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**Dr. Joud G AL Darsoni**

Family and Community  
Medicine, King Saud  
University, Riyadh-KSA,  
Saudi Arabia

**Dr. Norah A AL Shehri**

Family and Community  
Medicine, King Saud  
University, Riyadh-KSA,  
Saudi Arabia

## Milestones: Are mothers aware?

**Dr. Joud G AL Darsoni and Dr. Norah A AL Shehri**

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### Abstract

**Aim:** To assess maternal awareness of developmental milestones, and some of the factors that affects her level of knowledge. In addition, to address some of the sources they seek for information.

**Methods:** A cross-sectional study of the knowledge of developmental milestones exhibited by 358 mothers in Riyadh, Saudi Arabia.

**Results:** A large majority of the women (84.6%) scored poorly in terms of knowledge, and there was a clear connection between educational levels and knowledge levels. Other variables - such as age, occupation, marital status, income, number of children- had no influence on the scores.

**Conclusion:** Mothers in Saudi Arabia have poor knowledge of developmental milestones and this stems from the relationship between mothers and healthcare professionals. One way of tackling this issue is to ensure that all new parents are provided with evidence-based educational resources - for example, leaflets - as well as information on children's development, either by nurses or doctors.

**Keywords:** Child development, mothers' knowledge, developmental milestones, cognitive development, motor development

### Introduction

'Developmental milestones are markers of infant and child skill attainment occurring in a predictable sequence over time'. Children who do not meet these milestones could be at risk of having developmental problems <sup>[1]</sup>. Monitoring child health and development is essential if disabilities are to be identified early on, and both parents and clinicians have a role to play <sup>[2]</sup>.

Monitoring children's attainment of milestones will facilitate early interventions <sup>[1]</sup>, and researchers have also established that effective parenting depends on how much mothers know about child development, since mothers who are aware of how to support children's development will have more positive outcomes <sup>[3, 4]</sup>. On the other hand, poor knowledge leads to inappropriate expectations and overestimation of the rate of development, often resulting in impatience or intolerance of the child's behaviour <sup>[5]</sup>.

Parents normally wish to take part in evaluating and overseeing their child's progress <sup>[6]</sup>, and for this role they receive various amounts of information and education. Nevertheless. Although parents clearly have a patchy knowledge of child development, little is known about the level of knowledge they possess and the factors that influence such knowledge <sup>[3]</sup>. The kinds of information parent's access and whether the sources are trustworthy remains unclear.

'There is mixed evidence regarding parental knowledge of child development' <sup>[3]</sup> in the literature. And to date there have been no local studies on this subject in Saudi Arabia, so this study will meet a pressing need. The study objectives are to evaluate whether mothers are fully aware of children's developmental milestones. The literature does not agree on what parents know about child development <sup>[3]</sup> and to date there have been no local studies on this subject in Saudi Arabia, so this study will meet a pressing need. The study objectives are to evaluate whether mothers are fully aware of children's developmental milestones since mothers are invariably the main caregivers - and to discover the factors which impact on their knowledge. The research findings will contribute to the literature on child development, as well as provide health professionals - in particular front-line primary care doctors, who are often the first and the long-term healthcare providers - to find ways of raising health awareness. Finally, this study is a contribution to Saudi Arabia's current endeavours to upgrade its health services.

**Corresponding Author:**

**Dr. Joud G AL Darsoni**

Family and Community  
Medicine, King Saud  
University, Riyadh-KSA,  
Saudi Arabia

## Literature review

One study undertaken in Saudi Arabia <sup>[2]</sup> assessed how several factors (for example, the education of the mother, how many children are in the household etc.) affected child development, and established a clear link between the educational level of the mother and her child's development - whether assessed through language, gross motor skills, social skills or fine motor skills.

This confirms the findings of a 2017 Iraqi study <sup>[7]</sup>, which determined that the age of the mother, her level of education, and the number of children she has delivered are positively linked to the mother's knowledge of development. This study also found a connection between occupation and a mother's knowledge of motor skill development - but not in other areas.

