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Factors associated with delayed neonatal bathing in Afghanistan: insights from the 2022–2023 multiple indicator cluster survey

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Abstract

Objectives Delayed neonatal bathing, defined as postponing the first bath until at least 24 h after birth, is a key component of essential newborn care that helps maintain thermal stability and reduces the risk of hypothermia and infection. This study estimates the national prevalence of delayed neonatal bathing and identifies its determinants in Afghanistan. This study analyzed data from the Afghanistan Multiple Indicator Cluster Survey (MICS) 2022–2023. We fitted multivariable binary logistic regression models to determine factors associated with delayed neonatal bathing.

Results Out of 7,702 women, 68.6% reported delayed neonatal bathing. After adjustment, the odds of delayed bathing were higher among women whose household head completed primary education (AOR 1.38; 95% CI: 1.10–1.73), those delivering in health facilities (AOR 1.57; 95% CI: 1.29–1.91), and women attending 1–3 antenatal care (ANC) visits (AOR 1.29; 95% CI: 1.08–1.53) or 4–7 ANC visits (AOR 1.40; 95%CI: 1.14–1.72) or ≥ 8 ANC visits (AOR 2.05; 95% CI: 1.46–2.87). Conversely, women in the richest wealth quintile were less likely to delay bathing (AOR 0.69; 95% CI: 0.51–0.94). Tailored interventions that leverage antenatal contacts and facility-based care may further improve the adoption of optimal newborn bathing practices in Afghanistan.

Keywords Afghanistan, Associated factors, Delayed neonatal bathing, Early neonatal bathing

Introduction

Each year, approximately 2.3 million newborns die within the first 28 days of life, many due to preventable causes linked to inadequate newborn care [1]. Newborn bathing is a routine care that follows cultural tradition in Afghanistan, aiming to remove undesired fluids such as blood and meconium from the newborn's body. The World Health Organization (WHO), however, advises withholding bathing of neonates until 24 h after birth, and if it is not possible, it should be delayed for a minimum of 6 h [2].

Postponing the first bath for newborns helps prevent hypothermia by stabilizing their body temperature at around 36.8 degrees Celsius or higher [3]. Additionally,

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it helps preserve the vernix caseosa. This protective film is a chemical and mechanical barrier during pregnancy, with the most substantial layer forming between 36 and 38 weeks of gestation [4, 5]. Retention of vernix caseosa on a newborn offers multiple advantages, such as protection against infections, aiding in skin cleansing and hydration, and enhancing the newborn's natural immune response [4, 6]. Moreover, because a healthy newborn's skin is essentially sterile at birth, unless there has been a premature rupture of membranes, delaying bathing allows early microbial colonization to occur naturally; with vaginally delivered infants pick up maternal vaginal flora, while those born by cesarean section acquire skin-associated microbes [7]. This early establishment of beneficial microbiota further contributes to long-term skin and immune health.

Despite these benefits, delayed neonatal bathing is less commonly practiced in many low- and middle-income countries (LMICs). For instance, the prevalence of delayed neonatal bathing was 45.0% in Ethiopia [8], 12.0% in Nigeria [9], 47.2% in Bangladesh [10], and 59.5% in Uganda [11]. The timing of neonatal bathing is influenced by various factors, including educational background, residential area, socioeconomic status, antenatal care (ANC) utilization, place and type of delivery, and access to mass media [12–15]. Early neonatal bathing practices can greatly influence neonatal outcomes, especially in regions with high rates of neonatal mortality. Hypothermia resulting from early neonatal bathing is a notable cause of neonatal mortality [16]. A systematic review and meta-analysis revealed a significant increase in neonatal mortality associated with early bathing compared to those who experienced delayed bathing [17]. Other studies have also documented a wide range of adverse outcomes associated with early neonatal bathing practices [18, 19].

In Afghanistan, where neonatal mortality remains among the highest globally, the national essential newborn care guidelines advocate for delayed bathing as part of a comprehensive thermal care strategy. However, to date, no nationally representative data have quantified the prevalence of this practice or elucidated its determinants. Facility-based surveys in Kabul and rural provinces suggest that cultural practices favor early bathing, yet these findings are neither generalizable nor integrated into policy planning [20, 21]. To fill this gap, this study aims to determine the prevalence and associated factors of delayed neonatal bathing practices in Afghanistan. The findings will be invaluable in designing and implementing interventions for essential newborn care in Afghanistan.

