic and Health Survey (AfDHS). Understanding delivery services-related determinants of fistula could inform the development of strategies that might improve delivery services and prevent fistula occurrence among women in Afghanistan.

## Methods

### Data source and study settings

The study analysed data from the 2015 AfDHS, which took place from 15 June 2015 to 23 February 2016. The dataset is freely available for download at [https://dhsprogram.com/data/dataset/Afghanistan\\_Standard-DHS\\_2015.cfm?flag=0](https://dhsprogram.com/data/dataset/Afghanistan_Standard-DHS_2015.cfm?flag=0).

### Study design and sampling

The Ministry of Public Health and the Central Statistics Organization (CSO) of Afghanistan implemented the 2015 AfDHS. The survey used the updated version of the housing listing frame, provided by the CSO, as the sampling frame. The sampling frame consisted of 25 974 enumeration areas (EAs). A stratified two-stage sample design was followed in the 2015 AfDHS. In the first stage, clusters consisting of EAs were selected. A total of 950 clusters, 260 from urban areas and 690 from rural areas, were selected. In the second stage, 27 households were systematically selected from each cluster by following an equal probability selection process. Then members of the households were interviewed.

### Outcome variable

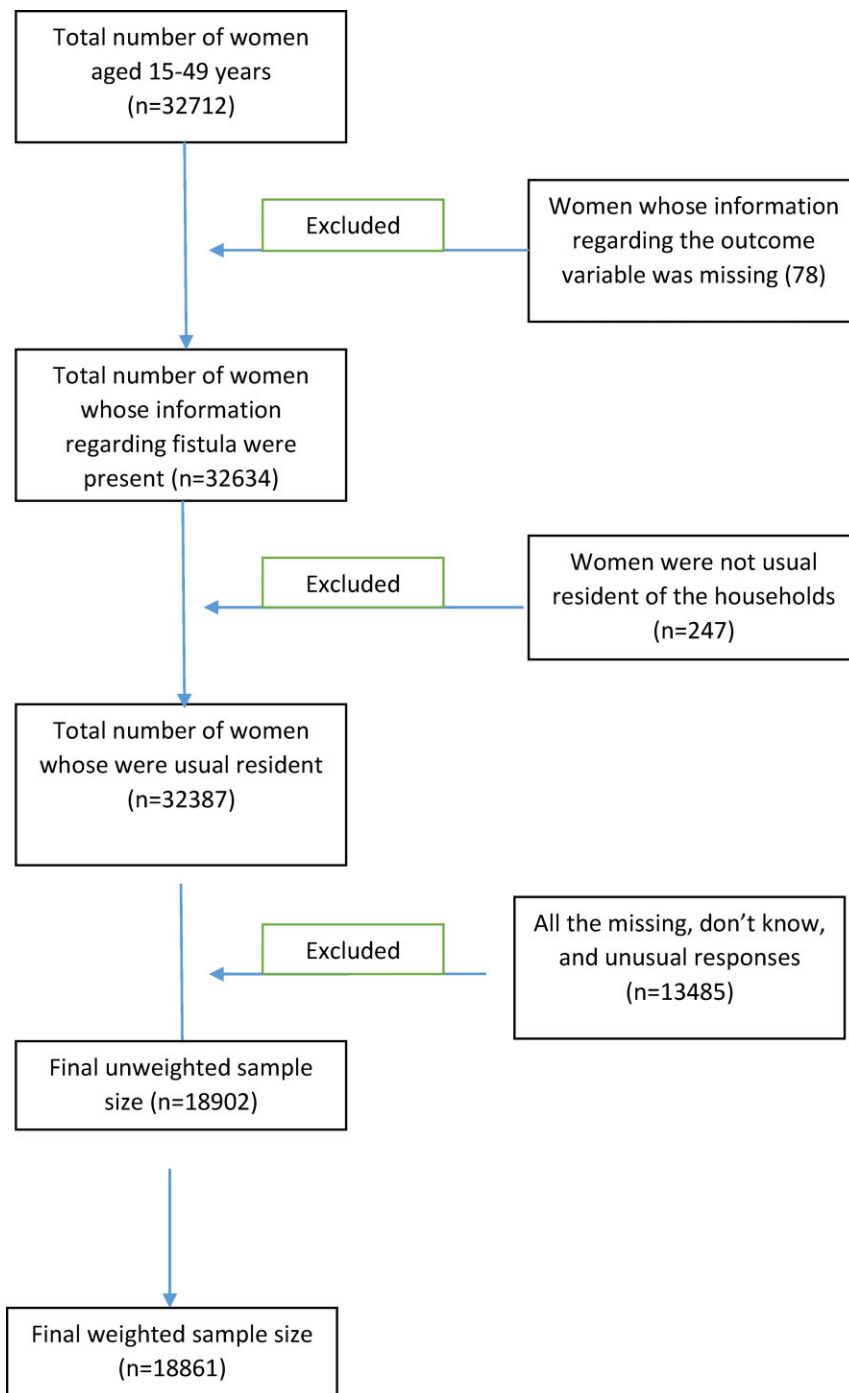
The outcome variable of the study was whether respondents reported ever having experienced the symptoms of obstetric fistula, vesico-vaginal fistula or recto-vaginal fistula. The outcome variable was coded from the variable S1101 ('Involuntary loss of urine and/or faeces through the vagina') as 'yes' or 'no'.

