ORIGINAL ARTICLE

General Practitioners' Knowledge of Childhood Immunization in South Punjab, Pakistan

Qaiser Jehangir Khan[1], Ghazal Farrukh[2], Nazish Khan[3], Sana Shaukat Siddiqui[4*], Alisha Shaukat[2] and Shumaila Shahid[1]

[1]*Combined Military Hospital (CMH), Multan, Pakistan*
[2]*National University of Medical Sciences (NUMS), Rawalpindi, Pakistan*
[3]*Combined Military Hospital (CMH), Gujranwala, Pakistan*
[4]*Sheikh Zayed Medical College, Rahim Yar Khan, Pakistan*

Abstract

Background: General practitioners (GPs) are essential to the success of childhood vaccination programs, as they are often the first people parents contact when seeking medical guidance. These frontline healthcare workers' knowledge and expertise directly impact the efficacy of these initiatives and the overall health outcomes for children.

Objective: To assess general practitioners' knowledge of childhood immunizations in South Punjab, Pakistan, and to compare frequencies for socio-demographic features of study participants among those with good and poor understanding.

Methodology: A cross-sectional study was conducted between December 2024 and July 2025 among 171 general practitioners in different cities of South Punjab. Data was gathered using a structured questionnaire that included the validated tool 'Knowledge and Attitude Regarding Childhood Vaccination (KACV) for knowledge assessment. Knowledge levels and demographic factors were compared using Chi-square or Fisher's exact tests.

Results: The mean age of the GPs included in the research was 46.46 ± 7.78 years. The sample was predominantly male (73.1%). 91.8% of general practitioners were well-versed in childhood vaccinations. GPs with good knowledge were more likely to have attended a formal vaccine training course (75% *versus* 25%, p=0.002), be over 40 years of age (100% *versus* 0%, p<0.001), and have more than 10 years of experience (100% *versus* 0%, p<0.001).

Conclusion: Although general practitioners (GPs) in the South Punjab have a generally strong level of knowledge, younger and less experienced practitioners have specific deficiencies. These results demonstrate that to increase vaccination rates and enhance public health outcomes, targeted educational initiatives are needed.

Keywords: *General practitioners, vaccination, health knowledge, attitudes, practice, immunization programs, primary health care, Pakistan.*

INTRODUCTION

In Pakistan, newborn mortality is a severe problem that may be significantly decreased by implementing regular, effective vaccination campaigns. Nonetheless, the Pakistan Demographic and Health Survey for 2017-2018 indicates that the nation's vaccination rate remains low [1]. Immunizations have been shown to reduce the number of deaths from infectious diseases, but their effectiveness depends on public awareness and informed vaccination decisions [2]. The best people to address vaccine hesitancy among the general public are knowledgeable medical experts who can offer evidence-based advice and foster community trust, thereby improving vaccine uptake [3, 4].

Medical professionals, particularly general practitioners (GPs), are essential in addressing vaccine hesitancy [5]. Because of their close relationships with patients and their families, GPs have a special opportunity to address these concerns and encourage vaccination uptake. As a result, general practitioners must be knowledgeable about childhood vaccination schedules and vaccine safety. If they are not well-versed in this area, it hinders their ability to counsel and advocate for immunization [6].

This study aims to assess general practitioners' knowledge of childhood immunizations in South Punjab, Pakistan, and to compare the frequencies of socio-demographic features among study participants with good and poor understanding. South Punjab was selected because, compared with urban areas like Lahore or Karachi, it has lower health indicators and serious socioeconomic issues. This region is characterized by high poverty rates, a stark rural-urban divide, and low vaccination rates [6]. Understanding general practitioners' knowledge is crucial due to the region's unique socioeconomic and cultural background. By identifying factors that may influence their knowledge, this study aims to increase immunization coverage and address potential gaps in healthcare delivery in South Punjab.

