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Seasonal influenza vaccination policies in the Eastern Mediterranean Region: Current status and the way forward

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ABSTRACT

Background: The World Health Organization recommends annual influenza vaccination, especially in high-risk groups. Little is known about the adoption and implementation of influenza vaccination policies in the Eastern Mediterranean Region.

Methods: A survey was distributed to country representatives at the ministries of health of the 22 countries of the Region between December 2016 and February 2017 to capture data on influenza immunization policies, recommendations, and practices in place.

Results: Of the 20 countries that responded to the survey, 14 reported having influenza immunization policies during the 2015/2016 influenza season. All countries with an influenza immunization policy recommended vaccination for people with chronic medical conditions, healthcare workers and pilgrims. Two of the 20 countries did not target pregnant women. Eight countries used the northern hemisphere formulation, one used the southern hemisphere formulation and nine used both. Vaccination coverage was not monitored by all countries and for all target groups. Where reported, coverage of a number of target groups (healthcare workers, children) was generally low. Data on the burden of influenza and vaccine protection are scarce in the Region.

Conclusions: Despite widespread policy recommendations on influenza vaccination, attaining high coverage rates remains a challenge in the Eastern Mediterranean Region. Tackling disparities in influenza vaccine accessibility and strengthening surveillance systems may increase influenza vaccine introduction and use.

1. Introduction

Seasonal influenza is an acute viral infection that affects people of all age groups worldwide. According to World Health Organization (WHO) estimates, influenza viruses infect between 5% and 15% of the global population, causing an estimated 3–5 million severe cases and up to 650,000 respiratory deaths a year [1,2]. Annual seasonal epidemics have also been associated with substantial healthcare costs and productivity losses [3,4].

Annual vaccination is the cornerstone for preventing infection, severe disease, and mortality from influenza [5]. Vaccination against influenza is particularly important for individuals at high risk of disease complications and for those caring for them. WHO recommends annual influenza vaccination for pregnant women at any stage of pregnancy, children aged between 6 months and 5 years, elderly individuals (>65 years), individuals with chronic medical conditions and healthcare workers [1,6]. In countries where influenza vaccination programmes are still in their early stages or not well developed, WHO recommends prioritizing vaccination for pregnant women, whereas other risk groups are not ranked by priority [6]. On the other hand, the United States Centers for Disease Control and Prevention (CDC) has taken a more universal approach, recommending the use of annual influenza vaccine for all persons aged ≥6 months [7]. However, during a vaccine

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shortage, the CDC recommends that vaccination efforts be focused on high-risk groups only with no order by priority [7].

The WHO Eastern Mediterranean Region, which consists of 22 countries (Afghanistan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates (UAE) and Yemen) is home to nearly 10% of the world's population. However, as of 2014, the Region's share of influenza vaccines is roughly 2.2% of the globally distributed doses [8]. The Region lies on a number of migratory bird flyways and is thus at risk of the emergence of new influenza viruses [9]. We undertook a survey to assess the adoption and implementation of influenza vaccination policies in the Region to provide the data needed for evaluating and developing guidelines for influenza prevention with the goal of increasing vaccination coverage.

2. Materials and methods

The survey consisted of a 38-item questionnaire that was developed based on available relevant literature on influenza vaccination. The self-administered survey was distributed by email to influenza focal points at the ministries of health (MOHs) of all countries of the Region between December 2016 and February 2017. The survey included questions on mechanisms in place to monitor influenza vaccination coverage; vaccination coverage; the existence of an official influenza vaccination policy (adopted by MOH), the national recommendations for influenza vaccination; and planned policies with regard to the national influenza immunization programme. Groups which were defined as risk or target groups were defined in the survey. However, the age groups for whom vaccine is recommended were not defined in the survey but rather asked in an open-ended question as these might vary from country to another.

3. Results

3.1. Response rate

In total, 20 countries from the Region completed the questionnaire, a response rate of 90.9%. Responses were not received from Bahrain and Djibouti.

