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# Understanding parental awareness of child developmental milestones in West Bank-Palestine: a cross-sectional study

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## Abstract

**Objective** Parental knowledge of children's developmental milestones is associated with more effective childcare practices and improved overall outcomes. Therefore, this study aimed to assess parents' knowledge levels regarding their children's developmental milestones and the information sources they use in the West Bank of Palestine.

**Methods** This was a cross-sectional study using a questionnaire that had already been verified. Multivariable logistic regression and descriptive statistics were used to analyze the data. The study included parents aged 18 years or older who reside in the West Bank, Palestine and had at least one child under the age of 14. Participants were selected from ten West Bank cities. The data were collected between January and March 2024.

**Results** This study included 619 parents aged 18 years or older residing in the West Bank of Palestine. Most respondents (76.0%) demonstrated a "poor" level of knowledge in all four domains. There was a statistically significant association between gender and knowledge level ( $p \leq 0.05$ ), females demonstrated a higher proportion of acceptable knowledge (26.5%) than males (13.3%). Among the four domains of child development, parents had the highest level of knowledge of physical development (57.22%). This was followed by cognitive development (27.30%), emotional development (24.81%), and social development (18.83%). Only a few parents (9.2%) claimed that they always relied on health care professionals for information.

**Conclusion** There is a significant gap in parents' understanding of developmental milestones, raising serious concerns about children's health in West Bank, Palestine. Currently, healthcare institutions and pediatricians play limited roles in health education. Implementing effective health education programs and strategies is essential to enhance child development outcomes in the community.

**Keywords** Pediatric, Cross sectional, Paternal, Developmental milestones, Knowledge.

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## Background

Early infancy, particularly the first three years of life, is a crucial time in a person's existence that shapes them into useful community members [1]. Rapid growth and development occur during this time as the body's organs mature, mental capacities grow, and fundamental motor skills such as walking, talking, and manipulating objects are learned [2]. The ability of a child to perform specific tasks at specific ages, such as lifting their head, rolling over, crawling, standing, walking, and running, is considered normal physical development [3]. These milestones in neurological development are critical, and parents' awareness of potential delays is essential to ensuring proper child development. Milestones are not set at a certain age and have a normal variance range because children's development varies from person to person and place to place. For example, around six months of age, babies recognize faces, react to noises by wriggling, and can roll over in both directions [2].

Since parents are children's primary caretakers during their early years, understanding the processes involved in a child's development is crucial for distinguishing between normal and abnormal physical development inside the child [4–6]. Strong parental understanding of child development and parenting techniques also reduced the likelihood of reported child abuse three to five years later. It also aided in the identification of developmental delays that may have allowed for earlier interventions, which are crucial for promoting a child's health and preventing diseases. Furthermore, it improves behavioral issues in children and reduces maternal anxiety and depression [25–27]. Finally, it helps parents better understand their child's abilities, create a healthy environment, set reasonable expectations, and engage in positive interactions with their child [2].

However, parents with inadequate understanding of normal child development frequently overestimated the rate at which their children were developing. This causes them to become irritated and intolerant of their children's misbehavior and engage in neglectful behaviors toward them, such as expressing frustration over how their standards don't match their children's development [7]. In addition, parents are frequently the primary source of developmental milestone information for pediatricians; when parents are aware of these developmental milestones, their interactions with pediatricians are more fruitful [8]. Abnormal functioning or development in two or more domains of childhood development, such as physical, cognitive, communicative, and emotional, can be used to identify developmental delays. Physical disabilities have a wide range of effects on children's lives, including involvement in activities, relationships with family and friends, and disruptions to schooling [1].

According to a 2019 study, raising parents' awareness of child development can help avoid misdiagnosing developmental delays in addition to fostering better parent-child relationships [9]. Understanding typical physical development is thought to be crucial for a doctor's job, especially when it comes to spotting developmental disorders in children and determining when early intervention is needed [9]. The purpose of this study was to determine how much parental awareness there was on the developmental milestones of children in the West Bank. The findings of our study should hopefully serve as a foundation for developing public health initiatives that inform West Bank parents about their children's developmental milestones.

