

# Clinical and economic burden of influenza vaccination programs among health care workers and the general population in Saudi Arabia

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## ABSTRACT

**Background:** Influenza is a communicable viral illness that may cause moderate to severe symptoms. It is accountable for widespread illness and economic burden. Despite the increased endorsement of influenza vaccination, it remains a significant public health concern in Saudi Arabia.

**Aim:** To investigate the clinical and economic burden of influenza vaccination programs among health care workers and general population in Saudi Arabia.

**Methods:** A prospective cross-sectional study targeting the Saudi population and the healthcare professionals was conducted from December 2016 to March 2017. The data was gathered by a self-administered questionnaire.

**Results:** The results have revealed that 28% of the general population participants (GP), and 20% of the healthcare team participants (HP), go directly to physicians when catching a common cold; 33% of the GP and 23% of the HP take medication after catching a common cold; 39% of the GP and 43% of the HP take medication and natural remedies as well; 59% of the GP and 55% of HP experience two to four episodes of influenza per year; 28% of HP and 55% of GP remain absent at their workplace for 1-3 days after influenza infection; 82% of GP and 69% of HP spend about 50-200 SAR per influenza attack; 42% of GP experience complications of the respiratory tract because of common cold or influenza;

**Conclusion:** Influenza has a significant clinical and economic impact, which incurs monetary loss resulting from work absence, decreased performance. It can also course substantial morbidity, mortality, and even premature death.

**Keywords:** Influenza, Clinical, Economic, Burden, Vaccination, Survey, Saudi Population.

## INTRODUCTION

Influenza, an acute respiratory infection, is a communicable viral illness that can cause moderate to severe symptoms<sup>1</sup>. Influenza infections cause substantial illness and death each year worldwide<sup>2</sup>. There are four types of seasonal influenza viruses, types A, B, C, & D. Influenza A and B viruses spread and cause periodic epidemics of disease<sup>3</sup>. Due to the excessive mutation rate of the virus, an individual influenza vaccine generally gives safety for no more than a few years.

In Saudi Arabia, millions of pilgrims unite in the holy sites during the Hajj pilgrimage<sup>4</sup>. The transmission of respiratory pathogens is widespread during religious mass gatherings in the holy cities of Makkah and Al-Madinah, which represents a global public health concern in the country<sup>5</sup>. Influenza serotype A (H3N2) is said to be predominant in Qatar and Saudi Arabia. Acute respiratory illness caused by influenza virus (serotypes A and B) is also occurring worldwide and is the reason for significant morbidity and mortality. Of the two serotypes, the frequency of influenza A is high, and it is more pathogenic, causing severe disease. Influenza B is usually less severe, but in elderly patients and children, the clinical presentation could be similar to that of influenza A<sup>6</sup>. Another influenza-like disease may be caused by respiratory syncytial virus<sup>7</sup>. The high-risk group for influenza comprises children and older people, although anyone can get the infection. Severe illness and risks of complications are highest among the elderly, children (< 2 years), and immunocompromised patients. Because of the potential health hazard, the Advisory Committee on Immunization Practices

(ACIP) endorses prophylactic vaccination annually for people at high risk and healthcare workers<sup>8</sup>.

The objective of the current study was to investigate the clinical and economic burden of an individual's out-of-pocket expenses, the effect on getting absence from work, comparison of health care workers and the general population for their risk of getting a respiratory illness, and the severity caused by influenza.

## MATERIALS AND METHODS

A self-administered questionnaire consisting of 36 questions was designed to perform this cross-sectional study. The study was conducted to analyze the clinical burden, the economic effect of influenza, and the effectiveness of influenza vaccination programs in the Northern Region of Saudi Arabia. The study population comprised the healthcare team and the general population in the Northern Region of Saudi Arabia. The Northern Region of Saudi Arabia has a population of about 360,000, of which 79.51% are Saudi nationals. This prospective cross-sectional study targeted the general population participants (GP, N = 640) and healthcare team participants (HP, N = 104) from December 2016 to March 2017. The inclusion criteria for the GP were to be a Saudi from the Northern Border Region (> 16 years), and the HP is to be currently working in health care facilities in Rafha city.

