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A RETROSPECTIVE ANALYSIS OF TRENDS IN INFLUENZA VACCINATION UPTAKE AT SUKRARAJ TROPICAL AND INFECTIOUS DISEASE HOSPITAL, KATHMANDU, NEPAL

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ABSTRACT

Influenza is one of the widespread public health problems. Influenza vaccination rates have fluctuated extensively between 2075 and 2081, influenced by the COVID-19 pandemic and seasonal patterns. Annual rates fell sharply between 2076-77 and 2077-78, most likely due to the redirection of healthcare resources and public reluctance to visit facilities, while recovering by 2080-81 with 208 doses. Monthly data showed peaks in winter and monsoon months like Magh and Asar, while in summer months like Baisakh, the doses are low due to low influenza transmission. The females received more vaccinations due to targeted pregnancy campaigns initially, while the males outgrew them by 2080-81, reflecting post-pandemic behavioral changes. Such trends highlight the effect of the pandemic on vaccination rates, besides underlining adaptive strategies in response to any health crisis and seasonal outbreaks.

Key words: Adaptive strategies, COVID 19, health crisis, pandemic

INTRODUCTION

Influenza is an infectious respiratory illness caused by influenza viruses that spreads easily through close contact with an infected person(WHO, 2024b). Influenza pathology was widely examined during three pandemics in the 20th century, with the most recent occurring in 1968 (Kuiken and Taubenberger, 2008) killing up to 100,000 individuals in the United States of America (USA) alone (Taylor, Boulos and Memoli, 2021). The pandemic's impact on public health

remains uncertain, despite the possibility of an influenza-related pandemic (Taubenberger and Morens, 2006).

Influenza affects 10-20% of the global population annually (Peasah *et al.*, 2013) with an estimated 3-5 million cases of severe illness and about 290,000-650,000 deaths globally (WHO, 2024b). Vaccination is the most effective way to prevent infection (World health organization, 2022) and serious complications caused by influenza viruses (WHO, 2024a). Vaccination against influenza averted 7,900 influenza-related deaths, 4.8 million influenza-related medical visits, 9.8 million influenza-related illnesses, and 120,000 influenza-related hospitalizations in USA (Centres for Diseases Control and Prevention [CDC], 2024). Thus, enhanced global influenza epidemiological research is crucial for allocating life-saving resources like vaccines and antiviral medications, (Fischer *et al.*, 2014). In Nepal, influenza vaccination campaigns have played major role in mitigating the disease's burden (Jha *et al.*, 2020). Sukra Raj Tropical & Infectious Disease Hospital, a leading referral hospital in the country, plays a critical role in administering vaccines and monitoring influenza trends. Understanding vaccination patterns, timely management and preparedness is essential for optimizing immunization strategies and addressing gaps in coverage to control possible outbreaks in Nepal (Acharya *et al.*, 2020).

This study aims to analyze influenza vaccination trends at Sukra raj Tropical & Infectious Disease Hospital from 2075- 2081 B.S. (2018-2024 A.D), focusing on temporal patterns, seasonal variations, and gender-based differences. By examining data spanning six years, this research seeks to identify key trends and provide evidence-based recommendations to enhance vaccine coverage and improve public health outcomes.

MATERIALS AND METHODS

Study design

This research employed a retrospective descriptive study design to analyze vaccination trends.

Data source, management and analysis

Vaccination records were obtained from Sukra Raj Tropical and Infectious Disease Hospital's record section, covering six fiscal years (2075-2081 B.S./2018-2024 A.D.). Data were organized and analyzed using Microsoft Excel 2013. Descriptive statistics were used to identify trends, seasonal patterns, and gender-based differences. Graphical representations and bar charts were created to visualize the findings.

Ethical consideration

Permission to access hospital records were obtained from relevant authorities.

RESULTS AND DISCUSSION

Results

The yearly distribution of influenza vaccinations showed significant fluctuations. In 2075-76, a total of 172 doses were administered, with a sharp decline to 55 doses in 2076-77. Vaccination efforts reached their lowest in 2077-78, with only 4 doses recorded. Recovery began in 2078-79, with 73 doses administered, and followed by a significant increase to 181 doses in 2079-80. The highest vaccination numbers were achieved in 2080-81, with 208 doses recorded (Figure 1).

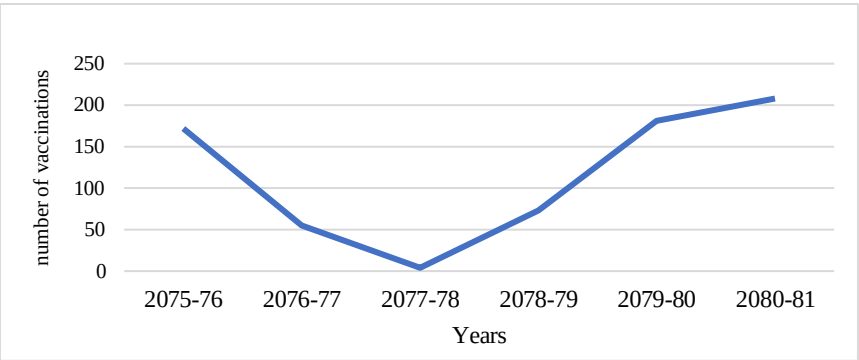

Figure 1. Yearly distribution of influenza Vaccinations from 2075-76 to 2080-81. Source: Sukra raj Tropical and Infectious Disease Hospital, Kathmandu,

The monthly distribution showed that highest vaccination rates were recorded during Magh, in 2075-76. Similarly, Asar in 2079-80 showed a peak for vaccinations. On the other hand, the lowest vaccination numbers were observed in summer and pre-monsoon months such as Baisakh and Jeth, where several years recorded zero doses (Figure 2).

