

Parental Perception Towards Flu Vaccination for Asthmatic Children in Saudi Arabia

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Abstract

Background

Asthma is a major noncommunicable disease that affects around 235 million people, including children, globally. In the Kingdom of Saudi Arabia (KSA), the incidence of childhood asthma continues to increase. The Ministry of Health in Saudi Arabia has attempted to put policies in place to prevent the occurrence of asthma-related complications by encouraging parents to vaccinate their diagnosed asthmatic children with the flu vaccine. To date, however, there have been no studies investigating the use of flu vaccine among asthmatic children in KSA. Our research aims to explore the perception of parents with asthmatic children towards flu vaccination and its effect on the decision to vaccinate their children.

Methods

Our research was a cross-sectional study of 190 parents who presented with asthmatic children at King Fahad Medical City (KFMC) in Riyadh, KSA from October 2016 to April 2017. The study tools included structured and semi-structured questionnaires with demographic information, types of healthcare, and perceptions of parents towards flu vaccination. Data analysis was done using Statistical Package for the Social Sciences (SPSS; IBM, Armonk, NY).

Results

Samples were mostly Saudis (97%), who were married (92%), and in the age group of 21-40 years (70%). Most of them were females (59%). More than two-thirds of the parents had a middle school education or bachelor's degree, and more than half were employed. Parents with higher education had a higher rate of vaccination for their children, and they were more likely to believe that a non-vaccinated child is more likely to get flu. Almost 76% of parents with vaccinated children agreed that the flu vaccine could safeguard children against flu. Doctors' opinion about flu vaccination was significantly associated with the parents' decision. The multivariate regression analysis results showed that easy access to services and parents' beliefs regarding vaccination are positively associated with influenza vaccination status.

Conclusion

Among the essential factors positively associated with the influenza vaccination status were a perception of easy access to vaccination services and the belief that non-vaccinated children are more likely to contract the flu virus. In contrast, the belief that vaccination prevents infection by the flu virus was negatively associated with vaccine uptake.

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Introduction

Asthma, a major non-communicable disease characterized by recurrent attacks of breathlessness and wheezing, affects around 235 million people globally. The World Health Organization (WHO) has reported an estimated 383,000 asthma-related deaths in 2015, many of which occurred in low- and middle-income countries [1]. It is a common disease among children. While asthma may be triggered by numerous factors (e.g., polluted air, outdoor and indoor allergens, and stressful lifestyle), viral infection of the respiratory tract (e.g., influenza) remains the leading risk factor for childhood asthma [2]. Studies have shown that approximately 85% of asthma attacks in children are related to this viral infection, which exacerbates asthma symptoms and leads to admission to the emergency department and hospitalization [3,4,5].

In the Kingdom of Saudi Arabia (KSA), the incidence of childhood asthma continues to increase [6]. The American Academy of Pediatrics and the WHO have recommended an annual administration of influenza vaccination for asthmatic children during fall and winter seasons [7,8]. These vaccinations are recommended as a precautionary measure to control serious asthma complications, including pneumonia [8]. Numerous research studies have been conducted to investigate the barriers and facilitators for vaccine uptake in the US [9]. However, despite these recommendations, a low rate of adherence to vaccination guidelines has been reported in many countries. Notably, the Middle Eastern countries account for only 3.7% of the flu vaccines administered worldwide [10].

Several studies have investigated the factors contributing to higher asthma prevalence among children [11,12]. In addition to poor air quality and environmental factors, viral infections are the most common triggering factor that leads to asthma in children aged 4 to 10 years [13]. The Saudi Ministry of Health has devised a management plan to control the occurrence of asthma-related complications [14]. The program focuses on raising public awareness by educating and encouraging parents to inoculate their asthmatic children with the flu vaccine. To date, however, there have been no studies investigating the details of the administration of flu vaccine among asthmatic children in KSA. Most of the current studies explore the adherence of healthcare workers to the recommendations for flu vaccination [15]. Thus, our research aims to examine the perception of parents with asthmatic children toward flu vaccination and its association with their decision to vaccinate their children in KSA.

