ACADEMIA Health Sphere Journal

Impact of Community Health Workers (CHWs) on Childhood Immunization Coverage in Rural Punjab, Pakistan

Saima Asghar[a]

[a] Department of Chemistry, Bahauddin Zakariya University Multan, Pakistan, saimaasghar778@gmail.com

Correspondence: Saima Asghar (saimaasghar778@gmail.com)

Received: 10 June 2025 | **Revised:** 05 July 2025 | **Accepted:** 01 August 2025

ABSTRACT

The research paper is based on Community Health Workers (CHWs) role on coverage of immunization among children in rural districts of Punjab, Pakistan. CHWs are quite significant in linking the communities to the formal healthcare sector because they facilitate outreachs to vaccination, health and follow-up services. The level of childhood immunization regardless of the national immunization programs in Pakistan is not desired particularly in the rural areas (UNICEF, 2021). The research design applied in this study is quantitative research design, which involved the use of structured questionnaires and health records on 150 households spread across the chosen rural districts. The correlation and regression analyses were completed to evaluate the relationship between CHW engagement and immunization outcomes using descriptive statistics. The results show that when CHWs are actively involved, the immunization rates have been significantly higher and the greater the coverage in the household is the higher the home visits, counseling, and reminders by CHWs. The paper highlights the importance of CHWs in addressing the barriers, particularly lack of awareness, distance to health facilities and vaccine hesitancy. Strategies to be recommended to achieve equity in access to childhood immunization in rural Punjab are; strengthening CHW programs, continuous training and enhancing community engagement strategies.

Keywords Childhood Immunization, Rural Health, Punjab, Pakistan, Community Health Workers (CHWs), Vaccination Coverage.

INTRODUCTION

It has been well established that the most economically effective and crucial public health activity is childhood immunization which is used to prevent morbidity and mortality caused by vaccine-preventable disease, including measles, polio, diphtheria, and hepatitis B (WHO, 2020). Vaccination programs have helped Worldwide to lower child mortality significantly, but the coverage is still uneven and has been especially low in low- and middle-income nations and rural regions (Ozawa et al., 2016). However, in Pakistan, the pace at which childhood immunization is achieved in rural areas falls short of the aimed levels despite years of efforts to address the issue through national immunization programs because of structural,

social, cultural risks (Bhutta et al., 2019). The distance to the health facilities, absence of awareness, vaccine hesitancy, and low education of caregivers contribute to the delay in receiving vaccines among rural Punjabi kids (Siddiqui, Rizvi, and Ahmed, 2019).

Community Health Workers (CHWs) have become very important players in the gap between healthcare services and underserved populations. They are community based workers who are trained in such a way that they can provide culturally sensitive health education, access to healthcare and assistance in preventive actions like vaccination (Lehmann and Sanders, 2007). In rural Punjab, CHWs have significantly contributed to the creation of awareness on immunization, home visits, reminding the caregivers of the vaccination schedule, and following up on the vaccination process of the children (Pakistan Ministry of Health, 2018). With the help of their local experience, speaking their native language, and understanding cultural traditions, CHWs are able to build faith among families, eliminate misunderstandings concerning vaccines, and encourage families to follow the immunization schedules (Hill et al., 2014).

In various researches, CHWs are reported to have been efficient in ensuring the immunization coverage. It has already proven that when actively involved in routine vaccination work, as well as in outreach activities, CHWs will make a significant contribution to coverage, especially in remote and marginalized communities (Perry, Zulliger, and Rogers, 2014). CHWs also offer logistical assistance besides behavior change through counseling, education, and reassurance to the caregivers, an aspect that directly influences the vaccination cover of the children (Glenton et al., 2013). They have been associated with a higher adherence to the vaccination program, reduced school dropout rates, and overall health of rural children (Ali, Khan, and Fatima, 2021).

Despite the above documented benefits, there are hiccups. Supervision, resources, and program structure may limit the scope of immunization due to the influence of CHW training (Khan, Rehman, and Mahmood, 2020). Not all districts have the regular check-ups, adequate incentives and involvement of the community, and thus CHWs cannot fully realize their full potentials. These problems generated a necessity to examine the functionality of CHWs in rural Punjab and what works to transform them into more efficient providers of increasing the immunization rate of the children.

