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Research Article

**PREVALENCE OF VACCINE HESITANCY AND ITS
ASSOCIATED FACTORS AMONG SAUDI MOTHERS
ATTENDING PHCS IN TAIF CITY, SAUDI ARABIA**

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Abstract:

Background: Despite the outstanding achievements in public health, especially the vaccinations system. An emerging phenomenon called vaccine hesitancy tends to be a significant obstacle that hinders the continuity of the herd immunity that all scientists with governments have built in the last decades.

Objectives: This study aimed to evaluate the level of parental vaccination hesitancy (PVH) among Saudi mothers and to identify the factors that may impact their confidence to vaccinate their children.

Methods: A cross-sectional study was conducted on Saudi mothers attending primary healthcare centers in Taif city, Saudi Arabia. Data were collected through a valid questionnaire designed by the SAGE (Strategic Advisory Group of Experts on Immunization) in June 2022.

Results: A total of 224 mothers were included. The majority were aged 24 to 29 years old (28.1%). Around 63% completed their bachelor's degree, and about 73% were working females. They frequently get their vaccine information from hospitals (35.7%) and social media platforms (35.7%). Upon evaluating PVH-associated factors, graduate and working mothers were less hesitant toward vaccination than non-graduate mothers ($p=0.025$, 0.047 , respectively). Rural area women were more confident about vaccinating their children ($p=0.001$). Mothers who received vaccination awareness from hospitals were more hesitant to vaccinate their children ($p=0.001$).

Conclusion: A significant proportion of Saudi mothers experience PVH. This hesitancy is lower among working mothers with a high level of education who live in rural areas. Mothers who get information from healthcare providers also tend to be less confident about vaccinations. Awareness about the safety and efficacy of childhood vaccinations should be raised among the Saudi community to limit preventable diseases.

Keywords: Parental vaccination hesitancy, Immunization, Saudi mothers, Vaccine.

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INTRODUCTION:

Vaccination is a safe way of protecting the body against viral diseases that cause harm; before contacting them. It uses the body's defense mechanism to develop resistance to specific pathogens and makes the immune system more grounded. The number of children vaccinated per year is ≥ 116 million. In the meantime, vaccination can prevent more than 20 life-threatening diseases [1]. Between 2010 and 2017, the mortality rate of children ≤ 5 years of age declined by 24%, consequential to vaccination [2].

Opposing vaccination has existed since vaccination exists itself¹. Many reasons were behind this opposition. For example, some people refused vaccination because they felt it violated their freedom. A tension that deepened as the government developed obligatory vaccination policies [2]. Germany outperformed the UK by putting vaccines into legislation morely and recognizing the necessity of re-vaccination [5,6]. Another reason was the fear of the side effects of these vaccinations. In 1998, doctor Andrew Wakefield suggested further investigating a possible correlation between autism and the MMR (Measles, Mumps, Rubella) vaccine [2]. Nevertheless, many studies have been held to evaluate the safety of the MMR vaccine, and none of them has proved a correlation between the vaccine and autism².

Although time has changed, profound beliefs—psychological, philosophical, political, or religious—underpin vaccine opposition have been constant since Edward Jenner introduced vaccination. The conflict about vaccination is predisposed to what is called Vaccine hesitancy [3].

Vaccine hesitancy is an almost new expression, used recently in the literature to describe someone who doubts vaccinations or delays or rejects immunizations^{3,4}. After that, another term emerged called “parental vaccine hesitancy” (PVH). PVH covers a broad range of vaccine concerns and is suspected of being responsible for reducing the coverage of many childhood vaccines [5]. The percentage of parents that delay or reject vaccines for nonmedical reasons increases in a dramatic way [5,6].

The successful outcomes of routine immunization programs prevented many vaccines preventable diseases in the United States, encouraging parents to replace their fear of the complications of the diseases with the side effects and risks of vaccines themselves [5]. Parents trust the advice of their child's health care provider (HCP) as regards areas such as nutrition,

physical examination, and childhood behavior and development. However, this was not reflected in the given vaccines' information¹⁶. Parents are convinced that HCPs share the benefits and do not give enough information about the risks of vaccines. Those who are vaccine-hesitant seem to get more information from the internet compared with parents who accept vaccines [12]. Internet-based information may be inaccurate or biased. People usually search to endorse their beliefs. Parents who search for risks of vaccines experience 4.8 times more websites with myths regarding vaccines [17].