## Methods

### Study design, setting, and period

A descriptive cross-sectional study was conducted to assess parents' understanding of children's developmental milestones and their sources of information. The study included parents aged 18 years or older who reside in the West Bank, Palestine, and have at least one child under the age of 14. Participants were selected from ten West Bank cities: Hebron, Jerusalem, Ramallah, Jenin, Tulkarm, Bethlehem, Nablus, Salfit, Qalqilya, and Jericho. Data collection was conducted from January to March 2024.

### Participants

We enrolled Palestinian parents aged 18 years or older residing in the West Bank, Palestine, who had at least one child under the age of 14. Conversely, we excluded individuals under 18, those living outside of the West Bank, those without children under the age of 14, and participants who did not complete the survey.

A threshold of 14 years was chosen to ensure a comprehensive assessment of parental knowledge across key developmental stages from infancy to early adolescence. This age range is particularly relevant, as parents of children under 14 years of age are typically actively engaged in monitoring and supporting their child's growth. By including parents with at least one child under the age of 14, the study ensured that participants had direct and recent experiences with childhood development, making their responses more reflective of current understanding and practices. Additionally, this age range aligns with critical periods of physical, cognitive, emotional, and social development, providing valuable insights into parental awareness and identifying potential knowledge gaps that could inform targeted educational interventions.

According to the United Nations Population Fund, the number of married Palestinians in 2017 was 1,745,676 persons [10]. Based on a 95% confidence level, a 4%

margin of error, and a 50% response distribution, a sample size of at least 601 was required. In our study, the total number of parents included in the analysis was 619. The sample size was calculated using the Roasoft online calculator [11].

### Research instruments

The English and Arabic versions of the questionnaire utilized in this research were obtained with authorization from Abdulrahman et al. [12]. This questionnaire was originally developed to measure the understanding of children's developmental milestones among adults in Riyadh, Saudi Arabia.

Participants were provided with the Arabic version of the online questionnaire, which explicitly detailed the study's objectives, withdrawal process, privacy assurances, and data confidentiality in its introductory section. At this stage, participants were asked for their informed consent, with the option to decline participation by selecting the 'No' option. After obtaining consent, participants proceeded to complete the online questionnaire. Families were recruited using online questionnaires distributed on digital platforms. The survey was conducted through social media channels, community networks, and relevant online groups targeting parents in the West Bank, Palestine. This approach allowed for efficient and widespread dissemination of the survey to eligible participants, specifically parents aged 18 years or older who had at least one child under the age of 14 years. The online method facilitated convenient participation, enabling parents to complete the questionnaire at their own pace and ensuring accessibility across different regions of the West Bank.

The questionnaire consisted of four sections. The first section addressed the study's aim and obtained participants' consent. The second section collected demographic information through 16 items, including age, gender, educational level, city of residence, socioeconomic status, family size, and residence history. The third section consisted of 17 items assessing parents' knowledge of children's developmental milestones across four domains: physical development (four questions), cognitive development (three questions), social development (five questions), and emotional development (five questions). Additionally, the questionnaire included a fourth section with seven questions regarding parents' reliance on specific resources and the frequency of their usage. The correct responses for developmental milestones were based on the study "Gauging knowledge of developmental milestones among Albertan adults: a cross-sectional survey" [6] chosen for its evidence-based approach in defining developmental milestones. To ensure transparency, a full list of developmental milestones and their

corresponding "correct" answers are included in Appendix A.

A pilot study involving 15 participants was conducted to ensure the survey's reliability and validity, addressing any misinterpretations or discrepancies. Participants' knowledge levels were categorized as follows: "excellent" if they scored  $\geq 75\%$ , "good" for scores between 50% and 75%, "fair" for scores between 40% and 50%, and "poor" for scores  $\leq 39\%$ . Those who scored  $\geq 50\%$  for each developmental domain were considered to have an acceptable level of knowledge.