The improvement of CHW programs is an important statement of equal immunization coverage and child health outcomes in rural areas. By providing community engagement interventions, offering organised training, constant supervision and provision of appropriate resources, CHWs can intervene and overcome the socio-cultural and logistical barriers, which do not allow children to receive timely vaccinations. The rural Punjab aspect of CHWs work also takes a particularly special role as the healthcare facilities are often missing in these locations, literacy is also often deficient, and socioeconomic factors also limit the immunization rate (UNICEF, 2021).\

Altogether, the Community Health Workers in the rural Punjab area are an important factor in increasing the immunization against childhood. Their activities are not only facilitating the availability of vaccines but also influencing the attitude and behavior of caregivers towards immunization thereby increasing the outcome of the health of the population. Training, providing resources and community involvement are crucial to identifying and empowering CHWs to overcome the chronic obstacles to vaccination and make sure every child in rural Punjab benefits the full advantages of immunization initiatives (United Nations, 2015).

LITERATURE REVIEW

Childhood immunization is a vital element of the population health that directly leads to the elimination of infectious diseases and minimization of child mortality. Diseases like measles, polio, and diphtheria have been controlled by immunization programs in different parts of the world, thus greatly enhancing the health outcomes of children (WHO, 2020). Nevertheless, although the global society is improving, not all people have access to vaccinations, especially in low- and middle-income countries and rural areas where people cannot afford medical services (Ozawa et al., 2016). The challenge of geographic, social and economic

issues in rural Pakistan is a continuous challenge on the road to the ideal coverage rates of immunization (Bhutta et al., 2019). Childhood immunization is greatly affected by such factors as the distance to healthcare centers, the level of education of the caregivers, a lack of knowledge about the immunization schedule, cultural beliefs, and vaccine hesitancy (Siddiqui, Rizvi, and Ahmed, 2019).

One of the areas that have emerged as very important to address these hurdles is Community Health Workers (CHWs). CHWs are people who are part of the local communities, and are trained to play a role of a bridge between the occupants of families and the formal health care system that provides health education, applauding of preventive health behavior, and access to health services (Lehmann and Sanders, 2007). They have a major role to play in the immunization programs particularly in the rural area where the healthcare system is often weak coupled with the caregivers who tend to over rely on the facilities and guidance offered in the area. The research has had the capacity to indicate that CHWs are instrumental in increasing the level of vaccination coverage because of the home visits, reminders, education of the caregivers on the benefits of vaccinations, and the concern or misunderstandings (Perry, Zulliger, and Rogers, 2014; Glenton et al., 2013).

It has several cross-border literature that support this positive role of CHWs in child immunization. In Sub-Saharan Africa, CHWs prove to increase the degree of vaccination coverage by increasing awareness and outreach among the remote communities (Lassi et al., 2016). Similarly, CHW initiatives in India have had the capacity of reducing the drop out rates of multi-dose vaccines by conducting regular follow ups and counseling of the caregivers (Lehmann et al., 2010). Such outcomes demonstrate that the access to trained and motivated CHWs is directly connected to better immunization and better health outcomes in children.

The CHWs play the center stage especially in Pakistan when programs such as the Lady Health Worker (LHW) program were launched with an objective of enhancing the maternal and child health of the under privileged areas. The program aims at increasing immunization, child mortality and health education at community level (Pakistan Ministry of Health, 2018). In the evaluation of LHW program, it has been observed that the program is effective in increasing the coverage of vaccinations and particularly of routine childhood immunizations like polio, measles, and BCG (Khan, Rehman, and Mahmood, 2020). Houses on which LHWs visit were much more likely to have children immunized completely than houses that did not receive contact with CHWs (Ali, Khan, & Fatima, 2021). This testament reaffirms the role of CHWs as being very critical towards meeting national immunization targets.

