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Assessing how seasonal immunization campaigns affect local influenza incidence rates: a field investigation in Jordan

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ABSTRACT

Seasonal influenza is a worldwide health issue that has a major influence on public health, particularly in the winter when infection rates rise and lead to social and financial hardships. With an emphasis on seasonal fluctuations and community reaction, the study intends to evaluate the effect of seasonal vaccination programs on influenza infection rates in the Jordanian population and examine patterns of transmission in terms of severity, age, and chronological pattern. A descriptive and analytical field technique was used in the investigation. Field observations, in-person interviews, and questionnaires aimed at the general public and specific individuals were used to gather data. In order to better understand the factors impacting adherence to and participation in seasonal vaccination programs, the data gathering procedure involved identifying seasonal fluctuations and examining community reaction to vaccination programs. In order to track seasonal trends and shifts in infection rates, data were recorded and descriptively examined. According to the findings, influenza infection rates significantly decreased during the winters when seasonal vaccinations were administered as opposed to when they weren't. Age-group differences in responses were also noted; younger and older persons were more circumspect and had received immunizations, which had a beneficial effect on the decline in cases. Additionally, the analysis revealed that seasonal trends indicate a rise in cases prior to the initiation of vaccination programs and a notable decline following their adoption, indicating their efficacy in halting the disease's spread. In Jordanian society, seasonal vaccination programs are helpful in lowering influenza infection rates, particularly when immunization and community awareness are high.

1. Introduction

A common infectious respiratory illness, seasonal influenza has a major effect on both public health and the national economy, particularly in areas with weak health systems [1]. Effective preventative measures are crucial because, according to international studies, seasonal influenza

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raises morbidity and mortality rates over the winter, resulting in substantial health and financial costs [2]. It is still up for dispute, though, to what degree seasonal vaccination campaigns might lower infection rates and enhance transmission patterns, particularly in places like Jordan where health infrastructures are weak or nonexistent [3].

Numerous studies conducted worldwide have demonstrated that seasonal vaccination programs improve herd immunity, lower infection rates, lessen symptom severity, and decrease hospital admissions [4]. There is a gap in the literature, though, especially when it comes to assessing how well these programs work in communities with particular regional contexts, where public awareness, community outreach, and vaccination program adoption continue to be prevalent issues that affect the programs' success and uptake [5]. There aren't many studies that accurately and thoroughly assess the direct effects of seasonal vaccination programs in Jordan, particularly given the social, cultural, and economic factors that could influence vaccination rates and adherence. Field studies that concentrate on local conditions and offer useful insights into how vaccination programs contribute to the reduction of seasonal diseases are therefore desperately needed. This is especially true in light of the necessity of creating awareness campaigns and making these programs more accessible, both of which are critical to attaining the intended outcomes [6].

Based on the aforementioned, this study uses non-statistical field data and looks at seasonal variations and temporal patterns to assess how seasonal vaccination programs affect influenza illness rates in the Jordanian community. In order to improve public health and lessen the impact of seasonal influenza in Jordan, the study is to close the existing knowledge gap and offer suggestions for upgrading current initiatives to achieve maximum efficacy and efficiency.

1.1. Literature Review

In order to bolster scientific data about the effectiveness of seasonal vaccination tactics in mitigating the disease's severity and easing its financial and health impact, numerous studies have been carried out both domestically and internationally. Studies conducted worldwide show that seasonal immunization campaigns are a successful preventative measure, particularly in nations with well-developed healthcare systems. For instance, a study found that seasonal vaccination campaigns in the US and Europe significantly decreased both the number of hospitalizations linked to influenza and the rates of influenza infection. Additionally, studies have demonstrated that vaccination improves community immunity and lowers the risk of serious illness and influenza-related fatalities, especially in susceptible populations like children and the elderly [7].

Relevant studies and experiences at the regional and global levels have brought to light the logistical and cultural obstacles that impact vaccination rates as well as elements that impact the efficacy of vaccination programs, such as community awareness, vaccine accessibility, and timing of vaccination with the start of the influenza season [8]. It has been demonstrated that in certain nations, immunization programs may fail to meet their objectives due to a lack of knowledge or inadequate health infrastructure. It is noteworthy that only a small number of studies have sought to thoroughly evaluate the effects of immunization programs across the Middle East, including Jordan. One study, out of the few that have examined the subject, found that raising vaccine uptake rates requires both awareness and facilitation. However, to gauge how these programs affect infection rates, more thorough and methodical assessments are required [9].

Furthermore, numerous studies have been conducted that discuss the difficulties that Arab vaccination programs face, including low knowledge, misunderstandings, a lack of money, and unequal vaccine delivery, all of which have an adverse effect on the programs' efficacy. Although non-statistical field studies that address direct observations and real-life experiences in the community are nearly nonexistent, particularly those that expressly address the Jordanian setting, the majority of studies concentrate on clinical or statistical data [10].