METHODOLOGY

This was a cross-sectional study conducted among GPs working across diverse settings, specifically private

**Corresponding author: Sana Shaukat Siddiqui, Sheikh Zayed Medical College, Rahim Yar Khan, Pakistan, Email: drssiddiqui7@gmail.com*
Received: August 14, 2025; Revised: December 22, 2025; Accepted: January 28, 2026
DOI: https://doi.org/10.37184/lnjpc.2707-3521.8.31

clinics, Basic Health Units (BHUs), and government dispensaries in South Punjab, Pakistan. The study was conducted over three months, from December 2024 to July 2025. South Punjab was chosen as the study setting due to its distinct population structure, high rural burden, and specific issues related to childhood immunization coverage. Ethical approval was obtained from the Institutional Review Board of Sheikh Zayed Medical College (Ref. No. 187 IRB/SZMC/SZH).

All General Practitioners of either gender between 25-60 years of age with a minimum qualification of MBBS, registered with PMDC, and with more than 6 months of experience in clinical practice were included in the study. General practitioners with postgraduate qualifications in pediatric medicine were excluded. All respondents in the study were briefed on the research objective to obtain their consent and assured of the confidentiality of the information they provided.

Initially, assuming a 95% confidence level, 8% margin of error, and an anticipated prevalence of 51.23% of adequate immunization knowledge [7], the minimum sample size for this cross-sectional study was determined to be 147 general practitioners. A non-probability convenience sampling method was used in the first data collection phase, producing a main sample of n=151. After preliminary statistical analysis, including a multivariable logistic regression attempt, the problem of total separation arose. Convenience sampling was then used to increase the sample size to a final count of n=171 to address this. All data provided in this paper are based on the final sample size of n=171.

A structured questionnaire was used to gather data, including demographic information, knowledge assessments about vaccination, and identification of primary sources of information about vaccination. We evaluated GPs' knowledge of childhood vaccinations using the Knowledge and Attitude Regarding Childhood Vaccination (KACV) questionnaire's knowledge domain, with a Cronbach's alpha of 0.896 [8]. A total of 10 knowledge-based questions were asked. One point was awarded for each correct response, while zero points were awarded for "don't know" or erroneous answers. Each participant's overall score was determined by adding up the points from each of the ten questions, with a maximum score of ten. A preset cut-off value of 70% was used to categorize the degree of expertise. Seven points or more, or at least 70% of the possible score, were awarded to those who were deemed to have "good knowledge." Participants who received a score of 6 or lower, which is less than 70% of the possible score, were labelled as having "poor knowledge"[9].

Both in-person and electronic distribution were used in the data collection process, and informed consent and willing participation were acquired. The Statistical Package for Social Sciences (SPSS) version 27 was used to enter and analyze the data. The socio-demographic data [age, gender, qualification, experience, and source of information] and the general level of knowledge of the GPs (*i.e.*, Good *vs.* Poor) were summarized using descriptive statistics, frequencies, and percentages. GPs with good knowledge were compared to those with poor knowledge across various demographic variables using Fisher's exact test (due to small expected cell counts). A 2-sided p-value is used to test for a difference in either direction. Significance is determined at a p-value of <0.05. Attempts to perform multivariable logistic regression failed due to complete separation in the data, despite efforts to reduce it by expanding the sample size to n=171. This restriction resulted from the fact that some independent factors, most notably age, qualification, and experience, perfectly predicted the result.

RESULTS

The socio-demographic characteristics of the general practitioners participating in our study are shown in Table **1**. The mean age of the GPs included in the research was 46.46 ± 7.78 years. The sample was predominantly male (73.1%), older (>40 years; 75.4%), highly experienced (77.2%), and the majority held a basic MBBS degree (85.4%). The majority of general practitioners lacked formal vaccine training (83.6%).

With 91.8% of GPs exhibiting good knowledge, the overall level of expertise was very high, as shown in Fig. **(1)**. Literature (40.9%) and the media (48.5%) were the primary information sources in this population.