3.2. Seasonal influenza vaccination policies

Of the 20 countries for which the data were available, 14 reported having seasonal influenza vaccination policies at the time surveyed (Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, and UAE). Of these 14, five (Iran, Libya, Qatar, Syria, and Tunisia) reported including the influenza vaccine in their national immunization programme (NIP). However, no details were provided as to whether NIP funds the vaccine or it simply oversees its implementation. Morocco and Somalia, on the other hand, reported having plans on the development and implementation of official influenza vaccination policies in the next 5 years.

3.3. Seasonal influenza surveillance for the 2015/2016 season

Of the 20 countries, 17 reported having active influenza surveillance systems (Afghanistan, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, and Yemen). All but one country (Pakistan) reported using data from existing surveillance systems to help guide policy-makers and ensure well-informed policy decisions.

While mortality surveillance data for influenza were reportedly collected by 16 countries (Afghanistan, Egypt, Iran, Iraq, Jordan, Kuwait, Libya, Morocco, Oman, Palestine, Saudi Arabia, Sudan, Syria, Tunisia, UAE, and Yemen), only 10 provided mortality data (Egypt, Iran, Iraq, Jordan, Kuwait, Morocco, Oman, Syria, Tunisia, and Yemen). Mortality among reported influenza cases ranged from 0% in Jordan to 15% in Morocco during the 2015/2016 season. Fifteen countries also reported collecting data on influenza-associated hospitalizations (Afghanistan, Egypt, Iran, Iraq, Jordan, Kuwait, Morocco, Oman, Pakistan, Palestine, Saudi Arabia, Syria, Tunisia, UAE, and Yemen), yet only nine provided data on hospitalization rates (Egypt, Iran, Iraq, Jordan, Morocco, Oman, Syria, Tunisia, and Yemen). The frequency of hospitalization among reported influenza cases ranged from 0.004% in Iran to 21.7% in Iraq.

3.4. Influenza vaccine recommendations

Children. Of the countries with an influenza vaccination policy during the 2015/2016 season, two countries (2/14), Libya and Qatar, included seasonal influenza vaccine in the childhood immunization schedule. Qatar targeted children <5 years of age. No specific age group was given by Libya.

Adults. Four countries (4/14) had influenza vaccination recommendations for adults during the 2015/2016 season: Oman, Qatar, Syria, and UAE. Oman and Qatar provided information on the age groups targeted, indicating that influenza vaccination was recommended for persons >60 years of age.

People with chronic illnesses. All countries with recommendations for influenza vaccination recommended the influenza vaccine for people with chronic illnesses (e.g. diabetes, asthma, renal disease) (Table 1). All but two countries, Jordan and Lebanon, recommended influenza vaccination for persons with immunological disorders and/or HIV/AIDS. Ten countries recommended vaccination for individuals with morbid obesity, and nine recommended vaccination for those with spinal cord injuries and disorders that can result in pulmonary impairment and complications from respiratory illness. However, only five countries recommended vaccination for individuals on long-term aspirin use.

Pregnant women. Annual vaccination of pregnant women was recommended by all countries that had an influenza vaccination policy, except Egypt and Lebanon, which had no specific recommendations for this group (Table 2). Only Iraq, Kuwait, and Libya recommended maternal influenza vaccination during the early postpartum period.

Healthcare workers. All countries with an influenza vaccination policy had recommendations for vaccination of hospital health care workers against influenza during the 2015/2016 season (Table 3). All but two (Lebanon and Syria) also recommended influenza vaccination for laboratory health care workers. Furthermore, 11/14 countries recommended seasonal influenza vaccination for health care workers at long-term care facilities and 10/14 recommended vaccination for those working at outpatient care clinics.

Occupational groups (non-healthcare settings). A smaller number of countries reported having influenza vaccine recommendations for one or more occupational groups (Table 4). Eleven (11/14) countries recommended influenza vaccination for investigators of human influenza outbreaks, but only seven recommended vaccination for investigators of animal influenza outbreaks. Furthermore, seven (7/14) countries recommended seasonal influenza vaccination for airline crew members. For essential and emergency services (e.g. police, fire, and rescue staff), vaccination was recommended by six (6/14) countries. Likewise, vaccination of military personnel was also recommended by six (6/14) countries. Egypt, Iran, Iraq, Libya, and Tunisia had recommendations in place for persons working in the animal sector. Iraq was

Table 1
Seasonal influenza vaccine recommendations for clinical risk groups in countries of the Eastern Mediterranean Region.

