Proceedings S.Z.M.C. Vol: 36(3): pp. 36-42, 2022. PSZMC-850-36-3-2022

Perception and Vaccination Status of Elderly Individuals Aged 60 Years and Above: An Urban Lahore Analysis

[1]Rizwana Kitchlew, [2]Afaq Shamim, [3]Spenta Kakalia, [4]Arous Khaqan, [5]Sonia Latif, [6]Faizan Farooq

[1]*Department of Medicine, CMH Lahore Medical College & Institute of Dentistry, Lahore.*
[2]*Department of Medicine, Fatima Memorial Hospital, Lahore.*
[3]*Department of Pediatrics, CMH Lahore Medical College & Institute of Dentistry, Lahore.*
[4]*Department of Nephrology, Fatima Memorial Hospital, Lahore.*
[5]*Department of Physiology, CMH Lahore Medical College & Institute of Dentistry, Lahore.*
[6]*Department of Medicine, PKLI Hospital, Lahore.*

ABSTRACT

Introduction: Although there have been successful global efforts to provide vaccinations to children, immunization of the elderly has remained a largely neglected issue. There is currently no literature looking at vaccine coverage amongst the elderly in Pakistan. Worldwide, there is insufficient vaccine coverage among older adults, a group at high risk of acquiring vaccine preventable diseases.

Aims & Objectives: Our objective was to assess vaccination status among the elderly in Pakistan, and reasons for being unvaccinated.

Place and duration of study: The study was carried out at the Fatima Memorial Hospital, Lahore, Pakistan from 1st January 2019 till October 2019.

Material & Methods: A cross-sectional analytical study was carried out on people over 60 years. Unvaccinated participants were counseled about the importance of vaccines, and for those willing, vaccination was arranged. Statistical analysis was carried out using SPSS version 23.

Results: The 402 participants enrolled, 288(72%) knew that vaccinations can prevent diseases. Only 168(42%) were sure they had received any vaccine as an adult; the vaccine most often received was against hepatitis B, 84(21%). Influenza and pneumococcal vaccine had been received by 72(18%) and 44(11%), respectively. A large number of participants were completely unaware of the need for adult vaccines (38%), 16% had never been told about vaccinations by their primary care professional and 60% responded that there was not enough awareness regarding vaccination. There was a positive correlation between vaccination and education, along with social status ($p<0.05$). After counseling, 278(69%) requested vaccinations.

Conclusion: A large proportion of the elderly populations studied were unvaccinated, or unaware of their immunization status. After receiving information about vaccinations, most participants were keen to avail this service; vaccinations of the elderly needs to be addressed in the background of the health challenges presented by the aging population of developing countries.

Keywords: Awareness, Elderly, Influenza, Pakistan, Pneumonia, Vaccination

INTRODUCTION

The present decade, 2020-2029, has been declared the Global Decade of Healthy Aging 2020-29 by the World Health Organization (WHO).[1] As healthcare has improved, elderly in Pakistan are living longer lives. Despite the increase in longevity, elderly have comorbidities, predisposing them to infections like influenza and pneumonia. Most of these infections can be prevented through vaccinations. With an aging population, conserving an adequate level of health and preventing diseases would be of great importance, both for this population and for the national health budget.

Worldwide, there has been a rising trend in the geriatric population with the United Nations (UN) stating a 400% increase by 2025.[2] According to the UN, as of 2019; there were 15 million people above the age of 60 years in Pakistan. Currently, the life expectancy for Pakistan in 2020

is 67.33 years.[3] An elderly population over the age of 65 has high mortality secondary to infections like influenza and pneumonia, which could be prevented by vaccination.[4] The WHO and the European Centre for Disease Prevention and Control (ECDC) agree that to prevent adverse outcomes from influenza, we need to focus on the elderly population.[5]

Vaccination of children has been recognized worldwide as an essential tool in preventing common childhood illnesses. The Government of Pakistan has actively made efforts in collaboration with the WHO in implementing the Expanded Programme on Immunization (EPI), which has been offering free of cost vaccination to children less than 5 years since 1978.[6,7] At present, no such programme is available in Pakistan for the elderly. The Centre for Disease Control and prevention (CDC) a national public health institute in the United States regularly updates its adult immunization recommendations. In Pakistan, such policies are non-existent. Recently, antimicrobial resistance (AMR)has been declared one of the top ten global public health threats facing humanity by the WHO.[8] With rising AMR, it has become more crucial to prevent infections in the elderly.

