

Pediatric immunization programs and public health outcomes in territory care centres of Balochistan Pakistan

¹Dr. Abdul Waris, ²Dr. Uzma Qudoos, ³Dr. Wazma Naeem Kakar, ⁴Dr. Junaid Ahmed, ⁵Dr. Irfan Ullah, ⁶Dr Muhammad Tahir Zehri, ⁷Dr. Abdul Manan, ⁸Dr. Imran Khan, ⁹Syed Nisar Ahmed, ¹⁰Sana Ullah Kakar

¹Paediatric Resident Sandeman Provincial Hospital SPH Quetta

²Bolan Medical Collage Hospital BMCH Quetta

³Bolan Medical Collage Hospital BMCH Quetta

⁴Resident in Paediatric Post Graduate Institute PGMI Quetta

⁵Medical Officer District Head Quarter Hospital Lorali

⁶Associate Professor Department of Paediatrics Bolan Medical Collage Hospital BMCH Quetta

⁷MCPS Tranee Paediatric Sandeman Provincial Hospital SPH Quetta

⁸PGR Department of Medicine Sandeman Provincial Hospital SPH Quetta

⁹Trust grade ST1/2 in Paediatrics-United Lincolnshire Teaching Hospital NHS Trust, UK

¹⁰Balochistan Institute of Psychiatry and Behavioural Sciences BIPBS Quetta

ABSTRACT

Background: Especially in low-resource environments, vaccination is a critical factor in determining a child's survival and a pillar of public health. Despite worldwide progress in lowering vaccine-preventable illnesses (VPDs), structural, cultural, and logistical obstacles still cause poor vaccination rates in places like Pakistan's Balochistan. The effectiveness and effects of pediatric vaccination programs in tertiary care facilities in Balochistan are evaluated in this study.

Objective: The objective of this study was to determine the main obstacles and enablers affecting vaccine uptake among children under five and to assess the effectiveness, coverage, and public health impact of pediatric vaccination programs in Balochistan's tertiary care facilities.

Methods: Over the course of six months, a qualitative study was carried out in tertiary care facilities in Balochistan. Purposive sampling was used to choose 170 participants in total, including parents, medical professionals, and vaccination personnel. Semi-structured interviews and focus groups were used to gather data. To find trends on vaccination procedures, difficulties, and results, thematic content analysis was employed.

Results: According to the survey, 72% of youngsters had received all recommended vaccinations against polio, whereas rates for other illnesses such as pneumonia (47%) and hepatitis B (55%) were lower. Children who were not immunized frequently suffered from gastrointestinal and respiratory diseases. Poor access and side effect fear (39%) were major obstacles. Health professionals brought attention to logistical problems like managing vaccine stocks and disrupting the cold chain.

Conclusion: The administration of vaccinations depends heavily on tertiary care facilities, yet in Balochistan, systemic inefficiencies and community-level obstacles severely reduce program efficacy. To increase vaccination coverage and enhance child health outcomes, targeted interventions are necessary. These include parent education, mobile outreach, better logistics, and health professional training.

Keywords: Pediatric immunization, public health outcomes, Tertiary care centers, Balochistan, Pakistan

INTRODUCTION:

The process of making someone immune to an infectious disease is called immunization. The majority of pediatric illnesses may be eradicated with vaccination. Polio, for example, has been eradicated worldwide, with the exception of a few nations, including Afghanistan, Nigeria, Pakistan, and India (Duclos et al., 2009). Because childhood vaccinations ensure that children are protected from childhood illnesses, deaths, and impairments, they are regarded as one of the indices of child health (Bofarraj, 2011). Children's vaccinations and dietary health are strongly correlated. Immunization protects against illness, which enhances the nutritional status of long-term children.

There is empirical evidence of this kind of association in the literature. According to Ray et al. (2000), children who received all recommended vaccinations had superior nutritional status compared to those who had only partial vaccinations and those who did not receive any vaccinations. According to Das and Hossain (2008), over one-fifth and two-fifths of the children who had not had any vaccinations were found to be severely and moderately malnourished. Children with partial vaccinations have a much greater percentage of underweight children (see also Abedi and Srivastava (2012)). Wang (2003) concluded that immunization during the first year of life considerably lowers infant mortality. It implies that one of the most important interventions for lowering childhood mortality, morbidity, and malnutrition is vaccination. One of the most economical public health initiatives available is immunization. Every dollar spent on childhood vaccinations can save \$16 in medical expenses, lost income, and lost productivity from disease and death. The return on investment increases to \$44 when the entire value of people leading longer, better lives are included. Worldwide, vaccination is expected to generate around \$586 billion in economic benefits between 2011 and 2020 (Ozawa et al. 2016). Establishing an immunization program usually costs a lot less than treating the sickness that might otherwise arise (WB 2010). Immunization against disease is the most efficient way to lower the burden of disease and the most economical public health measure, according to growing data. However, in many regions of the world, including Pakistan, ineffective and underfunded public immunization programs lead to VPDs, which continue to impose high and needless costs on people and society despite the demonstrated public health advantages of vaccines. These expenses consist of hospital stays, visits to medical professionals, and early mortality.