Materials And Methods

This cross-sectional study was conducted at the King Fahad Medical City (KFMC) in Riyadh, KSA, from September 2016 to April 2017. KFMC is an academic teaching hospital with a capacity of 600 beds, catering to patients in Riyadh and the surrounding areas. We interviewed a total of 190 parents at the family medicine clinic and asthma clinic. The inclusion criteria included: 1) parents who had at least one asthmatic children aged 6 months to 15 years; 2) parents of children who were admitted to the emergency department and/or had been hospitalized during the previous 12 months; and 3) parents of children receiving medications for asthma (i.e., inhaled steroid, oral steroid, leukotriene antagonist, cromolyn/nedocromil, and salmeterol or theophylline). All clinical information was obtained from the electronic medical records of KFMC. Parents of children without a medical record in KFMC and those of children with medical conditions considered as contraindications to vaccination against the flu were excluded.

In terms of the tool we used, this study is similar to a previous study conducted in the US, which examined modifiable factors contributing to increased vaccination rates [16]. The survey tool

was adopted from the Triandis model [16]. The original self-report instrument was designed to collect information regarding the facilitating conditions, behavioral habits, value of consequences of the activity, social influences (including the influence of the clinician on patients), and attitudes toward the activity [16]. This model has been used and validated in numerous settings for the investigation of health-related behaviors [17,18]. The survey tool was translated into Arabic, validated using a forward-back translation by two independent translators, and piloted on 10 participants to ensure the validity of the results. The semi-structured questionnaire included demographic and statements on knowledge and attitudes, perceived benefits, social support, adverse events observed, and perceived barriers to adherence. Each category was based on the Likert agreement scale and used to measure the respondents' agreement. All data were analyzed using the statistical package SPSS version 22.0 (IBM, Armonk, NY).

In terms of sampling, a trained research assistant approached all parents attending the family medicine clinic and asthma clinic each week from October 2016 to April 2017. Parents who agreed to participate in the study and signed the informed consent form were interviewed. The response rate was 100%, and all invited participants completed the questionnaire. The sample was conveniently collected to include all eligible parents attending the flu and family clinics each week. The asthma clinic was included to limit any possible participant-selection bias of parents attending it not being aware of the availability of the flu vaccine. Recall bias regarding vaccination data was controlled by rechecking the hospital records to confirm the flu vaccination status.

In terms of data analysis, all categorical variables such as sex, educational level, and vaccination status are presented as numbers and percentages. Based on whether the cell expected frequency was <5, the chi-squared or Fisher's exact test was used to determine significant relationships between categorical variables. Binary logistic regression was applied to determine the significant factors associated with parental perception regarding the flu vaccine. A p-value below 0.05 denoted a statistically significant difference. Ethical approval was obtained from the Institution Review Board at KFMC.

Results

A total of 190 of Saudi parents were interviewed. An overwhelming majority of them were Saudis nationals (97%). Most of the interviewed parents were aged 20-40 years. Almost 60% of the interviewed parents were mothers. Of note, 88 parents were vaccinated (46.3%), whereas 102 parents were not (53.7%) (Table 1).

| Characteristics (n = 190) | Description | N (%) |
|----------------------------|-------------|-------------|
| (a) Sample characteristics | | |
| Nationality | Saudi | 185 (97.4%) |
| | Non-Saudi | 5 (2.6%) |
| Age | ≤20 | 14 (7.4%) |
| | 21–40 | 133 (70%) |
| | >40 | 43 (22.6%) |