Country	Clinical risk groups						
	Chronic medical condition	Immunological disorders	HIV/ AIDS	Long-term aspirin use	Any condition	Extreme obesity	Residents of nursing homes and other chronic care facilities
Afghanistan	No seasonal influenza vaccination policy						
Egypt	R	R	R	NR	–	R	NR
Iran	R	R	R	–	R	R	R
Iraq	R	R	R	R	R	R	R
Jordan	R	NR	NR	NR	–	NR	NR
Kuwait	R	R	R	R	R	R	R
Lebanon	R	NR	NR	NR	NR	NR	NR
Libya	R	R	R	R	R	R	R
Morocco	No seasonal influenza vaccination policy						
Oman	R	R	R	NR	NR	NR	NR
Pakistan	No seasonal influenza vaccination policy						
Palestine	R	R	R	NR	R	R	R
Qatar	R	R	R	R	R	–	R
Saudi Arabia	R	R	R	R	R	R	R
Somalia	No seasonal influenza vaccination policy						
Sudan	No seasonal influenza vaccination policy						
Syria	R	R	R	–	R	R	NR
Tunisia	R	R	–	NR	R	R	–
UAE	R	R	R	–	–	R	R
Yemen	No seasonal influenza vaccination policy						

R: recommended, NR: not recommended, UAE: United Arab Emirates.
–: no data.

Table 2
Seasonal influenza vaccine recommendations for women during pregnancy and the early postpartum period in countries of the Eastern Mediterranean Region.

Country	Risk factor	
	Pregnant women	Women up to two weeks post-delivery
Afghanistan	No seasonal influenza vaccination policy	
Egypt	NR	NR
Iran	R	–
Iraq	R	R
Jordan	R	–
Kuwait	R	R
Lebanon	NR	NR
Libya	R	R
Morocco	No seasonal influenza vaccination policy	
Oman	R	–
Pakistan	no seasonal influenza vaccination policy	
Palestine	R	–
Qatar	R	–
Saudi Arabia	R	–
Somalia	No seasonal influenza vaccination policy	
Sudan	No seasonal influenza vaccination policy	
Syria	R	NR
Tunisia	R	NR
UAE	R	–
Yemen	No seasonal influenza vaccination policy	

R: recommended, NR: not recommended, UAE: United Arab Emirates.
–: no data.

the only country that had recommendations for families raising pigs, poultry, and/or waterfowl.

Other risk groups. Eight countries recommended seasonal influenza vaccination for people living in long-term care facilities (e.g. nursing homes and other chronic-care facilities) (Table 5). Furthermore, four countries recommended influenza vaccination for all household members and caregivers of children under 5 years and people aged 50 years and older. In addition, six countries had recommendations for all household contacts of persons at high risk of influenza complications (e.g. individuals with chronic medical conditions or suppressed immune systems, older people, children <6 months; i.e. a cocooning strategy).

Pilgrims, expatriates, and refugees. Annual influenza vaccination of pilgrims was recommended by all 14 countries with an influenza vaccination policy (Table 6). Among the countries lacking an official vaccination policy at the time of the survey, three countries (Morocco, Pakistan, and Sudan) indicated that influenza vaccination is recommended for pilgrims. On the other hand, only five countries recommended influenza vaccination for refugees, and none recommended vaccination for expatriates.

3.5. Vaccination monitoring and coverage

Six (6/14) countries reported data on influenza vaccination coverage among high-risk groups during the 2015/2016 season: Egypt, Jordan, Kuwait, Morocco, Oman, and Saudi Arabia. Kuwait was the only country of the Region that provided coverage data for children >5 years, reporting a vaccination rate of only 2%. Data on vaccination coverage for pregnant women was also reported by one country (Oman), where the vaccination rate was 90%. Three countries, on the other hand, provided information on coverage for persons with specific illnesses. Vaccination coverage in this target group ranged from 2% for people with non-communicable diseases (cardiovascular, diabetes, long-term aspirin use, immunological disorders, and obesity) in Kuwait to >70% for all high-risk groups in Saudi Arabia. Furthermore, information on coverage of healthcare workers was provided by six countries and ranged from 39% in Kuwait to 100% in Egypt. Finally, three of the 14 countries recommending influenza vaccination for pilgrims in 2015/2016 reported data on coverage; vaccination coverage was 100% in all three countries.