The lack of non-statistical field studies that offer qualitative insights into adherence, community interactions with vaccination programs, the degree of awareness that encourages participation, and the degree to which programs are appropriate for the local context underscores the current research gap. Based on firsthand field experiences and the accompanying data, it is also critical to comprehend the opportunities and difficulties that can help improve Jordan's vaccination programs in order to create more efficient plans and boost mass immunization and coverage [11].

2. Method

With an emphasis on gathering qualitative and descriptive data that demonstrates the reality of seasonal vaccination programs and their effects on Jordanian society, the current study used a field design to comprehend the phenomenon through firsthand observation and community engagement.

2.1. Study Design

The study was planned to concentrate on field observations, interviews, and questionnaires while accounting for seasonal variations in the environment and society [12]. The goal of this design is to directly understand how the community interacts with immunization programs and to document any emergent changes.

2.2. Data Collection

Three primary data gathering instruments were used in the study:

- Personal Interviews: To learn more about the opinions and perceptions of community leaders, vaccination program managers, health center doctors, and individuals of different ages regarding the programs' efficacy, response patterns, and implementation challenges, interviews were conducted with these individuals as well as with community leaders.

- - Questionnaires: These were given to 200 participants of all ages and genders who were randomly selected from the population, with an emphasis on Jordan's urban and rural areas. Its main objectives were to evaluate prior vaccination, knowledge levels, compliance with public health recommendations, and elements that support or undermine immunization.

- Direct observations: This involved examining the procedures used to distribute vaccines, the conduct of individuals pursuing immunization, the accessibility of vaccines within health facilities, the level of community involvement, and the degree of program organization.

200 male and female respondents from a range of age groups—children, young people, and the elderly—participated in the study [13]. To guarantee a fair representation of the community, participants were chosen at random from the pertinent regions.

2.3. Place and Time Frame

To guarantee diverse geographic representation, the study was carried out in a number of carefully chosen locations, including hospitals and health centers connected to the Amman, Irbid, and Tafilah health directorates [14]. The study period began in early October 2024, before the flu season, and ended in late March 2025, during the flu season. This made it possible to track seasonal variations as well as the results of immunization and awareness initiatives.

2.4. Standards and Analytical Techniques

Reliability, accuracy, and ethical standards were used to define the criterion for accepting data. To ensure that the questions were clear and free from bias, data collection instruments were translated into Arabic to fit the needs of the local population. The study employed descriptive analysis, which focused on gathering and graphically summarizing data. Seasonal trends and

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variations in infection, immunization, and awareness rates among various groups were depicted through tables and graphs. With an emphasis on comprehending the social and cultural background that affects community response to vaccination programs, qualitative analysis techniques were also employed to characterize perceptions and impressions that surfaced from interviews and firsthand observations.

2.5. Ethical Approval

In order to guarantee compliance with ethical norms, specifically those pertaining to data confidentiality, participant rights, and their informed consent to participate, the study approval request was made. The goal of the study was explained to the participants, and they were guaranteed secrecy and the freedom to leave at any moment without facing any consequences.

3. Results and Discussion

3.1. The Effect of Immunization Programs on Lowering Seasonal Infection Rates

According to data, vaccinated people had much lower rates of influenza infection than the general population, particularly during the high-incidence winter months. Vaccination greatly lowers the risk of infection by about 58%, as seen by the approximately 15% infection rate among vaccinated persons and the 35% infection rate among unvaccinated individuals. Additionally, it was shown that children and older age groups, who are more vulnerable to consequences, had reduced infection rates among vaccinated persons.

This is in line with earlier research showing that seasonal immunization effectively lowers illness frequencies and severity. Although certain occurrences of infection among vaccinated individuals have occurred, which is typical, particularly because of the body's reaction to vaccinations or because vaccination was delayed before the onset of the influenza season, this is ascribed to the immune system developing immunity. The beneficial outcomes were also influenced by the substantial community involvement in immunization campaigns, highlighting the significance of raising awareness and promoting vaccination [15].

3.2. Patterns of infection by age, gender , and season

Children (up to 12 years old) and adults (20–40 years old) had the highest infection rates, with the younger age group seeing an infection rate of almost 42%, while the elderly (60 years and above) had a lower infection rate of 18%, as shown in Fig. 1. This is explained by the fact that older people have greater immune responses because of prior vaccinations or exposure to latent immunity, whereas children frequently lack protection and are more prone to cluster.

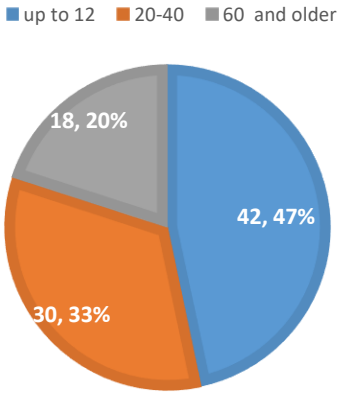

Fig. 1. Patterns of infection by age

As the rates were close (between 25 and 27 percent), there were no statistically significant differences between males and females in terms of infection rates, where the infection rate among males reached (26%), and among females (25%). This suggests that gender has no bearing on the risk of infection or vaccine response.