### Data analysis

We used R Statistical Software (version 4.1.3; R Core Team, 2022) to carry out all our statistical analyses. First, we summarized the descriptive statistics by looking at frequency distributions and percentages. To understand how respondents' demographic characteristics related to their knowledge levels, we used cross-tabulation and the chi-squared test at the bivariate level.

For a deeper analysis, we employed binary logistic regression at the multivariate level. This allowed us to identify and compare the odds ratios (OR) and adjusted odds ratios (aOR) of the significant variables in relation to knowledge levels.

We considered results with a p-value of 0.05 or less to be statistically significant.

## Result

### Demographics analysis

In total, 619 parents participated in the study, with mothers constituting 83% ( $n=514$ ) and fathers constituting 17% ( $n=105$ ) of the sample. Nearly all the participants were married (99%;  $n=614$ ). The largest proportion of participants were from Hebron, which accounted for the largest share (177 individuals, 29%), followed by Jerusalem (96 participants, 16%), Bethlehem 88 (14%), and Nablus 76 (12%). Other contributing cities included Jenin (48 participants, 7.8%), Jericho 35 (5.7%), and Ramallah 34 (5.5%). Both Qalqilya and Tulkarm had 31 participants each (5.0%), whereas Salfit had the smallest representation with three participants (0.5%).

The majority (52%) were young adults aged 18 to 30 years ( $n=322$ ), while the remaining 48% were aged 31–55 years ( $n=297$ ). Most parents had their first child between the ages of 15 and 26 (84%;  $n=517$ ). The majority were unemployed (62%;  $n=381$ ), had a middle economic status (45%;  $n=281$ ), and had a stable residency for the past five years (75%;  $n=467$ ). Regarding education, 68% had completed a university degree, 26% had completed high school or lower, and 6.5% had a master's or doctorate degree. Further participant characteristics are detailed in [Table 1].

**Table 1** Population characteristics

Characteristic	N	N = 619 <sup>†</sup>
<b>Gender</b>	619	
Male		105 (17%)
Female		514 (83%)
<b>Residence</b>	619	
Bethlehem		88 (14%)
Hebron		177 (29%)
Jenin		48 (7.8%)
Jericho		35 (5.7%)
Jerusalem		96 (16%)
Nablus		76 (12%)
Qalqilya		31 (5.0%)
Ramallah		34 (5.5%)
Salfit		3 (0.5%)
Tulkarm		31 (5.0%)
<b>Age</b>	619	
18–30		322 (52%)
31–55		297 (48%)
<b>Age at first child birth</b>	619	
15–26		517 (84%)
27–38		98 (16%)
39–45		4 (0.6%)
<b>Number of people living in Home</b>	619	
≤ 5		430 (69%)
≥ 6		189 (31%)
<b>Employment</b>	619	
Employed		160 (26%)
Self-employed		78 (13%)
Unemployed		381 (62%)
<b>Monthly income</b>	619	
I do not have a monthly income		196 (32%)
Less than 1880 shekels		75 (12%)
1880–5000 shekels		281 (45%)
More than 5000 shekels		67 (11%)
<b>Moved in the past year</b>	619	52 (8.4%)
<b>Number of times moved in the past five years</b>	619	
None		467 (75%)
One time		117 (19%)
Two times		24 (3.9%)
Three or more times		11 (1.8%)
<b>Educational level</b>	619	
Preuniversity		579 (94%)
University/PostGrad		40 (6.5%)
<b>Marital status</b>	619	
Married		614 (99%)
Divorced/Widow		5 (0.8%)
<b>Number of children you have under age 14</b>	619	
1		201 (32%)
2		174 (28%)
3		155 (25%)
4		55 (8.9%)
≥ 5		34 (5.5%)
<b>Age of first child</b>	619	
1 day to 6 years		321 (52%)