3.6. Formulation and type of vaccine

Eighteen (18/20) countries which responded to the survey provided information on vaccine formulation used. Of these, eight used the Northern Hemisphere formulation (Iran, Jordan, Lebanon, Morocco, Pakistan, Palestine, Syria, and Tunisia), one used the Southern Hemisphere formulation (Sudan), and nine used both formulations (Egypt, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, UAE, and Yemen).

Seventeen (17/20) countries provided information on the type (s) of influenza vaccine licensed for use. Thirteen countries reported using inactivated trivalent influenza vaccines (Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan, Qatar,

Table 3
Seasonal influenza vaccine recommendations for healthcare workers in countries of the Eastern Mediterranean Region by healthcare setting.

Country	Healthcare setting			
	Hospitals	Outpatients care clinics	Laboratories	Long-term facilities
Afghanistan	No seasonal influenza vaccination policy			
Egypt	R	R	R	R
Iran	R	–	R	R
Iraq	R	R	R	R
Jordan	R	R	R	R
Kuwait	R	R	R	R
Lebanon	R	NR	NR	NR
Libya	R	R	R	R
Morocco	No seasonal influenza vaccination policy			
Oman	R		R	R
Pakistan	No seasonal influenza vaccination policy			
Palestine	R	R	R	R
Qatar	R	R	R	R
Saudi Arabia	R	R	R	R
Somalia	No seasonal influenza vaccination policy			
Sudan	No seasonal influenza vaccination policy			
Syria	R	NR	NR	NR
Tunisia	R	NR	R	NR
UAE	R	R	R	R
Yemen	No seasonal influenza vaccination policy			

R: recommended, NR: not recommended, –: no data.
UAE: United Arab Emirates.

Table 4
Seasonal influenza vaccine recommendations for occupational groups in countries of the Eastern Mediterranean Region.

Country	Work setting							
	Essential services (police, firemen, etc.)	Military services	Veterinary services	Poultry industry	Families that raise pigs, poultry or waterfowl	Airline workers	Investigators of human influenza outbreaks	Investigators of animal influenza outbreaks
Afghanistan	No seasonal influenza vaccination policy							
Egypt	–	–	R	–	–	R	R	R
Iran	R	R	R	R	–	R	R	R
Iraq	R	R	R	R	R	R	R	R
Jordan	NR	NR	NR	NR	NR	NR	R	–
Kuwait	R	R	NR	NR	NR	R	R	NR
Lebanon	NR	NR	NR	NR	NR	NR	NR	NR
Libya	R	R	R	R	–	–	R	R
Morocco	No seasonal influenza vaccination policy							
Oman	NR	R	NR	NR	NR	NR	NR	NR
Pakistan	No seasonal influenza vaccination policy							
Palestine	NR	NR	NR	NR	NR	NR	R	NR
Qatar	–	–	–	–	–	R	R	R
Saudi Arabia	NR	NR	NR	NR	NR	NR	R	R
Somalia	No seasonal influenza vaccination policy							
Sudan	No seasonal influenza vaccination policy							
Syria	NR	NR	NR	NR	NR	–	R	NR
Tunisia	R	R	R	R	NR	R	R	R
UAE	R	–	–	–	–	R	–	–
Yemen	No seasonal influenza vaccination policy							

R: recommended, NR: not recommended, –: no data.
UAE: United Arab Emirates.

Saudi Arabia, Syria, and Tunisia), three reported using inactivated quadrivalent influenza vaccines (Palestine, Qatar, and Tunisia), and one reported using the high-dose, inactivated, trivalent influenza vaccine (Libya). Sudan was the only country of the Region that used the live-attenuated trivalent influenza vaccine.

