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Influenza virus vaccination among different groups in Wadi- Alshatti, Libya: A retrospective study.

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Highlights

- **A retrospective cross-sectional study, on influenza A (H1N1) vaccine utilization**
- **Estimate, and monitor the rate of influenza vaccination**
- **Estimate the different target groups in vaccination centers in Wadi Al-Shatti**
- **The public awareness of the benefits of the influenza vaccine must be need**

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ABSTRACT

Background and Aim: Flu is a respiratory tract infection that is caused by the influenza virus. H1N1 influenza (swine flu) has triggered significant morbidity and mortality all over the world. Immunocompromised individuals are considered a high-risk group for infection. Our work aims to estimate, and monitor the rate of influenza in Wadi- Alshatti, Southwest Libya. **Patients and Methods:** Data were collected from the files of all individuals admitted to vaccine centers in the target places during 2014 and 2016. Influenza vaccine records were belonging to health care workers, pregnant women, individuals aged ≥ 50 years with and without chronic diseases, individuals aged < 50 years with chronic diseases, and others. **Results:** Total vaccination numbers were 6256 and 7843 individuals in 2014, and 2016, respectively. The highest numbers were 1703 (27.22%), and 2130 (27.15%) recorded in Zlwaz vaccine center during 2014 and 2016, respectively. There was a statistically significant difference between this center and the other vaccination centers in Wadi- Alshatti (P=0.00). Furthermore, the elderly aged persons ≥ 50 years old with chronic diseases represented 35.29% of all vaccinated individuals in 2016 but there was no statistically significant difference from the other groups. **Conclusion:** The results of the current study revealed a higher vaccination rate against H1N1-Influenza was in Zlwaz vaccine center, whereas, the lowest in Aldesa center. Other areas in Wadi- Alshatti as Aldri, Wanzairik, Timsan need more health promotion due to lack of recording and documentation..

1. Introduction

Influenza "flu" diseases represent public health problem with many epidemics as H1N1 influenza in 2008 that was responsible for more than 250,000 deaths (CDC, 2008; Cheng *et al.,* 2009). It was transmitted by respiratory tract secretion and/or contact with infected surfaces. Immunocompromised individuals represent the high risk groups, such as pregnant women, elderly people, infants, HIV patients, ICU patients (Fezeu *et al.,* 2011; Lynfield *et al.,* 2014; Garnacho-Montero *et al.,* 2013; Zhang *et al.,* 2013; Álvarez-Lerma *et al.,*2016) and children (Dalziel *et al.,* 2013). New flu vaccines are prepared annually to minimize the risk of infection (CDC, 2009). The outcome of the vaccine process or infected cases documentation in some countries is inaccurate (Simpson *et al.,* 2013).

H1N1 influenza "swine flu" has resulted from a shift in the H and N antigen. This simultaneous mutation in the virus genetic code is named re-assortment "antigenic shift" and causes new virus production (Taubenberger *et al.,* 2008; Hay *et al.,* 2001; Obenauer *et al.,* 2006). Monovalent and trivalent vaccines are prepared annually to prevent infection by the new emerging mutant viruses (WHO, 2011).

In Libya, only one study on a vaccination program against H1N1 influenza infection was done among healthcare workers but not in the community (Hwisa *et al.,* 2014). Moreover, there is no study referring to H1N1-influenza vaccines given to the community yet. Thus, our study is the first one in Wadi Al-Shatti, Libya to estimate, and monitor the rate of influenza vaccination and the different target groups in vaccination centers in Wadi Al-Shatti, southwest Libya.

A VAXIGRIP is a flu vaccine that has (inactivated, spilled) active substances. Of the following stains A/California/7/2009H1N1) pdm09; A/Hong Kong/4801/2014; B/Bris bace/60/2008; prepared eggs from good flocks of fertilized hens, and hemagglutinin in addition. The vaccine complies with the advice of the WHO and the European Union decision for 2016/2017; according to manufacturing Company of VAXIGRIP®. Flu vaccine safety varies from 30% to 60%, depending on the connection between the vaccine and the main circulating flu strains. Since the manufacturing of vaccines already has a lag time of several months, there is always the possibility that the last match between the virus and the vaccine somewhat it off by the time flu season rolls around (Ross, 2019).

2. Materials and Sampling regions

Wadi Al-Shatti contains a wide range of small villages, measuring about 20 Km^2 at 27-28 N latitude so that the middle is Brak city. Furthermore, Wadi Al-Shatti has multi- vaccination centers ("12") that are distributed across it. These centers are named Ashkida, Almashroa, Ghera Zlwaz, Alzwia, Tamzawa, Aghar, Alayon, Alghrda, Aldesa, Ghta, Alzahra (Fig. 1a). All documents and data of the 12 vaccination centers are transferred to the Health care primary office of Brack Al-Shatti center.