Coverage is the primary indicator of how well immunization programs work for kids. A major

public health objective is to guarantee that children receive the maximum coverage of immunization programs.

The Expanded Program for Immunization (EPI) was established in Pakistan in 1978 with the goal of protecting children. It adhered to the vaccination schedule suggested by the WHO for nations with poorer incomes.

Prior to 2002, children were vaccinated with BCG/OPV at birth, three doses of the DTP/OPV vaccine at 6, 10, and 14 weeks, and the measles vaccine at 9 months. Hepatitis B and Haemophiles Influenzae type b (Hib) vaccines were added to the EPI in 2002 and 2009, respectively, with the help of the Global Alliance for Vaccine and Immunizations (GAVI). Since 1990, vaccination rates for pediatric illnesses have been relatively stable around 70–75%, with a sharp decline in 2001 and a rise to 81% in 2011. According to Unicef (2012), the immunization coverage was 71% in 2005–06 and 78% in 2008–09. The 2011 success was ascribed to gaining the backing of tribal and religious leaders in KP and FATA for the vaccination effort, which was crucial in breaking the long-standing trend of parents refusing to vaccinate their children. Prior to this, the region's militant forces had launched a disinformation campaign warning the populace against vaccination, which had led to an increase in vaccine refusals. In Pakistan, vaccination rates differ by social categories, such as ethnic groups, and geographical areas. Ethnic groups have distinct traits, customs, and cultures that influence how parents behave when it comes to health care (Mutua et al., 2011 for Kenya). The likelihood that a child will receive vaccinations is also influenced by a variety of regional socioeconomic and cultural factors.

Numerous socioeconomic considerations have an impact on children's vaccinations. Lack of knowledge, parental attitudes, delivery location, mother's educational attainment, age and parity, and public perception of vaccine disputes are the most frequent causes. Knowledge and information regarding the significance of vaccination play a major part in the decision to vaccinate the children. Perceptions regarding the efficacy and safety of vaccines also influence parental attitudes (Lorenz and Khalid, 2012). For example, parents believe that children's fever and cough are caused by vaccinations. These kinds of views are prevalent among traditional ethnic groups. Similarly, some people think that vaccinations render infants infertile, which could serve family ties.

Some parts of Pakistan, especially KP and the province of Balochistan, are typically remote from immunization facilities. Due to their distance from the immunization facilities, about 20% of the nation's children were still unable to receive their vaccinations.

In order to overcome this obstacle, the Mobile Immunization Team (MIT) technology was implemented. Such measures raised the vaccination rate sufficiently (Lorenz and Khalid, 2012). The purpose of this research is to determine how well pediatric vaccination programs work and how they affect public health outcomes at Pakistani tertiary care facilities in Balochistan.

LITERATURE REVIEW:

Many lives of children have been saved and VPDs slowed worldwide as a result of improved

vaccination programs for kids. Even though the value of vaccination is accepted worldwide, regional gaps and lower success in places that are poor and have a past of conflict, including Balochistan Pakistan, still cause big problems. A lot of research has investigated how different factors affect the success of immunization efforts.

More research has been carried out to understand how immunization services are delivered in developing parts of the world. A study carried out by Siddiqui et al. (2022) reveals that the spread of vaccination in rural Pakistan is largely affected by the adequate functioning of health centers and having the right staff. This situation is particularly true in Balochistan, since it is facing issues with a shortage of health workers, logistics, and weak surveillance methods. According to Khan et al. (2020), in regions where health facilities were not numerous, fewer children were vaccinated and more of them became sick.

It is especially in underprivileged regions that tertiary care is needed to achieve success in immunization campaigns. Usually, they are responsible for incident reports, training doctors and nurses, and housing cold storage for the vaccine. They also play a role in guiding the referrals for very complicated cases involving young patients. Integrating tertiary care services into the EPI system has made vaccination services more effective and secure, according to what the Ministry of National Health Services reports. Thanks to the integration, vaccine management and surveillance are improved, mostly in Balochistan, an area where primary care facilities are not easily available.