PVH is also a common problem in Saudi Arabia. Almost one-fifth of Saudi parents are hesitant to get their children vaccinated [12]. Therefore, the national plan of 95% vaccination has been achieved to maintain herd immunity. Still, it is essential to repeat this evaluation regularly to prevent unwanted changes in parents' attitudes towards vaccination [13].

Vaccination is an essential method of preventing fatal communicable diseases, some of which are not treatable and lead to permanent dysfunction or even death. Moreover, vaccination is the only proven, safe method to prevent these diseases. Hesitancy to vaccination can leave children exposed to plenty of communicable diseases. Mothers' hesitancy to vaccination should be studied closely to understand the prevalence of the issue and the reasons and factors associated with it. Furthermore, the variety of social and cultural factors associated with parents' hesitancy should be understood since it changes from city to city. Studies in Saudi Arabia regarding vaccine hesitancy are lacking and are scarce in number. Accordingly, our study aimed to assess the prevalence of PVH among Saudi mothers and its associated factors in Saudi Arabia.

METHODOLOGY:

Study Design:

This cross-sectional study was conducted in Taif city, Saudi Arabia, in June 2022. Saudi mothers attending primary healthcare centers (PHCs) in Taif city, Saudi Arabia, who voluntarily agreed to participate, were included in the study.

Data collection tool and technique:

Data was collected through a self-administrating questionnaire during the waiting time at the PHCC. The data included the following: Sociodemographic data of mothers; an adapted-valid questionnaire (35) designed by the SAGE group including 11 items assessing vaccine hesitancy, including attitudes and concerns about childhood vaccines, and the efficacy

of the vaccination. The answers were on a scale of five points to specify the level of agreement with a statement including "Strongly agree, Agree, Neutral, Disagree, and Strongly disagree".

Each answer was given a score from 0 to 4. The total score was calculated for each participant by summing the individual scores for each question to give a total score out of 44. Afterward, the level of hesitancy was categorized into three groups: $\leq 50\%$ was accounted for being strongly hesitant, >50 to $\leq 75\%$ for mild hesitancy, and $> 75\%$ for non-hesitancy.

Statistical analysis

The sample size was calculated by using the RaoSoft online sample size calculator. Considering a marginal error of 10%, a confidence level of 99%, and a 50% response distribution (maximum uncertainty), the minimal calculated sample size is 165 mothers. Four PHCCs were selected randomly from 18 PHCs in Taif city. The calculated sample size was proportionally allocated to each PHC.

Data entry and analysis were performed using appropriate statistical methods using the Statistical Package of Social Sciences (SPSS version 26). Data were analyzed using descriptive statistics of frequency and percentage. The chi-square and Fisher exact test were used to compare categorical variables. Statistical significance was considered when p-values were less than 0.05.

RESULTS:

A total of 224 mothers who met the criteria were included. Most respondents surveyed were 24 to 29 years old (28.1%). The majority were married women (77.2%) and has more than four children (40.6%). Almost all individuals were city residents (93.8%). Around 63% reported having educational completion of bachelor's degree, and about 73% were working females. The primary sources of their vaccine information were hospitals and health centers (35.7%) and social media platforms (35.7%). Complete respondents' sociodemographic characteristics are shown in table (1).

Table 1: Sociodemographic data of included mothers:

Characteristics		Count (N=224)	%
1. Age	18- 23	20	8.9
	24- 29	63	28.1
	30- 34	56	25.0
	35- 39	38	17.0
	≥ 40 years old	47	21.0
2. Social Status	Married	173	77.2
	Divorced	35	15.6
	Widowed	16	7.1
3. Number of children	1	36	16.2
	2	48	21.6
	3	48	21.6
	≥ 4	90	40.6
4. Residence	Country	14	6.3
	City	210	93.8
5. Education	Primary school	22	9.8
	Secondary school	39	17.4
	Graduated /post-graduate	142	63.4
	High school	14	6.3
	Illiterate	7	3.1
6. Job	Productive family	1	0.4
	Government sector	92	41.1
	Private sector	48	21.4
	Military sector	7	3.1
	Student	17	7.6
	Doesn't work	59	26.3
7. Source of information	Social media platforms	80	35.7
	Hospitals and health centers	80	35.7
	Family and friends	41	18.3
	Papers and magazines	13	5.8
	Internet	4	1.8
	Others	6	2.7

Mothers' hesitancy toward children's vaccination:

As seen in **figure 1**, half of the mothers had mild hesitancy to get their children vaccinated (48.7%), and the remaining was equally distributed between not hesitant (25.9%) and strongly hesitant (25.4%).