3.7. Vaccine providers and outlets for vaccination

Seventeen (17/20) countries reported data on seasonal influenza vaccine providers and principal outlets for administration. Influenza vaccine was available solely through the public sector in four countries (Iran, Iraq, Sudan and Tunisia). In the remaining 13 countries, the vaccine was available through both the public and the private sectors (Egypt, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Syria, and UAE).

The main outlets for seasonal influenza vaccination reported by 14 countries were primary health care centres, hospitals, and outpatient clinics (Egypt, Iran Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, and UAE). Furthermore, seven countries reported providing influenza vaccines through community pharmacies, albeit to a lesser extent than hospitals and clinics (Egypt, Lebanon, Morocco, Oman, Pakistan, Palestine, and Syria). Occupational health services and schools, on the other hand, were reported to be the least common outlets for the administration of seasonal influenza vaccines.

3.8. Promotion of seasonal influenza vaccination

Most countries (14/20) reported the use of a wide range of media activities to promote vaccination programmes (Egypt, Iran, Iraq, Jordan, Kuwait, Libya, Morocco, Oman, Pakistan, Palestine,

Table 5
Seasonal influenza vaccine recommendations for residents of long-term facilities and household contacts in countries of the Eastern Mediterranean Region.

Country	Risk group		
	Residents of long-term care facilities (nursing homes and other chronic-care facilities)	Household contacts and caregivers of children <5 years and adults ≥50 years	Household contacts of persons for whom vaccination is recommended
Afghanistan	No seasonal influenza vaccination policy		
Egypt	NR	NR	–
Iran	R	–	R
Iraq	R	NR	NR
Jordan	R	NR	NR
Kuwait	R	R	R
Lebanon	NR	NR	NR
Libya	R	R	R
Morocco	No seasonal influenza vaccination policy		
Oman	NR	NR	NR
Pakistan	No seasonal influenza vaccination policy		
Palestine	R	NR	NR
Qatar	R	–	–
Saudi Arabia	NR	NR	NR
Somalia	No seasonal influenza vaccination policy		
Sudan	No seasonal influenza vaccination policy		
Syria	NR	NR	R
Tunisia	R	R	R
UAE	–	R	R
Yemen	No seasonal influenza vaccination policy		

R: recommended, NR: not recommended, –: no data.
UAE: United Arab Emirates.

Table 6
Seasonal influenza vaccine recommendations for pilgrims, expatriates, and/or refugees in countries of the Eastern Mediterranean Region.

Country	Risk group		
	Pilgrims	Expatriates	Refugees
Afghanistan	No seasonal influenza vaccination policy		
Egypt	R	NR	–
Iran	R	NR	NR
Iraq	R	NR	R
Jordan	R	NR	NR
Kuwait	R	NR	R
Lebanon	R	NR	NR
Libya	R	–	R
Morocco	No seasonal influenza vaccination policy		
Oman	R	NR	NR
Pakistan	No seasonal influenza vaccination policy		
Palestine	R	NR	NR
Qatar	R	–	–
Saudi Arabia	R	NR	NR
Somalia	No seasonal influenza vaccination policy		
Sudan	No seasonal influenza vaccination policy		
Syria	R	–	R
Tunisia	R	NR	R
UAE	R	–	–
Yemen	No seasonal influenza vaccination policy		

R: recommended, NR: not recommended, –: no data.
UAE: United Arab Emirates.

Qatar, Saudi Arabia, Tunisia, and UAE). The main media activities included television and radio advertising, leaflets, posters, and emails.

3.9. Future plans

Nine (9/20) countries identified a number of planned strategies and operational policy changes needed to tackle the existing impediments to influenza vaccination (Egypt, Kuwait, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, and UAE). Kuwait, for instance, has planned to implement regular influenza immunization campaigns for high-risk groups. Furthermore, Egypt intends to expand the recommended groups for annual influenza immunization to include university students and vulnerable groups. Saudi Arabia has also prepared a plan to incorporate influenza vaccination in the national immunization schedule. Other plans include covering all risk groups in 2018 and progressing towards universal coverage by 2020 (Libya), adopting a recommendation to vaccinate people aged >60 years and <2 years (Oman), implementing seasonal influenza vaccination policies targeting persons at high risk identified by WHO (Morocco), and strengthening existing surveillance systems (Palestine). Somalia expressed interest in implementing a vaccination policy for influenza but highlighted the need for guidance on development of the policy, surveillance systems for influenza, capacity building, purchase of vaccines, and vaccination activities in the country.