Several characteristics showed a significant association with knowledge (p<0.05) in the bivariate analysis (**Table 2**). Age groups (p<0.001) and professional experience (p<0.001) were significantly associated with knowledge of childhood vaccinations. In particular, 100% of general practitioners over 40 and those with over 10 years of experience showed good knowledge. Additionally, there was a significant association with gender (p=0.023), with female GPs attaining 100.0% good knowledge, compared with 88.8% for male GPs.

Table 1: Demographic characteristics of the general practitioners (n=171).

Variable	Category	Frequency (%)
Gender	Male	125 (73.1)
	Female	46 (26.9)
Age Groups	Up to 40 Years	42 (24.6)
	More than 40 Years	129 (75.4)
Years of Professional Experience	Up to 10 Years	39 (22.8)
	More than 10 Years	132 (77.2)
Qualification	MBBS	146 (85.4)
	Higher	25 (14.6)
Formal Training	Yes	28 (16.4)
	No	143 (83.6)
Primary Source of Knowledge	Media	83 (48.5)
	Literature	70 (40.9)
	Interpersonal Communication	18 (10.5)

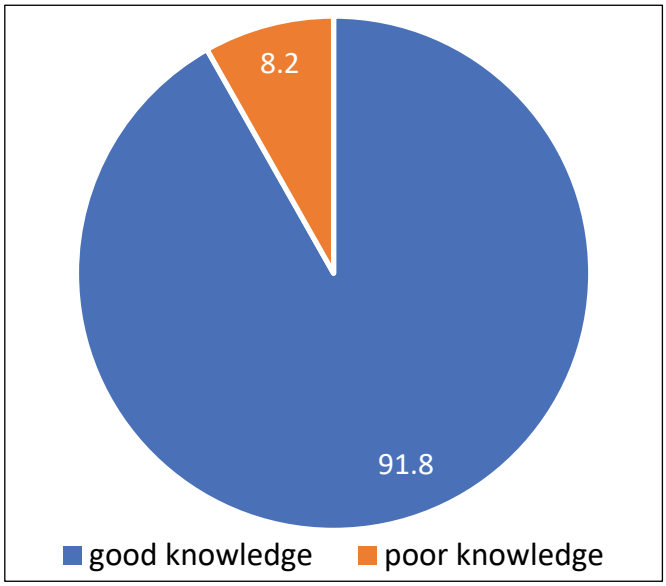

Fig. (1): Knowledge of general practitioners about childhood vaccination.

Table 2: Associated factors of general practitioners' knowledge of childhood immunization (n=171).

Variable (Category)	Total n (%)	Good Knowledge n (%)	Poor Knowledge n (%)	p-value
Gender				
Male	125 (73.1)	111 (88.8)	14 (11.2)	0.023*
Female	46 (26.9)	46 (100.0)	0 (0.0)	
Age Groups in Years				
Up to 40	42 (24.6)	28 (66.7)	14 (33.3)	<0.001*
More than 40	129 (75.4)	129 (100.0)	0 (0.0)	
Experience in Years				
Up to 10	39 (22.8)	25 (64.1)	14 (35.9)	<0.001*
More than 10	132 (77.2)	132 (100.0)	0 (0.0)	
Qualification				
MBBS	146 (85.4)	132 (90.4)	14 (9.6)	0.227
Higher	25 (14.6)	25 (100.0)	0 (0.0)	
Formal Training				
Yes	28 (16.4)	21 (75.0)	7 (25.0)	0.002*
No	143 (83.6)	136 (95.1)	7 (4.9)	
Primary Source				
Media	83 (48.5)	76 (91.6)	7 (8.4)	0.383
Literature	70 (40.9)	63 (90.0)	7 (10.0)	
Interpersonal	18 (10.5)	18 (100.0)	0 (0.0)	

*p<0.05 indicates a statistically significant association.

Contrary to expectations, GPs without proper vaccination training showed a significantly higher percentage of good knowledge (95.1%) than those who had attended training (75.0%).