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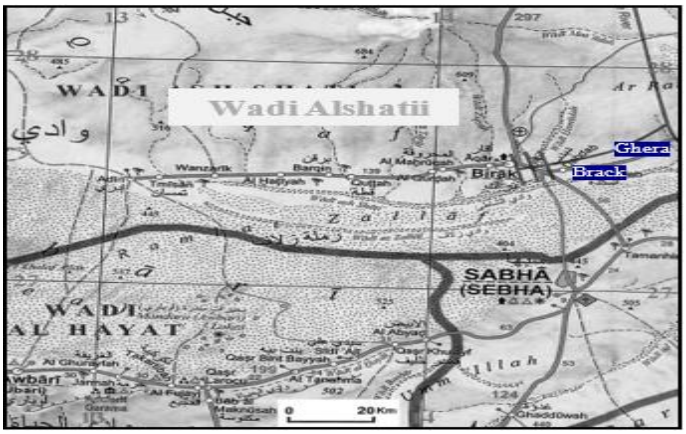

Fig. 1a. Map showing geographic locations of vaccination centers in Wadi-Alshatii, Southern Libya.

2.1 Data collected sources and characteristics

Data was collected from all vaccination records in Wadi-Al-shatii, Southern Libya, during 2014 and 2016, respectively. The analysis was according to H1N1-Influenza vaccine records that consisted of six sections; (1) Healthcare worker; (2) Pregnant women; (3) Elderly aged ≥ 50, without chronic diseases; (4) Elderly aged age ≥ 50 with chronic diseases (5) age group < 50 with chronic diseases; (6) other groups and then the data entered into an electronic database.

2.2 Ethical approval

The data was approved by the Faculty of Engineering and Technology, Sabha University, and research ethics of the Healthcare primary office, Brack Al-Shatti center (approval reference number, 39/2017-SH.TH.H/33/2017).

3. Statistical analysis

Statistical analysis was performed by using Minitab 16.1 program and fed into the Microsoft Excel software (Microsoft Office 2010) for descriptive statistics. We analyzed univariate associations between groups' type, Geographic's vaccination center, and years. The statistical differences between groups were tested by using ANOVA two-way and Student's t-test. A value of $P \leq 0.05$ was considered statistically significant.

4. Result

A retrospective cross-sectional study, on influenza A (H1N1) vaccine utilization, was conducted in the vaccination centers of Wadi-Alshatii, Southern Libya, during 2014 and 2016. The study included six different categories of individuals and the overall H1N1 vaccination number during 2014 and 2016 was 6256 and 7843 individuals, respectively) (Fig.1b).

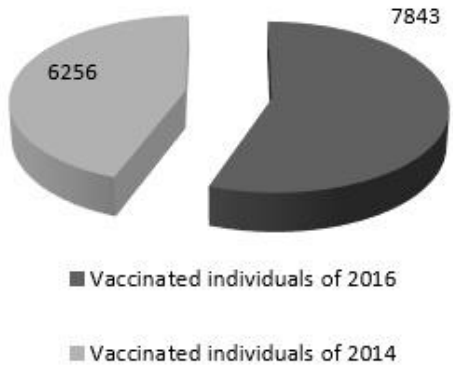

Fig. 1b. Numbers of vaccinated individuals during the year of 2014 and 2016 in Wadi Al-Shatti (T-test; $P > 0.05$).

I. Vaccine groups' categories:

Of the pregnant group, 824 out of 6256 (13.17%) and 1035 out of 7843 (13.19%) were vaccinated during 2014, 2016 respectively. Similarly, the numbers of vaccinated individuals during 2014 among healthcare workers, elderly aged ≥ 50 years with chronic diseases, elderly aged ≥ 50 years without chronic diseases, persons aged < 50 years with chronic diseases and others groups were 420 (6.71%), 2215 (35.4), 1875 (29.9%), 707 (11.3%), and 215 (3.43%), respectively (Fig. 2).

During 2016, the numbers of vaccinated individuals among healthcare workers, elderly aged ≥ 50 years with chronic diseases, elderly aged ≥ 50 years without chronic diseases, persons aged < 50 years with chronic diseases and others groups were 532 (6.78%), 2768 (35.29%), 2346 (29.9%), 886 (11.29%), and 276 (3.5%), respectively (Fig. 3). In both years, the elderly aged ≥ 50 years with chronic diseases represent the highest number in all vaccinated categories but these results were not statistically significant (P>0.05).