**Table 1** (continued)

Characteristic	N	N=619 <sup>1</sup>
7 years to 16 years		191 (31%)
17 years and more		107 (17%)
<b>Gender of 1st child</b>	<b>619</b>	
Male		339 (55%)
Female		280 (45%)
<b>Do any of your children have special needs</b>	<b>619</b>	15 (2.4%)
<b>Residence of children with their parents</b>	619	
Always		605 (98%)
Never		3 (0.5%)
Partial		11 (1.8%)
<sup>1</sup> n (%)		

**Table 2** Level of knowledge of population about child developmental milestones

Characteristic	N	N=619 <sup>1</sup>
<b>Level of knowledge</b>	619	
Poor		469 (76%)
Fair		116 (19%)
Good		34 (5.5%)
<sup>1</sup> n (%)		

### Knowledge level analysis

Most respondents (76.0%) demonstrated a “poor” level of knowledge. Additionally, 19% exhibited a “fair” level of knowledge, while only 5.5% achieved a “good” level, as detailed in [Table 2].

There was a statistically significant association between gender and knowledge level ( $p \leq 0.05$ ): Females demonstrated a higher proportion of acceptable knowledge (26.5%) compared to males (13.3%). Moreover, there was a significant association between household size and knowledge level: 27.0% of participants residing in households with six or more members exhibited acceptable knowledge, whereas 23.0% of those in households with five or fewer members showed acceptable knowledge ( $p \leq 0.05$ ).

The analysis revealed that females were more than twice as likely to have an acceptable level of knowledge compared to males (aOR=2.28; 95% CI 1.18–4.66,  $p < 0.001$ ). Additionally, participants living in households with 6 or more individuals were 1.86 times more likely to possess acceptable knowledge (aOR=1.86; 95% CI 1.03–3.39,  $p < 0.001$ ) than those in households with 5 or fewer members [Table 3].

### Analysis of information sources

The most frequently used source of information among parents was a family relative, utilized by 20% of respondents ( $n = 126$ ). This was followed by Internet websites at 13% ( $n = 83$ ), medical physicians and pediatricians at 9.2% ( $n = 57$ ), books and parenting magazines at 6.3% ( $n = 39$ ), social media broadcasts at 4.0% ( $n = 25$ ), parenting

courses at 1.8% ( $n = 11$ ), and TV shows at 1.3% ( $n = 8$ ). Additional information of “often,” “rarely,” and “never” used sources can be found in [Table 5].

### Discussion and conclusions

The current study assessed the knowledge of Palestinian parents in the West Bank regarding their children’s developmental milestones, focusing on the extent of their understanding and the sources they use for information. The findings indicated a generally low level of awareness among parents, particularly in the domains of social and emotional development. This discussion expands on these results by examining the implications, comparing them with findings from other studies, and discussing potential strategies for improvement.

Our research reveals that a significant number of parents in West Bank lack awareness of their children’s developmental milestones. Approximately 76% of the respondents scored poorly on the overall assessment, and correctly answered fewer than 40% of the questions. Interestingly, a comparable level of understanding was observed among adults in Saudi Arabia [12], whereas other Arab groups demonstrated higher levels of knowledge [13, 14]. These discrepancies in the findings may stem from several factors. For instance, Glascoe reported that parents often lack accurate information about typical child development, which can hinder their ability to recognize developmental delays early [15]. Similarly, a study by Ertem et al. found that parental knowledge varies widely and is often insufficient, especially in low-resource settings [16].

One possible reason for the finding that mothers in West Bank may not have sufficient knowledge about children’s developmental norms and milestones could be their limited interaction with specialists, such as pediatricians and developmental psychologists, as well as a lack of exposure to primary sources of information, such as advanced parenting classes. Interacting with healthcare professionals and child development specialists can provide a wealth of information about normative child