DISCUSSION

Our research shows a meaningful connection between a general practitioner's longevity in practice and their level of vaccination expertise. The most important finding of this study is that the vast majority of GPs (91.8%) had good knowledge of childhood vaccinations. While the majority of comparable studies in Pakistan have been conducted in large cities such as Karachi and Lahore, our study fills a critical knowledge gap by focusing on South Punjab's cities, where there is a notable dearth of such data. Our findings are consistent with studies from other regions of Pakistan that show a high baseline of vaccination knowledge among healthcare professionals in Karachi, Lahore, and [10, 11]. Globally, this aligns with findings from a study on French paediatricians and GPs, which reported that 98% of paediatricians and 62% of GPs demonstrated good knowledge of childhood vaccination[7]. A study in Malaysia found that 68.7% of healthcare professionals showed a good understanding of childhood vaccination [10]. While assessing GPs' knowledge of immunization, other studies have evaluated vaccination knowledge in the general population and among community pharmacists [12, 13].

In our study, there were more female general practitioners (46, 100%) than male general practitioners (125, 90.2%). Though fewer in number, 1005 females showed better knowledge of vaccination than males (90.2%). Similarly, a study by Gaber Alsemary *et al.* on childhood vaccination knowledge among healthcare providers found no association between gender and vaccination [14]. In contrast, a survey of healthcare professionals' knowledge included more female participants (164 *vs.* 34) [15]. This may be because this study included all healthcare professionals, whereas we included only general practitioners, not specialists.

GPs over 40 and those with over 10 years of experience showed substantially greater knowledge levels (100%) than younger GPs and those with fewer years of experience (66.8% and 66.7%, respectively), probably because years of work provide continuous exposure to clinical concerns and different patient cases collectively reinforce and refine knowledge. In a cross-sectional study, Bayram and Yiğitalp found similar patterns, noting that older, more experienced practitioners typically have a greater understanding and more positive attitudes towards vaccinations [16].

Formal training and knowledge were significantly correlated (p=0.002); however, untrained general practitioners unexpectedly showed better proficiency (95.1%) than trained GPs (75%). Confounding by professional experience is probably the cause of this dilemma. "Good Knowledge" scores (100%) were attained by all general practitioners (GPs) over 40 or with more than ten years of practice. These GPs gained their practical skills through decades of clinical experience rather than through recent training courses. Training programs likely targeted younger, less experienced practitioners who already had baseline gaps. The same group accounted for all of the "Poor Knowledge" cases in this study. Contrary to our findings, healthcare workers who received more training and continuing medical education (CME) demonstrated superior knowledge of vaccines and vaccine administration methods, according to a thorough assessment by Dyda *et al.* [17].

According to our research, GPs mainly obtained their information from the media (49%) and books (40.4%), with interpersonal interactions (10.6%) coming in second and third. This aligns with worldwide research demonstrating the importance of the media in educating healthcare professionals about vaccines [18, 19]. Literature and peer relationships are still essential for in-depth comprehension and memory retention, though [20, 21].

LIMITATIONS

Despite strong correlations between healthcare professionals' traits and knowledge of childhood vaccinations, this cross-sectional study has inherent limitations. First of all, the cross-sectional study design makes it impossible to prove causation, which makes it challenging to identify temporal links. The accuracy and generalizability of results may be constrained by biases in measurement and selection, arising from non-probability convenience sampling, non-response, and self-reported data. The findings suggest the level of knowledge among the GPs in the sample, but they cannot be statistically generalized to the entire population of GPs in South Punjab.

IMPLICATIONS

GPs with 40 years or more of experience demonstrated high levels of expertise, underscoring the need for specialized education and training programs for new graduates and younger practitioners. This knowledge gap can be closed by encouraging ongoing professional development and including thorough vaccine education in medical courses.

CONCLUSION

The study concludes that although general practitioners in South Punjab have a high level of awareness regarding childhood vaccines, formal training and professional experience have a significant impact on this knowledge. To address current knowledge gaps, the results highlight the importance of ongoing medical education programs, particularly for younger, less experienced general practitioners. By increasing immunization programs and enhancing public health outcomes in the area, the implementation of such focused interventions can result in a primary care workforce that is more informed.