4. Discussion

The 2015/2016 survey permitted a regional summary of the national influenza immunization policies. In general, our survey shows an increase in the number of countries adopting an influenza immunization policy. Previously, a joint WHO/UNICEF report identified 12 countries in the Region with seasonal influenza immunization policies in 2014 [10], whereas we identified 14 countries with influenza immunization policies in 2015/2016. In addition, Morocco recently adopted a formal vaccination policy after this survey was completed, bringing the total number of countries with a policy to 15. Although a small increase, this reflects an improved awareness of influenza and the importance of vaccination in mitigating its burden.

Surveillance of influenza is essential for the selection of appropriate vaccine strains and rapid detection of new subtypes in humans [11]. Local surveillance data provide country-specific information on the time and type of circulating influenza strains, which enables an informed decision to be made on the choice of the vaccine formulation (Northern vs. Southern Hemisphere or both) to use. Local morbidity and mortality data are also required to provide a more complete picture of the burden of disease, which, in turn, is critical to understanding the threat of influenza to public health. Surveillance also provides the evidence-based data needed for advocacy and assists in the development and update of prevention, control and mitigation policies for influenza [11]. Seventeen of the 22 countries in the Region reported conducting surveillance for influenza. In fact, 16 national laboratories in 15 countries are currently designated as national influenza centres, 13 of which detect and isolate influenza virus [12]. Consequently, the number of reported influenza cases in the Region doubled between 2011 and 2015 [12]. Currently, either one or both of the Northern and Southern Hemisphere vaccine formulations are used in countries of the Region. The increase in the availability of the local influenza data will help optimize the recommendations for vaccine formulations in the Region.

Seasonal influenza is a substantial cause of severe illness and hospitalization in infants under 6 months of age [13]. Studies have found that, in many cases, the rate of hospitalization of children <6 months is three times that of children >6 months [13]. However, prevention of influenza in this age group is problematic because of the absence of an approved vaccine, which, in turn, highlights the crucial need for other preventive strategies [13]. Research suggests that vaccinating pregnant women is the best preventive approach to protect newborns through passive immunization and by reducing the risk of infection in moms and its subsequent transmission to their babies [14,15]. Vaccination was also associated with reduced influenza-associated complications during pregnancy,

which range from miscarriages to preterm deliveries and death [14,16,17]. Nonetheless, influenza vaccination policies in two countries in the Region did not include maternal influenza vaccination in their recommendations, and only one country reported influenza vaccination rates in this group. In addition to vaccinating pregnant women, the American Academy of Pediatrics and the Centers for Disease and Control Prevention recommend "cocooning" as a method to protect young infants from seasonal influenza by ensuring all family members and close contacts receive the vaccine [18,19]. Despite this, only six countries of the Region recommended vaccination for household contacts and caregivers of children aged <6 months, and none reported on influenza vaccination rates in this group. Therefore, evidence-based data on influenza outcomes in infants in the Region are urgently needed to highlight the importance of this prevention strategy.

Avian influenza viruses are potential zoonotic disease agents that may be transmitted from infected poultry to humans [20]. As such, poultry workers and veterinarians have an occupational risk of exposure to avian influenza viruses [20]. Five countries (Egypt, Iran, Iraq, Libya, and Tunisia) in the Region had recommendations in place for people working in the animal sector, all of which have experienced outbreaks of avian influenza [21–25]. In particular, human cases of H5N1 virus infection were detected in Egypt every year from 2006 to 2016 [26–28]. Nonetheless, the rationale for vaccinating poultry workers with human influenza vaccine is not clear since there is no evidence that these vaccines protect against heterotypic avian influenza viruses [29]. One reason would be that vaccination of this group against human influenza can reduce the potential for an infection with a human virus, thus, minimizing the chance for a co-infection with an avian virus and the possibility of a subsequent reassortment event occurring between these viruses [30].