The data was gathered from GP and HP by a self-administered online questionnaire in the Arabic language; however, some participants also used the paper questionnaire. The questionnaire enclosed thirty-six questions involving the demographics (age, gender,

educational level, occupation, monthly income, nationality, social status, and smoking); experiences and effect of acute URTI; medications and sources of the budget for treatment; complications of common cold and influenza; attitudes, and opinions regarding prophylaxis against transmission of upper respiratory tract infections; and beliefs regarding influenza vaccination.

Participants who met the inclusion standards were given respondent information along with the questionnaire containing the rationale of the study, and they were notified that their contribution in the survey is voluntary and confidential. The participants that gave their consent took 15-20 minutes to complete the questionnaire. The online form was uploaded via Google drive and referred to a random sample of the target populations residing in the Northern Border Area (Arar, Rafha, and Turaif Cities).

### RESULTS

The demographic features of the participants are summarized in Table 1. A total of 5208 answers were presented by the interviewed respondents (7 x 744 = 5208), and the answers were provided by the HP and GP. More than 50% of the responders had cold one week ago, and 20% of HP and 78 GP had a common cold about one year ago (Table 2). This could be explained by the starting time of the common cold in the Northern Region of Saudi Arabia, which usually starts at the beginning of November. The behaviour of the respondents against the common cold was that 28 % of GP directly contact the physician when they had the first symptom of the common cold; similarly, 20% of the HP also follows this practice. Further, 66% of

94the HP and 43% of the GP reported that they had enough 126  
 95experience to get the suitable medication without visiting 127  
 96doctors. However, only one-quarter of the respondents 128  
 97from the HP used medication and no other treatments. On 129  
 98the economic impact on the respondent, 95% for the HP, 130  
 99and 75% for the GP had three episodes of cold per year. 131  
 100 Table 3 reported medications and the sources of the 132  
 101budget for treatment among participants. The commonness 133  
 102drugs prescribed were Analgesic and antipyretic in 30% 134  
 103and 51% of cases, for the HP and the GP respectively, with 135  
 104only 30% given antibiotics. The decision to contact directly 136  
 105to the pharmacist could reflect a level of knowledge behind 137  
 106the public health situation. More than one-fifth (22%) of the 138  
 107GP reported that they never go directly to the pharmacy, 139  
 108and the highest percentage of respondents of this group 140  
 109affirmed that the reason was "waiting a long time at the 141  
 110doctor's clinic." For the HP, 33% reported that "I have 142  
 111experience in dealing with temporary." The economic 143  
 112situation seems to be undermining the decision to go 144  
 113directly to the pharmacist, and only 5% and 8%, of the HP 145  
 114and the GP respectively, take that decision because of their 146  
 115good economic situation." For the source of the budget for 147  
 116common cold's treatment, the Governmental sector (free) 148  
 117allowed for about 63% for HP and only 46% for the GP. 149  
 118Supplementary data showed details about absenteeism, 150  
 119complications of common cold, and influenza, as well as 151  
 120opinions about the leading reasons for the common cold. In 152  
 121general, attitudes and views of participants regarding 153  
 122prophylaxis against transmission of URTI when analyzed 154  
 123the GP and HP both have a good idea about the viruses 155  
 124causing infection. 156  
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Table 1: Demographic Characteristics of the 744 survey respondents