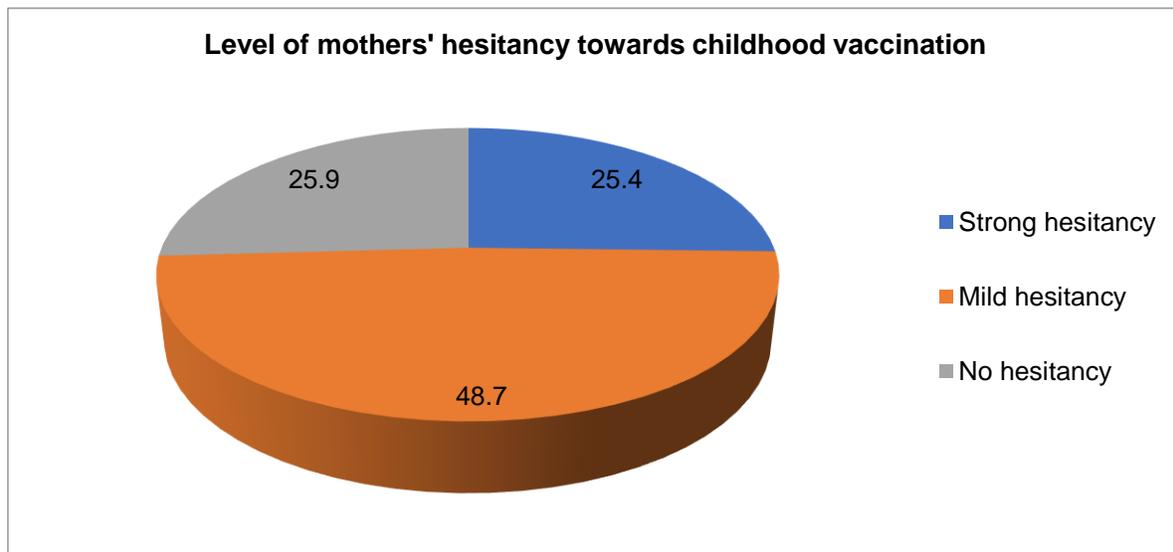


Figure 1: Level of mothers' hesitancy towards childhood vaccination

Concerning the confounding factors associated with hesitancy toward childhood vaccination among mothers, there was a significant relationship between education and working status as well as residency and source of information and vaccination hesitancy. Graduate and working mothers had less hesitancy toward vaccination than non-graduate mothers ($p=0.025$, $p=0.047$, respectively). However, women who lived in the countryside were more certain about vaccinating their children ($p=0.001$). Surprisingly, mothers with vaccination information from hospitals and health centres were more reluctant to vaccinate their children ($p=0.001$). The full illustration is identified in **table 2**.

Table 2: Factors associated with childhood vaccine hesitancy among mothers

Characteristics of the study group		Strongly hesitant N= 57	Mild hesitant N= 109	Not hesitant N= 58	P Value
Age	<35	35 (25.2%)	63 (45.3%)	41 (29.5%)	0.261
	≥35	22 (25.9%)	46 (54.1%)	17 (20%)	
Number of children	≤3	30 (22.7%)	63 (64.2%)	39 (34.2%)	0.266
	>3	27 (29.3%)	46 (50.0%)	19 (20.7)	
Marital status	Married	38(22.0%)	87 (50.3%)	48 (27.7%)	0.080
	Divorced/widowed	19 (37.3%)	22 (43.1%)	10 (19.6%)	
Educational level	Graduate	31 (21.8%)	66 (46.5)	45 (31.7%)	0.025
	Not graduate	26 (31.7%)	43 (52.4%)	13 (15.9%)	
Job	Working	43 (26.1%)	73 (44.2%)	49 (29.7%)	0.047
	Jobless	14 (23.7%)	36 (61.0%)	9 (15.3%)	
Residency	Country	10 (71.4%)	3 (21.4%)	1 (7.1%)	0.001
	City	47 (22.4%)	106 (50.5%)	57 (27.1%)	
Source of information	Family and friends	12 (29.3%)	20 (48.8 %)	9 (22.0%)	0.001
	Online platforms	10 (11.9%)	53 (63.1%)	21 (25.0 %)	
	Hospitals and health care centers	29 (40.3%)	28 (38.9%)	15 (20.8%)	
	Others	6 (22.2 %)	8 (29.6%)	13 (48.1%)	