### Exposure variables

Exposures of primary interest were place of delivery and type of assistants at delivery where normal vaginal delivery took place. The place of delivery was categorized as home, governmental institution, non-governmental institution (non-governmental organisation, private hospital/centre) and others. The categories of the variable indicating the assistant during delivery were doctor, midwife/nurse, traditional birth attendant and others (community health worker, relative/friend, no one). This implies that these individuals perform similar assistance during labour. Some deliveries are either assisted by a doctor or midwife/nurse or traditional birth attendant or in some cases by community health workers or family members or friends. The category 'no one' was not used, because of the small number of observations in that category.

### Controlled explanatory variables

A number of explanatory variables that need to be controlled for were selected from previous literature.<sup>14,16,24–26</sup> These include education level (no education, primary, secondary, higher), residence (urban, rural), wealth index (lowest, lower, middle, higher, highest), age at first marriage (<18 y, ≥18 y), antenatal care visit (yes, no), baby's birthweight (<3.5 kg, ≥3.5 kg) and number of deliveries (≤2, 3–5, >5).



**Figure 1.** Flowchart of how the sample size was derived.

### Statistical analyses

The data regarding women who have heard about fistula as well as those whose last delivery was a normal vaginal delivery and were usual residents of the household were analysed. All the missing responses and ‘don’t know’ responses regarding the confounders, exposure variables and outcome variable were

removed before analysing the data. Details regarding how the ultimate sample size was obtained are presented in Figure 1. The authors cannot provide data on whether women excluded due to the filtration process were different with respect to women included in the study. The association between two exposure variables and the outcome variable was independently investigated by fitting two binary logistic regression models in the presence of

education level, residence, wealth index, age at first marriage, antenatal care visit, baby's birthweight and number of deliveries. The presence of multicollinearity was investigated for both models by calculating the variance inflation factor (VIF) and any variable with a VIF > 5 was removed from the models. From the two fitted models, education level and wealth index were removed, as both variables were found to be highly multicollinear in both models. Therefore the models were fitted after controlling for residence, age at first marriage, antenatal care visit, baby's birthweight and number of deliveries. The model fitness was assessed by calculating the area under the receiver operating characteristics curve. All the analyses were done after incorporating the survey weight as well as the complex survey design. P-values <0.05 were considered significant. All the analyses were done using R version 4.0.3 (R Foundation for Statistical Computing, Vienna, Austria).

## Results

### Sample characteristics of the respondents

Most (76.7%) of the respondents were from rural areas and the majority (82.7%) had no education. A total of 20.73% were in the richer quantile. Most of the respondent's husbands had no education (57.65%). Regarding the age at first marriage, more than half (51.84%) of the respondents were <18 y of age. A total of 36% of the deliveries were assisted by a nurse/midwife and 48.44% took place at home. The respondents' characteristics are presented in Table 1. The occurrence of a fistula and the results of the  $\chi^2$  test of association are presented in Table 2. A total of 23.4% of the women had ever heard about fistula and 3% of the women had fistula (results not shown).

