

Prevalence and Determinants of Vaccine Hesitancy in Aseer Region, Saudi Arabia

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ABSTRACT: Objectives: This study aimed to assess the awareness of the general population regarding vaccines to determine the prevalence of vaccine hesitancy in Aseer Region in the southern part of Saudi Arabia. **Methods:** A descriptive cross-sectional approach was used, targeting all parents in Aseer Region. The study was carried out from January to April 2020. The data for this study were collected using a structured questionnaire, which was developed by the researchers after an intensive literature review and consultation with experts. The questionnaire covered aspects such as parents' sociodemographic data, their awareness regarding vaccine safety and efficacy for children and their attitude and adherence to children's vaccination, including their hesitancy towards vaccines. **Results:** The survey included 796 participants (response rate: 100%) whose ages ranged from 18 to 55 years. Two-thirds (63.4%) of the participants were female. Regarding vaccination adherence and hesitancy among participants, more than three-quarters completely adhered to the vaccination schedule for their children, and only 3.9% were non-adherent. With regards to participants' awareness regarding vaccine safety and efficacy for children, 89.3% agreed that vaccination keeps children healthy, 84.2% reported that vaccines are safe and effective for children and 83.4% reported that all scheduled vaccines in Saudi Arabia are effective. **Conclusion:** Vaccine hesitancy among participants was not low, and this should be taken into account notwithstanding their high awareness levels. The recorded antivaccine action was mostly related to vaccine safety and not its efficacy.

Keywords: Vaccination Refusal; Anti-Vaccination Movement; Parents; Awareness; Vaccination; Saudi Arabia.

ADVANCES IN KNOWLEDGE

- Vaccine hesitancy among parents in the Aseer Region is generally high and is probably due to certain misconceptions about vaccine safety and efficacy.
- Greater awareness needs to be spread during the Ministry of Health campaign and flu vaccine seasons due to the high rate of non-compliance.
- This study is the first to examine the prevalence and determinants of vaccine hesitancy among parents in Aseer Region, Saudi Arabia.

APPLICATION TO PATIENT CARE

- Awareness regarding vaccine intake needs to be duly emphasised among all parents.
- Understanding the safety and efficacy of vaccination is very important to avoid missing or delaying it.

VACCINATION IS THE PROVISION OF A VACCINE to initiate immunity through stimulating the immune system to develop protection from a certain disease.¹ When a sufficiently large proportion of a population has been vaccinated, herd immunity is initiated. The effectiveness of vaccination has been widely studied and verified.^{2–4} Vaccine efficacy is the magnitude of reduction in vaccine-related diseases using the most favourable conditions among vaccinated groups of people compared to an unvaccinated group.⁵ Vaccine effectiveness is variable according to vaccine type, disease nature and vaccination schedule.⁶

Despite the rigorous vaccine safety systems, some parents remain concerned about the safety of childhood vaccination and fail to adhere to the related immunisation schedule. The hesitations of some parents have resulted in them not letting their children receive some or all of the scheduled vaccines.⁷ In the USA, the rates of vaccine exemptions

increased from 1% in 2006 to 2% in 2016–2017 of the total population.⁸ This resulted in the prevalence of vaccine-preventable diseases being greater in children whose parents refused at least one of the vaccines for non-medical reasons as they were 23 times more likely to contract pertussis, 8.6 times more prone to have varicella and 6.5 times more vulnerable to contracting pneumococcal disease.^{9–11}

Vaccine hesitancy refers to either the lack of enthusiasm or plain refusal to be vaccinated or to have one's child vaccinated against infectious diseases despite vaccination services being accessible. It was identified by the World Health Organization as one of the top 10 global health threats of 2019.^{12,13} Vaccine hesitancy may be in the form of outright refusal to opt for vaccination, delaying getting vaccinated, accepting vaccines with uncertainty regarding their use or selectively using certain vaccines and not all.^{14,15} Arguments against vaccination are contradicted by

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Table 1: Characteristics of survey participants

Socio-demographic data	n (%)
Gender	
Male	291 (36.6)
Female	505 (63.4)
Age in years	
<20	38 (4.8)
20–29	254 (31.9)
30–39	275 (34.5)
40–49	184 (23.1)
≥50	45 (5.7)
Educational level	
Secondary school/below	140 (17.6)
Diploma	70 (8.8)
Undergraduate student	169 (21.2)
Postgraduate	417 (52.4)
Number of children cared for	
1–3	450 (56.5)
4–6	283 (35.6)
≥7	63 (7.9)
Youngest child's age in years	
<4	390 (49.0)
>4	406 (51.0)

overwhelming scientific consensus about the safety and efficacy of vaccines.

The Gulf Cooperation Council countries share common social and economic histories, health concerns and health systems and policies that are nearly identical.