RECOMMENDATIONS

In light of these limitations, we suggest that future research employ a larger sample size to ensure sufficient representation of all demographic groups, enabling the application of more powerful statistical techniques, such as logistic regression. Moreover, it is advised that future studies use objective knowledge assessments to reduce bias and employ longitudinal designs to establish causation. To improve generalizability, investigations should also aim for a representative sample. To enhance healthcare professionals' vaccination practices and understanding, more research into specific knowledge-acquisition barriers and the creation of targeted educational interventions is also advised.

ETHICS APPROVAL

Ethical approval was obtained from the Institutional Review Board of Sheikh Zayed Medical College (ref. No. 187 IRB/SZMC/SZH). All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Before data collection, each general practitioner provided informed verbal and written consent after being briefed about the study's objectives. Throughout the study, participants' anonymity and confidentiality were strictly maintained.

AVAILABILITY OF DATA

All data generated or analyzed during this study are available from the corresponding author upon reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

The study was planned and designed by Qaiser Jehangir Khan (QJK) and Ghazal Farrukh (GF). SSS (Sana Shaukat Siddiqui) was responsible for coordinating with general practitioners and collecting data. The statistical analysis and primary data interpretation were carried out by AS (Alisha Shaukat) and NK (Nazish Khan). The original copy was written by SS (Shumaila Shahid) and SSS. QJK and GF critically revised crucial intellectual content. The final review, technical editing, and approval of the manuscript version for publication were completed by all authors.

REFERENCES

1. Kamal A, Waseem A, Siddiqa M, Ijaz M, Shakeel A, Iftikhar S. Contextual factors influencing incomplete immunization and investigation of its geospatial heterogeneity in Pakistan: A cross-sectional study based on PDHS (2017-18). BMC Public Health 2023; 23(1): 1620.
DOI: https://doi.org/10.1186/s12889-023-16508-8
2. Malik MN, Awan MS, Saleem T. Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts of Pakistan. J Glob Health 2020; 10(2): 020337.
DOI: https://doi.org/10.7189/jogh.10.021302
3. Afolabi AA, Ilesanmi OS. Dealing with vaccine hesitancy in Africa: The prospective COVID-19 vaccine context. Pan Afr Med J 2021; 38(1): 3.
DOI: https://doi.org/10.11604/pamj.2021.38.3.27401