| | | |
|--|------------------|----------------|
| Sex | Male | 78 (41.1%) |
| | Female | 112 (58.9%) |
| Marital status | Married | 174 (91.6%) |
| | Divorced | 2 (1.1%) |
| | Other | 14 (7.4%) |
| Educational level | Not educated | 10 (5.3%) |
| | Middle education | 68 (35.8%) |
| | Bachelor | 73 (38.4%) |
| | Higher education | 39 (20.5%) |
| Occupation | Employed | 100 (52.6%) |
| | Unemployed | 78 (41.1%) |
| | Other | 12 (6.3%) |
| Asthmatic children flu vaccination status | Vaccinated | 88 (46.3%) |
| | Non-vaccinated | 102 (53.7%) |
| (b) Perceptions | | |
| Children with asthma should receive flu vaccination | Agree | 173 (91.1%) |
| | Do not agree | 4 (2.1%) |
| | Do not know | 13 (6.8%) |
| I received a reminder from the primary care unit/hospital regarding my child's flu vaccination appointment | Agree | 137 (72.1%) |
| | Do not agree | 25 (13.2%) |
| | Do not know | 28 (14.7%) |
| | Agree | 166 (87.4%) |

| | | |
|---|-----------------------|-------------|
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | Do not agree | 14 (7.4%) |
| | Do not know | 10 (5.3%) |
| I believe that my child has to receive the flu vaccination | Agree | 173 (91.1%) |
| | Do not agree | 8 (4.2%) |
| | Do not know | 9 (4.7%) |
| | Agree | 36 (18.9%) |
| The flu vaccination may cause complications/troubles to my child | Do not agree | 122 (64.2%) |
| | Do not know | 32 (16.8%) |
| | One shot | 108 (56.8%) |
| | Two shots | 82 (43.2%) |
| The maximum limit of flu vaccine for children per visit is | Three shots | 0 (0.0%) |
| | Four shots | 0 (0.0%) |
| | Agree | 53 (27.9%) |
| | Do not agree | 113 (59.5%) |
| I believe that my child is sick because of the flu shot | Do not know | 24 (12.6%) |
| | Less than last winter | 99 (52.1%) |
| Comparing the number of times that my child got sick during last year's winter versus this winter | More than last winter | 50 (26.3%) |
| | No difference | 41 (21.6%) |
| | Agree | 166 (87.4%) |
| | Do not agree | 10 (5.3%) |
| My child's pediatrician believes that my child should receive the flu vaccine | Do not know | 14 (7.4%) |
| | Agree | 144 (75.8%) |
| | Do not agree | 19 |

| | | |
|---|--------------|----------------|
| My relatives believe that my child should receive the flu vaccine | Do not agree | 10 (10.0%) |
| | Do not know | 27 (14.2%) |
| | Agree | 117 (61.6%) |
| Non-vaccinated children are more likely to contract the flu | Do not agree | 50 (26.3%) |
| | Do not know | 23 (12.1%) |
| | Agree | 157 (82.6%) |
| The flu vaccination prevents infection by the flu virus | Do not agree | 12 (6.3%) |
| | Do not know | 21 (11.1%) |
| | Agree | 45 (23.7%) |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | Do not agree | 119 (62.6%) |
| | Do not know | 26 (13.7%) |
| | Agree | 157 (82.6%) |

TABLE 1: Descriptive statistics of sample characteristics and parental perceptions

N: number of respondents

Table 2 shows the association between parental characteristics and children’s vaccination status. In terms of sociodemographic parameters, the results show that a higher education level was positively associated with vaccination uptake among asthmatic children (p-value = 0.042 and <0.001, respectively). Parents aged 21-40 years were more likely to vaccinate their children compared with those aged >40 years (p-value = <0.001). In terms of knowledge and facilitating conditions, a large number of parents with vaccinated children agreed that non-vaccinated children are more likely to contract the flu (p-value = <0.001). Unexpectedly, parents of both vaccinated and non-vaccinated children reported that children with asthma should receive the flu vaccine (p-value = 0.002). Moreover, they reported that their pediatrician had recommended that the children should receive the flu vaccine (p-value = 0.016), and the hospital had made the vaccine accessible to the parents (p-value = 0.002).