DISCUSSION:

Vaccine hesitancy is an emerging term that describes someone who doubts vaccinations that lead him to reject immunizations [10,11]. This phenomenon is an obstacle in front of the efforts of childhood vaccination which leads to a significant reduction in the incidence of vaccine-preventable diseases. Vaccine hesitancy is considered by the World Health Organization (WHO) as a growing concern worldwide, affecting high, middle, and limited developing countries [Error! Bookmark not defined.,Error! Bookmark not defined.,v,vi]. Our study aimed to assess mothers' hesitancy to childhood vaccination and explore the association between sociodemographic, cultural factors, and PVH.

The current study demonstrated that PVH was relatively high among Saudi Arabian mothers. While nearly half of the mothers were mildly hesitant to vaccinate their children (48.7%), the remainder were equally divided between non-hesitant (25.9%) and strongly hesitant (25.4%). Other studies have shown different percentages of hesitant parents all over the countries, considering that the explanation of hesitancy has been diverse across studies, and it was country and time dependent>Error! Bookmark not defined.^{vii}.

Alexander et al.^{viii} have studied the phenomenon of vaccine hesitancy. They used the data from 290 surveys from 149 countries from 2015 to 2019. They found that hesitancy about vaccine importance, effectiveness, and safety has increased in some countries such as South Korea, the Philippines, Pakistan, Indonesia, and Afghanistan. Also, another study held in the United States of America reported that one-third of parents are hesitant [21]. About PVH in Saudi Arabia, Alsubaie et al. reported that 20% of the participants have been reluctant to vaccinate their children [19].

The level of education has always been an important factor that may affect many aspects. Subsequently, it was essential to explore the correlation between the education level and the level of PVH. Xin Shen et al. reported that parents with a bachelor's degree or a higher educational level were significantly less hesitant than parents who had primary school or below. Metin et al.^{ix} agreed with Jessica that the parents' educational level greatly influenced vaccine hesitation. Other studies held in Nigeria, India, and Kyrgyzstan revealed that parents' low educational level was hindering their children's vaccination. As well as studies conducted in the United States, Greece, and the Netherlands had found that the

higher the parents' education, the lower the PVH [26]^{x, xi, xii}. All of the above was in agreement with the results of the current study, which showed that a significantly lower vaccine hesitancy rate was reported among mothers who are University graduates and working mothers.

Always, the place of residency was a significant predictor of personal beliefs. It was crucial to examine the correlation between PVH and the residency of the respondents. Our study revealed that women who live in rural areas were more confident about vaccinating their children. These results diverted from other studies based in China^{xiii}, where there was no difference in PVH between rural and urban residents. Lavanya Vasudevan et al.^{xiv}, reported that mothers from rural areas had more concerns about vaccines than mothers from urban areas. This variance in results may be due to the demographics of the participants and the proportion between urban and rural residents.

Regarding the sources of information mothers used to get about vaccines, mothers who had their vaccination information from hospitals and health centres were more hesitant about their children's vaccination. Ruiz et al.[17] concluded that vaccine-hesitant parents are convinced that HCPs share the benefits and do not tell them about the risks of vaccines. Also, their information was internet based compared with parents who accept vaccines. This is explained by the usual lack of trust in healthcare providers.

CONCLUSION:

Vaccine hesitancy is prevalent among Saudi mothers, level of education, place of residency, and source of information about vaccination were essential factors that impact the level of hesitancy when examined. More research must be conducted to investigate the reasons behind this growing deleterious phenomenon to counter its harmful effect on herd immunity. Massive efforts should also be made in the aspect of education and awareness about the importance, effectiveness, and safety of vaccinations to the community and the whole world.

List of abbreviations

MMR	Measles, Mumps, Rubella
PHCC	Primary Health Care Centres
PVH	parental vaccine hesitancy
SAGE	Strategic Advisory Group of Experts on Immunization
VPD	vaccines preventable diseases
WHO	World Health Organization

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