### Association between outcome and exposure variables in the presence of confounders

After controlling for the effects of the confounding variables of who assisted in the delivery and the delivery place, both were significantly associated with fistula. The results suggest that women whose delivery was assisted by a traditional birth attendant were significantly more likely (adjusted odd ratio [aOR] 2.44 [95% confidence interval (CI) 1.27 to 4.69]) to experience fistula compared with women whose delivery was assisted by a doctor. Similarly, women whose delivery was assisted by others were significantly more likely (aOR 1.97 [95% CI 1.02 to 3.82]) to experience fistula compared with women whose delivery was assisted by a doctor (Table 3). Regarding delivery place, the women whose delivery took place at a government hospital were less likely (aOR 0.71 [95% CI 0.52 to 0.96]) to experience fistula compared with women whose delivery took place at home (Table 4).

## Discussion

In this study, we investigated the association between place of delivery and type of delivery assistants with the incidence of obstetric fistula among women who had a normal vaginal delivery in Afghanistan using data from the 2015 AfDHS. The findings revealed that 23.4% of the women surveyed had ever heard about obstetric fistula and 3% reported symptoms of fistula. The study also revealed that place of delivery and type of assistants

**Table 1.** Characteristics of the participants

Variables	Frequency (N=18 861)	Percentage
Residence		
Urban	4385	23.3
Rural	14 476	76.7
Education level		
None	15 601	82.7
Primary	1567	8.3
Secondary	1378	7.3
Higher	315	1.7
Wealth index		
Poorest	3759	19.93
Poorer	3781	20.05
Middle	3881	20.57
Richer	3910	20.73
Richest	3530	18.72
Husband's education level		
None	10 874	57.65
Primary	2785	14.77
Secondary	4015	21.29
Higher	1187	6.29
Age at first marriage (years)		
<18	9777	51.84
≥18	9084	48.16
Antenatal care visit		
Yes	11520	61.08
No	7341	38.92
Number of deliveries		
≤2	5988	31.75
3–5	7395	39.21
>5	5478	29.04
Baby's birthweight (kg)		
<3.5	1809	9.59
≥3.5	17 052	90.41
Assisted in delivery		
Doctor	3303	17.52
Nurse/midwife	6789	36
Traditional birth attendant	5971	31.65
Others	2798	14.83
Place of delivery		
Home	9135	48.44
Government institution	8570	45.44
Non-government institution	1037	5.5
Others	119	0.62

at delivery were significantly associated with the incidence of obstetric fistula. Specifically, women whose deliveries were assisted by traditional birth attendants, community health workers, relatives or friends had significantly higher odds of experiencing obstetric fistula compared with women whose deliveries were assisted by a doctor. Also, women whose deliveries took place at a government hospital were less likely to experience obstetric fistula compared with those whose deliveries took place at home. These findings were significant even after controlling for the level of education, place of residence, wealth index, age at first

**Table 2.** Prevalence of fistula by respondents' characteristics

Variables	Frequency (N=18861)	Has fistula	Percentage	p-Value
Residence				
Urban	4385	185	4.2	0.07
Rural	14 476	382	2.6	
Education level				
None	15 601	476	3.05	0.39
Primary	1567	30	1.91	
Secondary	1378	50	3.99	
Higher	315	7	2.22	
Wealth index				
Poorest	3759	149	3.96	0.26
Poorer	3781	103	2.72	
Middle	3881	84	2.16	
Richer	3910	106	2.71	
Richest	3530	125	3.54	
Husband's education level				
None	10 874	344	3.16	0.28
Primary	2785	61	2.19	
Secondary	4015	130	3.24	
Higher	1187	32	2.70	
Age at first marriage (years)				
<18	9777	337	3.45	0.07
≥18	9084	230	2.53	
Antenatal care visit				
Yes	11 520	375	2.62	0.14
No	7341	192	3.26	
Number of deliveries				
≤2	5988	159	2.66	0.16
3–5	7395	208	2.81	
>5	5478	200	3.65	
Baby's birthweight (kg)				
<3.5	1809	127	7.02	<0.001
≥3.5	17 052	441	2.59	
Assisted in delivery				
Doctor	3303	76	2.30	0.42
Nurse/midwife	6789	232	3.42	
Traditional birth attendant	5971	186	3.12	
Others	2798	73	2.61	
Place of delivery				
Home	9135	271	2.97	0.78
Government institution	8570	270	3.15	
Non-government institution	1037	22	2.12	
Others	119	4	3.39	

marriage, antenatal care visits, baby's birthweight and number of deliveries.