Methods

Study design and data source

We used and analysed data from the Afghanistan Multiple Indicator Cluster Survey (MICS) 2022–2023. The MICS 2022–2023 applied a two-stage cluster sampling approach and collected data from a nationally representative sample. The survey design, sampling method, and data collection are reported elsewhere [22]. During the survey, trained surveyors collected data from women of reproductive age, 15–49 years, who answered questions related to child and maternal health and nutrition. For the purpose of this study, we included data from 7,702 ever-married women who had a live birth over the past 2 years prior to the MICS 2022–2023 survey (Fig. 1).

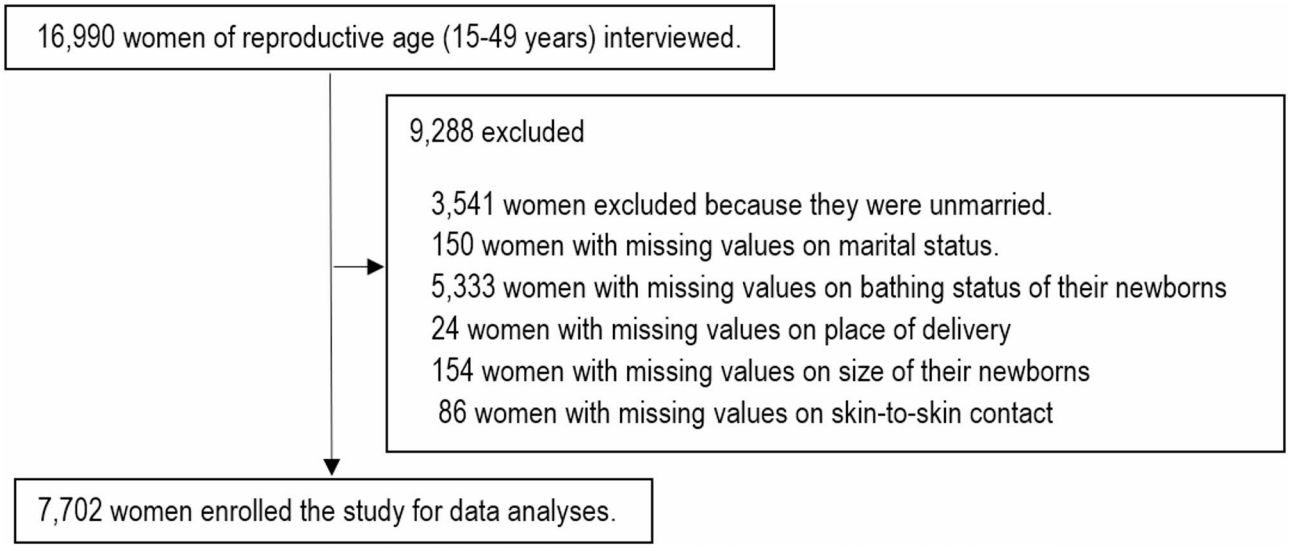

Fig. 1 Final sample size and schematic presentation of the sample selection

Study variables

Outcome variable

In line with the WHO's recommendation on withholding bathing of neonates until 24 h after birth [2], we defined the outcome as delayed neonatal bathing, which was coded "one" if the newborn had bathing after 24 h of delivery and "zero" if the newborn had bathing within 24 h of delivery, inclusive of the time 24 h. This binary outcome (one referring to delayed, and zero referring to early bathing) was fitted in the logistic regression analysis employed in this study.

Explanatory variables

The explanatory variables were women's age at the time of survey (15–29, 30–39, and 40–49 years), women's education level (no formal education, primary education, and secondary or higher education), education level of the household head (no formal education, primary education, and secondary or higher education), place of residence (urban vs. rural), sex of child (boy vs. girl), birth order (first child vs. second and more children), ANC visits (no visit, 1–3 visits, 4–7 visits, ≥ 8 visits), place of delivery (whether the woman gave birth at a health post, health facility or hospital vs. the woman gave birth at home), household wealth index (lowest quintile up to highest quintile), skin to skin contact (whether the woman placed her newborn baby on her breast or not right after childbirth), very small size baby at birth (woman recalled whether her newborn baby was a very small size or not at birth), and access to media (yes vs. no). Access to media was defined as "yes" if the woman watched TV daily, or the woman listened to the radio daily, or the woman read the newspaper, and as "no", if otherwise.