**Table 3** Knowledge model table displays the cross-tabulation [table 4],d results of the chi-squared test [table 4],d aminating the relationship [table 4],d between demographic variables [table 4],d knowledge [table 4],d. Also, presents [table 4],d justed odds ratios for significant variable. In the four domains of child development, parents [table 4],d. bited the highest [table 4],d. vel of knowledge of physical development, with 57.22% correct responses ( $n = 1417$ ). [table 4],d. is was followed [table 4],d. cognitive development (27.30%,  $n = 507$ ), [table 4],d. optional development (24.81%,  $n = 768$ ), [table 4],d. social development (18.83%,  $n = 583$ ) [Table 4]

Dependent: Knowledge levels bi		0	1	OR (univariable)	OR (multivariable)
<b>Gender</b>					
	Male	91 (86.7)	14 (13.3)	-	-
	Female	378 (73.5)	136 (26.5)	2.34 (1.33–4.41, $p = 0.005$ )	2.28 (1.18–4.66, $p = 0.018$ )
<b>Age group at first child birth</b>					
	15–26	392 (75.8)	125 (24.2)	-	-
	27–38	75 (76.5)	23 (23.5)	0.96 (0.57–1.58, $p = 0.880$ )	1.40 (0.77–2.49, $p = 0.263$ )
	39–45	2 (50.0)	2 (50.0)	3.14 (0.37–26.36, $p = 0.256$ )	5.01 (0.51–53.68, $p = 0.150$ )
<b>Age of first child</b>					
	1 day to 6 years	250 (77.9)	71 (22.1)	-	-
	7 years to 16 years	137 (71.7)	54 (28.3)	1.39 (0.92–2.09, $p = 0.118$ )	1.38 (0.81–2.36, $p = 0.238$ )
	17 years and more	82 (76.6)	25 (23.4)	1.07 (0.63–1.79, $p = 0.789$ )	0.65 (0.32–1.28, $p = 0.221$ )
<b>Number of people Living in Home</b>					
	≤ 5	331 (77.0)	99 (23.0)	-	-
	≥ 6	138 (73.0)	51 (27.0)	1.24 (0.83–1.82, $p = 0.290$ )	1.86 (1.03–3.39, $p = 0.042$ )
<b>Employment</b>					
	Employed	120 (75.0)	40 (25.0)	-	-
	Self-employed	69 (88.5)	9 (11.5)	0.39 (0.17–0.82, $p = 0.019$ )	0.48 (0.20–1.07, $p = 0.084$ )
	Unemployed	280 (73.5)	101 (26.5)	1.08 (0.71–1.67, $p = 0.715$ )	1.05 (0.62–1.82, $p = 0.853$ )
<b>Monthly income</b>					
	I do not have a monthly income	142 (72.4)	54 (27.6)	-	-
	Less than 1880 shekels	62 (82.7)	13 (17.3)	0.55 (0.27–1.06, $p = 0.084$ )	0.64 (0.30–1.27, $p = 0.217$ )
	1880–5000 shekels	217 (77.2)	64 (22.8)	0.78 (0.51–1.18, $p = 0.235$ )	0.83 (0.51–1.36, $p = 0.465$ )
	More than 5000 shekels	48 (71.6)	19 (28.4)	1.04 (0.55–1.91, $p = 0.899$ )	1.58 (0.79–3.10, $p = 0.186$ )
<b>Moved in the past year</b>					
	Yes	41 (78.8)	11 (21.2)	-	-
	No	428 (75.5)	139 (24.5)	1.21 (0.63–2.53, $p = 0.589$ )	1.05 (0.52–2.24, $p = 0.902$ )
<b>Educational level bi</b>					
	Preuniversity	436 (75.3)	143 (24.7)	-	-
	University/Postgrad	33 (82.5)	7 (17.5)	0.65 (0.26–1.41, $p = 0.308$ )	0.62 (0.23–1.45, $p = 0.298$ )
<b>Number of children You have under age 14</b>					
	1	156 (77.6)	45 (22.4)	-	-
	2	134 (77.0)	40 (23.0)	1.03 (0.64–1.68, $p = 0.890$ )	0.96 (0.57–1.60, $p = 0.879$ )
	3	108 (69.7)	47 (30.3)	1.51 (0.94–2.43, $p = 0.091$ )	1.22 (0.69–2.16, $p = 0.488$ )
	4	43 (78.2)	12 (21.8)	0.97 (0.45–1.94, $p = 0.928$ )	0.48 (0.18–1.21, $p = 0.128$ )
	≥ 5	28 (82.4)	6 (17.6)	0.74 (0.26–1.80, $p = 0.536$ )	0.33 (0.10–1.01, $p = 0.061$ )
<b>Gender of 1st child</b>					
	Male	261 (77.0)	78 (23.0)	-	-
	Female	208 (74.3)	72 (25.7)	1.16 (0.80–1.67, $p = 0.434$ )	1.13 (0.77–1.67, $p = 0.522$ )