Over the first six years, females received more vaccinations than males. For instance, in 2075-76, 103 females were vaccinated as opposed to 69 males. However, by 2080-81, the trend had shifted, with males receiving 122 vaccinations as opposed to 86 for females. Vaccination rate declined between 2076 and 2077 with no records available for several months (Figure 3).

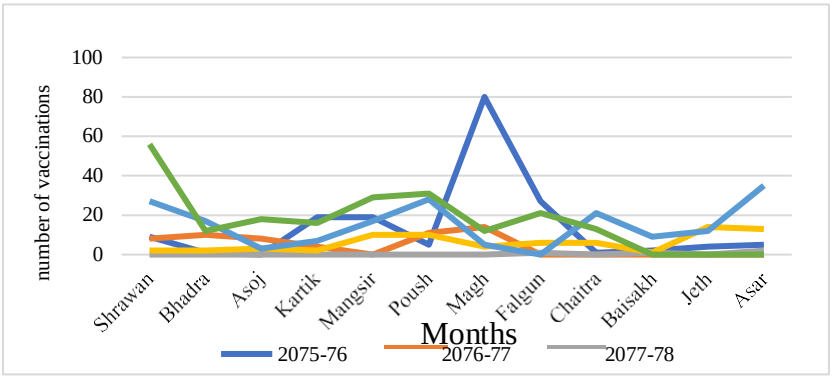

Figure 2. Monthly distribution of influenza vaccination from 2075-76 to 2080-81. Source: Sukra Raj Tropical and Infectious Disease Hospital, Kathmandu, Nepal

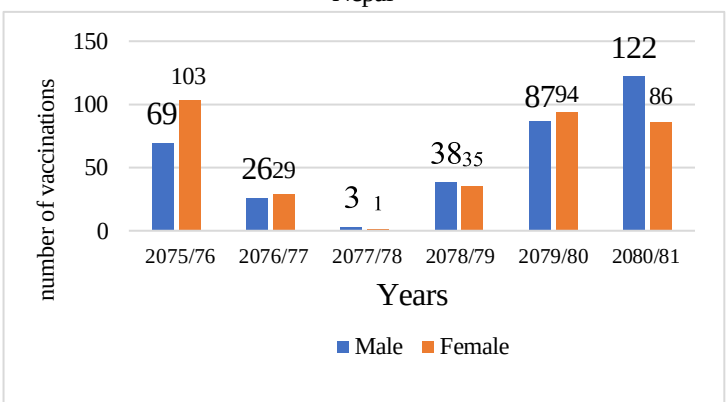

Figure 3: Sex-wise distribution of influenza vaccination (2075-76 to 2080-81) Source: Sukra raj Tropical and Infectious Disease Hospital, Kathmandu, Nepal

Discussion

Annual vaccination rates shows alterations that can be attributed to a variety of factors. The sharp decline observed in 2076-77 and 2077-78, with vaccinations dropping from 172 in 2075-76 to 55 and then 4 doses, is most likely due to the COVID-19 pandemic. Healthcare resources were redirected to pandemic management during this time as hospital policy also shifted to focus solely on COVID patients and public reluctance to visit medical facilities might have also played a role in the decline of vaccination rates. This is consistent with a study conducted in the USA, where vaccine uptake rates decreased in several countries during the COVID-19 pandemic (Vojtek, Wouw and Thomson, 2024). The recovery of vaccination rates in 2078-79 (73 doses) and subsequent increase to

181 doses in 2079-80 and 208 doses in 2080-81 demonstrate that the pandemic had beneficial effects on influenza vaccination rates (Shamoun *et al.*, 2022).

The monthly distribution of influenza vaccination revealed distinct seasonal pattern influenced by Nepal's climatic changes. The peak rates of vaccination, such as during Magh, corresponding to winter in 2075-76, and Asar corresponding to the monsoon period in 2079-80, are concurrent with seasonal changes in Nepal. This might be because of the fact that incidence of influenza infection increases when there is cold (Keswani, Meharda and Gupta, 2019; Sapkota and Upadhyay, 2020) or high humidity (Moura, Perdigão and Siqueira, 2009).

In contrast, the lowest vaccination rates were observed during summer and pre-monsoon months such as Baisakh and Jeth, with several years recording zero doses. These months are typically characterized by lower influenza transmission rates, which may result in reduced intention to receive influenza vaccination (Yang, Cowling and Liao, 2015).

During the initial years of study period, female received more vaccinations. It might be influenced by the strategy of influenza vaccination during pregnancy aiming to safeguard the pregnant women, the fetus and the young infant (Maltezou and Rodolakis, 2021). However, the trend shifted by 2080-81 with male recording higher vaccination number than female as reason for vaccination uptake changed post COVID-19 pandemic. It aligns with the study conducted in Germany where vaccination rate of male increased significantly from 50.5% to 66.2% (Kromer *et al.*, 2024) post pandemic.

CONCLUSION

The study indicated that influenza vaccination trends were dynamic in nature and were influenced by external crises and seasonal variation. The sharp decline during the COVID-19 pandemic underscores the importance of continued routine vaccination even during emergency periods. Peaks in seasonal vaccination rates indicate that well-timed vaccination campaigns must be planned in relation to the high-risk periods for their maximum effectiveness. Furthermore, vaccination trends have shifted toward becoming gender-based, and this may call for a better understanding of behavior and access to reduce disparities. Adaptive and targeted strategies are important in maintaining and increasing vaccination coverage, especially in the face of new future health challenges.

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