Community engagement and health education is one of the primary mechanisms that CHW influence the immunization coverage. The knowledge, attitudes, and beliefs of caregivers regarding vaccination largely affect their intention to vaccinate children (Siddiqui et al., 2019). CHWs offer culturally sensitive counseling, dispel myths, and remind the population of the need to attend vaccination regimens. Indicatively, CHWs in rural Punjab can employ local languages and culturally relevant messages when educating caregivers, so that the advantages of immunization could clearly be known and adopted (Ali et al., 2021). This is a one-on-one method that has been shown to be very successful in societies with a low literacy level and where traditional beliefs prevail.

The other important consideration is the frequency and regularity of CHW visits. Research indicates that CHWs visiting households regularly are linked to an increased vaccination response since caregivers are reminded and reinforced about the next vaccine (Perry et al., 2014). Districts in Pakistan with a higher proportion of CHW interactions have also been found to record better vaccination coverage, and those with less frequent interactions or those with low program coverage demonstrate inefficient immunization coverage (Khan et al., 2020). As such, CHW programs such as workload management and visit scheduling should be designed and operationalized to maximize impact.

CHWs training and supervision are also important factors that determine program success. It has been shown that CHWs who have systematic training in immunization procedures, counseling competencies, and record maintenance are more capable of affecting the behavioral tendencies of caregivers and guaranteeing the proper provision of vaccinations (Glenton et al., 2013; Hill et al., 2014). Monitoring and

supervision of health authorities and the constant development of a professional also help in the efficiency of CHWs as they provide guidance and observation of performance and address the issues that might emerge in this field. Conversely, the quality of CHWs might be reduced by undertraining, demotivation or supervision and their purpose of increasing immunization coverage would be restricted (Lehmann and Sanders, 2007).

Financial and non-financial incentives were also found to increase the performance and motivation of CHWs. Even though some CHW programs are founded on volunteering, it has been proved that appropriate payment, recognition, and promotion are other incentives that lead to higher participation and a reduction in turnover (WHO, 2018). The retention and motivation of CHWs in rural Punjab is significant in order to sustain the immunisation programs, the program end can have a negative impact on the coverage and confidence of the community.

The hindrances to CHW effectiveness also should be considered. The CHWs can be also limited in accordance with the sociocultural characteristics of the respective communities: resistance of local authorities, gender norms, and the ignorance of the vaccination (Siddiqui et al., 2019). Logistical issues such as low transport, material shortage and lack of connection with formal health systems also exist (Bhutta et al., 2019). CHWs need to be empowered to positively influence immunization coverage by overcoming these barriers with the assistance of facilitating policies, community interaction, and resource distribution.

Various studies have put forward the interactive nature of CHWs and national immunization programs. The CHWs collaborate with formal health facilities, vaccination coverage, and community mobilization efforts when the latter work together to ensure greater coverage rates and reduced incidences of vaccine-preventable diseases (Perry et al., 2014; Ozawa et al., 2016). This has to be well coordinated in a way that CHWs are not lones rangers but they are the components of the larger health system, which can bridge the services delivery gap, pursue the immunization process and provide timely feedback to the health authorities.

Altogether, it can be concluded that the literature demonstratively indicates the value of CHWs in the context of improving childhood immunization. Their health education, community participation, follow-up and advocacy roles are especially critical in rural communities where healthcare access is low. Pakistan and other third world countries show evidence that CHWs have a positive impact on the immunization outcome particularly when trained, supervised and motivated. Nevertheless, their efficiency is constrained by the issues of resource shortages, socio-cultural obstacles, and the design of a program. Policy support, training, and involvement of communities in CHW programs is essential to attain equitable coverage of immunization and child health in rural Punjab (UNICEF, 2021; United Nations, 2015).

METHODOLOGY

This paper used quantitative research design to investigate the role of Community Health Workers (CHWs) regarding childhood immunization rates in the rural regions in Punjab, Pakistan. The quantitative approach was selected since the structured data can be collected and analyzed statistically to evaluate the correlations between CHW engagement and immunization outcomes (Creswell, 2014). The study targeted one district in Punjab, Rahim Yar Khan, which is representative of rural areas with the problem of lack of healthcare access and immunization coverage. This methodology allowed making findings meaningful within the framework of rural healthcare delivery.

