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Knowledge of Neonatal Danger Signs Among Mothers Attending Vaccination Centers in Central West Bank: A Cross-Sectional Study

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ABSTRACT

Background and Aims: One core goal of the 2030 Sustainable Development Goals is embracing good health and well-being among all age groups including the vulnerable neonatal age group. Aside from the contribution of preconception, antenatal, and intrapartum factors, neonatal health is a harmony between the mother's health and neonatal care. In Palestine, specifically in the Central West Bank, there is a scarcity of studies investigating the determinants of neonatal deaths. Through this study, we investigated the level of mothers' knowledge and awareness in recognizing neonatal danger signs (NDS) and associated factors.

Methods: A community-based descriptive cross-sectional study was conducted through convenient sampling. This study involved 377 mothers who gave birth in the last year and attended primary care centers for child vaccination in Ramallah and Jerusalem Governance from December 2023 to January 2024. This was done using structured questionnaires completed through face-to-face interviews covering socio-demographic variables, mothers' reproductive history, and NDS knowledge assessment.

Results: Among the 377 mothers, only 51% had good knowledge, reporting at least three danger signs. The most frequently mentioned were difficulty breathing (73.2%) and fever (64.7%), while hypothermia (2.7%) and convulsions (11.7%) were the least mentioned. Statistical analysis indicated that having a national health insurance card and an educated husband are significantly associated with mothers' knowledge of NDS. These factors could potentially be important to consider in intervention and educational programs aimed at improving mothers' knowledge.

Conclusion: This study showed that mothers' knowledge of NDS is relatively low, impacting public health in Palestine as in other developing countries. Therefore, collective efforts are needed to educate mothers on the importance of early NDS identification.

1 | Introduction

The neonatal period is a 28-day transitional period marked by physiological adaptation to the challenges of extra-uterine life [1]. The significance of this period lies in its vulnerability, as it bears the highest mortality risk among children under 5 years of age. The World Health Organization (WHO) has highlighted ten neonatal danger signs that carry high rates of mortality and

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morbidity. The common thread linking these signs is the potential for effective interventions [2], which can be realized upon their prompt recognition by caregivers, influenced by maternal awareness [3].

In 2021, the worldwide prevalence of neonatal mortality stood at a rate of 18 deaths per 1000 live births, resulting in an estimated 6400 neonatal deaths daily [2]. Specific regions differ in their local rates due to demographic, geopolitical, sociocultural, economic, and health-system-related causes. For Palestine specifically, the documented neonatal mortality rate in 2021 was approximately 14.7 deaths per 1000 live births [4]. Neonatal mortality is a globally growing concern, particularly in middle- and low-income countries like Palestine. This study in the Central West Bank aimed to help address this concern by taking a few steps towards achieving the 2030 Sustainable Development Goal (SDG) of embracing good health and well-being among all age groups [5].

Through the provision of empirical insight, this study examined the relationship between sociocultural factors in the West Bank and their contributions to women's knowledge of the need to seek urgent healthcare services. It also evaluated the impact of demographic factors as part of proximate maternal factors [6, 7]. In addition, it examined distant factors for neonatal mortality and their effects, such as the individual modifiable socio-economic factors, parental education and parental employment, household factors such as rural residence and household income, and community factors [6, 7]. Finally, health-system-associated causes were investigated, as healthcare personnel play an essential role not only in the delivery of medical interventions but also in ensuring good maternal knowledge of Neonatal Danger Signs (NDS)—if encountered-during prenatal and postnatal visits [6].

Ultimately, this study aims to assess mothers' knowledge across multiple phases (preconception, antenatal, intrapartum, and postnatal periods) and identify gaps that can be filled through targeted community interventions and the implementation of educational programs to promote positive outcomes in the short and long term for both mothers and neonates.

2 | Materials and Methods

2.1 | Study Design, Period, and Setting

A community-based cross-sectional study was conducted to investigate maternal knowledge of neonatal danger signs in the Central West Bank, mainly the Jerusalem Governorate and Ramallah and Al-Bireh Governorate. Ramallah and Al-Bireh Governorate constitutes a large component of the Central West Bank, located north of Jerusalem Governorate, for which the total registered population is 370,030 [8]. Jerusalem Governorate (J2) is divided into 29 districts and is home to 174,665 people as of 2023 [9]. The study was carried out from the December 11, 2023 to January 30, 2024 in Primary Care Centers affiliated with the Ministry of Health. Data was collected in four main vaccination centers in Ramallah and Al-Bireh Governorate and three primary centers in Jerusalem Governorate that provide health services free of charge.