development. Consequently, a lack of access to these sources may prevent mothers from acquiring valuable knowledge about typical child development stages [5].

Parents showed the most knowledge in physical development (57.22%) and the least in social development (18.83%). This aligns with the findings of Bornstein and Cote, who noted that parents generally have more knowledge about physical and cognitive milestones than social-emotional ones. The lower understanding of social and emotional milestones could be due to these aspects being less observable or discussed in public discourse compared to physical and cognitive milestones [5].

In this study, we explored how mothers' sociodemographic characteristics influenced their knowledge. The significant gender differences in knowledge levels, with females being more knowledgeable than males ( $OR=2.299$ ), reflect the traditional gender roles in childcare, as noted by Volling et al. [17]. This is particularly relevant in West Bank, where cultural norms may still assign primary childcare responsibilities to women. Efforts to educate fathers about child development are crucial, as involved fathers have been shown to positively impact children's outcomes, including cognitive development and emotional regulation [18].

The correlation between parents' age at the time of their first child's birth and their knowledge levels is an intriguing finding. Older parents, particularly those with their first child aged between 39 and 50 years, demonstrated greater knowledge (50%). This could be attributed to greater life experiences, better access to information, or a higher likelihood of seeking information due to perceived responsibility. This finding is consistent with research by Guo et al., who found that older parents often have more extensive knowledge about child health and development due to increased resources and life experience [19].

Employment status also significantly influenced knowledge levels. Most participants in our study were unemployed and had a middle economic status. Additionally, participants considered their monthly income to be their families' total income. Unemployed parents were more likely to have an acceptable level of knowledge, possibly because they had more time to dedicate themselves to parenting and seeking information. This finding supports the notion that time constraints faced by working parents can limit their opportunities to engage in educational activities related to parenting [20].

The study highlighted that family relatives were the most frequently used source of information, followed by internet websites and medical professionals. This reliance on familial advice is common in many cultures, especially where trust in healthcare systems or internet resources may be limited. However, the variability in the quality of information from these sources raises concerns. For

instance, a study by Dahlem et al. noted that while family members can be valuable sources of practical advice, they may not always provide accurate or evidence-based information [21].

The increasing reliance on internet sources, which accounted for 13% of parents who always used this medium, is both a strength and a potential weakness. While the internet offers vast resources, the accuracy of the information varies significantly. A study by Nicole Meyers et al. (2020) found that parents often turn to the internet for developmental information but may encounter misleading or incorrect information if they do not critically assess the sources [22].

These findings underscore the need for comprehensive and accessible educational programs targeting parental knowledge of child development. These programs should particularly focus on less-understood areas, such as social and emotional development, which are crucial for the child's overall well-being. Healthcare providers and educators should actively disseminate accurate and accessible information. For example, integrating child development education into regular pediatric visits could be an effective strategy, as suggested by the American Academy of Pediatrics [23]. Additionally, tailored interventions are needed to engage fathers more actively in child-development education. Programs that include both parents can help distribute childcare responsibilities more equitably and ensure that both parents are informed equally. This approach has been shown to improve child outcomes, as both parents uniquely contribute to their child's development [24].

