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Community Perception and Constraints to the Expanded Program on Immunization (EPI) in Peshawar, Pakistan: A Public Health Perspective

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ABSTRACT

Aim of the Study: This study explores the community perceptions regarding the Expanded Program on Immunization (EPI) in District Peshawar, Pakistan, and to identifies the major constraints that deter its effective executions.

Methodology: A quantitative cross-sectional design was employed; data were collected from 379 respondents across five tehsils in District Peshawar. Participants included parents, healthcare providers, religious scholars, and community elders. A structured questionnaire was used to measure perceptions, barriers, attitudes and practices toward immunization. The univariate and bivariate data analyses were carried out by using SPSS version 26, and the chi-square tests were also applied to determine correlations between dependent and independent variables.

Findings: The study findings make known that while the majority of participants acknowledge the safety and religious acceptability of vaccines, substantial obstacles persist. These include vaccine reluctance driven by misinformation, religious misconceptions, lack of outreach services, and socioeconomic disparities, particularly in underserved areas. Data showed strong associations between immunization status and factors such as parental education, household income, gender roles, and access to health facilities. Respondents from higher-income households and those with better accessibility to health care facilities had a higher probability of having their children vaccinated.

Conclusion: The study stresses the necessity of focused policy interventions, enhanced awareness, and improved community engagement to strengthen EPI implementation and reduce the prevalence of diseases that can be prevented by vaccination in the region, particularly in marginalized communities.

Keywords: Expanded Program on Immunization, Immunization Coverage, Vaccine Reluctancy, Public Health, Socioeconomic Barriers, Healthcare Accessibility.

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1. INTRODUCTION

Immunization, as a public health intervention, has had a profound impact on national and global health (Eboreime, 2015). Recognized by the World Health Organization (WHO) as one of the greatest public health achievements of the 20th century, it is estimated that vaccines prevent approximately six million deaths annually (Ehreth, 2003; WHO, 2021). The Expanded Program on Immunization (EPI), launched by WHO in 1974 and adopted by Pakistan in 1978, was designed to protect children and pregnant women against vaccine-preventable diseases (UNICEF, 2012). Despite over four decades of implementation, Pakistan still struggles to achieve the WHO-recommended immunization coverage target of 95% due to various constraints (Khowaja et al., 2012). The constraints are abundant, but some of them are social and cultural-related ambiguities of the public, religious reluctance, less resource availability in less developed areas, and logistic accessibility (PDHS, 2018; Ullah et al., 2016), and a significant part of the community may associate immunization and vaccination with Western conspiracies, often viewing these health interventions with suspicion and distrust (Rahman & Salam, 2019).

A crucial location in this environment is the district of Peshawar, the capital of Khyber Pakhtunkhwa, because of its high population, urban-rural divide, and frequent outbreaks of diseases that can be prevented by vaccination, including polio (WHO, 2020).

The region's poor routine immunization rates are caused by a confluence of sociocultural, religious, economic, and logistical reasons (Khan et al., 2017). Misinformation, vaccination reluctance, religious misinterpretations, and mistrust of Western-led health campaigns have all contributed to a decline in community confidence in immunization programs like EPI (Dubé et al., 2013). The degree of public in immunization is vital to achieving herd immunity; increasing vaccination program participation and vaccine acceptance are facilitated by trust. Without it, attempts to prevent and manage vaccine-preventable diseases are still severely hampered (WHO, 2021). In addition, infrastructure shortcomings such as inconsistent outreach initiatives, poor cold chain systems, and limited access to female health experts exacerbate the problem (Habib et al., 2017).

This study explores these precise challenges in District Peshawar, converging on recognizing weighty barriers and obstacles to immunization coverage, evaluating perception of the community, and understanding the connection between public health activities and socio-cultural norms. The findings are meant to guide policy reforms and improve EPI delivery strategies in similar high-risk urban and semi-urban settings across Pakistan.

1.1 Problem Statement

The Expanded Program on immunization (EPI) has been in place for decades in Pakistan, but it still faces numerous difficulties in its efforts to meet the World Health Organization's aim of 95% vaccination uptake. These impediments are mostly evident in District Peshawar, given the logistical, sociological, and religious barriers that hinder inoculation acceptance. Some of these obstacles include inadequate access to medical services, exclusively in less developed areas, religious misconceptions, lack of awareness about vaccine safety, and economic constraints. This study aims to determine how the public views the EPI, identify the primary hindrances to its effectiveness, and identify the reasons for vaccine hesitancy. The results will give policymakers insight into how to increase vaccination rates in this high-risk region.

1.2 Significant of the Study

This work is significant because it elucidates the hindrances standing in the way of the EPI's best execution in District Peshawar, a vital region overwhelmed by regular outbreaks of diseases like polio and other vaccine preventable illnesses that can be prevented by immunization. The goal of the study is to gather valuable material for public health practitioners and policymakers to produce customized interventions by determining community perceptions and limitations. Enlightening healthcare service delivery, raising awareness, and addressing socio-cultural and economic issues that disturb vaccination coverage are all made possible by the findings. Moreover, in developing countries like Pakistan, where

vaccine reluctance and accessibility complications are widespread, the findings are decisive for guiding future immunization programs in contradiction of vaccine-preventable diseases.