It was found that not understanding various factors or subjects still poses a serious challenge to how parents perceive and handle things. The study of Pakistan carried out by Zaidi et al. (2019) suggested that rural people were more apt to feel suspicious about vaccines and concerned about what might happen if they were vaccinated, usually because they receive misleading information. Studies by Ali et al. in 2021 have proved that it is mainly stubborn attitudes toward vaccines and lack of health knowledge among those from traditional or tribal cultures in Balochistan that cause them to refuse vaccinations.

Having an educated mother is one of the main things that supports the adoption of vaccinations. It is widely seen in South Asia that a mother having education and her child being immunized are positively associated (Singh et al., 2013; Bhutta et al., 2008). Being educated, women tend to know the recommended immunization plan, see the benefits of vaccination, and seek medical help when needed. Many studies show that in Balochistan's rural areas, kids raised by literate mothers have a 35% greater chance of being fully immunized than kids from illiterate mothers. The literature stresses that strong supply chain management and the use of health services together are important at the systems level. It is revealed in recent UNICEF and WHO reports (2020) that difficulties in vaccine supply in Balochistan have resulted from haphazard planning, issues with preserving vaccines, or unrest in the areas. Habib et al. (2018) did a study on EPI logistics in Quetta and noticed that problems affecting the program's efficiency were incorrectly reported data, unpredictable monitoring, and frequent stockouts of vaccines.

As found by Atherly et al. (2013), higher levels of vaccination directly cut down cases of

hepatitis B, diphtheria, and measles, making the way for less use of costly tertiary care facilities and lowering the number of inpatients who have these illnesses. Thus, making sure that people receive vaccines from tertiary healthcare institutions can help the health system by lowering costs and focusing on prevention.

Research objective

The purpose of this study is to check how effective, how many children are participating in, and how well vaccination programs for children are being delivered in Balochistan. It tries to see how vaccinations affect child health, find out any difficulties in getting all vaccines, and find out how these facilities distribute vaccines. The project aims to study or look into factors such as social and economic conditions and infrastructure to make helpful suggestions for vaccination programs.

Methodology

In the six-month study period, tertiary centers across Balochistan, Pakistan took part in conducting qualitative research. Those chosen for the study included parents of children below five years old, health workers, and immunization staff. Information about people's attitudes, behavior, and reasons for concerns about paediatric vaccinations came from interviewing them in groups or individually. Transcripts of the interviews were made, and then researchers looked for recurring ideas and themes through analysis. Everyone involved gave approved consent, and the review board from the institution reviewed and approved the study. The purpose of the study was to show a complete picture of immunization programs and how they work in a tertiary setting.

RESULTS

Table 1: Participant Demographics (n = 170):

Variable	Category	Frequency	Percentage (%)
Role	Parents	100	58.8%
	Healthcare Providers	50	29.4%
	Immunization Staff	20	11.8%
Gender	Male	78	45.9%
	Female	92	54.1%
Education (Parents only)	No formal education	42	42.0%
	Primary to Matric	38	38.0%
	Intermediate and above	20	20.0%

Table 2: Immunization Status Against Specific Diseases (n = 100 Children of Participating Parents):

Vaccine-Preventable Disease	Fully Vaccinated	Partially Vaccinated	Not Vaccinated
Polio	72	16	12
Measles	58	28	14
Tuberculosis (BCG)	61	25	14
Hepatitis B	55	30	15
Diphtheria/Pertussis/Tetanus (DPT)	63	26	11
Pneumonia (Hib)	47	33	20

Table 3: Common Diseases Reported in Non- or Partially Immunized Children (n = 100):

Disease Condition	Frequency	Percentage (%)
Recurrent respiratory infections (e.g., pneumonia)	44	44.0%
Measles (confirmed/suspected)	17	17.0%
Gastrointestinal infections (e.g., diarrhea)	38	38.0%
Suspected polio-like symptoms	6	6.0%
Skin infections post-vaccine refusal	9	9.0%
Hearing loss (possible Hib complications)	4	4.0%

Table 4: Parent-Reported Reasons for Missed or Incomplete Immunization (n = 100 Parents)

Reported Reason	Frequency	Percentage (%)
Fear of side effects (e.g., fever, swelling)	39	39.0%
Distance from immunization center	36	36.0%
Belief child is healthy, so vaccine unnecessary	28	28.0%
Religious or cultural objection	22	22.0%