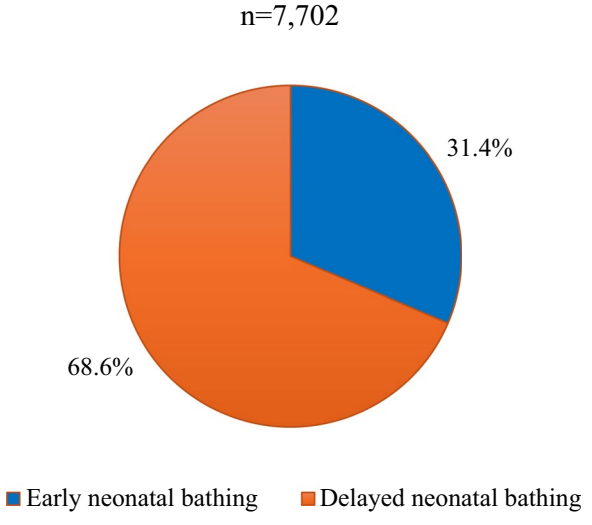

Fig. 2 Prevalence of delayed neonatal bathing

Statistical analysis

Descriptive statistics described the distribution of sociodemographic characteristics of women and their neonates. The chi-square test was used to assess the relationship between categories of explanatory variables and the status of neonatal bathing. Bivariate and multivariate binary logistic regression models were specified and run to examine the likelihood of delayed neonatal bathing across the categories of explanatory variables. For model selection, we selected explanatory variables considering the literature [8, 10, 12, 23], and produced crude as well as adjusted odds ratios and 95% CI: OR (95%CI) using the bivariate and multivariate logistic regression analyses. The decision as to which explanatory variables to include in the multivariate analysis was made when the *p*-value from the bivariate regression model was less than 0.25 for any categories of an explanatory variable examined in the bivariate regression analysis. Prior to fitting the full model, we assessed multicollinearity by calculating variance inflation factors (VIFs) for all candidate predictors; no variable exceeded a VIF of 5, indicating acceptable collinearity. Model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test ($p > 0.05$ indicating adequate fit) and the area under the receiver operating characteristic curve (AUC) to assess discrimination. Missing data were minimal (< 5% for all covariates) and, after confirming that data were missing completely at random, we conducted a complete-case analysis. Sampling design and weights were used by applying the survey strata and primary sampling unit. All data analyses were performed using STATA version 17.

Results

As shown in Fig. 2, among the 7,702 women who had a live birth in the two years preceding the survey, 68.6% reported delaying their newborn's first bath until at least 24 h after delivery (Fig. 2).

Table 1 presents the baseline characteristics of women by neonatal bathing (delayed vs. early). Overall, 57.5% of mothers were aged 15–29 years. Women who delayed bathing differed significantly from those who bathed earlier in terms of their own education, household head's education, wealth quintile, ANC attendance, place of delivery, skin-to-skin contact, and media exposure. For example, 11.9% of women with secondary or higher education practiced delayed bathing, compared to 9.4% among early bathed infants (Table 1).

After adjusting for potential confounders, several factors emerged as significant predictors of delayed neonatal bathing (Table 2). Babies born in health posts, clinics, or hospitals were about 1.6 times more likely to experience a delayed first bath than those delivered at home (AOR 1.57; 95% CI 1.29–1.91). Maternal engagement with antenatal care also showed a dose–response relationship:

Table 1 Sociodemographic and healthcare-related characteristics of the study population