| Characteristic of the parents | Description | Vaccinated | Non-vaccinated | P-value |
|-------------------------------|--------------|------------|----------------|---------|
| | Not educated | 2 (2.3%) | 8 (7.8%) | |
| | Middle | | | |

| | | | | |
|--|-----------------------|------------|------------|---------|
| Educational level | High school education | 20 (22.7%) | 48 (47.1%) | <0.001* |
| | Bachelor | 30 (34.1%) | 43 (42.2%) | |
| | Higher education | 36 (40.9%) | 3 (2.9%) | |
| Age | ≤20 | 13 (14.8%) | 1 (1.0%) | <0.001* |
| | 21–40 | 46 (52.3%) | 87 (85.3%) | |
| | >40 | 29 (33%) | 14 (13.7%) | |
| Sex | Male | 35 (39.8%) | 43 (42.2%) | 0.739 |
| | Female | 53 (60.2%) | 59 (57.8%) | |
| Nationality | Saudi | 87 (98.9%) | 98 (96.1%) | 0.232 |
| | Non-Saudi | 1 (1.1%) | 4 (3.9%) | |
| Social status | Married | 76 (86.4%) | 98 (96.1%) | 0.042* |
| | Divorced | 1 (1.1%) | 1 (1.0%) | |
| | Other | 11 (12.5%) | 3 (2.9%) | |
| Occupation | Employed | 39 (44.3%) | 61 (59.8%) | 0.098 |
| | Unemployed | 43 (48.9%) | 35 (34.3%) | |
| | Other | 6 (6.8%) | 6 (5.9%) | |
| Children with asthma should receive the flu vaccination | Agree | 77 (87.5%) | 96 (94.1%) | 0.224 |
| | Do not agree | 2 (2.3%) | 2 (2.0%) | |
| | Do not know | 9 (10.2%) | 4 (3.9%) | |
| I received a reminder from the primary care unit/hospital regarding my child's flu vaccination appointment | Agree | 64 (72.7%) | 73 (71.6%) | 0.641 |
| | Do not agree | 13 (14.8%) | 12 (11.8%) | |
| | Do not know | 11 (12.5%) | 17 (16.7%) | |
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | Agree | 69 (78.4%) | 97 (95.1%) | 0.002* |
| | Do not agree | 12 (13.6%) | 2 (2.0%) | |
| | Do not know | 7 (8.0%) | 3 (2.9%) | |
| I believe that my child has to receive the flu vaccination | Agree | 78 (88.6%) | 95 (93.1%) | 0.533 |
| | Do not agree | 5 (5.7%) | 3 (2.9%) | |
| | Do not know | 5 (5.7%) | 4 (3.9%) | |
| The flu vaccine may cause complications/troubles to my child | Agree | 23 (26.1%) | 13 (12.7%) | <0.001* |
| | Do not agree | 42 (47.7%) | 80 (78.4%) | |

| | | | | |
|---|-----------------------|------------|------------|---------|
| | Do not know | 23 (26.1%) | 9 (8.8%) | |
| The maximum limit of flu vaccine for children per visit is | One shot | 83 (94.3%) | 25 (24.5%) | <0.001* |
| | Two shots | 5 (5.7%) | 77 (75.5%) | |
| I believe that my child is sick because of the flu shot | Agree | 29 (33.0%) | 24 (23.5%) | 0.266 |
| | Do not agree | 47 (53.4%) | 66 (64.7%) | |
| | Do not know | 12 (13.6%) | 12 (11.8%) | |
| Comparing the number of times that my child got sick during last year's winter versus this winter | Less than last winter | 20 (22.7%) | 79 (77.5%) | <0.001* |
| | More than last winter | 46 (52.3%) | 4 (3.9%) | |
| | No difference | 22 (25.0%) | 19 (18.6%) | |
| My child's pediatrician believes that my child should receive the flu vaccine | Agree | 72 (81.8%) | 94 (92.2%) | 0.016* |
| | Do not agree | 9 (10.2%) | 1 (1.0%) | |
| | Do not know | 7 (8.0%) | 7 (6.9%) | |
| My relatives believe that my child should receive the flu vaccine | Agree | 64 (72.7%) | 80 (78.4%) | 0.340 |
| | Do not agree | 8 (9.1%) | 11 (10.8%) | |
| | Do not know | 16 (18.2%) | 11 (10.8%) | |
| Non-vaccinated children are more likely to contract the flu | Agree | 63 (71.6%) | 54 (52.9%) | <0.001* |
| | Do not agree | 10 (11.4%) | 40 (39.2%) | |
| | Do not know | 15 (17.0%) | 8 (7.8%) | |
| The flue vaccination prevents infection by the flu virus | Agree | 67 (76.1%) | 90 (88.2%) | 0.008* |
| | Do not agree | 7 (8.0%) | 5 (4.9%) | |
| | Do not know | 14 (15.9%) | 7 (6.9%) | |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | Agree | 31 (35.2%) | 14 (13.7%) | 0.002* |
| | Do not agree | 46 (52.3%) | 73 (71.6%) | |
| | Do not know | 11 (12.5%) | 15 (14.7%) | |