The objective of the study was to evaluate the status of vaccination in the elderly and to identify barriers leading to suboptimal vaccination. Vaccine misconceptions and vaccination under special circumstances like Hajj or Umrah has also been evaluated.

MATERIAL AND METHODS

This was a descriptive cross sectional analytical study carried out in the Department of Medicine at Fatima Memorial Hospital Lahore from 1st January 2019 till October 2019. REB approval was obtained from the Fatima Memorial Hospital (REB: FMH-11-2018-IRB-522-M).

Inclusion criteria included individuals over the age of 60, with cognitive fitness to answer the questionnaire. (The WHO has defined the age for elderly in Pakistan as 60 years).[9] Individuals who were unable to answer due to physical or cognitive impairment were excluded.

After obtaining informed consent, participants were enrolled from the individual's visiting hospital or in the community. Questions were asked through a structured questionnaire. The questionnaire was developed for this study based on the literature available on pediatric and adult vaccination. Before finalizing, the questionnaire was read and critiqued by two physicians who were not involved in the study. The questionnaire was developed in English. The questions were asked by the research team, with translation to Urdu where required. The questionnaire collected basic demographic data, health history, along with specific questions about vaccinations. Status of vaccination was obtained, both as an adult and in childhood. Special vaccination, as in prior to religious pilgrimage like Haj and Umrah was obtained.[10] Vaccination status was based on history and recall. As majority of our population does not maintain health records, documentation was not requested. Participants were asked about their perceptions about vaccines, in order to understand any misconceptions that they may have. Literacy was assessed by asking people how much schooling they had. Socio-economic status was assessed by asking for the monthly household income. For the purposes of this study, it was stratified as lower (less than Rupees (Rs.) 20,000), middle (Rs. 20,000- Rs. 100,000), and upper (greater than Rs. 100,000).

After completion of the questionnaire, counselling was done. Specifically, each participant was given information regarding the importance of vaccines at their age, and which vaccines they were eligible to get. After the information was given, they were asked if they would like to be immunized. Phone numbers of willing and interested people were noted, who were then facilitated in receiving the appropriate vaccinations.

Statistical analysis:

A sample size of 377 was calculated. Statistical analysis was conducted with SPSS version 23. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables were expressed as percentage values. The p-value of less than 0.05 was considered significant. Univariate and multivariate logistic regression was used to see the effects of all factors on vaccination status.

RESULTS

A total of 402 patients were enrolled in the study; 194(48%) were females. Mean age was 68 years ±6.62. Individuals with low socioeconomic status were 166(41%). Participants with no schooling were only 98(24%). Hypertension was present in 256(64%) and Diabetes Mellitus in 200 (50%). Fig-1 indicates the distribution of co-morbidities in our population. Table-1 summarizes the basic demographic findings. Amongst the participants, 288(72%) knew that vaccination can prevent

diseases. Only 168(42%) were sure they had received any vaccination in their adult life. The vaccination which had been done most frequently was against hepatitis B in 84(21%). The frequency of various vaccinations is shown in Fig-2. Out of 110(27%) who had performed Hajj 72(65%) was sure that they were vaccinated for influenza and meningococcal. Schooling was assessed in different categories; here we have reported the two extremes: no schooling, and those who had achieved an undergraduate education. Responses are given as frequencies and percentages, and where appropriate, as mean, and standard deviation.