Variable	Categories	Health care team (n = 104)		Categories	General population (n = 640)	
		Frequency	%		Frequency	%
Sex	Male	55	53%	-	85	13%
	Female	49	47%	-	555	87%
Age (Years)	16-18	0	0%	-	65	10%
	18-20	1	1%	-	83	13%
	20-29	50	48%	-	261	41%
	30-39	26	25%	-	155	24%
	40-49	10	10%	-	49	8%
	50-59	14	13%	-	22	3%
Marital status	60-69	3	3%	-	5	1%
	Married	30	29%	-	409	64%
Nationality	Not married	74	71%	-	231	36%
	Saudi	64	62%	-	640	100%
Occupation	Non Saudi	40	38%	-	0	0%
	Pharmacist	37	36%	Student	193	30%
	Physician	21	20%	Unemployed	229	36%
	Dentist	8	8%	Private sector	30	5%
	Nurse	20	20%	Military sector	41	6%
	Technician	8	8%	Government employee	129	20%
	Specialist (not physician)	7	7%	Retired	2	1%
	Administrative employee	3	3%	Freelance	15	2%
Monthly income (Saudi Riyal)	< 1000	-	-	-	262	40%
	1000-3000	13	13%	-	101	16%
	3001-5000	11	11%	-	55	9%
	5001-8000	10	10%	-	81	13%
	8001-12000	50	48%	-	85	13%
Smoking	> 12000	20	18%	-	56	9%
	Yes	20	19%	-	41	7%
	No	84	81%	-	599	93%

Table 2: Experiences and Impact of Acute Upper Respiratory Tract Infections among participants

Variable	Categories	Health care team (n = 104)		General population (n = 640)	
		Frequency	%	Frequency	%
1. Last time I catch the common cold	A week ago	20	19%	161	25%
	1 month ago	33	32%	240	38%
	3 month ago	21	20%	93	15%
	6 month ago	8	8%	40	6%
	9 month ago	1	1%	106	17%
	1 Year ago	21	20%	78	12%
2. When I catch the common cold	I go directly to the physician	21	20%	178	28%
	Often Mild symptoms and I go directly to the pharmacy	11	11%	105	16%
	I have enough experience to get the suitable medication without go to the doctor	69	66%	278	43%
	I buy enough medication from community pharmacy and no need to go hospital	3	3%	79	12%
3. When I catch a common cold, I do like the following:	I take medication only	24	23%	216	34%
	Don't take medication and take the traditional natural medicinal agents ( e.g. myrrh, ginger and garlic	16	15%	114	18%
	Don't take medication or traditional natural medicinal agents but only take a rest, drink some fluids and eat fruits	19	18%	59	9%
	I take medication and buy what is necessary from traditional natural medicinal agents, fruits and others which help relieve disease attack	45	43%	251	39%
4. Frequency (rate) by which I caught a common cold during the year	Once	41	39%	166	26%
	Twice	36	35%	179	28%
	Three times	18	17%	134	21%
	Four times	3	3%	65	10%
	Five times	1	1%	25	4%
	> 5 Times	5	5%	42	6%
	Not affected previously	0	0%	29	5%
5. My total expense of money every time I catch a common cold (including the price of medications, natural medicinal agents and others) is ( In Saudi Riyal)	0	32	31%	115	18%
	< 50	39	37%	163	25%
	50-100	26	25%	193	30%
	100-200	5	5%	105	16%
	200-300	2	2%	64	10%
6. Every time I catch a common cold, the physician advises me to take a rest and give me leave for	The case does not require leave	75	72%	270	42%
	1 Day	16	15%	173	27%
	2 Days	11	11%	97	15%
	3 Days	2	2%	83	13%
	4 Days	0	0%	6	1%
	5 Days	0	0%	5	1%
	> 5 Days	0	0%	6	1%
7. The time spent for common cold patients from their arrival to hospital until taking the suitable medications is approximately (In Hours)	< 0.5	30	29%	153	24%
	> 0.5, but < 1	54	51%	192	30%
	1 to < 2	8	8%	141	22%
	2 to < 3	2	2%	67	10%
	> 3	8	8%	60	9%
	The patient often hospitalized	2	2%	27	4%