Population and Sample

The study used households with children of 12-24 months of age; this is important because they are at the age when routine vaccines are received using the immunization schedule of Pakistan under the program known as the Expanded Program on Immunization (EPI). Convenience sampling was employed in selecting a sample of 150 households based on accessibility and willingness of the participants to provide right information on immunization. The convenience sample was selected because of the practical limitations in

the field of fieldwork in the remote rural areas, and because of the necessity to comprise of households having children to be vaccinated.

Data Collection Instruments

Primary data were collected using a **structured questionnaire** and supplemented with **immunization record verification**. The questionnaire included sections on:

1. **Socio-demographic** factors of people who provide care (e.g., age, education, occupation, household income).
2. **CHW involvement** (number of visits, nature of counseling, reminders given and involvement in community health activities).
3. **Status of childhood immunization**, which was confirmed by vaccination cards or by a recall of the caregiver in cases where the records were not available.

The questionnaire was developed in **English and Urdu** to ensure comprehension by participants and was pre-tested on 10 households outside the study area to ensure clarity, reliability, and validity of items.

Data Collection Procedure

The data were also collected within a span of four weeks and the researcher visited the households of the selected villages. The CHW activity was documented according to the reports of the caregivers, which encompassed frequency of home visit, counseling sessions, vaccination reminders, and their attendance at community outreach events. Where EPI cards were in place, childhood immunization data were confirmed by verification. All participants were informed and their consent was sought and ethical approval was obtained by the respective health authorities of the area. The respondents were promised a sense of privacy and free will.

Data Analysis

Analysis of collected data was done through SPSS version 25. To summarize the socio-demographic traits, CHW engagement and immunization coverage, descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated. The association between CHW activities and immunization outcomes was tested with the correlation analysis. To determine the predictive value of CHW involvement on vaccination rates, regression analysis using socio-demographic variables like caregiver education and household income was done.

Also, cross- tabulations were used to investigate the difference in immunization coverage in relation to frequency of CHW visits and involvement in health education. Data tables were made ready to give a more in-depth view of the level of immunization on the basis of CHW involvement, so that the patterns and influence of community health intervention can be well comprehended.

Ethical Considerations

The research was conducted in line with guidelines of research dealing with human subjects. Informed consent was taken as part of participation and was a voluntary activity. Privacy and confidentiality were ensured through the anonymization of all the responses and the subjects discussed were made aware that they need not have any repercussions as long as they dropped out of the study. To have the local research regulations adhered to, the Department of Public Health, University of Punjab, provided ethical approval.

Data Analysis and Findings

This part includes the findings of the information gathered on Community Health Worker (CHW) levels and childhood immunization coverage in the chosen rural district of Rahim Yar Khan, Punjab. One hundred and fifty families having children of 12-24 months were surveyed. Data were analyzed with the help of

SPSS version 25 that includes descriptive statistics, correlation analysis, regression analysis, etc. The results are given in details, with the help of tables.

Socio-Demographic Characteristics of the Respondents.

It is necessary to understand the socio-demographic profile of caregivers since the education level, age, and household income could be the determinants of immunization. These features are summarized in table 1.

Table 1. Socio-Demographic Characteristics of Caregivers (N = 150)

Variable	Category	Frequency	Percentage (%)
Caregiver Age (years)	18–25	40	26.7
	26–35	65	43.3
	36–45	30	20.0
	46+	15	10.0
Education Level	No formal education	50	33.3
	Primary (1–5)	35	23.3
	Secondary (6–10)	40	26.7
	Higher Secondary+	25	16.7
Household Income (PKR/month)	<15,000	55	36.7
	15,000–25,000	60	40.0
	25,001–35,000	25	16.7
	>35,000	10	6.6

Interpretation: Most of the caregivers were between the ages of 26 to 35 (43.3) and with little education; only 16.7% had secondary education and above. Majority of households (76.7) had a monthly income of less than PKR 25,000, and this shows low to middle socio-economic status, which could influence the healthcare access.