2.2 | Population, Inclusion, and Exclusion Criteria

Generally, the source of the population was all mothers who gave birth at vaccination centers in the Ramallah and Jerusalem Governorate. The specific study population was mothers aged from 18 to 45 years who satisfied the inclusion criteria of having an under-1-year-old child and attending a vaccination unit in the Central West Bank. Exclusion criteria included mothers younger than 18 years, any caregiver other than the mother attending primary care centers, and any child aged older than 1 year. Participants who satisfied any of the earlier criteria were not included in the data collection process.

2.3 | Sample Size and Sampling Technique

The sample size was calculated using Raosoft's sample calculation, considering a 5% margin of error, a 95% confidence interval, and an estimated population size of 20,000. A total of 377 mothers were included in the analysis, ensuring a representative sample from targeted vaccination centers. In the first stage of our study, we selected primary care centers using convenience sampling, focusing on those that are highly utilized. The centers included vaccination facilities located in the Ramallah and Al-Bireh governorate and the Jerusalem governorate. The total sample was proportionally allocated among these centers based on the number of mothers who had scheduled appointments at each location. These primary care centers provided vaccination services 5 days a week, and data collection was scheduled on those particular days based on the availability of the primary investigators. In the second stage, mothers were randomly selected and approached in the waiting room before receiving services to minimize bias.

2.4 | Data Collection

Face-to-face interviews were conducted using a structured questionnaire by the four main primary investigators in primary care centers of the Central West Bank. The questionnaire was designed as a compilation of previous studies [3, 10, 11]. It was written in English and then translated into Arabic by a licensed translator. A pilot study was pretested on 5% of the sample, and clarifying modifications of grammar and phrasing were made. During the pilot period, the investigators discussed ambiguities in the data collection process and addressed them as needed to minimize inaccuracies. A reliability assessment was conducted to test the internal consistency of responses. The obtained Cronbach's alpha coefficient was 0.719, indicating a moderate level of consistency. The data collected during the pilot phase was not included in the final analysis of the main study since the pilot study aimed to test the feasibility of the methodology.

The questionnaire comprised three main sections. The first section collected the socio-demographic characteristics of the parents, including age, marital status, area of residence, level of education, occupation, and monthly income. Information about the reproductive history of the mother was covered in the second section, such as the number of births, number of

antenatal and postnatal care visits, and place of delivery. Finally, participants were requested to list the signs they considered life-threatening and part of the NDS.

As defined by the WHO, there are ten danger signs in neonates: vomiting, not being able to feed since birth or stopping feeding well, high temperature ($\geq 37.5°C$), low temperature ($\leq 35.5°C$), jaundice (yellow soles), difficulty breathing (chest indrawing), fast breathing (more than 60 breaths per minute), convulsions or fits since birth, lethargy (only moving when stimulated or not moving even when stimulated), and any signs of local infection (pus draining from eyes, umbilical redness or pus, skin boils) [2].

Participants were considered to have good knowledge if they mentioned at least three danger signs. Mothers stating two or fewer signs were regarded as having poor knowledge.

2.5 | Ethical Consideration

All participants were informed of the study's goals, their right to deny participation, and the confidentiality of their information. Written consent was obtained from the participants before participating in the study. Data was kept confidential and used only for the study, and the personal data gathered was retained without any identifiers.

An ethical clearance was obtained from the Scientific Research Ethics Committee of Al-Quds University (certificate of approval number 341/REC/2023). A written permission letter was obtained from the Director General of the Palestinian Ministry of Health to authorize data collection from the vaccination centers.

2.6 | Statistical Analysis

Descriptive statistics were used to summarize the characteristics of the study participants. Categorical variables are presented as frequencies and percentages.

To examine the association of independent variables with the dependent variable, a binary logistic regression analysis was performed. The dependent variable was NDS knowledge level. The independent variables included socio-demographic and reproductive factors, all treated as categorical variables. Additionally, a χ^2 square test was performed, to determine whether there is a statistically significant association between categorical variables.

Independent variables with p-value < 0.25 in the bivariate logistic regression were included in the multivariable logistic regression. Subsequently, the results from the multivariable logistic regression analysis, at a set p-value < 0.05 along with odds ratios (OR) and 95% confidence intervals (CIs), were reported as factors influencing knowledge of maternal awareness of NDS. An OR greater than 1 indicated higher odds of having good knowledge, while an OR less than 1 indicated lower odds of having good knowledge. All tests were two-sided.