Table 3: Medications and sources of the budget for treatment among participants

Variable	Categories	Health care team (n = 104)		General population (n = 640)	
		Frequency	%	Frequency	%
If you take medication for common cold What is the type of treatment which the physician prescribes to you	Analgesic and antipyretic	31	30%	327	51%
	Antibiotic	23	21%	229	36%
	Decongestant	10	10%	234	37%
	Antihistaminic	11	11%	25	4%
	All of the above	23	22%	312	49%
	None of the above	6	6%	2	1%
If you caught a common cold and decided to go directly to a private pharmacy which type of drug you buy?	Analgesic and antipyretic	29	28%	251	39%
	Antibiotic	16	15%	192	30%
	Decongestant	13	13%	63	10%
	Antihistaminic	11	11%	21	3%
	All of the above	22	21%	92	14%
	None of the above	13	13%	21	3%
You go directly to the pharmacist because of:	The economic situation is good	5	5%	53	8%
	Symptoms are mild	16	15%	6	1%
	Lack of time	14	13%	7	1%
	Many actions were taken at the doctor's clinic	1	1%	108	17%
	Waiting a long time at the doctor's clinic	14	13%	236	37%
	I have experience in dealing with the temporary disease	33	32%	92	14%
	I never go directly to a private pharmacy	21	20%	138	22%
Source of the budget for treatment regimen	Free (Governmental sector)	63	61%	294	46%
	Insurance companies	2	2%	70	11%
	My own expense	39	37%	276	43%

**DISCUSSION**

The common cold or acute upper respiratory infection is the most familiar infectious illness of humans. The literature survey reveals that children are getting the infection 5-7 times per year, whereas adults are experiencing 3-5 episodes of disease in a year<sup>9</sup>. The current study identified that 59% of the GP, and 55% of the HP experience 2-4 episodes of influenza in a year. Also, 20% of GP and 9% of HP catch a cold more than 3 times in a year, this finding is concurrent with a previous study, in which 10% of the respondents catch a cold more than 3 times in a year<sup>10</sup>. According to the literature, 64% of the physician and pharmacists participated in the study approximate the percentage of typical cold patients to all patients to be ranged from 30% to more than 50%<sup>10</sup>. General community awareness and rehears concerning the common cold and its management are essential. Inappropriate treatment may cause severe consequences in terms of health insurance and the economy, including the effect on patients' quality of life. Therefore, the general community must be aware of the causes and nature of the common cold. This and other studies reveal the fact that the public extensively trusts the efficacy of antibiotics to treat the viral infections to get better soon<sup>11</sup> even though the common cold is a viral disease, in this study, it has been shown that 81% of the HP was aware that the common cold is a viral illness, whereas 44% of the GP was unaware of this fact. This finding indicates the need for increasing public alertness about the cause of the common cold to decrease the cost and irrational use of antibiotics, which may cause antibiotic resistance.

In this study, 12% of GP, and 3% of HP believed that bacteria are responsible for the common cold and about one-third (30%) of the GP and, surprisingly, 15% of the HP take antibiotics when suffering from cold. However, This finding is lower than what was reported in other studies, for

example, 53% of the UK residents assumed bacteria as the primary cause of cold, whereas 44% trusted that antibiotic could cure cold<sup>10</sup>; 88% residents of the North Manhattan believed that bacteria is the causative agent of flu and cold, 90% supposed that antibiotics could cure it, and 30% thought that no treatment is required for it<sup>11</sup>; 38% of the New Zealand respondents believed that antibiotics cure a cold, about 50% requested physicians to prescribe antibiotics, and 73% of the healthcare professionals (physicians and pharmacists) stated that antibiotic is prescribed often for influenza and cold patient<sup>12</sup>; and 25% of German participants revealed that antibiotics are active against viruses<sup>13</sup>. In several cases, the prescribers are aware that antibiotics are not a treatment for viral infections but prescribe antibiotics due to the pressure from the patient to prescribe antibiotics<sup>14</sup>.