A similar study in Ethiopia found a similar prevalence of women's knowledge on obstetric fistula (23.2%) but a relatively lower incidence of fistula (1.06%).<sup>39</sup> This finding implies that 10.6 per 1000 women who delivered in Ethiopia had obstetric fistula, while 30 per 1000 women in Afghanistan had obstetric fistula. Additionally, a recent DHS analysis of 13 countries, mostly

from sub-Saharan Africa, reported a fistula prevalence ranging between 0.3% (3 per 1000 women) in Cameroon to 1.8% (18 per 1000 women) in Uganda.<sup>40</sup> The comparatively higher prevalence of fistula in Afghanistan could be attributed to the prolonged conflict in the country, which has seriously affected the healthcare delivery system.<sup>41</sup> For instance, the United Nations Population Fund estimated that about 80% of Afghanistan's maternal healthcare needs remain unmet,<sup>42</sup> with poor maternal

**Table 3.** Association between fistula and who assisted in delivery after controlling for variables of residence, age at first marriage, baby's birthweight, antenatal care visit and number of deliveries

Variable	aOR	95% CI
Assisted in delivery		
Doctor	Ref.	
Midwife/nurse	1.79	0.90 to 3.55
Traditional birth attendant	2.44*	1.27 to 4.69
Others	1.97*	1.02 to 3.82

\* Significant.  
Ref.: reference.

**Table 4.** Association between fistula and delivery place after controlling for variables of residence, age at first marriage, baby's birthweight, antenatal care visit and number of deliveries

Variable	aOR	95% CI
Delivery place		
Home	Ref.	
Government institution	0.71*	0.52 to 0.96
Non-government institution	0.43	0.13 to 1.46
Others	0.90	0.32 to 2.57

\* Significant.  
Ref.: reference.

health outcomes being higher in provinces badly affected by conflict compared with the least affected ones.<sup>41</sup> Additionally, early marriages and teenage pregnancies, which are highly prevalent in Afghanistan, are also associated with a high incidence of obstetric fistula in the country.<sup>42,43</sup> With the recent ousting of the democratically elected Afghan government and the return of the Taliban government, which is known for oppression and marginalization of women,<sup>41</sup> there is a heightened risk for increases in early marriages and teenage pregnancies in the country. Perhaps this could further increase the risk for obstetric fistulas in Afghanistan.

Findings from this study also suggest that women whose deliveries were assisted by unskilled birth attendants, such as traditional birth attendants, community health workers, relatives or friends, had higher odds of having an obstetric fistula compared with those whose deliveries were assisted by skilled birth attendants such as doctors. A similar association between unskilled delivery attendance and the risk for obstetric fistula have been reported in previous studies in Nigeria,<sup>27</sup> Malawi<sup>28</sup> and Kenya.<sup>29</sup> The association between unskilled deliveries and fistula has been attributed to the limited knowledge and skills of unskilled birth attendants in managing delivery-related complications such as prolonged or obstructed labour, which account for most cases of obstetric fistula.<sup>30</sup> In spite of their limited skills and knowledge, as well as the risk associated with their services, unskilled birth attendants constitute one of the major birth attendants in Afghanistan.<sup>31,32</sup> In 2018 for instance, 15.5% of deliveries in

Afghanistan were assisted by traditional birth attendants while 20.5% were assisted by friends, relatives or neighbours.<sup>33</sup> The proportion of unskilled deliveries in certain Afghan provinces could be as high as 61%,<sup>32</sup> which probably contributes to the high incidence of obstetric fistula in Afghanistan.

After decades of conflict, Afghanistan has one of the most devastated healthcare systems in the world, with limited infrastructure and skilled health workers, including doctors, nurses and midwives.<sup>32</sup> Although skilled birth attendance in Afghanistan has increased significantly, from 11% in 2003 to 58.8% in 2018, the rate is still below the average for low- and middle-income countries (79%).<sup>31</sup> As found in the current study, women whose deliveries are assisted by doctors have significantly lower odds for obstetric fistula compared with those whose deliveries are assisted by traditional birth attendants. Even though this finding was expected, it re-emphasises the need for strategies to further improve the rate of skilled deliveries in Afghanistan in order to end the occurrence of obstetric fistula, which is completely preventable.<sup>31</sup>