All statistical analyses were conducted using SPSS version 25.0 (IBM Corp.), which provides robust tools for performing the aforementioned analyses. The results were interpreted per established guidelines, ensuring clarity in reporting effect sizes and precision of estimates.

3 | Results

3.1 | Socio-Demographic Characteristics

Of the 384 recruited, 377 completed the questionnaire, yielding a response rate of 98.18%. Table 1 describes the socio-demographic characteristics of the 377 mothers included in the analysis. About half of the participants were aged 29–38, and about 45% were aged 18–28. All the participating mothers were married, and the majority (266, 70.6%) lived in Ramallah and Al-Bireh Province.

Regarding educational level, more than half of mothers had completed a bachelor's degree (226, 59.9%). Only (36, 9.5%) had completed less than secondary education. Of the fathers, 46.7% were educated with a bachelor's degree or higher.

In terms of socioeconomic status, about 66% of the participating mothers had a national health insurance card. Only 33.7% of mothers worked, while 97% of their husbands worked, the majority in the private sector.

3.2 | Reproductive History of Mothers

Table 2 presents the reproductive history of mothers. Nearly all (375, 99.5%) had attended antenatal care (ANC) visits for their last pregnancy, and just slightly fewer (372, 98.9%) had attended all the WHO-recommended ANC. About 91% of the mothers had postnatal care (PNC) following their last childbirth.

3.3 | Mothers' Knowledge of Neonatal Danger Signs

Table 3 presents the distribution of mothers' knowledge concerning NDS. Around half of mothers, 50.7% (95% CI: 45.6%–55.7%), were classified as having good knowledge, while 49.3% (95% CI: 44.3%–54.4%) had poor knowledge.

Participants' knowledge of NDS is summarized in Table 4. The most frequently reported signs were difficulty breathing (276, 73.2%), fever (244, 64.7%), and yellowish discoloration (130, 34.5%). The least mentioned sign was low temperature (10, 2.7%), followed by convulsions (44, 11.7%), and fast breathing (54, 14.3%).

3.4 | Factors Associated With Mothers' Knowledge of Neonatal Danger Signs

A χ^2 analysis was conducted to examine the association between various predictors and knowledge levels (poor vs. good). Results in Table 5 indicated significant statistical associations for educational level (χ^2 (4, $N = 377$) = 24.25, $p < 0.001$,

TABLE 1 | Socio-demographic characteristics of mothers.

Variable		N	Percentage (%)
Mother's age (in years)	18–28	171	45.4
	29–38	192	50.9
	39–45	14	3.7
Place of residence	Ramallah and Al-Bireh	266	70.6
	Jerusalem	111	29.4
Mother's educational level	Less than secondary	36	9.5
	Secondary	78	20.7
	Diploma	37	9.8
	Bachelor's degree	204	54.1
	Higher studies	22	5.8
Mother's occupation	Housewife	250	66.3
	Worker	127	33.7
Mother's occupation sector	Public	41	32.5
	Private	83	65.9
	UNRWA	1	0.8
	Others	1	0.8
Having a national health insurance card	No	128	34.0
	Yes	249	66.0
Family monthly income (in shekels)	< 2000	37	9.8
	2000–4000	145	38.5
	4000–6000	109	28.9
	≥ 6000	86	22.8
Husband's educational level	Less than secondary	74	19.6
	Secondary	110	29.2
	Diploma	17	4.5
	Bachelor's degree	148	39.3
	Higher studies	28	7.4
Husband's work status	No	10	2.7
	Yes	367	97.3
Husband's occupation	Public sector	63	17.1
	Private sector	305	82.9

TABLE 2 | Reproductive history of mothers.

Variable		N	Percentage (%)
Neonate's age (in months)	0–4	166	44.0
	4–8	182	48.3
	8–12	29	7.7
Place of last birth	Public hospital	133	35.3
	Private hospital	242	64.2
	Out of Palestine	2	0.5
Parity	< 2	199	52.8
	2–4	161	42.7
	≥ 5	17	4.5
History of ANC attendance	No	2	0.5
	Yes	375	99.5
ANC frequency	1 visit	0	0
	2 visits	2	0.5
	3 visits	2	0.5
	4 or more visits	372	98.9
History of PNC attendance	No	36	9.5
	Yes	341	90.5

was marginally significant (χ^2 (2, $N = 377$) = 4.78, $p = 0.09$, $\varphi = 0.080$).