TABLE 2: Association between parental characteristics and vaccination status

*Significant p-value

In terms of attitudes, there was no significant association between attitudes and perceptions of parents toward vaccine uptake. A large number of parents (n = 78) agreed that a child should receive the flu vaccine, whereas only five disagreed; this belief was not reflected in the

association with vaccine uptake. The attitude of parents toward vaccination (e.g., concerns regarding potential adverse effects, the required number of vaccine shots, and the comparison of flu episodes prior to and after receiving the vaccine) was significantly associated with flu vaccine uptake (p-value = <0.001). In terms of social support, physicians thought that vaccination against the flu was significantly associated with parents' decision to vaccinate their children (p-value = 0.016). Parents with vaccinated children (81.8%) and those with non-vaccinated children (92.2%) agreed with the following statement: "my child's pediatrician believes that my child should receive the flu vaccine." In terms of perceived consequences, there was a significant association between the perceived consequences and flu vaccine uptake. The majority of parents (71%) reported that non-vaccinated children were more likely to contract the flu (p-value = <0.001). Almost 76% of the parents with vaccinated children agreed that the flu vaccine prevented infection by the flu virus (p-value = 0.008). Only 35% of the parents were worried about contracting the flu due to the vaccine (p-value = 0.002).

Table 3 shows the independent factors associated with the uptake of the flu vaccine in children using multivariate logistic regression. Results show that the most important factors positively associated with the influenza vaccination status were easy access to vaccination services and the perception of parents that non-vaccinated children are more likely to contract the flu virus. In contrast, worrying about the chance of contracting the flu due to the vaccine and the belief that vaccination prevents infection by the flu virus were negatively associated with vaccine uptake.

| Survey description | OR (95% CI) | P-value |
|---|----------------------|---------|
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | 0.206 (0.07–0.608)* | 0.004** |
| Non-vaccinated children are more likely to contract the flu | 2.479 (1.200–5.119)* | 0.014** |
| The flu vaccination prevents infection by the flu | 0.395 (0.157–0.992)* | 0.048** |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | 2.913 (1.367–6.208)* | 0.006** |

TABLE 3: Independent factors associated with the flu vaccine uptake

OR: odds ratio; CI: Confidence interval;

*Reference range: do not know/do not agree

**Significant p-value

Discussion

Our findings show that parents' age and education were significantly associated with the children's vaccine uptake. These findings are similar to a cross-sectional study conducted in Taiwan, where 50% of the participating parents were females with at least a middle-school education [19]. Moreover, a web-based study by Flood et al. reported that the decision to vaccinate was related to parental knowledge on the importance of childhood vaccination [20]. Parents who were aware of the flu were more likely to vaccinate their children. However, in our study, the parental level of knowledge was not positively associated with vaccine uptake in children. A possible explanation is that other factors, such as access to a healthcare service

provider, may affect the decision to administer the vaccine as well.

The facilitating conditions found to be associated with the rate of vaccination among asthmatic children in KSA were consistent with the results obtained from other studies. A study by Daley et al. reported that regular reminders increased the chances of parents vaccinating their children [9]. American parents also reported that other conditions, such as availability and easy access to care, were related to the decision to vaccinate their children. Furthermore, in terms of the attitude of parents toward vaccination, a study by Chen et al. applied the health benefit model to identify differences in the rate of vaccination between Caucasian children and those of other ethnic groups. The results indicated that African- American parents were hesitant regarding flu vaccination and worried that the vaccine might cause an influenza infection [21].