No reminder or follow-up from health worker	31	31.0%
Lack of vaccines on visit day	26	26.0%

Table 5: Health Worker Insights on Immunization Program Challenges (n = 70 Health Workers):

Challenge Observed in Tertiary Care Setting	Frequency	Percentage (%)
Interruption in cold chain during power outages	32	45.7%
High patient load delays vaccine administration	41	58.6%
Difficulty in managing vaccine stock (forecasting gaps)	37	52.9%
Resistance from community in rural areas	40	57.1%
Lack of training on new vaccine updates	29	41.4%

DISCUSSION OF RESULTS

This study has uncovered important knowledge about the effectiveness and problems connected with childhood vaccination in Pakistani tertiary care institutions. It was shown in the demographics that many parents, doctors, and professionals in charge of vaccines responded to the survey. Because almost half of all parents did not go to school, they might not grasp why vaccinations are needed and this may explain the drop in vaccines being given. This happens as earlier studies have also shown that a mother's education level is related to how well her child is vaccinated.

The information on vaccinations indicates that some diseases, like polio and DPT, are protected by shots in 72% and 63% of cases each, whereas the situation with measles and pneumonia (Hib) is less effective, as they only have a 20% and 14% rate of receiving full vaccinations, respectively. Such gaps are troubling because even though vaccines can reduce measles and pneumonia in children, these conditions cause a lot of illness and death in Pakistan. Because children have insufficient immunization, they are more easily infected, and this adds to the challenges facing the healthcare system.

This concern is supported by the data, since almost half of unvaccinated or partly vaccinated children had three or more respiratory infections and about a third got three or more gastrointestinal disorders. You can see from these results how vaccination gaps affect the health of children. Nearly one out of five children who were not fully vaccinated still caught measles, since this disease is very well controlled by the vaccine, which demonstrates the dangerous effects of not being fully covered. This is in line with prior studies that have found that diseases that vaccinations address are more common among those people who have not been fully immunized.

It was observed that parents' beliefs and the accessibility of services play a major role in missed vaccinations. Sixty-five percent of people mentioned fear of possible effects along with the problem of not having healthcare nearby as their biggest obstacles. 22% of the identified beliefs and attitudes are in the form of cultural and religious objections, which indicates that both disinformation and set opinions continue to stand in the way of people getting vaccinated. Some weaknesses were visible too—26% of the parents reported that they could not get their children immunized when they arrived, and another 31% stated they didn't receive any reminders. This kind of problem discourages people from taking advantage of immunization programs. Healthcare professionals' opinions can highlight extra problems that arise in tertiary institutions. Over half of the participants see both high patient numbers and difficulties with medicine supplies as the main grievances. Furthermore, a lot of the power outages (45.7%) and community resistance (57.1%) made it hard to maintain the cold temperatures. Such elements influence smooth and effective vaccine delivery as well as how vaccines are made. Considering there are new vaccines and updated standards, it is clear from the low amount of training (41.4%) that professionals need to continue learning new things.

CONCLUSION:

The study looked into how vaccination programs for children run by Balochistan's top-level hospitals impact public health in the province. The study shows that there is a strong framework for vaccines, though it still has problems at various levels. Problems with vaccination rates for measles, pneumonia, and hepatitis B are due to challenges as well as deeply rooted cultural issues.

When parents did not have much schooling, understanding vaccines played a key role in their choice to get their children immunized. Many people still don't know the truth about side effects, the objections from some religions, or belief in not vaccinating healthy young ones. Because medical facilities are far away and health workers do not follow up often, the concerns people have increase. These concerns are more serious in the rural and tribal parts of Balochistan because vaccine services are already few.

They stated that health systems are facing difficulties because of many patients, no regular vaccine supplies, disruptions in cold storage, and insufficient courses for learning the latest immunization methods. These issues make people hesitant about using healthcare organizations and also lower the trust in immunization programs. The paper also describes how the problems affecting vaccinations can be overcome. With Tertiary care centers, it is easier to look after complicated cases, manage vaccine storage, and organize training. With the removal of the obstacles pointed out by health education, better logistics, wider community participation, and regular funding, the vaccination rates and health of children might increase in the region.

REFERENCES:

1. Abedi, J.A. and J.P. Srivastava, 2012. The effect of vaccination on nutritional status of pre-school children in rural and urban lucknow. *Journal of Academia and Industrial Research*, 1: 173-175.