The mean consumption of the influenza vaccine was 17% (21% among 'at risk' individuals) and ranged from 15% in Saudi Arabia to 24% in Qatar. The primary reasons cited for being vaccinated were doctor's recommendation (23%) and a perception of poor body immunity (21%). Between 2017–2020, the average consumption of pneumococcal vaccine was 22% (25% among people 'at risk') and ranged from 0% in Bahrain to 79% in Kuwait. Ignorance about vaccines was mentioned as the key obstacle to vaccination (43%).

The overall pertussis vaccine consumption was 16% (31% among 'vulnerable' individuals) and ranged from 7% in Saudi Arabia to 75% in Oman. The overall meningococcal vaccine consumption was 20% (29% among 'at risk' individuals) and ranged from 3% in Oman to 50% in Bahrain.^{16–20}

The present study aimed to assess parents' awareness regarding vaccination, determine the prevalence of vaccine hesitancy and identify factors associated with vaccine hesitancy among parents in Aseer Region, Saudi Arabia.

Methods

A descriptive cross-sectional approach was used, targeting all parents in Aseer Region due to the mixture of rural and urban areas present in this region. This study was conducted from January to April 2020. Data were collected using a structured questionnaire, which was developed by the researchers after an intensive literature review and consultation with experts. The first section of the questionnaire included parents' sociodemographic data such as age, gender, education and number of children under their care. The parents' awareness regarding vaccine safety and efficacy for children was assessed using six questions in the second section. The third section covered parents' attitudes towards and adherence to children's vaccination and hesitancy *vis-à-vis* vaccines. A panel of three experts reviewed the questionnaire independently for content validity, and all suggested modifications were applied till the final tool was achieved. The questionnaire was uploaded online on social media platforms (WhatsApp and Telegram) by the researchers and their relatives and friends to be filled by the population in Aseer Region. A pilot study was conducted to assess the tool's applicability and reliability. The tool reliability coefficient (Cronbach's alpha) was assessed and determined to be 0.68.

After the data were extracted, they were revised, coded and input into the Statistical Package for the Social Sciences (SPSS) Version 22 (IBM Corp., Armonk, New York, USA). All statistical analyses were done using two-tailed tests. A *P* value less than 0.05 was considered to be statistically significant. For awareness items, each correct answer was scored as one point, and the sum of the discrete scores of the different items was calculated. A patient with a score less than 60% of the maximum score (i.e. four points) was considered to have poor awareness; a score of 60% of the maximum score or more (i.e. five points or more) was considered as having good awareness. A descriptive analysis based on the frequency and percentage distribution was carried out for all the variables including demographic data, awareness, attitude, adherence to vaccination and hesitancy. Thereafter, cross tabulation was used to assess the distribution of awareness according to the participants' personal data and their attitudes. The

Table 2: Participants' awareness regarding vaccine safety and efficacy for children

Awareness item	n (%)		
	Yes	No	Unsure
Vaccination keeps children healthy	711 (89.3)	21 (2.6)	64 (8.0)
Vaccines are safe and effective in children	670 (84.2)	33 (4.1)	93 (11.7)
Non-vaccinated children are more liable to infection than other children and the elderly	583 (73.2)	78 (9.8)	135 (17.0)
All scheduled vaccines in Saudi Arabia are effective	664 (83.4)	28 (3.5)	104 (13.1)
Repeated doses of the vaccine over intervals keep children immune	628 (78.9)	38 (4.8)	130 (16.3)
Routine vaccination prevents infectious diseases and complications	651 (81.8)	34 (4.3)	111 (13.9)
Overall awareness			
Poor	195 (24.5)		
Good	601 (75.5)		

relations were tested using the chi-squared test.

The study was ethically approved by the Medical Research Committee of King Khalid University. Participation in this study was on voluntary basis and no informed consent was sought from the children's parents or the families.

Results

The survey included 796 participants (response rate: 100%) whose ages ranged from 18 to 55 years. Approximately, two-thirds (63.4%) of the participants were female. Moreover, 52.4% of them had either graduated from university or had higher qualifications. Regarding the number of children cared for, 56.5% of the respondents cared for 1–3 children and 7.9% for seven children or more. For 40.0% of the participants, the youngest child was aged less than four years [Table 1].

Regarding vaccination adherence and hesitancy among participants concerning vaccination, 80.5% of the participants fully adhered to their child's vaccination schedule, 15.6% partially adhered and only 3.9% of them had been non-adherent.