Another study, which focussed on the knowledge of 206 mothers and expectant women, <sup>[5]</sup> found that 53% of the respondents did not know what a six-month old child could do, and when asked to outline babies' development capabilities, the majority of the women overestimated their abilities by an average of three or even more months.

In 2000 a study of 1066 parents, whose children ranged from new-born to six months, <sup>[8]</sup> discovered that most of the participants had no idea when children interact with their external surroundings - with 62% of parents stating that this occurs at two months, or later, while in reality this takes place in the first days of a child's life. In addition, 55% of the parents could not say when babies start to discern and react to the 'moods of other people.

A recent study <sup>[9]</sup> asserted that babies start to communicate through emotions, before learning language. A baby's confidence, self-assurance and self-control are shaped by the connection they have with their caregiver and their calming, dependable reactions to the child's emotions.

Since child development research has shown that stressed or depressed caregivers have a detrimental effect on a baby's development, such a result is critical <sup>[8]</sup>.

Furthermore, a survey which recruited 59 teenage mothers, to determine what they knew about child development, <sup>[10]</sup> found that they had a good idea about the order in which babies developed skills, but were less sure of when this occurred <sup>[10]</sup>. They could more accurately estimate when children reached cognitive, language and motor skills milestones than play and social skills milestones. Overall, the mothers tended to overestimate when milestones occurred.

A 2010 paper <sup>[3]</sup> listed a series of results, namely: 63% of parents gave correct answers to two to four questions on physical development; while 15% of parents correctly answered two out of three questions on cognitive development. On social development, 7% gave the right answer to three out of five questions, while a low 2% provided the correct answer on emotional development. In contrast to the adolescent mothers <sup>[10]</sup>, adults tended to overestimate when abilities emerge. The study also considered where parents found information and found that more than 90% consulted their doctor or paediatrician, while 65.6% used books. Parenting classes, websites and television also served as sources of information.

## Research methodology

This cross-sectional study took place in a hospital in Riyadh, Saudi Arabia, and involved the family medicine well-baby clinic, paediatric clinics and paediatric ERs. The

study ran for a year and its participants were mothers whose children were aged from birth to 10.

Mothers whose infants had been diagnosed with chronic diseases which could impact on development - for example, hyperthyroidism and neurological conditions - were excluded from the study, since the children's conditions could have affected the mothers' knowledge and attitude towards milestones.

Sample size was calculated by using the single-proportion formula. With a confidence level of 95%, margin of error of 5%, and prevalence of 50%, <sup>[6]</sup> the estimated number was 384 mothers. After excluding incomplete responses, the answers of 358 mothers were included in the data analysis.

The survey was a modified version of a validated example, which had been used to evaluate the parenting knowledge of American parents <sup>[8]</sup>. The questionnaire sections on child development came from a freely-available list of items drawn up by the authors of a comparable study <sup>[10]</sup>.

The original questionnaire was written in English, so two bilingual professional translators translated it into Arabic, then back to English, whereupon it was checked for meaning and content accuracy by a paediatrician and a family doctor. It was then pretested on 10 participants.

The questionnaire was made up of 23 questions on developmental milestones in four developmental domains. 21 questions focussed on how parents accessed information about child development, and the degree to which they were satisfied with each source <sup>[2]</sup>.

Data analysis was carried out using the Statistical Package for Social Studies (SPSS 22; IBM Corp; New York, NY, USA), with continuous variables being expressed as mean  $\pm$  standard deviation, while percentages were used to express categorical variables. Continuous variables were assessed by using the t-test and ANOVA test, while categorical variables were subjected to the chi-square test. A p-value of 0.05 was viewed as statistically significant.