Several limitations of this study should be considered when interpreting its findings. First, reliance on self-reported data through online questionnaires may introduce response bias, where participants may provide socially desirable responses or misunderstand survey questions. Online administration could have introduced a selection bias, potentially excluding certain groups such as older parents who may be less familiar or comfortable with online platforms, families with limited access to the internet or digital devices, and parents with lower literacy levels or language barriers. This limitation may affect the generalizability of the findings, as these underrepresented groups could have different perspectives or experiences regarding children's developmental milestones and sources of information.

Additionally, the study sample predominantly consisted of mothers (83%) compared with fathers (17%), which may not fully represent paternal perspectives on children's developmental milestones. This imbalance could potentially skew results related to parental knowledge and information sources. Moreover, the study focused exclusively on parents residing in the West Bank, Palestine, which may not be generalizable to other regions or

**Table 4** Population knowledge level in the four domains of child development milestones

Characteristic	N	N = 619 <sup>†</sup>
<b>Physical development</b>	619	
Average age children can first walk		
correct		462 (75%)
Incorrect		157 (25%)
Average age children can first crawl	619	
correct		495 (80%)
Incorrect		124 (20%)
Average age children can first reach for objects	619	
correct		317 (51%)
Incorrect		302 (49%)
Average age children can first dress and undress by themselves	619	
correct		143 (23%)
Incorrect		476 (77%)
<b>Cognitive development</b>	619	
Average age children can first engage in pretend fantasy play		
correct		97 (16%)
Incorrect		522 (84%)
Average age children can first follow simple instructions	619	
correct		177 (29%)
Incorrect		442 (71%)
Average age children can first begin counting	619	
correct		233 (38%)
Incorrect		386 (62%)
<b>Social development</b>	619	
Average age children can first play alongside other children without incident		
correct		133 (21%)
Incorrect		486 (79%)
Average age children can first share toys with other children	619	
correct		146 (24%)
Incorrect		473 (76%)
Average age children can first sit and play quietly by him/herself for an hour	619	
correct		119 (19%)
Incorrect		500 (81%)
Average age children can first have best friends	619	
correct		138 (22%)
Incorrect		481 (78%)
Average age children can first start to show concern for others	619	
correct		47 (7.6%)
Incorrect		572 (92%)
<b>Emotional development</b>	619	
Average age children can first exert independence from their caregiver by picking out their clothes or toys.		
correct		27 (4.4%)
Incorrect		592 (96%)
Average age children can first recognize or read emotions of others	619	
correct		262 (42%)
Incorrect		357 (58%)
Average age children can First make different Cries for different needs	619	
correct		123 (20%)
Incorrect		496 (80%)
Average age children can First bond with a parent	619	
correct		203 (33%)
Incorrect		416 (67%)
Average age children can first speak out when They think something is unfair or not right	619	



**Table 4** (continued)

Characteristic	N	N=619 <sup>†</sup>
correct		153 (25%)
Incorrect		466 (75%)

<sup>†</sup> n (%)**Table 5** The source of information of population about child development milestones

Characteristic	N	N=619 <sup>†</sup>
<b>Medical physician &amp; pediatrician</b>	619	
Yes, always		57 (9.2%)
Yes, sometimes		236 (38%)
Rarely		122 (20%)
Never		204 (33%)
<b>Family relatives</b>	619	
Yes, always		126 (20%)
Yes, sometimes		293 (47%)
Rarely		94 (15%)
Never		106 (17%)
<b>Books and parenting magazines</b>	619	
Yes, always		39 (6.3%)
Yes, sometimes		193 (31%)
Rarely		157 (25%)
Never		230 (37%)
<b>Internet websites</b>	619	
Yes, always		83 (13%)
Yes, sometimes		264 (43%)
Rarely		120 (19%)
Never		152 (25%)
<b>Social media broadcasts</b>	619	
Yes, always		25 (4.0%)
Yes, sometimes		176 (28%)
Rarely		149 (24%)
Never		269 (43%)
<b>Parenting courses</b>	619	
Yes, always		11 (1.8%)
Yes, sometimes		83 (13%)
Rarely		85 (14%)
Never		440 (71%)
<b>Television shows</b>	619	
Yes, always		8 (1.3%)
Yes, sometimes		160 (26%)
Rarely		181 (29%)
Never		270 (44%)