Most of the Saudi parents did not agree that a vaccine could cause harm to children regardless of vaccination uptake. Further qualitative research is warranted to explore which specific factors affect the decision of Saudi parents. Also, evidence shows that social support from relatives and friends is a core factor that influences the decision of parents regarding vaccination among some American parents [21]. Allison et al. also indicated that parents who were affected by the opinions of relatives and friends regarding the positive outcomes of the vaccine were more likely to vaccinate their children [22]. However, according to our findings, Saudi parents were not influenced by their relatives. It may be argued that Saudi parents did not share their decision regarding the flu vaccine with others.

Another important social support is the one provided by healthcare providers. This type of support was significantly associated with the rate of vaccination in the present and other studies [23,24]. A study by Gaglani et al. showed that a physician's recommendation had a high impact on parents' decisions regarding vaccination against the flu [25]. Since our study did not investigate whether physicians provided recommendations, future studies should explore whether recommendations of physicians could increase the rate of vaccination in KSA.

The perceived consequences consist of two parts: the perceived benefits of the vaccine and the perceived risks linked to non-vaccination. The perceived benefits reported in the literature were associated with parental intention to vaccinate the children. A web-based study involving Chinese parents reported that parental knowledge on the potential benefits of vaccination was positively associated with the intention to vaccinate [15]. However, this association was observed among parents with healthy children, rather than asthmatic children. Another study conducted in five European countries revealed a similar association between the perceived benefits of vaccination and the high vaccine uptake [26]. However, all reported associations were noted among healthy children. Parents with asthmatic children may hesitate to vaccinate them despite being aware of the benefits. In this study, the perceived benefits were strongly associated with vaccine uptake among asthmatic children, even after adjusting for other variables in the multivariable analysis. Parents who perceived risks in this study were more likely to be favorable toward the vaccine uptake.

Conclusions

Although parents agreed with most of the positive statements of perception toward the vaccine against the flu in asthmatic children, the rate of vaccination among their children was low. This is one of the very few studies that has been conducted in the Middle East investigating the perception of parents about immunization against the flu in asthmatic children. The vaccination status was rechecked using the medical records of patients to avoid recall bias in the results of the questionnaire. However, our study was limited to participants from a single tertiary healthcare provider. Future research should conduct similar surveys in more facilities to get a broader understanding of the association between parental perceptions and vaccine uptake in KSA.

Appendices

| Characteristics (n = 190) | Description | N (%) |
|----------------------------|------------------|----------------|
| (a) Sample characteristics | | |
| Nationality | Saudi | 185 (97.4%) |
| | Non-Saudi | 5 (2.6%) |
| Age | ≤20 | 14 (7.4%) |
| | 21–40 | 133 (70%) |
| | >40 | 43 (22.6%) |
| | | |
| Sex | Male | 78 (41.1%) |
| | Female | 112 (58.9%) |
| Marital status | Married | 174 (91.6%) |
| | Divorced | 2 (1.1%) |
| | Other | 14 (7.4%) |
| Educational level | Not educated | 10 (5.3%) |
| | Middle education | 68 (35.8%) |
| | Bachelor | 73 (38.4%) |
| | Higher education | 39 (20.5%) |
| Occupation | Employed | 100 (52.6%) |
| | Unemployed | 78 (41.1%) |
| | Other | 12 (6.3%) |
| Vaccination status | Vaccinated | 88 (46.3%) |
| | Non-vaccinated | 102 (53.7%) |
| (b) Perceptions | | |