In order to determine the accuracy of the mothers' age estimates, we harnessed the developmental window originally designed by the authors of the knowledge of child development checklist referenced earlier <sup>[9]</sup> (which was derived from standardised instruments such as BSID, HELP Checklist) for all the items on the five developmental scales. We were then able to determine if the responses of the mothers fell inside or outside the window. Thus, if a mother estimated a child would support their head and control it at any point between one and three months (the window) this would be an accurate estimate <sup>[2]</sup>. Inaccurate estimates were divided between over and under-estimation groups.

Mothers who gave 17-23 (71-100%) correct or accurate answers were classified as having a high level of knowledge; while those who scored 13-16 (51-70%) had an intermediate level of knowledge; and mothers who answered 12 or fewer answers correctly had a poor level of knowledge.

Institutional ethical permission for the study was obtained. The participants were only enrolled after giving informed consent.

## Results

In total, 358 women took part in the study, and had a mean age of 32 ( $\pm 5$ ) - see Table 1. The majority were Saudi (93.6%), of whom 93.3% were married, over two-thirds had a bachelor's degree and 52.5% were housewives. Over half of the women (65%) had two or three children, and the

mean age of the eldest child was 7.2 ( $\pm 2.9$ ). 14% of the children had been diagnosed with long-term medical conditions.

**Table 1:** Participants' demographics (N = 358)

Characteristics (Mean (Std.))	N	%
Age 32 (5) <= 25 Years	28	7.8%
26–30 Years	120	33.5%
31–35 Years	128	35.8%
36–40 Years	74	20.7%
Nationality Saudi	335	93.6%
Social status Married	334	93.3%
Level of education Illiterate	2	0.6%
High school or Less	72	20.1%
Bachelor degree	250	69.8%
Postgraduate	34	9.5%
Occupation Housewife	188	52.5%
Teacher	60	16.8%
Healthcare provider	25	7.0%
Monthly income (SR) 5000-less than 10000	126	35.2%
10,000-less than 20,000	149	41.6%
20,000-less than 30,000	49	13.7%
Number of children 3 (1) <= 1	49	13.6%
2–3	234	65.5%
4–5	62	17.4%
Eldest child age 7.2 (2.9) 0–3	55	15.4%
4–6	76	21.2%
7–9	103	28.8%
10 +	124	34.6%
Children with a long-term medical condition No, all of them are medically free	308	86.0%

Table 2 illustrates the mothers' knowledge of children's developmental milestones, with 84.6% of the participants showing poor knowledge; 15.1% achieving intermediate scores and a single mother (0.3%) showing good levels of knowledge. Consequently, the mean of the participants' total

knowledge score was low - 10.03 ( $\pm 2.5$ ).

**Table 2:** Participants' knowledge (N = 358).

Knowledge			(Mean (Std.))
Good (71-100%)	1	0.3%	10.03 (2.5)
Intermediate (51-70%)	54	15.1%	
Poor (0-50%)	303	84.6%	

Table 3 provides a breakdown of mothers' knowledge of individual milestones.

In relation to motor milestones, 85.2% of the mothers knew when children would be able to sit and balance without support, and 75.8% knew when a child could crawl on the floor. In contrast, 53.1% underestimated when a child could stand up by holding on to furniture and 67.2% overestimated when a child could control and hold their head up, without help.

Mothers either underestimated or correctly estimated cognitive milestones, with 70.9% stating that children begin to count between 34 and 36 months - which is accurate. In relation to social milestones, 95.2% of mothers underestimated when a child shows empathy and 84.3% underestimated the age at which children have best friends. Most of the emotional milestones questions resulted in overestimates, in particular when children showed independence, since 85.7% of mothers answered that this occurred later than 12-18 months. In general, the percentage of correct answers in this set of milestones was between 10.1 and 37%, which is a low score - with 37% referring to the milestone when children recognise the emotions of others.

Knowledge levels mirrored educational levels, and differed significantly ( $P < 0.05$ ), with 100% of illiterate women scoring poor levels of knowledge - a figure which fell to 64.7% among postgraduates.