Regarding participants' awareness concerning vaccine safety and efficacy for children, 89.3% of the respondents agreed that vaccination keeps children healthy, 84.2% reported that vaccines are safe and

Table 3: Participants practice and attitude regarding vaccine safety and efficacy for children

Domain	Item		n (%)
Participants' practice	Adherence to the MoH's recommendations for vaccination schedule	Yes	703 (88.3)
		No	93 (11.7)
	Vaccinating your child during the MoH's campaigns	Yes	618 (77.6)
		No	178 (22.4)
Participants' attitude	Vaccinating your child against seasonal influenza	Yes	264 (33.2)
		No	532 (66.8)
	Think vaccines affect child health negatively	Yes	125 (15.7)
		No	481 (60.4)
Maybe		190 (23.9)	
Worried about vaccines' side-effects	Yes	193 (24.2)	
	No	353 (44.3)	
	Maybe	250 (31.4)	

MoH = Ministry of Health.

effective in children and 83.4% reported that all scheduled vaccines in Saudi Arabia are effective; 81.8% reported that routine vaccination prevents infectious diseases and complications. Overall, a good level of awareness regarding vaccine efficacy and safety was reported among 601 (75.5%) of the participants [Table 2].

Adherence to the Ministry of Health (MoH) recommendations for vaccination schedule was recorded among 88.3% of the participants, and 77.6% of them vaccinated their children during the MoH campaigns. Vaccinating children against seasonal influenza was reported by 33.2% of the participants. Moreover, 60.4% think that vaccines do not affect child health negatively and 24.2% were worried about vaccine side-effects [Table 3].

A good level of awareness was recorded for 77.5% of those with university education, compared to 64.3% of those with secondary education or less with recorded statistical significance ($P = 0.005$). Further, good awareness was recorded among 73.1% of those who cared for 1–3 children, compared to 63.5% of those who cared for seven children or more ($P = 0.002$). Additionally, 80.7% of those who completely adhered to vaccination schedules for their children had good awareness, compared to 9.7% of the non-adherent group ($P = 0.001$). The awareness levels were significantly higher for those who adhered to the MoH's vaccination recommendations (83.6%), those who vaccinated their children during the MoH campaigns (79.1%) and those who were not worried about vaccine side-effects (65.3%; $P = 0.001$, each) [Table 4].

Table 4: Predictors of participants' awareness regarding vaccination for children

Factors		n (%)		P value
		Awareness level		
		Poor	Good	
Age in years	<20	10 (26.3)	28 (73.7)	0.071
	20–29	64 (25.2)	190 (74.8)	
	30–39	79 (28.7)	196 (71.3)	
	40–49	31 (16.8)	153 (83.2)	
	50+	11 (24.4)	34 (75.6)	
Educational level	Secondary school/below	50 (35.7)	90 (64.3)	0.005
	Diploma	18 (25.7)	52 (74.3)	
	University student	33 (19.5)	136 (80.5)	
	University/postgraduate	94 (22.5)	323 (77.5)	
Number of children cared for	1–3	121 (26.9)	329 (73.1)	0.002
	4–6	51 (18.0)	232 (82.0)	
	7+	23 (36.5)	40 (63.5)	
Youngest child's age in years	<4	108 (27.7)	282 (72.3)	0.058
	>4	87 (21.4)	319 (78.6)	
Adherence to child's vaccination schedule	Completely adherent	124 (19.3)	517 (80.7)	0.001
	Partially adherent	43 (34.7)	81 (65.3)	
	Non-adherent	28 (90.3)	3 (9.7)	
Adherence to the MoH recommendations for vaccination schedule	Yes	115 (16.4)	588 (83.6)	0.001
	No	80 (86.0)	13 (14.0)	
Vaccinating the child during the MoH campaigns	Yes	129 (20.9)	489 (79.1)	0.001
	No	66 (37.1)	112 (62.9)	
Vaccinating the child against seasonal influenza	Yes	46 (17.4)	218 (82.6)	0.001
	No	149 (28.0)	383 (72.0)	
Think that vaccines affect child health negatively	Yes	39 (31.2)	86 (68.8)	0.001
	No	71 (14.8)	410 (85.2)	
	Maybe	85 (44.7)	105 (55.3)	
Worried about vaccines' side-effects	Yes	67 (34.7)	126 (65.3)	0.001
	No	64 (18.1)	289 (81.9)	
	Maybe	64 (25.6)	186 (74.4)	

MoH = Ministry of Health.

Regarding identified side-effects reported by the participants, allergy was the most reported (25.8%), followed by autism (8.4%), fever (8%), paralysis (6.5%) and epilepsy (5.9%), while 57.2% reported that there was no side-effect [Figure 1].