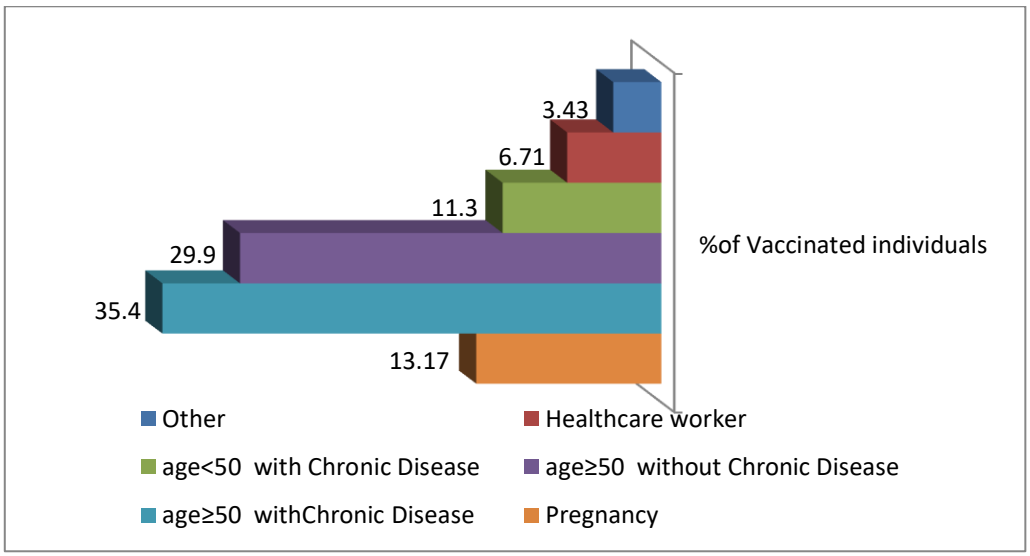

Fig. 2. Numbers of the vaccinated individual during 2014 around Wadi AlShatti

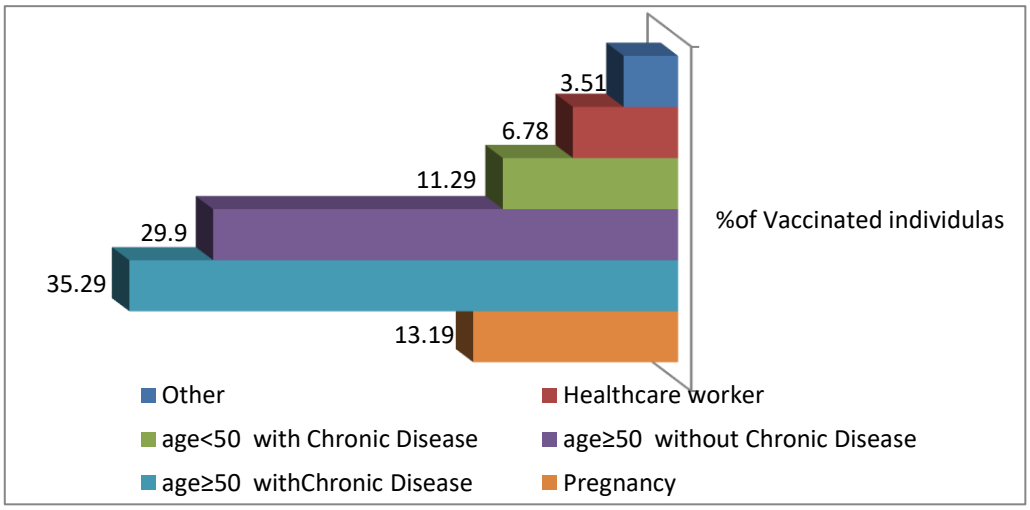

Fig. 3. Numbers of the vaccinated individual during 2016 around Wadi AlShatti

II. Geographic distribution of vaccination

The geographic distribution of the vaccinated individuals during 2014 was in Ashkida; 291 (4.65%); Almashroa;192 (3.06%); Ghera; 521 (8.32%); Zlwaz; 1703 (27.22%); Alzwia 656 (10.48%); Tamzawa; 369 (5.89%); Aghar; 1060 (16.49); Alayon;471 (7.52); Alghrda; 231 (3.69%); Aldesa; 212 (3.38%); Ghta; 376 (6.0%), and Alzahra; 174 (2.78%); all out of 6256 individual number (Fig. 4). While, the geographical distribution of the vaccinated individuals during 2016 were 364 (4.64%), 243 (3.09%), 660 (8.41%), 2130 (27.15%), 818 (10.42%), 464 (5.9%), 1326 (16.90%), 590 (7.52%), 290 (3.69%), 268 (3.41%), 470 (5.99%) and 220 (2.80%) in the same countries, respectively; all out of 7843 individuals (Fig. 5). There was a statistically significant difference among vaccine centers in two years ($P<0.05$).