A bivariate logistic regression analysis was conducted to separately examine the association of the dependent variable with each independent variable. This revealed occupation status, having a national health insurance card, parity, mother's educational level, and husband's educational level to be associated with knowledge of NDS at p values of < 0.25; accordingly, these variables were included in the multivariable logistic regression analysis, and the parity predictor was also included, similar to previous studies [3, 10].

Table 6 shows factors associated with mothers' knowledge of NDS based on that multivariate analysis. Specifically, having a national health insurance card ($p = 0.002$) and an educated husband (at least a bachelor's degree, $p = 0.02$) were significantly associated with good knowledge of NDS, having odds ratios (Exp(B)) less than 1. However, the mother's occupation status ($p = 0.69$), mother's educational level ($p = 0.06$), and child parity ($p = 0.86$) did not exhibit statistically significant associations with knowledge level.

4 | Discussion

Maternal recognition of neonatal danger signs is crucial for prompt intervention by a health care provider and the reduction of neonatal morbidity and mortality [12]. In this study, we

$\varphi = 0.253$), work status (χ^2 (1, $N = 377$) = 19.39, $p < 0.001$, $\varphi = 0.202$), and the husband's level of education (χ^2 (4, $N = 377$) = 26.00, $p < 0.001$, $\varphi = 0.262$), all reflecting moderate effect sizes. Additionally, having a national health insurance card had a statistically significant association with knowledge level (χ^2 (1, $N = 377$) = 6.34, $p = 0.01$, $\varphi = 0.129$). The association with parity

TABLE 3 | Mothers' knowledge about neonatal danger signs.

Knowledge level	Frequency	Percentage (%)	95% confidence interval
Poor knowledge	186	49.3	(44.3%–54.4%)
Good knowledge	191	50.7	(45.6%–55.7%)

TABLE 4 | Mothers' awareness of specific neonatal danger signs.

	Yes		No	
Danger sign	N	Percentage (%)	N	Percentage (%)
Fever (high temperature)	244	64.72	133	35.28
Convulsion	44	11.67	333	88.33
Fast breathing	54	14.32	323	85.68
Lethargy	65	17.24	312	82.76
Persistent vomiting	100	26.53	277	73.47
Hypothermia (low temperature)	10	2.65	367	97.35
Yellowish discoloration of skin	130	34.48	247	65.52
Difficulty breathing	276	73.21	101	26.79
Poor feeding	103	27.32	274	72.68
Any sign of local infection	64	16.98	313	83.02

TABLE 5 | Association between predictors and knowledge levels.

		Knowledge level				
Variable		Poor	Good	χ^2 square	p-value	Effect size
Mothers' educational level	Less than secondary	27	9	24.25	< 0.001	0.253
	Secondary	42	36			
	Diploma	26	11			
	Bachelor's degree	86	118			
	Higher studies	5	17			
Work status	No	139	111	19.39	< 0.001	0.202
	Yes	47	80			
Having a national health insurance card	No	80	48	6.34	0.01	0.129
	Yes	106	143			
Husband's educational level	Less than secondary	48	26	26.0	< 0.001	0.262
	Secondary	63	47			
	Diploma	11	6			
	Bachelor's degree	59	89			
	Higher studies	5	23			
Parity	< 2	100	99	4.78	0.09	0.080
	2–4	75	86			
	≥5	11	6			

assessed Palestinian mothers' awareness of key danger signs among neonates. According to our findings, slightly more than half of our population (50.7%) had a good knowledge of at least three signs. This result is higher than reported by studies in Kenya [13], the Sheko District of Southwest Ethiopia [3], and China [10], which observed rates of 15.5%, 39%, and 42%, respectively. The following cohort factors highlight the variations in maternal knowledge across several studies:

Regarding the timing of the study, our findings reflect a more recent representation of the mothers' knowledge. This contrasts with the study described by Zhou et al. in China [10], where

TABLE 6 | Factors associated with good maternal knowledge of neonatal danger signs (multivariate logistic regression analysis (reference category: last).