CHW Engagement

The frequency of home visits, counseling and vaccine reminders evaluated CHW engagement. The distribution is provided in Table 2.

Table 2. CHW Engagement Activities (N = 150)

CHW Activity	Category	Frequency	Percentage (%)
Home Visits (per month)	None	15	10.0
	1–2 times	40	26.7
	3–4 times	60	40.0
	>4 times	35	23.3
Counseling Provided	No	20	13.3
	Yes	130	86.7
Vaccination Reminders	No	25	16.7
	Yes	125	83.3
Community Meetings Participation	No	50	33.3
	Yes	100	66.7

Interpretation: The majority (63.3%) of households had 3 or more visits per month by CHW. Active CHW engagement was also noted with a high percentage of caregivers in the counseling (86.7) and vaccination reminders (83.3) groups. Nevertheless, one-third of households failed to attend a community meeting, indicating that they could have a better way of reaching them.

Childhood Immunization Coverage

The EPI cards or caregiver recall was used to measure childhood immunization status. The coverage of the key vaccines is presented in table 3.

Table 3. Childhood Immunization Coverage (N = 150)

Vaccine	Fully Vaccinated	Partially Vaccinated	Not Vaccinated	Coverage (%)
BCG	145	5	0	96.7
DPT (all 3 doses)	130	15	5	86.7
Polio (all 4 doses)	125	20	5	83.3
Measles	120	25	5	80.0
Hepatitis B (3 doses)	125	20	5	83.3

Interpretation: The highest level of immunization coverage was achieved in BCG (96.7) and the lowest in measles (80%). This shows that although there is a significant initial vaccination, there are dropouts at the multi-dose vaccination indicating the need to follow up with vaccinations and CHW reminders.

Association of CHW Activities and Immunization Coverage.

The correlation between CHW engagement and the general immunization coverage was analyzed with the help of Pearson correlation.

Table 4. Correlation Between CHW Engagement and Immunization Coverage

Variable	Immunization Coverage (r)	p-value
Home Visits	0.58	<0.001
Counseling Sessions	0.53	<0.001
Vaccination Reminders	0.49	<0.001
Community Meetings Participation	0.41	<0.01

Interpretation: The interpretation of all CHW activities had a significant positive correlation with the childhood immunization coverage. The highest correlation was found in home visits and counseling indicating that close communication with caregivers is essential in increasing the rate of vaccination.

Regression Analysis

A multiple regression analysis was performed in order to determine the predictive effect of CHW activities on immunization coverage referring to caregiver education and household income.

Table 5. Multiple Regression Analysis Predicting Immunization Coverage

Predictor Variable	B	SE B	β	t	p
Home Visits	0.34	0.08	0.38	4.25	<0.001
Counseling Sessions	0.29	0.09	0.31	3.22	0.002
Vaccination Reminders	0.24	0.10	0.27	2.40	0.017
Community Meetings Participation	0.18	0.08	0.20	2.25	0.026
Caregiver Education	0.12	0.07	0.13	1.71	0.090
Household Income	0.09	0.06	0.10	1.50	0.135

Model Summary: $R^2 = 0.61$, $F(6,143) = 37.45$, $p < 0.001$

Interpretation: All CHW activities contribute to 61 percent of the variation in childhood immunization coverage that warrants a significant effect. The strongest predictor was the home visits and then there was counseling and reminders. The socio-economic factors (education of caregivers, household income) were smaller and not significant and reflectively suggest that CHW engagement is the most important determinant of vaccination coverage in this rural area.

Patterns and Observations

1. **Leaving Multi-Dose Vaccines:** Although the initial vaccines (BCG, first polio dose) were high coverage, subsequent vaccines (such as measles) were lower coverage and the need to re-engage with CHWs is important.
2. **CHW Frequency Matters:** When the households had a higher number of visits (3-4) in a month, there was a much higher immunization coverage than those with lower number of visits.
3. **Counseling and Reminders:** Timely reminders and direct counseling proved to be effective in enhancing the adherence to vaccination schedules.
4. **Community Participation:** Community meetings had a positive but lesser impact, and this indicates that more community mobilization strategies should be adopted.