Characteristics	Weighted %	Delayed neonatal bathing		*P*-Value
		Yes (weighted %)	No (weighted %)	
Total sample (*n* = 7,702)	100	68.6	31.4	
Women's age (years)				
15–29	58.7	59.3	57.5	0.33
30–39	34.3	33.9	35.2	
40–49	7.0	6.9	7.3	
Women's education				
No formal education	79.8	78.3	83.2	< 0.001
Primary	9.2	9.8	7.9	
Secondary/higher	11.0	11.9	8.9	
Household head education				
No formal education	63.8	61.9	68.0	< 0.001
Primary	11.7	12.6	9.6	
Secondary/higher	24.5	25.4	22.5	
Residential area				
Urban	15.4	15.8	14.7	0.23
Rural	84.6	84.2	85.3	
Antenatal care (ANC) visits				
No visit	26.5	24.1	31.6	< 0.001
1–3 visits	43.6	43.8	43.2	
4–7 visits	23.2	24.7	20.1	
≥ 8 visits	6.7	7.4	5.1	
Place of delivery				
Home	36.6	33.1	44.3	< 0.001
Health facility	63.4	66.9	55.7	
Sex of the child				
Male	51.5	51.8	50.9	0.51
Female	48.5	48.3	49.1	
Birth order				
1st child	13.0	13.3	12.5	0.36
2nd or higher child	87.0	86.7	87.5	
Skin-to-skin contact				
No	38.6	36.9	42.4	< 0.001
Yes	61.4	63.1	57.6	
Small-sized baby				
No	86.1	86.2	85.8	0.63
Yes	13.9	13.8	14.2	
Women's access to media				
No	76.1	74.7	79.3	< 0.001
Yes	23.9	25.4	20.8	
Wealth status				
Lowest quintile	26.0	25.5	27.0	0.039
Second	24.9	24.6	25.7	
Third	21.8	21.7	22.1	
Fourth	16.6	16.9	15.8	
Highest quintile	10.7	11.4	9.4	

compared with mothers who received no ANC, those with 1–3 visits had a 29% higher odds of delaying the bath (AOR 1.29; 95% CI 1.08–1.53), those attending 4–7 ANC visits had a 40% increase (AOR 1.40; 95% CI 1.14–1.72), and those attending 8 and more ANC visits had a 105% increase (AOR 2.05; 95% CI 1.46–2.87). Additionally, newborns from households where the head had completed primary education were 38% more likely to undergo delayed bathing than those in households with no formal education (AOR 1.38; 95% CI 1.10–1.73). In contrast, infants from the wealthiest households were 31% less likely to have their first bath postponed compared to those from the poorest quintile (AOR 0.69; 95% CI 0.51–0.94).

Discussion

In this nationally representative survey of Afghan mothers, we found that 68.6% reported delaying the first neonatal bath until ≥ 24 h after birth. On multivariate analysis, having a household head with formal education (primary school), receiving ANC during pregnancy, and delivering in a health facility were independently associated with a greater likelihood of delayed bathing. In contrast, women in the richest wealth quintile were less likely to delay bathing compared to the poorest.

WHO recognizes the crucial role of delayed neonatal bathing practices in neonatal health. The prevalence of delayed neonatal bathing practices (68.6%) in this study was higher than in other LMICs, such as 45.0% in Ethiopia [8], 12.0% in Nigeria [9], 47.2% in Bangladesh [10], and 59.5% in Uganda [11]. No previous study has reported this finding for Afghanistan. However, studies have documented that essential newborn care is below optimal levels in Afghanistan [20, 24]. For instance, the prevalence of early breastfeeding initiation and skin-to-skin contact is 46.9% and 32.9%, respectively [25, 26]. Moreover, a study in rural Afghanistan showed that mothers had cultural beliefs and traditional practices regarding neonatal bathing [21]. Considering the findings of this study and earlier studies, the quality of essential newborn care services in Afghanistan requires significant growth and development to meet the standards set on the global scale.

Our finding that an educated household head predicts delayed bathing is consistent with prior work in LMICs [27, 28]. Studies in South Asia and elsewhere have shown that greater parental (or head-of-household) education correlates with better newborn care practices. For example, in Nepal and Bangladesh, higher household education was linked to appropriate newborn care [27, 28]. In the Afghan context, other MICS analyses have similarly shown that household head education strongly influences maternal and child health service use [25, 26, 29, 30]. Educated heads likely better understand