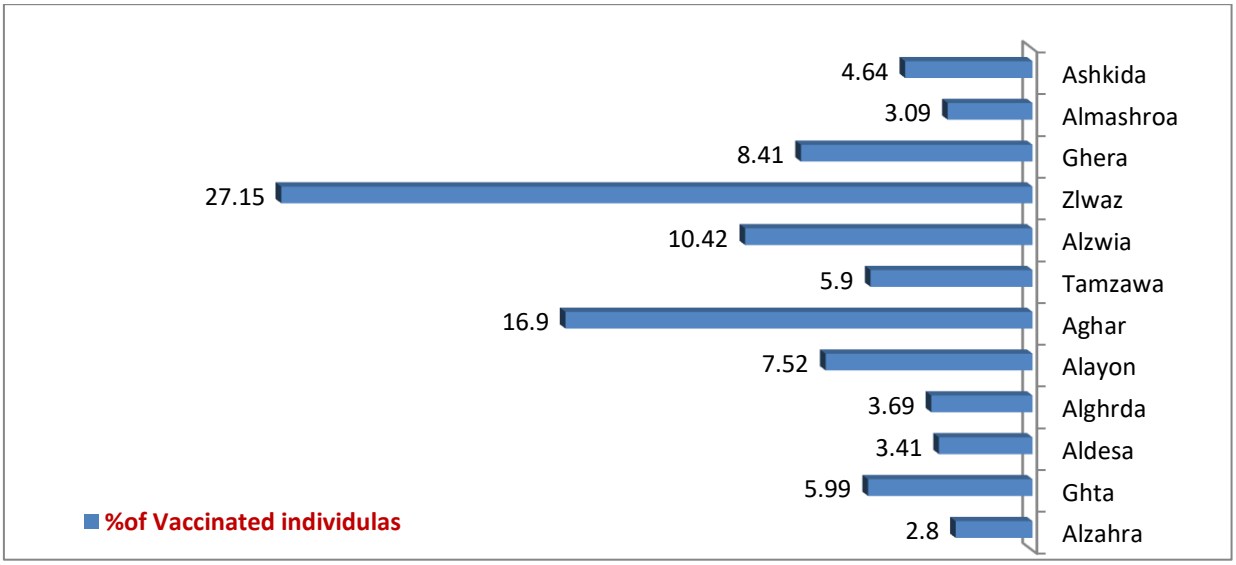

Fig. 4. Geographic distribution of vaccination around Wadi Alshatti centers in 2014.

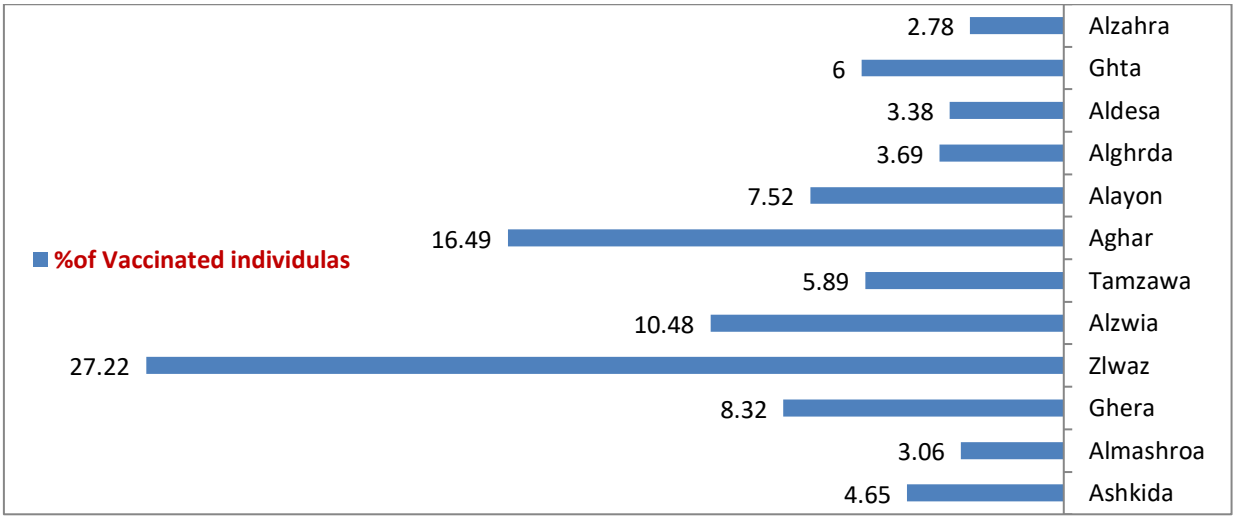

Fig. 5. Geographic distribution of vaccination around Wadi Alshatti centers during 2016.