As the world's largest mass gathering of people, the annual Hajj pilgrimage to Mecca is an optimal environment for the spread of respiratory infections including influenza [31,32]. Nearly 40% of pilgrims suffer from respiratory symptoms during Hajj, with influenza virus being one of the most common etiologies [31,33,34]. The Ministry of Health of Saudi Arabia recommends that all pilgrims, particularly those at increased risk of severe influenza disease including pregnant women, receive the most recent influenza vaccine before leaving for the Hajj [35]. In accordance with the Saudi Ministry of Health recommendations, 14 countries of the Region recommend pre-departure vaccination for all their pilgrims, yet only three reported on influenza vaccination rates among this group which were 100% in all three. These data suggest satisfactory compliance with the vaccine recommendation. Yet, in view of the limited number of countries reporting on influenza vaccination rates among pilgrims, the available data are not sufficiently representative. Furthermore, the reported data contradict those in the literature. For instance, one study found that only 19.4% of Egyptian pilgrims were vaccinated against influenza in the 2015 Hajj season [36]. Another study reported that only 22% of Hajj pilgrims from 22 countries, including some countries of the Eastern Mediterranean Region, received the influenza vaccine in 2013 [37].

Accessibility of vaccines is one of the key barriers to improving vaccination rates, including for influenza [38]. Given their ubiquitous distribution, extended working hours, and walk-in policies, pharmacists are in an ideal position to provide influenza vaccines to the community and thus support increased immunization uptake [39]. For example, a study in the United States of America demonstrated an increase in influenza immunization rates among people aged 65 years and older following pharmacists' involvement in the influenza vaccination programmes [40]. This is consistent with data from Canada that showed an increase in influenza immunization rates when pharmacists were allowed to administer influenza vaccines [41]. Of note, the effect appeared to be greatest in people aged 65 years and older [41]. This may be because elderly people go to pharmacies more frequently than younger people, giving more opportunity for pharmacists to recommend vaccination to this age group. In the Region, only seven countries reported providing influenza vaccines through community pharmacies, suggesting that the effect of allowing pharmacists to provide influenza vaccines on the uptake of seasonal influenza immunization is not fully appreciated. Policies to expand the role of pharmacists in immunization could improve the accessibility of influenza vaccination in the Region and increase vaccination rates.

It is important to note that the data presented in this study was limited by its reliance on information relied to us by the survey responders. Influenza focal points were tasked with filling out the survey and the completeness or accuracy of the responses may be hindered if all stakeholders in the MOH were not engaged. Thus, data on vaccine coverage and influenza-associated deaths and hospitalizations and the methods used to obtain these estimates were not independently validated or verified. Finally, we did not assess the rationale or basis for making recommendations for specific target groups in each country and whether this was based on local evidence, WHO or other organization's recommendations.

5. Conclusion

Despite widespread policy recommendations on influenza vaccination, attaining high coverage rates among the various populations including those at risk continues to be a challenge in the Eastern Mediterranean Region. Availability of influenza vaccines is another challenge. In fact, in spite of an increase from previous years, the number of influenza vaccine doses distributed in the Region in 2015 accounted for only 2.2% of the global market [8]. Effective communication of influenza vaccination policies and strong advocacy initiatives are needed to improve awareness of the public and health professionals about influenza and vaccines. In addition, equitable distribution of and access to influenza vaccines is critical for increasing uptake. Finally, encouraging and investing in influenza surveillance and research could be particularly valuable for controlling influenza in the Region. Such research is important for making informed decisions on influenza vaccine introduction and expansion.

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Competing interests

None.

Ethical approval

Not applicable.

Authors' contributions

Hassan Zaraket, Abdinasir Abubakar, Nada Melhem, and Wasiq Mehmood Khan designed the survey and the analysis. Hassan Zaraket supervised the data analysis and wrote the initial draft of the manuscript. All the authors critically revised the manuscript.

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