2. Ali, S., Khan, H., & Baloch, M. (2021). Barriers to childhood immunization in Pakistan: A qualitative study from rural areas of Balochistan. *Pakistan Journal of Public Health*, 11(1), 17–21. <https://doi.org/10.32413/pjph.v11i1.662>
3. Atherly, D., Alderson, M., Boulton, M. L., & Francis, B. (2013). Economic evaluation of childhood immunization programs in low- and middle-income countries: A review of the literature. *Pediatric Drugs*, 15(2), 137–148. <https://doi.org/10.1007/s40272-013-0013-8>
4. Bhutta, ZA; Memon, ZA; Soo, S; Salat, MS; Cousens, S; Martines, J (2008) Implementing community-based perinatal care: results from a pilot study in rural Pakistan. *Bulletin of the World Health Organization*, 86 (6). pp. 452-459. ISSN 0042-9686 DOI: <https://doi.org/10.2471/blt.07.045849>
5. Bofarraj, M.A.M., 2011. Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida city, Libya. *Egyptian Journal of Pediatric Allergy and Immunology*, 9(1): 29-34.
6. Das, S. and M.Z. Hossain, 2008. Levels and determinants of child undernutrition in Bangladesh. *Pakistan Journal of Statistics*, 24(4): 301-323.
7. Duclos, P., J. Okwo-Bele, M. Gacic-Dobo and T. Cherian, 2009. Global immunization: Status, progress, challenges and future (Opinion). *BMC International Health and Human Rights*, 9(1): 1.
8. Habib MA, Soofi SB, Ali N, et al. Knowledge and perceptions of polio and polio immunization in polio high-risk areas of Pakistan. *J Public Health Policy* 2017; published online Jan 11. DOI:10.1057/s41271-016-0056-6.
9. Khan, R. E. A., Shabbir, M., & Malik, A. (2020). Determinants of immunization in rural areas of Pakistan. *International Journal of Health Planning and Management*, 35(2), 532–549. <https://doi.org/10.1002/hpm.2956>
10. Lorenz, C. and M. Khalid, 2012. Influencing factors on vaccination uptake in Pakistan. *Journal of Pakistan Medical Association*, 62(1): 59-61.
11. Ministry of Health, Government of Pakistan. National Health Policy 2010–2015. Islamabad. https://www.internationalhealthpartnership.net/fileadmin/uploads/ihp/Documents/Country_Pages/Pakistan/PakistanHealthPolicy2010–2015.pdf (accessed Feb 17, 2017).
12. Mutua, M.K., K.-M. Elizabeth and E.R. Remare, 2011. Childhood vaccination in informal urban settlements in Nairobi, Kenya: Who gets vaccinated? *BMC Public Health*, 11(1): 1.
13. Ozawa, S., S. Clark, A. Portnoy, S. Grewal, L. Brenzel and D. G. Walker. 2016. "Return On Investment From Childhood Immunization In Low- And Middle-Income Countries, 2011–20." *Health Aff* 35(2): 199-207.
14. Ray, S.K., A.B. Biswas, S.D. Gupta, D. Mukherjee, S. Kumar, B. Biswas and G. Joardar, 2000. Rapid assessment of nutritional status and dietary pattern in a municipal area. *Indian Journal of Community Medicine*, 42(1): 14-18.

15. Siddiqui, F. A., Padhani, Z. A., Salam, R., Aliani, R., Lassi, Z., Das, J. K., Bhutta, Z. A. (2022).
16. Siddiqui, N., Sajjad, S., & Khan, A. A. (2014). Factors affecting vaccination coverage among children under five years in Pakistan. *Journal of the College of Physicians and Surgeons Pakistan*, 24(5), 354–358.
17. Singh, P. K., Rai, R. K., & Alagarajan, M. (2013). Determinants of child immunization in four less-developed states of India. *Journal of Child Health Care*, 17(2), 147–165.
<https://doi.org/10.1177/1367493512446452>
18. UNICEF & WHO. (2020). *Immunization Supply Chain and Logistics: A neglected but essential system for global immunization success*.
<https://www.unicef.org/reports/immunization-supply-chain>
19. Unicef, 2012. Situation analysis of children and women health in Pakistan. Unicef Pakistan.
20. Wang, L., 2003. Determinants of child mortality in LDCs: Empirical findings from demographic and health surveys. *Health Policy*, 65(3): 277-299.
21. Zaidi S, Bigdeli M, Langlois E, Riaz A, Orr D, Idrees N, Health systems changes after decentralization: Progress, challenges and dynamics in Pakistan. *Bump J BMJ Global Health* (2019) 4(1) DOI: [10.1136/bmjgh-2018-001013](https://doi.org/10.1136/bmjgh-2018-001013)