Aside from unskilled birth attendance, the place of delivery is one of the major factors that contributes to the occurrence of obstetric complications.<sup>31</sup> Similar to the findings from previous studies,<sup>34,35</sup> this study revealed that women who delivered at a government hospital were less likely to experience obstetric fistula relative to those delivered at home. A possible explanation for this finding is that government hospitals are equipped with skilled birth attendants, including doctors, nurses and midwives, who can promptly recognise danger signs during delivery and make the necessary decisions to minimize complications and ensure safe delivery.<sup>30</sup> For example, the use of caesarean section in hospitals to relieve obstructed labour was associated with the complete elimination of obstetric fistula in Europe, the USA and other developed parts of the world.<sup>36,37</sup> In 2018, approximately 41% of deliveries in Afghanistan occurred at home.<sup>33</sup> Factors that contribute to this high rate of home deliveries include limited access to healthcare facilities, lack of transport, financial constraints, insecurity, lack of permission from husbands or relatives to go to a hospital during labour and shame associated with women exposing themselves during childbirth.<sup>32</sup> Therefore it is important for the Afghan Ministry of Health and other stakeholders to design and implement strategies that could address these factors and thereby reduce the rate of home deliveries and its associated obstetric complications such as fistula.

## Strengths and limitations

The main strength of this study is the use of a nationally representative data to determine the association between place of delivery and type of delivery assistants with the incidence of obstetric fistula among women who had a normal vaginal delivery in Afghanistan. Thus our findings could be generalized to all women who had a normal vaginal delivery in Afghanistan in 2015. Despite these strengths, one major limitation of this study is the use of cross-sectional data, which does not allow causality to be inferred. Additionally, the incidence of obstetric fistula was based on self-reported symptoms of fistula among respondents. However, due to the shame and embarrassment associated with the condition,<sup>38</sup> there is a possibility of underreporting of symptoms

that could affect the interpretation of our findings. Therefore, future studies should consider using clinically diagnosed cases of fistula.

## Conclusions

This study highlights the importance of skilled delivery in reducing the risk of obstetric fistula among women in Afghanistan. It is important for the various stakeholders in Afghanistan's healthcare delivery system, including healthcare providers, local authorities and international non-governmental organisations, to collaborate and institute measures that will promote health facility deliveries and improve access to skilled delivery. Such interventions could be targeted at increasing the number of skilled birth attendants (through training and incentives) and improving access to emergency obstetric care. Additionally, engaging local authorities and family heads to address socio-cultural and religious practices that promote home delivery (e.g. seeking prior permission from husbands or relatives before going to the hospital during labour or the perceived shame associated with women exposing themselves during childbirth) could also improve maternal health outcomes and reduce the risk of obstetric fistula among women in Afghanistan.

**Authors' contributions:** NS was responsible for the conception and design of the study. PD and NS were responsible for analysis and/or interpretation of data. NS, PD, BOA, AS, AM, JBF and DKM were responsible for drafting the manuscript and revising the manuscript critically for important intellectual content. All authors have read and approved the final manuscript.

**Acknowledgments:** The authors are grateful to MEASURE DHS for granting access to the AfDHS 2015 data. The authors express their gratitude to Dr Nibir Anubhab for his intellectual input.

**Funding:** None.

**Competing interests:** None declared.

**Ethical approval:** The study did not require ethical clearance since the authors used already existing secondary data from the DHS. However, the DHS reports that ethical clearance was obtained from the Institutional Review Board of ICF International. The DHS also anonymized all data before making them accessible to the public. Permission to use the data was obtained from MEASURE DHS, which is a US Agency for International Development-funded project that assists and funds population and health surveys in countries worldwide.

**Data availability:** The dataset can be accessed at [https://dhsprogram.com/data/dataset/Afghanistan\\_Standard-DHS\\_2015.cfm?flag=0](https://dhsprogram.com/data/dataset/Afghanistan_Standard-DHS_2015.cfm?flag=0).