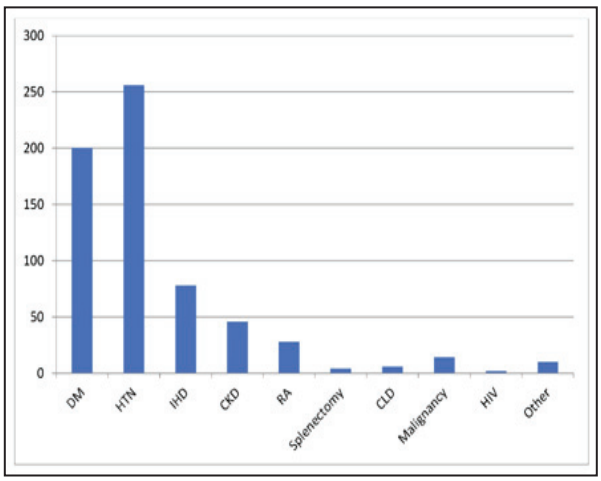

Fig-1: Co-morbidities amongst the elderly.

Abbreviations: DM, Diabetes mellitus; HTN, hypertension; IHD, ischemic heart disease; CKD, chronic kidney disease; RA, rheumatoid arthritis; CLD, chronic liver disease; HIV, human immunodeficiency virus.

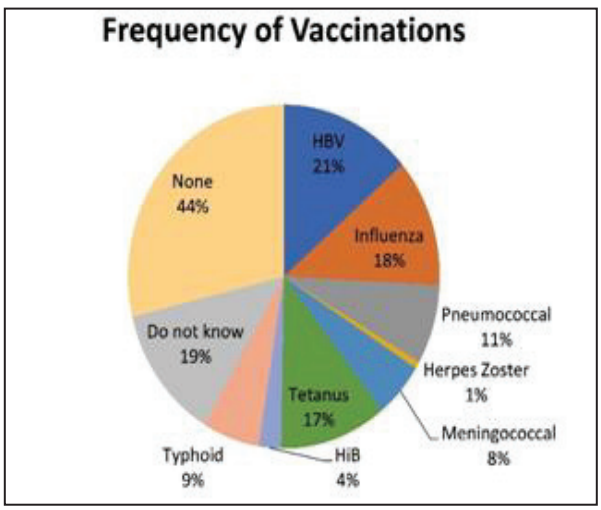

Fig-2: Frequencies of vaccination received by the elderly.

Abbreviations: HBV, hepatitis B vaccine; HiB, Haemophilus influenza b

Demographic variables		Male n (%)	Female n (%)
Participants		210 (52%)	192 (48%)
Age (years) (mean±SD)		68± 7.2	67± 5.9
Level of Education	**No schooling**	42 (10%)	56 (14%)
	Under-graduate	102 (25%)	100 (25%)
Social Status	**Upper**	38 (10%)	26 (7%)
	Middle	88 (22%)	84 (21%)
	Lower	82 (20%)	84 (21%)
Do you know different diseases can be prevented by vaccination	**Yes**	148 (37%)	140 (35%)
	No	30 (7%)	32 (8%)
Did any doctor or health worker advise you about vaccination	**Yes**	94 (23%)	84 (21%)
	No	114 (28%)	110 (27%)
Have you been vaccinated (ever)	**Yes**	84 (21%)	84 (21%)
	No	94 (23%)	84 (21%)
Childhood vaccination	**Yes**	118 (29%)	98 (24%)
	No	-36 (9%)	-60 (15%)

Table-1: Demographics and details of vaccination gender-based response.

When asked if they were ever hospitalized, 224(56%) responded yes and when asked whether they were ever advised vaccination by a doctor only 178(44 %) responded positively. Some form of childhood vaccination was received by 216(54%) Table-1. In 152(38%) reason for being not vaccinated was complete unawareness regarding vaccination and 64(16%) attributed it to lack of recommendation by a doctor. The reasons for not having vaccination are presented (Table-2). Among participants, 192(48%) received information about vaccinations through their health care providers, 88(22%) through television and 48(12%) through newspaper. To question regarding whether enough awareness is created in society about vaccination, 242(60%) responded in negative. Though 352 (88%) believed one's vaccination history should be known to an

individual, only 234(64%) were aware of their vaccination history or whether they had received vaccinations or had any record of the above.

Upon counseling regarding importance of vaccination 278(69%) responded that they would like to get vaccinated. Upon logistic regression analysis, there was a positive association between vaccination status and the level of education P=0.02 (odds ratio= 4.686, CI= 1.343-16.348). Association between vaccination status and social status was also positive with P=0.05(odds ratio= 4.203, CI= 1.158-15.256). There was no association between gender (p=0.19), although males were less likely to get vaccination compared with females (odds ratio=0.627, CI=0.308-1.287).