| | | |
|--|----------------|----------------|
| Children with asthma should receive flu vaccination | Agree | 173 (91.1%) |
| | Do not agree | 4 (2.1%) |
| | Do not know | 13 (6.8%) |
| I received a reminder from the primary care unit/hospital regarding my child's flu vaccination appointment | Agree | 137 (72.1%) |
| | Do not agree | 25 (13.2%) |
| | Do not know | 28 (14.7%) |
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | Agree | 166 (87.4%) |
| | Do not agree | 14 (7.4%) |
| | Do not know | 10 (5.3%) |
| I believe that my child has to receive the flu vaccination | Agree | 173 (91.1%) |
| | Do not agree | 8 (4.2%) |
| | Do not know | 9 (4.7%) |
| The flu vaccination may cause complications/troubles to my child | Agree | 36 (18.9%) |
| | Do not agree | 122 (64.2%) |
| | Do not know | 32 (16.8%) |
| The maximum limit of flu vaccine for children per visit is | One shot | 108 (56.8%) |
| | Two shots | 82 (43.2%) |
| | Three shots | 0 (0.0%) |
| | Four shots | 0 (0.0%) |
| I believe that my child is sick because of the flu shot | Agree | 53 (27.9%) |
| | Do not agree | 113 (59.5%) |
| | Do not know | 24 (12.6%) |
| | Less than last | 99 |

| | | |
|---|-----------------------|-------------|
| | winter | (52.1%) |
| Comparing the number of times that my child got sick during last year's winter versus this winter | More than last winter | 50 (26.3%) |
| | No difference | 41 (21.6%) |
| | Agree | 166 (87.4%) |
| My child's pediatrician believes that my child should receive the flu vaccine | Do not agree | 10 (5.3%) |
| | Do not know | 14 (7.4%) |
| | Agree | 144 (75.8%) |
| My relatives believe that my child should receive the flu vaccine | Do not agree | 19 (10.0%) |
| | Do not know | 27 (14.2%) |
| | Agree | 117 (61.6%) |
| Non-vaccinated children are more likely to contract the flu | Do not agree | 50 (26.3%) |
| | Do not know | 23 (12.1%) |
| | Agree | 157 (82.6%) |
| The flu vaccination prevents infection by the flu virus | Do not agree | 12 (6.3%) |
| | Do not know | 21 (11.1%) |
| | Agree | 45 (23.7%) |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | Do not agree | 119 (62.6%) |
| | Do not know | 26 (13.7%) |

TABLE 4: Descriptive statistics of sample characteristics and parental perceptions

N: number of respondents

| Characteristic | Description | Vaccinated | Non-vaccinated | P-value |
|--|------------------|------------|----------------|---------|
| Educational level | Not educated | 2 (2.3%) | 8 (7.8%) | <0.001* |
| | Middle education | 20 (22.7%) | 48 (47.1%) | |
| | Bachelor | 30 (34.1%) | 43 (42.2%) | |
| | Higher education | 36 (40.9%) | 3 (2.9%) | |
| Age | ≤20 | 13 (14.8%) | 1 (1.0%) | <0.001* |
| | 21–40 | 46 (52.3%) | 87 (85.3%) | |
| | >40 | 29 (33%) | 14 (13.7%) | |
| Sex | Male | 35 (39.8%) | 43 (42.2%) | 0.739 |
| | Female | 53 (60.2%) | 59 (57.8%) | |
| Nationality | Saudi | 87 (98.9%) | 98 (96.1%) | 0.232 |
| | Non-Saudi | 1 (1.1%) | 4 (3.9%) | |
| Social status | Married | 76 (86.4%) | 98 (96.1%) | 0.042* |
| | Divorced | 1 (1.1%) | 1 (1.0%) | |
| Occupation | Other | 11 (12.5%) | 3 (2.9%) | 0.098 |
| | Employed | 39 (44.3%) | 61 (59.8%) | |
| | Unemployed | 43 (48.9%) | 35 (34.3%) | |
| Children with asthma should receive flu vaccination | Agree | 77 (87.5%) | 96 (94.1%) | 0.224 |
| | Do not agree | 2 (2.3%) | 2 (2.0%) | |
| | Do not know | 9 (10.2%) | 4 (3.9%) | |
| I received a reminder from the primary care unit/hospital regarding my child's flu vaccination appointment | Agree | 64 (72.7%) | 73 (71.6%) | 0.641 |
| | Do not agree | 13 (14.8%) | 12 (11.8%) | |
| | Do not know | 11 (12.5%) | 17 (16.7%) | |
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | Agree | 69 (78.4%) | 97 (95.1%) | 0.002* |
| | Do not agree | 12 (13.6%) | 2 (2.0%) | |
| | Do not know | 7 (8.0%) | 3 (2.9%) | |
| I believe that my child has to receive the flu vaccination | Agree | 78 (88.6%) | 95 (93.1%) | 0.533 |
| | Do not agree | 5 (5.7%) | 3 (2.9%) | |