Age, nationality, marital status, occupation, income, age of the eldest child, number of children, mother's age and the number of children with long-term medical issues were all found to be statistically insignificant ( $P$  values more than 0.05), in relation to levels of milestone knowledge.

**Table 3:** Mothers' knowledge of milestone

	Less than	Correct	More than
Supports own head upright with good control.	4 0.8%	114 31.9%	240 67.2%
Reach for Objects	67 18.3%	245 68.8%	46 12.9%
Rolls over from back to stomach	146 40.8%	187 52.2%	25 7.0%
Sits without support with good balance.	53 14.8%	305 85.2%	0 0.0%
Pulls himself or herself to stand up using furniture.	189 53.1%	169 46.9%	0 0.0%
Crawls across the floor on hands and knees.	68 19.1%	272 75.8%	18 5.1%
Walks alone while holding the wall or furniture.	166 46.6%	189 52.2%	4 1.1%
Dress Themselves	27 7.6%	218 60.7%	113 31.7%
Turns head when he or she hears a sound	18 4.8%	234 65.5%	106 29.7%
Imitates simple actions like clapping and waving	138 38.7%	179 50.1%	41 11.2%
Follow Simple Instructions	120	198	40

	33.6%	55.5%	10.9%
Copies a line with a crayon on paper	202	98	58
	56.6%	27.5%	16.0%
Begin Counting	69	253	36
	19.3%	70.9%	9.8%
Makes sounds in response to another person's voice.	7	72	279
	1.7%	20.2%	78.2%
Becomes upset when caregiver leaves the room or home	53	194	111
	14.6%	54.3%	31.1%
Parallel Play	168	144	46
	47.0%	40.3%	12.7%
Share Toys	268	88	2
	75.5%	24.2%	0.3%
Have Best Friends	300	54	4
	84.3%	14.6%	1.1%
Show Empathy	340	8	10
	95.2%	2.0%	2.8%
Differential Cries	29	123	206
	7.8%	34.5%	57.7%
Bond with Caregiver	29	98	231
	8.1%	27.2%	64.7%
Recognize Others' Emotions	68	132	158
	18.8%	37.0%	44.3%
Exert Independence	17	36	305
	4.2%	10.1%	85.7%

## Discussion

It has long been evidenced that maternal knowledge and comprehension of child development are key to the welfare of children, their parents and society. This study focusses on what mothers in Saudi Arabia know about developmental milestones, since this will shape parental expectations of a child's behaviour and significantly affect developmental outcomes and the type of parenting a child receives <sup>[11, 12]</sup>. The study data suggests that most mothers do not have a clear understanding of developmental milestones, and therefore cannot support their children in reaching them. The literature demonstrates that there is a research gap concerning developmental milestones and the influence of the social environment in infancy <sup>[13]</sup>.

The first two years of a child's life are marked by the simultaneous development of motor (general and fine) and verbal skills <sup>[13]</sup>. The World Health Organisation (WHO) conducted a trans-national Multicentre Growth Reference Study, looking at countries such as Norway, Ghana, Oman and the US, and discovered few differences in the attainment of important motor skills <sup>[3]</sup>. This study found that most mothers correctly answered motor skills questions. Contrary to Safadi *et al.*, 's findings on awareness of developmental milestones in Jordan, <sup>[14]</sup> this study established that many mothers were fully aware of cognitive milestones, although others tended to underestimate when these should be reached. The lowest knowledge score related to social milestones, which were overestimated by the majority of respondents. A Canadian study <sup>[3]</sup> found that adults had a poor grasp of developmental milestones, with 63%, 15% and 7% correctly answering most questions on physical, cognitive and social development respectively. Earlier studies <sup>[5, 15]</sup> have also found that low levels of education result in poor knowledge of child development - a conclusion borne out by a Turkish study <sup>[16]</sup>. This was disputed by Safadi *et al.*, who found no connection between educational levels and knowledge of developmental milestones <sup>[14]</sup>. This lack of unanimity could stem from differences in experience and sources of information, rather

than the actual level of education.