## References

- Adler AJ, Ronsmans C, Calvert C, et al. Estimating the prevalence of obstetric fistula: a systematic review and meta-analysis. *BMC Pregnancy Childbirth*. 2013;13(1):246.
- Ahmed S, Anastasi E, Laski L. Double burden of tragedy: stillbirth and obstetric fistula. *Lancet Glob Health*. 2016;4(2):e80–2.
- World Health Organization. Obstetric fistula. Available from: <https://www.who.int/news-room/facts-in-pictures/detail/10-facts-on-obstetric-fistula> [accessed 1 November 2021].
- United Nations Population Fund. Obstetric fistula. Available from: <https://www.unfpa.org/obstetric-fistula> [accessed 1 November 2021].
- Mohamed AA, Ilesanmi AO, Dairo MD. The experience of women with obstetric fistula following corrective surgery: a qualitative study in Benadir and Mudug regions, Somalia. *Obstetr Gynecol Int*. 2018;2018:5250843.
- Osman SA, Al-Badr AH, Malabarey OT, et al. Causes and management of urogenital fistulas: a retrospective cohort study from a tertiary referral center in Saudi Arabia. *Saudi Med J*. 2018;39(4):373–8.
- Tunçalp Ö, Tripathi V, Landry E, et al. Measuring the incidence and prevalence of obstetric fistula: approaches, needs and recommendations. *Bull World Health Org*. 2014;93:60–2.
- Wall LL. Obstetric fistula is a “neglected tropical disease”. *PLoS Negl Trop Dis*. 2012;6(8):e1769.
- Wall LL. Overcoming phase 1 delays: the critical component of obstetric fistula prevention programs in resource-poor countries. *BMC Pregnancy Childbirth*. 2012;12:68.
- Central Statistics Organization, Ministry of Public Health and ICF International. 2015 Afghanistan Demographic and Health Survey key findings. Kabul, Afghanistan: Central Statistics Organization; 2017. Available from: <https://dhsprogram.com/pubs/pdf/SR236/SR236.pdf> [accessed 1 November 2021].
- Wall LL. Obstetric vesicovaginal fistula as an international public-health problem. *Lancet North Am Ed*. 2006;368(9542):1201–9.
- Maheu-Giroux M, Filippi V, Samadoulougou S, et al. Prevalence of symptoms of vaginal fistula in 19 sub-Saharan Africa countries: a meta-analysis of national household survey data. *Lancet Glob Health*. 2015;3(5):e271–8.
- Khisa WW, Mutiso SM, JW Mwangi. Demographic and medical profiles of patients with obstetric fistula in Kenyatta National Hospital, Kenya. *Int J Obstetr Trauma*. 2011;1(1):46–65.
- Barageine JK, Tumwesigye NM, Byamugisha JK, et al. Risk factors for obstetric fistula in western Uganda: a case control study. *PLoS One*. 2014;9(11):e112299.
- Bangser M, Mehta M, Singer J, et al. Childbirth experiences of women with obstetric fistula in Tanzania and Uganda and their implications for fistula program development. *Int Urogynecol J*. 2011;22(1):91–8.
- Swain D, Parida SP, Jena SK, et al. Prevalence and risk factors of obstetric fistula: implementation of a need-based preventive action plan in a south-eastern rural community of India. *BMC Womens Health*. 2020;20:40.
- Mselle LT, Kohi TW. Healthcare access and quality of birth care: narratives of women living with obstetric fistula in rural Tanzania. *Reprod Health*. 2016;13:87.
- Bashah DT, Worku AG, Yitayal M, et al. The loss of dignity: social experience and coping of women with obstetric fistula, in northwest Ethiopia. *BMC Womens Health*. 2019;19:84.
- Wilson SM, Sikkema KJ, Watt MH, et al. Psychological symptoms among obstetric fistula patients compared to gynecology outpatients in Tanzania. *Int J Behav Med*. 2015;22(5):605–13.
- Contini S, Taqdeer A, Cherian M, et al. Emergency and essential surgical services in Afghanistan: still a missing challenge. *World J Surg*. 2010;34(3):473–9.