Reasons for not being vaccinated	Frequency	Percent %	Male n (%)	Female n (%)
Lack of awareness	152	38	84 (35%)	68 (28%)
Never told by health professional	64	16	30 (12%)	34 (14%)
Non-availability	18	5	10 (4%)	8 (3%)
Mis-conception	10	3	2 (0.8%)	8 (3%)
Fear of side effects	12	3	2 (4%)	8 (7%)
Financial problems	16	4	6 (3%)	10 (4%)
Delayed due to lack of time	8	2	0 (0%)	8 (3%)
Casualness	20	5	4(2%)	16(7%)
Religious belief	8	2	2(1%)	6(3%)

Table-2: Reasons for not being vaccinated.

DISCUSSION

Elderly in Pakistan are living longer lives, albeit with increased morbidity from diseases like influenza and pneumonia, which are preventable by immunizations. This study was carried out to assess vaccination status in the elderly in Lahore, Pakistan**.**When asked if they knew that vaccines prevent disease, 72% answered affirmatively. Yet, when asked about their own vaccination status, only 42% had received any vaccination during their adult life, and only 54% recalled receiving any amongst the childhood vaccines. Of the 42% who had received vaccinations, most of them (21%) reported having received the hepatitis B vaccine.

The WHO has various strategies over the next decade. The Immunization Agenda 2030 aims at widespread immunization, especially to marginalized populations, "A Global Strategy to leave no one behind", with the aim is to protect the world's population by immunizations at all ages, gender, wealth, and location.[1]

Vaccination rates amongst children in Pakistan have increased significantly over the past decade; official figures from 2017-18 estimate that 66% children in Pakistan are fully immunized.[11] This is a testament to the success of having a dedicated government service for providing vaccinations to each child. The EPI has managed to spread awareness about vaccinations and has reached children living in far flung areas of the country. Similar steps are required in context with elderly population.

The primary goal of vaccination is to reduce susceptibility to serious infections, thus directly reducing hospitalizations, complications, and deaths. This is of key importance among high-risk groups such as the elderly. In March 2017, at a meeting of the WHO, policies and activities were defined with the aim of promoting vaccination of older adults, specifically in low- and middle-income countries (LMICs).[12] Presently, immunization policies for the elderly in LMICs either do not exist, and where they do, they are not implemented. It is now being recognized that vaccination of elderly in LMICs is much needed.[13]

The only vaccine that is mandated by WHO for the elderly is the annual Influenza vaccine. Despite this, in our study, only 18% had received the influenza vaccine. The Centers for Disease Control (CDC)has specific guidelines focusing on adult vaccinations.[14] Vaccinations required after the age of 50 years include: Influenza, Herpes Zoster, Pneumococcal polysaccharide and Pneumococcal conjugate vaccines. Tetanus-diphtheria is recommended every 10 years for persons previously fully immunized with DTaP and TDaP, Hepatitis B, MMR and Varicella if lack of prior vaccinations. Unfortunately, vaccination rates for the elderly remain low despite widely accepted practice guidelines.[15]

Hepatitis B is endemic in Pakistan. Although the exact prevalence is hard to ascertain, studies estimate its prevalence up to 6.7%.[16,17] in our study, only 21% reported being vaccinated against hepatitis B. On the other hand, inthe United States, the incidence of hepatitis B decreased by 88.5% since the introduction of hepatitis B into routine vaccinations.[18] In Pakistan, it is the need of the day, as we continue to see much high numbers of the disease. Even though it was the vaccination most reported by our study population, the overall numbers are dismal.