5. Discussion

The current study alarms the present situation in Libya on H1N1 influenza infection spread as no studies were referring to vaccination programs and/or awareness in southwestern Libya. Despite the absence of a developed and effective social insurance system in Libya due to WHO's high alert rates during the 2009-10 outbreak of SARS, the government has made all the necessary contributions to ensuring immunization for all the population, including health care workers. As for September 2009, Libya has 233 confirmed individuals and one death due to "swine" influenza infection (H1N1) in the midst of the beginning of the inoculation period (WHO, 2009). The WHO has proposed that all nations should inoculate their medicinal services workers rapidly to make sure that the infrastructure is fundamentally well-being (WHO, 2010).

The strengths of the current study include the fact that it involved multiple centers around Wadi Alshatti, which helped us to monitor H1N1 vaccination in these regions. Our study represents a low vaccination rate among HCWs as it was 10 % lower than that reported in western Libya. This low-level of immunization recognition needs HCWs deemed (Hwisa *et al.,* 2014).

In general, the study showed that there is an increased rate of vaccination from 2016 than in 2014. Also, the elder group aged ≥ 50 years old with chronic disease have higher vaccination rates in both years followed by an elder group aged ≥ 50 without chronic disease than a group aged < 50 with chronic disease. The keep up of the pregnant group was on the level in both years. There were not any statistically significant differences between both years ($P< 0.05$). The outcome of the current study cohort for the older age group reflects their awareness and positive behavior.

However, the outcome of the current study was smaller than that reported by Simpson *et al.* (2013) who recorded 69.3% uptake among those aged ≥65 years and aged <65 years there a 26.2%. In addition, it was less than the study reported by Fireman *et al.* (2000).

The geographical distribution of the vaccine centers around Wadi Alshatti is based on village places. Zlwaz center has the highest rate of vaccination against influenza (>20%), followed by Aghar then Alzwia centers. On the opposite side, Alzahra center reported the lowest rate of vaccination against influenza (<3%). These results may be affected by the population size in these villages. Another fact is that people are coming from the Brack city (the biggest one in a long area) to Zlwaz center.

The elderly aged group ≥50 years old with chronic disease showed the highest recorded vaccination rate against influenza in all the centers except Almashroa, Aldesa, and Ghta. While Zlwaz, Ghta, and Aghar centers have a higher vaccination rate among group age ≥50 without chronic disease; and the group of age <50 with chronic disease in Aghar center. The older age people are the high-risk group to be exposed to influenza side effect (Simonsen *et al.,* 2007; Nichol *et al.,* 2007) have reported that outcomes such as hospitalization for influenza and pneumonia (27%) and death (48%) occurred in people aged >65 years. Hwisa *et al.* (2014) have referred to that the common barriers of H1N1 vaccination are lack of awareness, fear of adverse effects, allergies, and religious beliefs that influence the HCWs. Improvement of consumption of seasonal influenza vaccination depends on the awareness of healthcare workers and the community, therefore, the pandemic planning program is a constituent. Sadly, many experts predict an active, and possibly severe, flu season. More than 300,000 patients have had laboratory-confirmed influenza in Australia and summer flu outbreaks in the Southern Hemisphere based on research reported in recent years (Ross, J., 2019).

Finally, this is the first study conducted in Libya to report the response to the influenza vaccine. Our study has several limitations due to its retrospective design including lack of gender data; residence, missing data in the other years; as well as completion of questions before and after vaccine from a different class of cohort study which reported side effects of the vaccine.

6. Conclusion

In a current study, we reported the numbers of individuals vaccinated with the H1N1-Influenza virus vaccine as a reference to the provided protection against H1N1- an infection in the target area. The vaccine plan reports only existed for 2014 and 2016. The vaccination program documentation appeared for 2014 and 2016 only. The vaccine was not administered in 2015; while no documents for vaccination in the other years. Our cohort study revealed that some areas need more promotion of health, as a vaccinated individual is not yet recorded. Finally; to avoid the impact of missing data, we have to use the electronic forms for tracking and monitoring through center administration manager input. Besides, larger studies in different Libyan cities are needed to create a large authentication database. The public awareness of the benefits of the influenza vaccine needs more promotion.

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