Table 2 Likelihood of delayed neonatal bathing practices

Characteristics	Crude odds ratio (95%CI)	*P*-Value	Adjusted odds ratio (95%CI)	*P*-Value
Women's age (years)				
15–29	Reference		-	-
30–39	0.94 (0.82–1.07)	0.36	-	-
40–49	1.09 (0.86–1.40)	0.48	-	-
Women's education				
No formal education	Reference		Reference	
Primary	1.24 (0.98–1.58)	0.08	1.05 (0.80–1.37)	0.72
Secondary/higher	**1.37 (1.09–1.72)**	**0.01**	1.13 (0.87–1.47)	0.37
Household head education				
No formal education	Reference		Reference	
Primary	**1.55 (1.25–1.93)**	**<0.001**	**1.38 (1.10–1.73)**	**0.01**
Secondary/higher	**1.23 (1.05–1.45)**	**0.01**	1.06 (0.89–1.27)	0.51
Residential area				
Urban	Reference		-	-
Rural	0.94 (0.77–1.15)	0.55	-	-
Antenatal care (ANC) visits				
No visit	Reference		Reference	
1–3 visits	**1.48 (1.26–1.76)**	**<0.001**	**1.29 (1.08–1.53)**	**0.01**
4–7 visits	**1.73 (1.42–2.11)**	**<0.001**	**1.40 (1.14–1.72)**	**0.01**
≥8 visits	**2.53 (1.84–3.50)**	**<0.001**	**2.05 (1.46–2.87)**	**<0.001**
Place of delivery				
Home	Reference		Reference	
Health facility	**1.78 (1.52–2.07)**	**<0.001**	**1.57 (1.29–1.91)**	**<0.001**
Sex of the child				
Male	Reference		-	-
Female	1.00 (0.88–1.14)	1.00	-	-
Birth order				
1st child	Reference		-	-
2nd or higher child	0.90 (0.73–1.10)	0.30	-	-
Skin-to-skin contact				
No	Reference		Reference	
Yes	**1.36 (1.19–1.56)**	**<0.001**	1.01 (0.86–1.18)	0.90
Small-sized baby				
No	Reference		-	-
Yes	0.88 (0.70–1.12)	0.29	-	-
Women's access to media				
No	Reference		Reference	
Yes	**1.33 (1.13–1.56)**	**<0.001**	1.19 (0.99–1.43)	0.06
Wealth status				
Lowest quintile	Reference		Reference	
Second	1.12 (0.93–1.34)	0.24	0.98 (0.82–1.17)	0.82
Third	1.21 (0.99–1.48)	0.06	0.92 (0.76–1.13)	0.45
Fourth	**1.34 (1.05–1.70)**	**0.02**	0.86 (0.69–1.12)	0.29
Highest quintile	1.27 (0.98–1.64)	0.07	**0.69 (0.51–0.94)**	**0.02**

CI, confidence interval

Significant values are in bold

health advice and can support mothers in following recommended practices [10, 11, 25]. Therefore, engaging household heads in interventions aimed at enhancing delayed neonatal bathing practices is paramount. In addition, engaging religious leaders, men, and other household decision-makers can amplify these messages, since our results point to the influence of household heads. For example, radio campaigns or mullah-led messages can reach rural women who may not receive formal education.

ANC utilization is considered one of the most effective interventions in improving maternal and child health globally [31]. Similarly, we found that women with 1–3 ANC visits, 4–7 ANC visits, and ≥8 ANC visits were 1.29, 1.40, and 2.05 times, respectively, more likely to practice delayed neonatal bathing compared to those with no ANC visits. This finding is consistent with previous studies conducted in Ethiopia [8] and Bangladesh [10]. ANC provides an opportunity for health workers to counsel mothers on newborn care, including thermal protection and the risks of hypothermia. Indeed, systematic reviews show that women with ANC follow-up have substantially higher odds of practicing essential newborn care in LMICs [32, 33]. However, ANC utilization is still suboptimal in Afghanistan [30, 34]. Therefore, enhancing good-quality ANC utilization should be a key priority in improving newborn care.

The odds of delayed neonatal bathing practices were 1.58 times greater in institutional deliveries. This finding is similar to studies conducted in Southwest Ethiopia [12] and Bangladesh [13]. Moreover, studies have also shown an association between institutional deliveries and the uptake of other components of essential newborn care [13, 25, 26]. Newborns in healthcare facilities can receive essential newborn care, such as drying the baby immediately, cutting the umbilical cord with a sterile blade, timely breastfeeding initiation, and skin-to-skin contact after birth [13, 20, 25, 26]. Additionally, health facilities provide crucial information to mothers on newborn care, immunization, and breastfeeding, which helps ensure that all children receive essential newborn care [13, 20]. Nonetheless, the institutional delivery rate in Afghanistan is extremely low—roughly 50% [35], therefore, increasing access to institutional deliveries may be a necessary policy consideration for improving neonatal bathing practices in Afghanistan and elsewhere.