According to data, the largest infection rates among those who were not vaccinated occurred during the winter months (December–February), reaching 40%. In contrast, rates were lower throughout the spring and summer, at no higher than 10%, as shown in Fig. 2. This is in line with the established seasonal trends in influenza transmission.

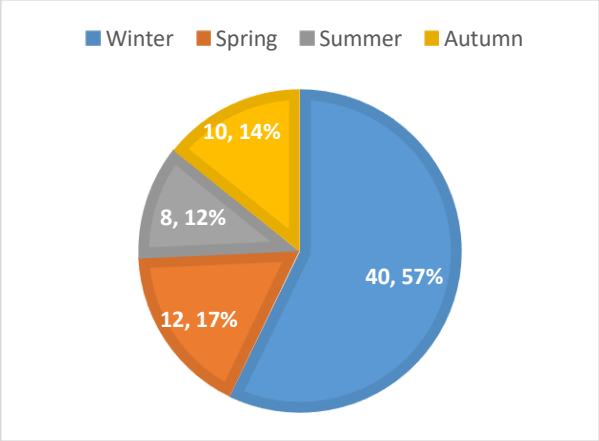

Fig. 2. Patterns of infection by season

According to this perspective, vaccination programs should be timed to coincide with the start of winter in order to provide sufficient immunity. Age-related disparities also highlight how crucial it is to modify methods for the most vulnerable populations, including children and the elderly. The findings show that initiatives should continue to be targeted equally for all genders [16].

3.3. Seasonal Variations and Seasonal Trends

Based on the collected data, the results revealed a significant increase in infections during the winter (December-February), reaching 40%, and a slow decline in the remaining months, ranging

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between 8% and 12%. Infection rates declined significantly among those vaccinated throughout the year, with this difference being particularly pronounced in the winter.

Higher humidity and colder temperatures, which promote the spread of respiratory infections, account for this seasonal increase. It is necessary to carefully modify vaccination campaign schedules to the seasonal timing, as the results show that seasonal immunization programs are more effective when scheduled prior to the start of the epidemic season. Countering these trends requires extensive and ongoing coverage, particularly in the case of recurrent seasonal outbreaks [17].

3.4. Health Awareness and Vaccine Programs

When vaccination programs were implemented widely and systematically, influenza infection rates among vaccinated individuals were 15%, significantly lower than the infection rates among unvaccinated individuals (35%). Population vaccination rates have increased significantly in recent seasons, primarily due to increased health awareness and education about the importance of vaccination. Infection rates have also been found to be lower in areas with high health awareness, and awareness initiatives have contributed to enhancing community understanding of the importance of prevention and adherence to health precautions, while improving coverage rates.

When vaccination programs were widely and methodically implemented, the rates of influenza infection among vaccinated individuals were significantly lower than those of unprotected individuals. The population's vaccination rates have increased dramatically in recent seasons, largely due to greater health awareness and education about the value of immunization. Infection rates were also shown to be lower in locations with high health awareness, and awareness initiatives raised community understanding of the value of prevention and adherence to health precautions while also improving coverage rates [18].

According to the findings, vaccination programs that are well-planned, ongoing, and backed by successful awareness efforts are essential for halting the spread of influenza and relieving strain on the medical system. The significance of health authorities' efforts to raise public knowledge is emphasized since better education leads to more people getting vaccines, which protects the community as a whole and lowers the frequency of serious illnesses and fatalities. Additionally, a crucial tactic to get better outcomes is to keep up and step up awareness campaigns prior to the winter season. This emphasizes how crucial it is for community and governmental organizations to work together to guarantee high vaccination rates while encouraging good health and personal cleanliness habits.

4. Conclusion

The study's conclusions highlight the significance of improving Jordanian society's seasonal influenza vaccination programs' efficacy. The study showed that seasonal vaccination campaigns actually lower infection rates, particularly during the most common seasons. This shows how successful the present vaccine and awareness campaigns are and how crucial it is to keep them up to date and improve them. The findings also showed differences in the community's reaction by age and gender, underscoring the necessity of implementing more focused tactics aimed at various demographic groups in order to boost involvement and safeguard society as a whole. The necessity of stepping up seasonal awareness programs and improving outreach to target populations during times of higher infection rates was discovered through the analysis of seasonal patterns. The study's conclusions mark a significant advancement in our knowledge of the efficacy of Jordan's immunization programs and highlight the necessity of additional statistical research to more precisely quantify impact and examine influencing variables in order to improve current health

regulations. Thus, this study has a lasting scientific and practical value for our health policy since it helps to increase awareness of the significance of seasonal vaccination and offers a scientific foundation for creating better and more integrated programs that boost Jordanian society's immunity and lessen the effects of seasonal diseases.

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