4. Jama AA. Determinants of complete immunization coverage among children aged 11-24 months in Somalia. Int J Pediatr 2020; 2020(1): 5827074.
DOI: https://doi.org/10.1155/2020/5827074
5. Verger P, Dualé C, Lenzi N, Scronias D, Pulcini C, Launay O. Vaccine hesitancy among hospital staff physicians: A cross-sectional survey in France in 2019. Vaccine 2021; 39(32): 4481-8.
DOI: https://doi.org/10.1016/j.vaccine.2021.06.053
6. Ali I, Ijaz M, Rehman IU, Rahim A, Ata H. Knowledge, attitude, awareness, and barriers toward influenza vaccination among medical doctors at tertiary care health settings in Peshawar, Pakistan-A cross-sectional study. Front Public Health 2018; 6: 173.
DOI: https://doi.org/10.3389/fpubh.2018.00173
7. Dhobale RV, Waghachavare VB, Gore AD, Dhumale GB. General practitioners' knowledge, attitude, and practices regarding optional immunization in the urban area of Sangli District: A cross-sectional study. J Family Med Prim Care 2022; 11(7): 3923-8.
DOI: https://doi.org/10.4103/jfmpc.jfmpc_1966_21
8. Abdul Kadir A, Noor NM, Mukhtar AF. Development and validation of the Malay version of the knowledge and attitude regarding childhood vaccination (KACV) questionnaire among healthcare workers. Hum Vaccin Immunother 2021; 17(12): 5196-204.
DOI: https://doi.org/10.1080/21645515.2021.1989915
9. Hanifa AN, Insani WN, Abdulah R. Pharmacists' role in HPV vaccine uptake among women: A scoping review of interventions and barriers. International Journal of Women's Health. 2025; 17: 5695-708.
DOI: https://doi.org/10.2147/IJWH.S561011
10. Kashif M, Fatima I, Ahmed AM, Ali SA, Memon RS, Afzal M, *et al.* Perception, willingness, barriers, and hesitancy towards COVID-19 vaccine in Pakistan: Comparison between healthcare workers and general population. Cureus 2021; 13(10): e18883.
DOI: https://doi.org/10.7759/cureus.19106
11. Mukhtar AF, Abdul Kadir A, Mohd Noor N, Mohammad AH. Knowledge and attitudes toward childhood vaccination among healthcare workers at Hospital Universiti Sains Malaysia. Vaccines (Basel) 2022; 10(7): 1017.
DOI: https://doi.org/10.3390/vaccines10071017
12. Umbreen G, Rehman A, Avais M, Jabeen C, Sadiq S, Maqsood R, *et al.* Knowledge, attitude, practice, and barriers associated with influenza vaccination among health care professionals working at tertiary care hospitals in Lahore, Pakistan: A multicenter analytical cross-sectional study. Vaccines (Basel) 2023; 11(1): 136.
DOI: https://doi.org/10.3390/vaccines11010136
13. Tahir MJ, Zaman M, Saffi J, Asghar MS, Tariq W, Ahmed F, *et al.* Knowledge, attitudes, and practices of the general population of Pakistan regarding typhoid conjugate vaccine: Findings of a cross-sectional study. Front Public Health 2023; 11: 1151936.
DOI: https://doi.org/10.3389/fpubh.2023.1151936
14. Gaber Alsemary HI, Shihab NS, AlMahdy HS, Mohamed Zayed HA. Knowledge and practices of primary health care providers regarding childhood immunization. Libyan J Med 2022; 17(1): 2106733.
DOI: https://doi.org/10.9734/jammr/2022/v34i231257
15. Muhammad K, Saqlain M, Muhammad G, Hamdard A, Naveed M, Butt MH, *et al.* Knowledge, attitude, and practices (KAPs) of community pharmacists regarding COVID-19: A cross-sectional survey in 2 provinces of Pakistan. Disaster Med Public Health Prep 2022; 16(5): 1864-72.
DOI: https://doi.org/10.1017/dmp.2021.54
16. Bayram Değer V, Yiğitalp G. Considering the attitudes toward the COVID-19 vaccine, the levels of vaccine hesitancy among family healthcare center (FHC) employees: A cross-sectional study. Int J Clin Pract 2024; 2024: 2698910.
DOI: https://doi.org/10.1155/2024/2698910
17. Dyda A, King C, Dey A, Leask J, Dunn AG. A systematic review of studies that measure parental vaccine attitudes and beliefs in childhood vaccination. BMC Public Health 2020; 20(1): 1-8.
DOI: https://doi.org/10.1186/s12889-020-09327-8
18. Loftus R, Sahm LJ, Fleming A. A qualitative study of the views of healthcare professionals on providing vaccines information to patients. Int J Clin Pharm 2021; 43(6): 1683-92.
DOI: https://doi.org/10.1007/s11096-021-01299-y
19. Pelullo CP, Della Polla G, Napolitano F, Di Giuseppe G, Angelillo IF. Healthcare workers' knowledge, attitudes, and practices about vaccinations: a cross-sectional study in Italy. Vaccines (Basel). 2020;8(2):148.
DOI: https://doi.org/10.3390/vaccines8020148
20. Bakhache P, Virey B, Bienenfeld C. Knowledge and practices regarding infant vaccination: Results of a survey of French physicians. Eur J Pediatr 2019; 178(4): 533-40.
DOI: https://doi.org/10.1007/s00431-018-03314-3
21. Jackson C, Nielsen SM, Simonyan B, Kirakosyan M, Hovhannisyan M, Sahakyan G, *et al.* Medical specialists' attitudes and practices towards childhood vaccination: A qualitative study in Armenia. BMC Pediatr 2022; 22(1): 620.
DOI: https://doi.org/10.1186/s12887-022-03687-3