One surprising result was the inverse wealth gradient: women in the richest quintile were less likely to delay bathing than the poorest. This pattern contrasts with much of the LMIC literature. In most contexts, greater wealth predicts more complete newborn care. For instance, in Nigeria, the highest-wealth women had higher odds of delayed bathing [36], and studies of equity in newborn care document persistent wealth-related gaps favoring the rich [37]. Earlier studies in Afghanistan have also documented that households with greater wealth status tend to make better use of maternal and child healthcare services [26, 30, 38]. The negative wealth effect in our study may reflect complex cultural dynamics. For example, in Afghanistan, it is possible that poorer, rural households adhere more strictly to traditional newborn practices (which in some communities may favor delayed bathing as a protective ritual). In contrast, wealthier, perhaps more urbanized families might prioritize early cleanliness or have different beliefs about the vernix, leading to earlier bathing. Qualitative evidence suggests that Afghan newborn care is strongly influenced by tradition and advice from family or religious figures [21], which could operate differently across socioeconomic groups. Determining the precise reasons will require further qualitative research, but our findings highlight that socioeconomic status does not always align with expected newborn care behaviors in this setting.

Another notable observation is that maternal education and media access were linked to delayed bathing in bivariate analysis but did not remain significant after adjustment. This suggests these factors were confounded by other variables. For instance, educated mothers and those with media exposure are often from wealthier or more educated households, so once household wealth and head's education were included in the model, maternal schooling and media per se added little independent predictive value. This pattern has been observed elsewhere: in a Nigerian survey, sociodemographic factors (including maternal education) did not independently predict newborn thermal care after accounting for ANC and delivery settings [33]. In sum, while maternal literacy and information exposure may influence behavior indirectly (via empowerment or knowledge), their effects were absorbed by stronger predictors in our adjusted model.

Limitations

Although this study added important information on one of the critical components of essential newborn care in Afghanistan, it has some limitations. First, the cross-sectional nature of the study makes it impossible to infer a cause-and-effect relationship between the independent variables and delayed neonatal bathing practices. Second, the MICS data relies on self-reporting, which is subject to information and recall biases. Third, the study was limited by unavailable data for knowledge about danger signs, knowledge about hypothermia, and cultural and religious beliefs in the MICS 2022-23 data set. Lastly, potential unmeasured confounding cannot be ruled out, and our interpretation of associations should be made with caution

Conclusion

This study reveals that delayed neonatal bathing is practiced by approximately 69% of mothers in Afghanistan, a rate higher than in many other LMICs. Key factors positively associated with this recommended practice include household head education, antenatal care utilization, and institutional delivery, while higher household wealth was unexpectedly linked to lower odds of delayed bathing. These findings highlight important opportunities for intervention. Strengthening the quality and coverage

of antenatal care, especially by integrating counseling on newborn thermal protection, can be an effective strategy to promote delayed bathing. Similarly, reinforcing WHO-recommended newborn care practices in health facilities and engaging household decision-makers through community-based education and mass communication campaigns may improve adherence to optimal newborn care standards. Future research, especially qualitative studies, should explore cultural and contextual beliefs influencing early bathing to tailor interventions more effectively.

Abbreviations

ANC	Antenatal care
AOR	Adjusted odds ratio
AUC	Area under curve
CI	Confidence interval
COR	Crude odds ratio
LMICs	Low and middle-income countries
MICS	Multiple Indicator Cluster Survey
MNCH	Maternal, newborn, and child health outcomes
VIF	Variance inflation factors
WHO	World Health Organization

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Author contributions
Conceptualization and design: MHS and ET. Analysis: ET and MHS. Writing-original draft: MHS, ET, MJ, and ZE. Writing- review & editing: MHS, ET, MJ, AWW, ZE, and OD. All authors have read and approved the final manuscript.

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Data availability
The MICS 2022-23 dataset is publicly available on UNICEF's official website through the following link: [https://mics.unicef.org/surveys?display=card&keys=Afghanistan](https:/mics.unicef.org/surveys?display=card&keys=Afghanistan).

Declarations

Ethics approval and consent to participate
The Research and Ethics Committee of the Faculty of Medicine at Kandahar University reviewed the study protocol and granted a waiver of ethical approval, given that no primary data were collected and all analyses were performed on publicly available, de-identified datasets. The original MICS survey protocols were approved by relevant national authorities, and informed consent was obtained from all participants prior to data collection. For child-related data, informed consent was secured from a parent or legal guardian in accordance with ethical guidelines. Moreover, the study adheres meticulously to the ethical standards outlined in the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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