Discussion

Vaccine hesitancy is mostly a result of public debates regarding the medical, ethical and legal issues related

to vaccines. It is related to many factors including a person's lack of confidence, complacency (as the person does not see the need for/value in the vaccine) and vaccine convenience.²¹ The specific hypotheses raised by antivaccination advocates—that vaccination leads to autism and that vaccines contain microchips developed to control people—have been found to change over time.²² Vaccine hesitancy often results in disease outbreaks and deaths from vaccine-preventable diseases.^{23,24}

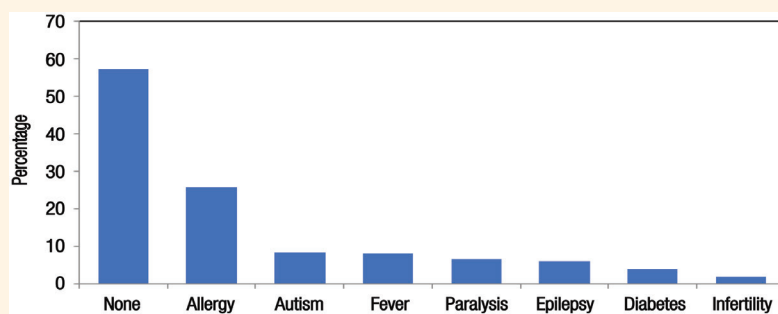


Figure 1: Vaccine's side-effects as reported by survey participants.

The present study aimed to assess parents' awareness regarding vaccines and vaccine hesitancy in Aseer Region, Saudi Arabia. The study revealed that nearly 20% of the participating parents reported either partial or complete non-adherence to the vaccinations recommended for their children. Further, nearly one out of five mothers did not vaccinate their children during the MoH campaigns. On the other hand, vaccination against seasonal influenza was reported by only one-third of the participants. This could be because approximately one-third of the participants thought that vaccines affect child health negatively and that more than half of them worried about the vaccines' side-effects. The vaccines' side-effects that most of the participants knew of and referred to were allergy, autism, fever and infertility. Some of the mentioned side-effects, such as autism and infertility, are not scientifically proven but their mere mention is sufficient to yield a negative attitude against vaccines and empower the antivaccine movement.

As for the participants' awareness regarding vaccines, more than three-quarters of the participants reported that vaccination keeps children healthy, they are safe and effective, repeated doses of the vaccine over intervals keep children immune, and routine vaccination prevents infectious diseases and complications. A very important question arises, as three out of four participants were well aware about vaccines but still reported fear of commitment and vaccination hesitancy. This could partially explain the fact that very few participants with good awareness were non-adherent to their children's vaccination schedule. However, a high percentage of those who were worried about the vaccines' side-effects and those who thought that vaccines affect child health negatively had good awareness regarding vaccines. This may be related to the vaccine safety aspect as there was no doubt about vaccine efficacy. As with any medical treatment, vaccines have the potential to cause serious complications such as severe allergic reactions.^{25,26} Yet, vaccines are somewhat different

from medical interventions. Unlike most other medical interventions, vaccines are administered to healthy people, so a higher standard of safety is expected.²⁷ The growing link between vaccines and autism has been massively studied and conclusively shown to be incorrect. The scientific consensus is that there is no relationship, causal or otherwise, between vaccines and the incidence of autism and that vaccine ingredients do not cause autism.^{28,29}

Mothers need to encourage vaccinations for their children as getting vaccinated is a child's right. This will improve their children's health and, in turn, community health and lessen the social, psychological and economic burden. Appropriate laws may need to be enacted to obligate mothers to vaccinate their children, disallow non-vaccinated children from being admitted to schools and impose monetary penalties for refusing to vaccinate their children.

This study was subject to some limitations. The online sampling technique may affect sample representativeness, as only those who have access to the online questionnaire could respond. This study population covers those who are educated and have online access. Therefore, the study results are not generalisable to the whole population; however, this sampling technique was necessary due to the restricted lifestyle during the current pandemic. In addition, cross-sectional studies have low precision regarding causality and testing for association which may also affect the study results. Furthermore, the timing of the study during the current pandemic may affect participants perception or even practice regarding their children's vaccination due to fear of infection if they attend primary healthcare centres. Finally, this study was conducted in one region in the country, which may not reflect the views of other regions. Further large studies are needed in the future to assess vaccine hesitancy and its determinants in many regions of Saudi Arabia.

Conclusion

This study revealed that vaccine hesitancy among participants was not low, and this should be taken into account notwithstanding their high awareness levels. The recorded antivaccine action was mostly related to vaccine safety and not efficacy. Most participants were aware that vaccines are effective, but they reported fear of some complications such as autism and infertility, among others, which is enough to convince some of not vaccinating their children. More efforts should be made by the country and its medical staff, in particular, to disseminate correct detailed information, regarding vaccine safety and explain to the people that most research studies warn against unsafe vaccination which has many drawbacks. Furthermore, health education campaigns should be organised to duly reach parents in remote areas who may constitute the main bulk of carers of unvaccinated children.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS' CONTRIBUTION

YAA and KHA drafted the manuscript. KHA drafted the questionnaire, while YMA, AHA and AAA collected the data. YAA and AAA analysed the data. YAA and AHA reviewed the literature. All authors approved the final version of the manuscript.

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