The findings of the analysis make it evident that CHW intervention can greatly improve the immunization coverage of children in rural Punjab. The most effective activities are home visits, counseling, and reminders. These results confirm the use of enhanced CHW programs in the areas of the unaddressed gap in multi-dose vaccination compliance and the enhancement of the overall child condition.

CONCLUSION

The paper has discussed the role of Community Health Workers (CHWs) in rural Punjab, Pakistan, in influencing the immunization coverage of children using a mixed-method design and a sample of 150 households. Its findings are quite suggestive of the fact that CHWs are valuable and transformational actors in augmenting the immunization coverage in children in rural underserved areas.

The literature review revealed that the frequency of CHW home visits, counseling, immunization reminders, and community meeting attendance positively impacted immunization coverage. Specifically, the households with frequent CHW contact, three or more visits per month, and frequent counseling had an far greater predisposition to high vaccination coverage than the households with minimal CHW contact. Regression findings showed that CHW engagement predicts a higher percentage of immunization coverage, which exceeds 60 percent, and their significance is more in the provision of primary healthcare.

Another observation to be highlighted in the paper was the fact that socio-economic factors, such as education levels of the caregivers and the household income though significant were not well affecting as compared to CHW activities. It implies that the CHWs will be able to overcome the socio-economic barriers to access to healthcare with the help of interpersonal communication, trust-building, and direct interaction that the CHWs provide.

On the whole, the research arrives at the conclusion that Community Health workers are the pillars of immunizations program in rural Punjab. Not only do they help to enhance vaccine coverage, but also generate awareness among communities, which combats misinformation and positively influences the linkage between communities in a rural setting and the formal health system. However, the loopholes in the form of vaccine drop outs (especially with measles and Hepatitis B) represent that the follow-ups must be regularly taken, and control of the CHW programs must be strengthened.

RECOMMENDATIONS

Empower CHW Training and Capacity Building.

The CHWs will need ongoing and updated training about communication, vaccine logistics, and data recording, as well as mobilizing the community in order to maximize their effects. The Expanded Programme on Immunization (EPI) should be involved in arranging refresher courses quarterly as part of the Punjab Health Department.

Digital Tracking and Reminder Systems.

The use of mobile-based applications or setting up of systems that remind CHWs of upcoming immunization schedules and the need to remind caregivers of immunization can improve the efficiency of the process. Online resources will decrease human mistakes and aid prompt responses.

Enhance CHW Incentives and Job Satisfaction.

CHW motivation can be enhanced by providing sufficient financial incentives and recognition awards as well as career advancement opportunities. Motivated labor force will be more prone to interact on a regular basis with communities and cover full immunization.

Improve Supervision and Accountability Measures.

There should be regular field supervision of the district health officers to guarantee the reliability of data and to check the performance of the CHWs. Accountability and outcomes can be enhanced by the introduction of performance-based evaluation systems.

Publicity of Community Awareness.

The myths and misconceptions about vaccines can be dealt with with the help of awareness campaigns with the participation of religious leaders, local elders, and schools. Participation of the communities will be encouraged to promote the trust and the shared responsibility of child health.

Focus on Hard-to-Reach Areas

The remote villages and marginalized groups which have lower immunization rates should be prioritized by the government and NGOs. These areas should have special mobile immunization teams with the assistance of CHWs.

Incorporate Gender-Sensitive Approaches.

Most caregivers are women and therefore, gender responsive training should be further empowered to female CHWs. The programs should also be safe, mobile, and friendly to female workers in order to maintain their outreach programs.

Enhance Partnership with NGOs and Donors.

Collaborations with other organizations like UNICEF, WHO, and local NGOs can assist in the provision of resources in terms of vaccines, data systems, and community outreach. Sustainability can also be enhanced by collaborative programs by utilizing similar monitoring structures.

Future Research Directions

\The qualitative interviews with CHWs and caregivers should be also considered in future studies to examine the barriers and perceptions in more detail. As a longitudinal study might determine the effect of the continued CHW engagement on immunization rates in a number of years.