Upper respiratory tract infection (URTI) mainly affects the nasopharynx and paranasal sinuses, and it can easily be recognized by the patients, resulting in the self-diagnosis and treatment<sup>15</sup>. The general public is fun of practising self-medicate with the over the counter (OTC) medicines before visiting the physician<sup>16</sup>. In this study, 77% of the HP and 59% of the GP reported that the symptoms are mild, and there is no need to go to a physician while some believe they have enough experience to get suitable medication without going to the doctor. The Midwest study revealed that 50% of participants visit the physician when they suffer from cold, whereas 50% prefer self-medication<sup>17</sup>.

During a public program organized by the Ontario Ministry of Health for the cold and flu in London, the notion that "Seeking doctor's assistance is time-consuming, and needs resources" was addressed leading to a slight lessening in the figure of the doctor's visit for cold<sup>18</sup>. It has also been shown that on certain occasions, patients could postpone a physician visit by one week after the self-medication trial<sup>19</sup>. This might be owing to the

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disappointment experienced by patients regarding their disease or uncertainties in developing complications of a cold<sup>19</sup>. A significant improvement was observed after a school program that was aimed to decrease antibiotic practice in Moldova resulting in a substantial decrease in antibiotic use was detected<sup>20</sup>.

In this study, 93% of HP and 82% of GP believed that isolation of patients, using masks in crowded places, taking a suitable vaccine, and washing hands using water and soap can help in decreasing the rate of infection transmission. This figure is higher and better than the data of a previous report, in which 52% of respondents were aware of these aspects<sup>21</sup>.

An economic loss of \$25 billion due to common cold caused by rhinovirus infection was estimated in the United States, of which \$16.6 billion was lost due to less job productivity, \$8 billion because of absenteeism from work, and \$230 million due to caregiver absenteeism<sup>22</sup>. In this study, 28% of HP and 55% of GP reported absenteeism for 1-3 days; 82% of GP and 69% of HP said that the total expense of money every time they catch a common cold (including the price of medications, natural remedies, and others) ranged from 13\$ to 53\$ represents a part of the economic cost of a typical cold; and 42% of GP experienced complications of the respiratory tract as a result of the common cold or influenza in Saudi Arabia, wherein 16% of them were hospitalized last year due to these complications. Further, the budget for the treatment of 61% of the HP and 46% of the GP in this study was shouldered by the government. Many studies have shown that getting vaccination can reduce the cost burden, including medical costs and indirect costs due to absenteeism<sup>23</sup> while on other vaccination can lessen 13-44% visits by a healthcare provider, reduces 18-45% loss of workdays<sup>24</sup>, and saves \$60-4,000 per illness in healthy persons, excluding the cost of vaccination and its effectiveness<sup>25</sup>. Another study also demonstrated annual cost savings of \$13.66 per vaccinated person<sup>26</sup>. However, some analyses have not been proven economic benefits of vaccination<sup>27</sup>. In this study, only 19% of GP were vaccinated against influenza, which necessitates finding practical means for increasing public awareness and encourage them to be vaccinated.

Similarly, the transmission of influenza in healthcare settings can be reduced by getting healthcare personnel vaccinated so that absenteeism, along with morbidity and mortality could be controlled<sup>28</sup>. In this study, only 62% of HP reported being vaccinated, which also necessitates the need for increasing health care worker's awareness to be vaccinated. People are usually avoiding getting vaccinated because of side effects<sup>29</sup>, thinking of vaccine ineffectiveness and contracting influenza<sup>28</sup>, and eventually reliance on treatment with alternative medications<sup>29</sup>. Factors facilitating vaccine acceptance include a desire for self-protection<sup>29</sup>, previous receipt of influenza vaccine, a desire to protect patients, and perceived effectiveness of vaccine<sup>30</sup>. In this study, 53% of GP and 22% of HP reported fear of vaccine side effects as their reason for not been vaccinated, whereas 19% of GP, 25% of HP don't know where to get it?

## 24. CONCLUSION

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