Factor		Knowledge level		B	S.E.	Wald	Df	Sig.	Exp (B)
		Poor	Good						
Mother occupation status	No	139	111	−0.108	0.269	0.162	1	0.69	0.897
	Yes	47	80						
Having a national health insurance card	No	80	48	−0.726	0.240	9.156	1	0.002	0.484
	Yes	106	143						
Husband's educational level	< BA	122	79	−0.611	0.262	5.439	1	0.02	0.543
	≥ BA	64	112						
Mother's educational level	< BA	95	56	−0.531	0.280	3.594	1	0.06	0.588
	≥ BA	91	135						
Parity	< 2	100	99	−0.099	0.546	0.033	1	0.86	0.906
	≥ 2	86	92						

Abbreviation: BA, Bachelor of Arts.

data collection took place in 2020, a year when COVID-19 heavily impacted the quality of the healthcare system which reflected particularly on the pediatrics department. Although previously reported to be the busiest department, reductions in more than one-third of pediatric outpatient visits were observed [14].

Several studies have also reported higher maternal awareness levels than our findings. In particular, a study in Iraq by Abdulrida et al. revealed a remarkable level of knowledge, with 81% of participating mothers mentioning at least three danger signs [15]. In our current study, it was found that less than half of mothers (45.4%) were in the age group (18–28 years), which is a relatively young age compared to previous studies conducted in Iraq, where 42.2% of participants were in the age group of 26–36 years. This explains, rightfully so, why the mothers in our study exhibited a lower level of knowledge because younger mothers tend to be less experienced in their duties of caring for their newborns [15]. The discrepancies among these studies can be further attributed to different study settings, sample sizes, methodological differences, and operational definitions used.

Interestingly, all mothers attending vaccination centers in our study recognized at least one neonatal danger sign. In addition, a remarkably high percentage (86.5%) had knowledge of two signs. These findings are congruent with the report by Abdulrida et al. in Iraq [15] as well as similar studies in Nigeria (95.2%) [12] and Saudi Arabia (89%) [11]. However, although these figures are commendable, only 0.3% could enumerate four or more WHO-recognized signs, and none were able to identify more than eight. Thus, there is an inarguable need to implement an intensive education regimen about these signs to minimize delays in healthcare-seeking behavior.

In the present study, the most frequently cited danger sign was difficulty breathing at 73.2%, followed by fever at 64.7%. This is consistent with a cross-sectional study in Bangladesh, which reported rates of 24% and 36%, respectively [16]. Notably, some of the most common causes of mortality in the first month of

life among Palestinian refugees are prematurity and respiratory illnesses, which commonly present with both of these signs [17]. This explains, and importantly so, the frequent mention of fever and difficulty breathing by mothers, since these are alarming signs that can be readily documented and difficult to miss. Contrary to our results, fever was among the less frequently mentioned danger signs in a study conducted in Saudi Arabia, where only 31.2% reported a high temperature [11]. Similarly, 32.2% of participants attending Sheko District of Southwest Ethiopia vaccination centers identified difficulty breathing as a danger sign [3]. These findings highlight the differences in the scope of focus during maternal visits to healthcare centers and socio-cultural variations on what is considered part of NDS.

Meanwhile, the danger signs with the lowest recognition rates were low body temperature (2.7%) and convulsions (11.7%). These results are again in line with similar studies [18, 19]. Delayed identification of these lesser-known signs is a particular source of concern because they can be suggestive of a life-threatening condition. Failure to recognize them promptly can preclude caregivers from immediate decision-making and care-seeking. This is referred to as "delay 1" as described by a study by Waiswa et al., which introduces a 3-day model to analyze barriers to care-seeking and perinatal death. The model consists of three stages: delay in deciding to seek care (delay 1), delay in reaching the healthcare facility (delay 2), and delay in receiving care once at the facility (delay 3). Waiswa et al. argue that delay 1 is the leading cause of 50% of newborn deaths [20].

Within the distinct cultural and social setting of Palestine, our analysis revealed two statistically significant influencing factors: national health insurance and the husband's education level.

Having a national health insurance card emerged as a statistically significant determinant of good maternal knowledge. This result could be attributed to the sense of security provided by the insurance coverage, as mothers with such coverage anticipate financial support for medical interventions at hospitals, while mothers lacking health insurance may limit their

definition of neonatal danger signs to avoid potential hospital expenses. Another factor potentially informing the disparate results is the fact that in 2021, 36% of the Palestinian population lived under the poverty line [21]. Therefore, it seems imperative to provide urgent medical services in a bundle of low-cost, obligatory national insurance so as to promote seeking medical advice when in need.