- 21 Hail SA. Challenges in treating obstetric fistula in Afghanistan. *Int J Obstetr Trauma*. 2011;1(1):1-3.
- 22 Miller S, Lester F, Webster M, et al. Obstetric fistula: a preventable tragedy. *J Midwifery Womens Health*. 2005;50(4):286-94.
- 23 Kassebaum NJ, Barber RM, Bhutta ZA, et al. Global, regional, and national levels of maternal mortality, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1775-812.
- 24 Mubikayi L, Chow EJ, Matson DO, et al. A case-control study of obstetric fistula risk factors in the Democratic Republic of the Congo. *Open J Obstetr Gynecol*. 2016;6(12):740-53.
- 25 Melah GS, Massa AA, Yahaya UR, et al. Risk factors for obstetric fistulae in north-eastern Nigeria. *J Obstet Gynaecol*. 2007;27(8):819-23.
- 26 Gebertsadik AW, Gebrehiwot GG, Desta AA, et al. Factors associated with obstetric fistula among reproductive age women in Ethiopia, community based, case control study. Available from: <https://www.researchsquare.com/article/rs-61513/v1> [accessed 1 November 2021].
- 27 Ezeonu PO, Ekwedigwe KC, Isikhuemen ME, et al. Awareness of obstetric vesicovaginal fistula among pregnant women in a rural hospital. *Adv Reprod Sci*. 2017;5(3):39-46.
- 28 Kaplan JA, Kandodo J, Sclafani J, et al. An investigation of the relationship between autonomy, childbirth practices, and obstetric fistula among women in rural Lilongwe District, Malawi. *BMC Int Health Hum Rights*. 2017;17:17.
- 29 Khisa AM, K., Nyamongo I. What factors contribute to obstetric fistulae formation in rural Kenya?. *Afr J Midwifery Womens Health*. 2011;5(2):95-100.
- 30 World Health Organization. *Obstetric fistula: guiding principles for clinical management and programme development*. Geneva: World Health Organization; 2006.
- 31 World Health Organization. *World health statistics 2019: monitoring health for the SDGs, sustainable development goals*. Geneva: World Health Organization; 2019.
- 32 Thommesen T, Kismul H, Kaplan I, et al. "The midwife helped me...otherwise I could have died": women's experience of professional midwifery services in rural Afghanistan-a qualitative study in the provinces Kunar and Laghman. *BMC Pregnancy Childbirth*. 2020;20:140.
- 33 KIT Royal Tropical Institute, Afghanistan National Statistics and Information Authority: *Afghanistan Health Survey 2018*. Amsterdam: KIT Royal Tropical Institute; 2019. Available from: <https://www.kit.nl/wp-content/uploads/2019/07/AHS-2018-report-FINAL-15-4-2019.pdf> [accessed 1 November 2021].
- 34 Boene H, Mocumbi S, Högberg U, et al. Obstetric fistula in southern Mozambique: a qualitative study on women's experiences of care pregnancy, delivery and post-partum. *Reprod Health*. 2020;17:21.
- 35 Trovik J, Thornhill HF, Kiserud T. Incidence of obstetric fistula in Norway: a population-based prospective cohort study. *Acta Obstet Gynecol Scand*. 2016;95(4):405-10.
- 36 Ahmed S, Tunçalp Ö. Burden of obstetric fistula: from measurement to action. *Lancet Glob Health*. 2015;3(5):e243-4.
- 37 Browning A. The circumferential obstetric fistula: characteristics, management and outcomes. *BJOG*. 2007;114(9):1172-6.
- 38 Changole J, Thorsen VC, Kafulafula U. "I am a person but I am not a person": experiences of women living with obstetric fistula in the central region of Malawi. *BMC Pregnancy Childbirth*. 2017;17:433.
- 39 Biadgilign S, Lakew Y, Reda AA, et al. A population based survey in Ethiopia using questionnaire as proxy to estimate obstetric fistula prevalence: results from demographic and health survey. *Reprod Health*. 2013;10:14.
- 40 Mallick L, Tripathi V. The association between female genital fistula symptoms and gender-based violence: a multicountry secondary analysis of household survey data. *Trop Med Int Health*. 2018;23(1):106-19.
- 41 Mirzazada S, Padhani ZA, Jabeen S, et al. Impact of conflict on maternal and child health service delivery: a country case study of Afghanistan. *Conflict Health*. 2020;14:38.
- 42 United Nations Population Fund. *After childbirth trauma, Afghan women emerge from life in shadows*. Available from: <https://www.unfpa.org/news/after-childbirth-trauma-afghan-women-emerge-life-shadows> [accessed 1 November 2021].
- 43 Mahbooba S, Saiqal O, Salih M. The teenage pregnancy on obstetric fistula among women in fistula center at Malalai Hospital, Kabul Afghanistan: a cross-sectional study. *Technium Soc Sci J*. 2021;20(1):953-60.