| | | | | |
|---|-----------------------|------------|------------|---------|
| | Do not know | 5 (5.7%) | 4 (3.9%) | |
| | Agree | 23 (26.1%) | 13 (12.7%) | |
| The flu vaccine may cause complications/troubles to my child | Do not agree | 42 (47.7%) | 80 (78.4%) | <0.001* |
| | Do not know | 23 (26.1%) | 9 (8.8%) | |
| The maximum limit of flu vaccine for children per visit is | One shot | 83 (94.3%) | 25 (24.5%) | <0.001* |
| | Two shots | 5 (5.7%) | 77 (75.5%) | |
| I believe that my child is sick because of the flu shot | Agree | 29 (33.0%) | 24 (23.5%) | |
| | Do not agree | 47 (53.4%) | 66 (64.7%) | 0.266 |
| | Do not know | 12 (13.6%) | 12 (11.8%) | |
| Comparing the number of times that my child got sick during last year's winter versus this winter | Less than last winter | 20 (22.7%) | 79 (77.5%) | |
| | More than last winter | 46 (52.3%) | 4 (3.9%) | <0.001* |
| | No difference | 22 (25.0%) | 19 (18.6%) | |
| My child's pediatrician believes that my child should receive the flu vaccine | Agree | 72 (81.8%) | 94 (92.2%) | |
| | Do not agree | 9 (10.2%) | 1 (1.0%) | 0.016* |
| | Do not know | 7 (8.0%) | 7 (6.9%) | |
| My relatives believe that my child should receive the flu vaccine | Agree | 64 (72.7%) | 80 (78.4%) | |
| | Do not agree | 8 (9.1%) | 11 (10.8%) | 0.340 |
| | Do not know | 16 (18.2%) | 11 (10.8%) | |
| Non-vaccinated children are more likely to contract the flu | Agree | 63 (71.6%) | 54 (52.9%) | |
| | Do not agree | 10 (11.4%) | 40 (39.2%) | <0.001* |
| | Do not know | 15 (17.0%) | 8 (7.8%) | |
| The flue vaccination prevents infection by the flu virus | Agree | 67 (76.1%) | 90 (88.2%) | |
| | Do not agree | 7 (8.0%) | 5 (4.9%) | 0.008* |
| | Do not know | 14 (15.9%) | 7 (6.9%) | |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | Agree | 31 (35.2%) | 14 (13.7%) | |
| | Do not agree | 46 (52.3%) | 73 (71.6%) | 0.002* |
| | Do not know | 11 (12.5%) | 15 (14.7%) | |

TABLE 5: Association between parental characteristics and vaccination status

*Significant p-value

| Survey description | OR (95% CI) | P-value |
|---|----------------------|----------|
| It is easy to reach the primary care unit/hospital to receive the flu vaccination | 0.206 (0.07–0.608)* | *0.004** |
| Non-vaccinated children are more likely to contract the flu | 2.479 (1.200–5.119)* | *0.014** |
| The flu vaccination prevents infection by the flu | 0.395 (0.157–0.992)* | *0.048** |
| I am worried about the chances of my child contracting the flu because of the flu vaccine | 2.913 (1.367–6.208)* | *0.006** |

TABLE 6: Independent factors associated with the flu vaccine uptake

OR: odds ratio; CI: Confidence interval;

*Reference range: do not know/do not agree

**Significant p-value

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. Institutional Review Board at King Fahad Medical City issued approval FWA00018774. The study has been reviewed and approved by the Institutional Review Board at King Fahad Medical City, KSA. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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