The husband's educational level also exhibited a statistically significant relationship with maternal awareness. This aligns with the results of a meta-analysis and systematic review of diverse observational studies (cross-sectional, cohort, case-control) conducted in Ethiopia until 2019, where findings in the context of low-income countries were linked to cultural beliefs that position them as primary decision-makers [22]. Similarly, sociocultural norms in Palestine place fathers in authority as the householder, limiting mothers' roles. Consequently, a higher educational level in husbands enhances mothers' access to healthcare services, thereby elevating their level of knowledge [19].

A cross-sectional study in Bangladesh from January to April 2015 examined in depth the husband's role and involvement throughout pregnancy and reproductive health [19]. The results indicated that husbands who received advice and health education were more likely to facilitate healthcare-seeking behaviors. In contrast, mothers with less involved partners had a lower understanding of neonatal danger signs and, as a result, provided less medical assistance for their sick newborns.

Our research did not reveal any significant relationships between maternal awareness and the other examined socio-demographic factors. These results both support and contradict existing literature carried out in various locations.

Starting with maternal education, several studies conducted on similar populations demonstrated a significant statistical correlation between maternal education and awareness of NDS. A cross-sectional study was conducted in Northwest Ethiopia (2015) [23], a research study in Baghdad, Iraq (2017) [15], and a study in rural and urban Egypt [24]. They hypothesized that educated mothers, through their academic experience, pursue knowledge that enables them to seek appropriate medical intervention for their sick neonate. However, in the present study, Palestinian mothers demonstrated a high educational level, yet awareness levels remained low. This suggests a potential deficiency in educational resources and facilities, highlighting the necessity of interventions to address issues related to education quality and delivery. For instance, simulations of several scenarios targeting good behavior towards neonates and the danger signs encountered should be held in school as well as being part of the university curriculum.

With regard to residence and income, the study in southwest Ethiopia (2017) corroborates our findings, indicating no significant impact of place of residence or family monthly income on awareness levels [3]. However, these results are challenged by findings from a cross-sectional study conducted in Egypt (2010), an overpopulated and low-income country, which identified both places of residence and family monthly income as significant determinants, illustrating that mothers in rural residences and with low monthly incomes had poorer knowledge [24].

This observation was further supported by research from Ethiopia [25]. The study justified results as mothers in far areas have less access to ANC and PNC visits, subsequently gaining less information about NDS.

Regarding maternal reproductive history, studies conducted in both the Northwest [23] and Southwest [3] regions of Ethiopia have suggested that mothers who attended the recommended ANC and PNC visits had higher odds of having good knowledge. These results were attributed to the information and resources offered during these visits, as well as the presence of qualified ANC providers. In the present study, a vast majority of mothers attended WHO-recommended ANC and PNC visits; however, despite this high level of adherence, a notable gap in mothers' knowledge of neonatal danger signs. Therefore, the integral role of healthcare personnel in elevating maternal knowledge should be a focus of attention. It is also essential to train healthcare personnel in the skills and expertise necessary to decrease the incidence of health-system-related contributors to neonatal mortality.

4.1 | Strengths and Limitations

As the very first study of maternal knowledge regarding neonatal danger signs to be conducted in the West Bank, this study is a wheel-driving action toward the issue on a regional level. Another cornerstone strength is the utilization of face-to-face interviews, which reduce information loss during the demonstration, minimize the risk of the misconception of medical terms, and allow simplification of the questions according to the mentality and educational level of mothers.

One unprovoked limitation that should be highlighted lies in the practicability of data collection. That is, convenience sampling was employed as there was no variety of participants' residential areas, for example, urban versus rural areas; this sample may therefore not be representative of the Palestinian West Bank population.

Finally, concerning the self-reporting of neonatal danger signs, variation in the time since delivery due to the spread of participants' ages may have led to a recall error, increasing the unintentional recall bias.

5 | Conclusion

In the present study, a relatively low proportion of mothers exhibited good knowledge of neonatal danger signs compared with previous studies. In addition to being a critical matter that affects many life aspects; in developing countries like Palestine, recognition of neonatal danger signs has a significant direct impact on population growth as far as public health is concerned. Consequently, efforts must be made immediately and collectively to enlighten mothers on the importance of early identification of neonatal danger signs.

Data Availability Statement

Data supporting the findings of this study is available from the corresponding author, Zeina Sinnokrot, upon reasonable request.

All authors have read and approved the final version of the manuscript. The lead author, Zeina Sinnokrot, had full access to all the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

Transparency Statement

The lead author Zeina Sinnokrot affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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