Among our study population, only 18% had received annual influenza vaccine, and 11% the pneumococcal vaccine. It is estimated that Pneumococcal and influenza vaccines prevent deaths (in the thousands) annually, despite this, CDC surveillance reports vaccination rates among adults 65 years of age and above, at only 50.2% in 2020-21.[19]WHO's recommendation of influenza vaccine goals of 50% by 2006 for adults aged 60 years and older, and 75% by 2010, has only been achieved by few countries.[20,21] Some higher income countries report high rates of immunization in the elderly; in Australia, it is reported as 70.9%.[22] United States of America at 71.5%.[23] United Kingdom at 70.8%, Canada at 60%, Ireland at 59%, and New Zealand at 68%.[24] In Pakistan, although official statistics on adult pneumonia is sparse, a review reports mortality from community acquired pneumonia at about 51%.[25] In this study, the most common etiology was Streptococcus Pneumonia. Official statistics for the incidence of influenza in Pakistan are largely unknown. A 10-year surveillance of patients in Pakistan with respiratory symptoms demonstrated influenza incidence of 20.6%.[25,26] most influenza-related deaths occur in elderly persons, highlighting the importance of annual influenza vaccination.

We report herpes zoster vaccination among only 1% of our study participants. Herpes Zoster has an incidence of 2.0 to 4.6 cases per 1000 persons/year. With age, this increases rather dramatically; in persons 80 years and older, the incidence is 10.0 to 12.8 per 1000 person/years.[27] The incidence of complications like post herpetic neuralgia also increases with age.[27]

Our study showed that vaccine acceptance increases with higher the level of education and social status. With a low literacy rate of 57% in Pakistan, [28] this explains one of the reasons of lack of awareness about vaccination in our country. Studies from Turkey and Colombia demonstrated similar findings.[29, 30]

The aging populations in both developed and developing countries present many challenges for the healthcare system; one of those is of vaccinations. Even though vaccines are often less efficacious in the elderly, due to changes in immunity and other chronic medical problems, it is still of paramount importance that the elderly receive vaccinations, to help prevent infectious diseases. Implementing comprehensive adult immunization programs effectively will remain a challenge; all stakeholders will have to work together to overcome the multiple hurdles.

There are many hindrances towards adult vaccinations, such as a gap in knowledge and a lack of awareness as in our study population 38% claimed complete unawareness regarding adult vaccination. Non availability and cost of vaccines were other factors identified by 4.5% and 4% respectively and these figures are an underestimate as very few pursued vaccinations. The physicians' advice for immunization has a major impact on vaccine delivery. Among our study participants 56% were those who had access to health care providers (HCPs) as they had been hospitalized on various occasions due to their ailments and still vaccination status was found to be far from satisfactory. HCPs may prioritize some vaccines over others, their awareness and interest level or problems in delivery or availability ensuring system may be some of the key factors. General physicians should inform and update patients about immunizations during each patient encounter and not exclusively treat the present illness. Doctor's lack of recommendation contributes to the problem.

Hajj the sacred pilgrimage for Muslims requires vaccination as an essential requirement by the Saudi government. In our group 110 (27%) had performed Hajj; 72 (64%) were sure they were vaccinated whereas 38 (34%) were not sure because of recall bias. This shows that if proper implementation of the process and availability of vaccination is ensured, there can be an improvement in vaccination rates amongst adults, particularly the elderly.

In our study, upon counseling and education regarding vaccinations of the elderly, 69 % agreed to getting vaccinated. These participants were facilitated in receiving vaccinations. This indicates that if appropriate awareness is created and availability of vaccines is ensured the present vaccination status can be improved tremendously. Television, print media, radio all can prove to be effective means of creating awareness over and above the properly educated and motivated health care providers.

This study had some limitations. We conducted the study in the major city Lahore, of the biggest province of Pakistan where health facilities are far better than rest of the province and our sample size was not very large. Therefore, the results may not represent the true vaccination status in elderly in the country which is very likely far lower than this. For the same reason, we may not necessarily be able to generalize the results to the rest of the developing world. Secondly, there could be recall bias in remembering if vaccinations have been

given or not, especially childhood vaccines. Misconceptions about vaccines have not been explored in further detail.

CONCLUSION

Larger surveys are needed to assess the requirements and appropriate steps to fulfill the deficiency. Awareness of the crucial role and importance of vaccines for the elderly is the order of the day. The government as well as both the public and private sector needs to join hands to create awareness regarding this vital issue among the public and to ensure availability in time and at standard costs. Many eligible remain deprived from healthcare due to financial constraints. In the present days of COVID 19 pandemic, emphasizing the need for vaccination among elderly will not be an overstatement.