<sup>†</sup> n (%)

populations with different cultural, socioeconomic, or educational backgrounds. The geographical concentration within certain cities may further limit the generalizability of the findings to rural or less-represented urban areas. The presence of a diagnosed health condition or disability in the family was not considered as an inclusion or exclusion criterion. This may have excluded the perspectives of families with children who have special needs and who might have unique experiences, knowledge, or

sources of information regarding developmental milestones. Future studies should explicitly include this population to provide a more holistic understanding of parental knowledge and experiences. Despite these limitations, this study provides valuable insights into parental knowledge and information sources regarding children's developmental milestones in West Bank, Palestine.

This study provides important insights into the knowledge of developmental milestones among Palestinian parents in the West Bank, highlighting significant gaps in understanding, particularly in the areas of social and emotional development. The reliance on informal sources of information, such as family and the internet, combined with the observed demographic disparities, suggests a critical need for improved educational resources and outreach efforts. Future research should focus on evaluating the effectiveness of specific educational interventions and understanding the cultural factors that influence parental knowledge and practices.

The healthcare system in the West Bank encounters numerous obstacles that impede its ability to provide health education, including guidance for parents regarding child development. Ongoing conflicts intensify systemic problems such as disjointed infrastructure, insufficient funding, and limited access to services. Many health services fail to maintain consistent standards regarding training, equipment, and overall quality. This subpar care is partially attributed to restricted mobility, which hampers effective health-system operations, management, and accountability, along with the presence of inadequately qualified healthcare providers and a weak institutional capacity for monitoring and evaluation [28, 29]. These systemic barriers correspond with the study's finding that only 9.2% of parents sought developmental information from health care professionals.

The findings from this study, along with previous research on parenting knowledge, strongly indicate the need for further investigation of maternal knowledge to better understand its connection to parenting behaviors and child development. Understanding parenting beliefs is particularly important, as research has shown that parents' knowledge of child development affects their expectations and interactions with their children. In developing countries, a mother's knowledge of their child's development has been positively associated with her ability to promote her child's growth and development [6].

#### Abbreviations

UNFPA United Nations Population Fund  
OR Odds ratios  
aOR Adjusted odds ratios

## Supplementary Information

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Supplementary Material 1: Appendix A: List of Children's Developmental Milestones and Corresponding Correct Answers

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## Author contributions

All authors fulfill the authorship criteria because of their substantial contributions to the conception, design, analysis, and interpretation of the data. Mohammad Yaser Hasan Awad and Haya Jebreen Mohammed Warasna administrated the project. Mohammad Yaser Hasan Awad, Haya Jebreen Mohammed Warasna, Farah Bilal Yousef Shahin and Bashar Yaser Hasan Awad drafted the manuscript. Tarek A. Owais analyzed the data. Mohammad Yaser Hasan Awad, Haya Jebreen Mohammed Warasna, Farah Bilal Yousef Shahin and Bashar Yaser Hasan Awad participated in data acquisition. Afnan W. M. Jobran participated in data acquisition, and participated in its design. Afnan W. M. Jobran and Mohammed Abdulrazzak reviewed the study and participated in writing the final version. All authors reviewed the study and wrote the final version. Mohammed Abdulrazzak prepared the final documents, submit and corresponded the manuscript on behalf of authors. All authors read and approved the final manuscript.

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## Data availability

The datasets used and/or analyzed in this study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

The study protocol, assigned reference number: KA/41/2024/1, was approved by the ethical committee of the Institutional Review Board at Palestine Polytechnic University. Informed consent was obtained from participants at the beginning of the online questionnaire, giving them the option to decline participation by selecting 'No'. Participants were provided with comprehensive information regarding the study's objectives and methods.

### Consent for publication

Not Applicable.

### Competing interests

The authors declare no competing interests.

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