This study did not find that the age of the mother was statistically significant in relation to knowledge of milestones, which is supported by an earlier Jordanian study <sup>[14]</sup> but challenged by earlier studies <sup>[5, 15]</sup>. This could be because each study used a different population, with different characteristics.

Contrary to the findings of this study, the Malathi study <sup>[20]</sup> found a clear link between mothers' occupation and their knowledge of motor development. An Iraqi study <sup>[7]</sup> also disagreed with our findings - but solely in relation to motor development.

The present study found that most information on developmental milestones came from the internet, relatives, doctors and nurses, and the expansion of the internet will no doubt change how information is accessed in the future <sup>[4]</sup>. Parents normally turn to family members for information and a mother's knowledge is closely related to the knowledge of her own mother <sup>[4]</sup>. A comparable Iraqi study <sup>[7]</sup> determined that 71.5% of women relied on their mothers' experiences for information and only 16.5% consulted doctors - which differs from our findings. Rikhy *et al.*, found that more than 90% of parents turned to paediatricians and doctors for information <sup>[3]</sup>, and Deepika *et al.*, 's study similarly concluded that parents depended on doctors, nurses, paediatricians and books for information <sup>[17]</sup>.

Some parents 37.2% also reported in 2020 that they often read through their child's health record book, and its health education information, and 91.6% expressed satisfaction with what it contained <sup>[18]</sup>.

In the absence of formal education, women turn to their mother or mother-in-law and follow tradition.

When formal structured education is absent, informal sources (a mother or a mother-in-law) predominate, and traditional practices are retained.

Although mothers' knowledge scores significantly correlated with physicians and nurses as sources of information, such sources emphasise biological safety measures, and it is not a readily structured service.



Moreover, healthcare workers all too often simply provide mothers with medical information and overlook cognitive, social and emotional skills <sup>[14]</sup>. Vaccinations and physical examinations are the focus of healthcare practice and, as noted in the literature, paediatricians frequently concentrate on basic healthcare and do not teach mothers about child-rearing <sup>[17]</sup>.

Studies have shown that mothers who overestimate when their child should acquire developmental skills could react negatively to their behaviours, and this could place the child at risk of abuse <sup>[21]</sup>. Conversely, if mothers underestimate developmental milestones, they could fail to provide their child with the stimulation and support they need for these skills to grow, as well as not notice or report significant delays to healthcare professionals. This study found that a large number of knowledge milestones were either over- or underestimated by mothers in Saudi Arabia.

Given parents' level of knowledge about developmental milestones irrespective of where they obtained the information, there may be an opportunity for improving the quality of the information obtained from routinely used sources. Considering that doctors and nurses are among the most commonly used resources and that knowledge scores are significantly associated with them, there is an opportunity to support these individuals in providing evidence-based and accurate information regarding children's development.

This study indicates the pressing need for the KSA's healthcare services to give new parents evidence-based educational materials on child development - such as leaflets - by enlisting doctors to provide these resources and, in addition, uploading accurate information to the increasingly consulted internet.

All studies have limitations and this study is no exception. Since its results were based on a small sample of mothers from one healthcare centre in Riyadh, they cannot be generalised across Saudi Arabia. Nevertheless, the study focussed on a hospital which treats patients from the whole country, and data was gathered from a number of departments, thereby broadening the socio-demographic basis of the research.

## Conclusion

Overall, Saudi mothers have poor knowledge of developmental milestones, and this is particularly evident in relation to motor, social and cognitive milestones. Inadequate knowledge creates unrealistic expectations, and can prevent the early detection of disability and frustration with a child's behaviour. The healthcare-mother relationship is the primary cause of this poor knowledge, since healthcare workers rarely emphasise developmental goals. To overcome this issue, healthcare staff - particularly primary-care doctors - must offer new parents information, support and evidence-based educational resources - like leaflets - which will clearly outline their child's developmental milestones.

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