REFERENCES

1. World Health Organization. Immunization Agenda 2030: A global strategy to leave no one behind. Geneva, Switzerland 2020. https://www.who.int/publications/m/item/immunization-agenda-2030-a-global-strategy-to-leave-no-one-behind (accessed 4/02/22)

2. Jalal S, Younis MZ. Aging and elderly in Pakistan. Ageing International. 2014 Mar; 39(1):4-12.

3. Sabzwari SR, Azhar G. Ageing in Pakistan—a new challenge. Ageing International. 2011 Dec; 36(4):423-7.

4. Weinberger B. Vaccines for the elderly: current use and future challenges. Immunity & ageing. 2018 Dec; 15(1):1-8.

5. Smetana J, Chlibek R, Shaw J, Splino M, Prymula R. Influenza vaccination in the elderly. Human vaccines &immunotherapeutic. 2018 Mar 4;14(3):540-9.

6. National Institute of Population Studies. Pakistan Demographic and Health Survey 2017-18. Islamabad, Pakistan, and Rockville, Maryland, USA2019.https://dhsprogram.com/publications/publication-fr354-dhs-final-reports.cfm.(accessed 4/02/22)

7. Patel KK, Rai R, Rai AK. Determinants of infant mortality in Pakistan: evidence from Pakistan Demographic and Health Survey 2017–18. Journal of Public Health. 2021 Jun; 29:693-701.

8. EClinicalMedicine. Antimicrobial resistance: a top ten global public health threat. E Clinical Medicine.2021Nov;41:101221.doi:10.1016/j.eclinm.2021.101221

9. United Nations. World population Ageing. 2015. NewYork2015.https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Highlights.pdf. (accessed 4/02/2022)

10. Qureshi H, Gessner BD, Leboulleux D, Hasan H, Alam SE, Moulton LH. The incidence of vaccine preventable influenza-like illness and medication use among Pakistani pilgrims to the Haj in Saudi Arabia. Vaccine. 2000 Jul; 18(26):2956-62.

11. National Institute of Population Studies. Demographic and Health Survey, Pakistan 2017-2018. Islamabad, Pakistan 2017-18. https://dhsprogram.com/publications/publication-fr354-dhs-final-reports.cfm (accessed 4/02/22)

12. Rudnicka E, Napierała P, Podfigurna A, Męczekalski B, Smolarczyk R, Grymowicz M. The World Health Organization (WHO) approach to healthy ageing. Maturitas. 2020 Sep 1; 139:6-11.

13. Sauer M, Vasudevan P, Meghani A, Luthra K, Garcia C, Knoll MD, Privor-Dumm L. Situational assessment of adult vaccine preventable disease and the potential for immunization advocacy and policy in low-and middle-income countries. Vaccine. 2021 Mar 12; 39(11):1556-64.

14. Centers for Disease Control and Prevention. Immunization Schedules; adult immunization schedule.Atlanta,USA2021.https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html#vacc-adult (accessed 4/02/2022)

15. Burke M. Vaccinations for older adults. Current Geriatrics Reports. 2018 Dec; 7(4):250-5.

16. Samo AA, Laghari ZA, Baig NM, Khoso GM. Prevalence and Risk Factors Associated with Hepatitis B and C in Nawabshah, Sindh, Pakistan. The American Journal of Tropical Medicine and Hygiene. 2020 Dec.

17. Khan NU, Zalan A, Petruzziello A. Suppl-1, M4: Determining the Actual Prevalence of Hepatitis B in Khyber Pakhtunkhwa-Pakistan: A Meta-Analysis. The open virology journal. 2018; 12:33.

18. Schillie S, Vellozzi C, Reingold A. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2018; 67(No.RR1):131. http://dx.doi.org/10.15585/mmwr.rr6701a1 (accessed 4/02/2022)

19. Centers for Disease Control and Prevention Flu vaccination coverage, United States, 2020-21 influenza season. Atlanta, USA 2021 https://www.cdc.gov/flu/fluvaxview/coverage-2021estimates.htm Updated June 23, 2016. (accessed May 19, 2022).