The paper emphasizes that an investment in Community Health Workers is an investment in healthier generations. The capacity building, the integration of technologies and community involvement in strengthening CHW programs would help drastically to increase the rate of child survival and move Pakistan towards the Universal Health Coverage (UHC) and the Sustainable Development Goal 3 (Good Health and Well-being).

REFERENCES

Ahmed, R., & Ali, S. (2020). Role of community-based health initiatives in improving child health outcomes in South Asia. *Global Health Research Journal, 8*(2), 112–124. https://doi.org/10.1177/2049936120937435

Ali, M., & Hussain, A. (2019). Determinants of immunization coverage in rural Pakistan: Evidence from Punjab. *Pakistan Journal of Public Health, 9*(3), 145–153. https://doi.org/10.32413/pjph.v9i3.162

Ali, S., & Qamar, K. (2021). Exploring the challenges of community health workers in delivering vaccination services in low-resource settings. *International Journal of Health Systems, 15*(1), 89–103.

Baloch, Z., & Akhtar, N. (2020). Parental education and childhood immunization: A study of rural districts in Punjab. *Asian Social Science, 16*(4), 45–56.

Bishai, D. M., Suzuki, E., McQuestion, M., Chakraborty, S., Koenig, M., & Perry, H. (2021). The role of community health workers in improving immunization coverage: Evidence from low- and middle-income countries. *Health Policy and Planning, 36*(5), 708–719. https://doi.org/10.1093/heapol/czaa114

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.

Government of Pakistan. (2018). *Expanded Programme on Immunization (EPI) annual report 2018*. Ministry of National Health Services, Regulations & Coordination.

Government of Punjab. (2020). *Punjab Health Sector Strategy 2020–2025*. Department of Health, Lahore.

Haider, M., & Saleem, F. (2020). Community engagement and immunization: A pathway toward universal health coverage in Pakistan. *Journal of Community Medicine and Health Education, 10*(2), 221–234.

Hassan, R., & Ahmad, M. (2019). Barriers to immunization coverage in rural areas: A case study from Southern Punjab. *International Journal of Public Health Research, 9*(1), 17–29.

Khan, S. A., & Iqbal, Z. (2021). The contribution of Lady Health Workers in enhancing child immunization rates in Pakistan. *Asian Journal of Public Health Studies, 12*(3), 233–247.

Khan, T., & Javed, M. (2022). Impact of government immunization programs on child health outcomes in Punjab. *Pakistan Development Review, 61*(1), 67–81.

Mahmood, K., & Younas, M. (2020). Sociocultural determinants of vaccination acceptance in Pakistan: The moderating role of CHWs. *BMC Public Health, 20*(1), 987–998. https://doi.org/10.1186/s12889-020-09237-1

Perry, H. B., Zulliger, R., & Rogers, M. M. (2014). Community health workers in low-, middle-, and high-income countries: An overview of their history, recent evolution, and current effectiveness. *Annual Review of Public Health, 35*, 399–421. https://doi.org/10.1146/annurev-publhealth-032013-182354

Rahman, A., & Nasir, Z. M. (2020). The effectiveness of community health worker interventions on childhood immunization: A case of Pakistan's rural healthcare model. *Health Services Research and Policy Review, 13*(2), 123–137.

Rashid, N., & Latif, S. (2019). Evaluating the success of immunization programs in developing countries: Evidence from Pakistan. *Global Public Health, 14*(6), 809–820.

Saeed, A., & Farooq, S. (2018). Factors affecting childhood immunization in rural Punjab: An empirical investigation. *Pakistan Journal of Social Sciences, 38*(1), 77–90.

United Nations Children's Fund (UNICEF). (2021). *Immunization and child survival in Pakistan: Progress and challenges*. UNICEF Pakistan.

World Health Organization (WHO). (2018). *Community health worker programs: Policy and system support implementation guidance*. WHO Press.

World Health Organization (WHO). (2020). *Global vaccine action plan 2011–2020: Review and lessons learned*. WHO.