20. World Health Organization. The global vaccine action plan 2011-2020: review and lessons learned: strategic advisory group of experts on immunization. Geneva, Switzerland 2021. https://apps.who.int/iris/handle/10665/329097 (accessed 4/02/222)

21. Palache A, Oriol-Mathieu V, Fino M, Xydia-Charmanta M. Seasonal influenza vaccine dose distribution in 195 countries (2004–2013): Little

progress in estimated global vaccination coverage. Vaccine. 2015 Oct 13;33(42):5598-605.

22. Karki S, Dyda A, Newall A, Heywood A, MacIntyre CR, McIntyre P, Banks E, Liu B. Comparison of influenza vaccination coverage between immigrant and Australian-born adults. Vaccine. 2016 Dec 7; 34(50):6388-95.

23. Williams WW, Lu PJ, O'Halloran A, Kim DK, Grohskopf LA, Pilishvili T, Skoff TH, Nelson NP, Harpaz R, Markowitz LE, Rodriguez-Lainz A. Surveillance of vaccination coverage among adult populations—United States, 2014. MMWR: Surveillance Summaries. 2016 Feb 5;65(1):1-36.

24. Giese C, Mereckiene J, Danis K, O'Donnell J, O'Flanagan D, Cotter S. Low vaccination coverage for seasonal influenza and pneumococcal disease among adults at-risk and health care workers in Ireland, 2013: The key role of GPs in recommending vaccination. Vaccine. 2016 Jul 12;34(32):3657-62.

25. Ansarie M, Kasmani A. Community acquired pneumonia in Pakistan: An analysis on the literature published between 2003 and 2013. J Pak Med Assoc. 2014 Dec 1;64(12):1405-9.

26. Nisar N, Aamir UB, Badar N, Mahmood MR, Yaqoob A, Tripathy JP, Laxmeshwar C, Tenzin K, Zaidi SS, Salman M, Ikram A. Epidemiology of Influenza among patients with influenza-like illness and severe acute respiratory illness in Pakistan: a 10-year surveillance study 2008-17. Journal of Medical Virology. 2020 Dec;92(12):3028-37.

27. Cunningham AL, Lal H, Kovac M, Chlibek R, Hwang SJ, Díez-Domingo J, Godeaux O, Levin MJ, McElhaney JE, Puig-Barberà J, Vanden Abeele C. Efficacy of the herpes zoster subunit vaccine in adults 70 years of age or older. N Engl J Med. 2016 Sep 15;375(11):1019-32.

28. Government of Pakistan, Finance Division. Pakistan Economic Survey in 2019-20. Islamabad,Pakistan2012.https://www.finance.gov.pk/survey_1920.html (accessed 4/02/22)

29. Ciblak MA, Platformu G. Influenza vaccination in Turkey: prevalence of risk groups, current vaccination status, factors influencing vaccine uptake and steps taken to increase vaccination rate. Vaccine. 2013 Jan 7;31(3):518-23.

30. Vélez-Mejia C, Vélez-Londoño JD, Cardona-Arango D. Current Immunization Status and Barriers to Immunization in the Elderly Population of the Second most Developed Region of Colombia, South America. Int J Vaccine Immunizat. 2017;3(1):1-5.

The Authors:

Prof. Rizwana Kitchlew
Professor of Medicine,
Department of Medicine,
CMH Medical College & Dentistry, Lahore.

Dr. Afaq Shamim
PG Resident,
Department of Medicine,
Fatima Memorial Hospital, Lahore.

Dr. Spenta Kakalia
Assistant Professor Pediatrics,
Department of Pediatrics,
CMH Medical College & Dentistry, Lahore,

Dr. Arous Khaqan
PG Resident,
Department of nephrology,
Fatima Memorial Hospital, Lahore.

Dr. Sonia Latif
Demonstrator Physiology,
Department of Physiology,
CMH Medical College & Dentistry, Lahore.

Dr. Faizan Farooq
Registrar Medicine,
Department of Medicine,
PKLI Hospital, Lahore.

Corresponding Author:

Prof. Rizwana Kitchlew
Professor of Medicine,
Department of Medicine,
CMH Medical College & Dentistry, Lahore.
Email: riz102403@yahoo.com