1.3 Research Objectives

- To identify the foremost constraints to EPI in the District Peshawar.
- To assess community perceptions and attitudes toward the Expanded Program on Immunization (EPI) in District Peshawar.
- To assess awareness levels and the impact of vaccine-related misinformation on immunization uptake.

1.4 Research Questions

- What are the major constraints hindering the implementation of the Expanded Program on Immunization (EPI) in District Peshawar?
- How do community members in District Peshawar perceive and react to the Expanded Program on Immunization (EPI)?
- How does vaccine-related misinformation affect the awareness levels and immunization uptake in District Peshawar?

2. LITERATURE REVIEW

Humanity's long-standing attempt to fight infectious diseases is reflected in the historical development of vaccination. Early immunization practices date back to ancient China, India, and the Middle East, where variolation was used to induce immunity against smallpox (Hsu, 2013; Rodrigues & Plotkin, 2020). Edward Jenner's invention and progress of the smallpox vaccine in 1796 was an important turning point in the history of mankind's medical field. It established the groundwork for contemporary vaccination procedures and the worldwide battle against infectious illnesses (Offit, 2005).

The Expanded Program on Immunization (EPI) was started by World Health Organization in 1974 to condense infant and child mortality through well-organized immunization programs (Andre et al., 2008). At the start, the immunization program focused on six main infectious diseases: measles, polio, tetanus, pertussis, diphtheria, and tuberculosis. Ultimately, vaccinations against pneumococcal disease, rubella, hepatitis B, and Haemophilus influenzae type b (Hib) were contained within (WHO, 2013). The EPI program was officially launched in Pakistan in 1978, and in spite of its extensive implementation, regional disproportions and socio-cultural barriers continue to hamper optimum coverage (UNICEF, 2020).

Misconceptions, ignorance, and religious convictions are frequently the causes of vaccine hesitancy and reluctance in low-income and developing countries like Pakistan, while these elements extremely obstruct vaccination campaigns and public health results (Ullah et al., 2016; Khan, 2017), and chronicles surrounding Western-led inoculation campaigns have subsidized to skepticism too (Larson et al, 2020). The misconceptions regarding the vaccination uptakes, chiefly in areas like Khyber Pakhtunkhwa, fuels fear and centrals to condensed vaccination coverage (PDHS, 2018). Thus, public engrossment and communication with home-grown influencers are indispensable for overwhelming vaccine unwillingness and disinclination in order to upsurge immunization uptake (Bettampadi et al., 2020). In the same way, religious decrees (fatwas) and traditional beliefs by the religious scholars also increase immunization rates among Muslim communities (Ali et al., 2020). Several researchers emphasize that maternal education, healthcare accessibility, and socioeconomic status significantly influence immunization uptake, as educated mothers are more likely to understand vaccine benefits, seek timely immunization, and overcome misinformation (Lorenz & Khalid, 2012).

Both supplementary immunization activities (SIAs) and routine vaccinations are the key components of national immunization strategies. However, disparities in cold chain systems, targeted messaging,

healthcare worker training, and community engagement affect program efficiency (WHO, 2018). Outreach vaccination teams through regular visits can also play a key role for better vaccine uptake (WHO, 2020). Whereas community-based approaches, including involvement of religious and political leaders, have proven effective in increasing vaccine coverage (Orenstein & Ahmed, 2017).

Overall, literature supports the view that enlightening vaccination coverage entails addressing systemic barriers, fostering trust, and ensuring equitable access to vaccination services. Achieving EPI goals in Pakistan and around the world still requires bolstering health institutions, raising public awareness, and forming community alliances.

3. METHODOLOGY

A quantitative cross-sectional study was carried out in District Peshawar from July to December 2024 to evaluate the community perceptions and constraints regarding the Expanded Program on Immunization (EPI) in District Peshawar. Due to its history of vaccination issues, such as poor vaccination rates and opposition to vaccination campaigns, particularly in high-risk regions like polio eradication zones, Peshawar was selected for this study (NIPS & ICF, 2019; WHO, 2020). 379 individuals participated in the research study, primarily parents with children under two years old, medical professionals, religious leaders, and local elders. A multistage sample procedure was used to pick respondents, with one village or neighborhood council selected from each of the six tehsils in the district.

For data collection purposes, a standardized and structured questionnaire was used, and a phase of pre-testing was carried out with a tiny sample size of 30 individuals before the full data collection process started. Moreover, the gathered data were analyzed through SPSS version 26.0. Descriptive statistics were used to compile and summarize the data, while univariate and bivariate analyses explored relationships between variables. Chi-square tests were employed to identify significant associations between dependent and independent variables through a significance level set at $p < 0.05$.

4. RESULTS

4.1 Uni-variant Analysis

Table 1: *Constraints to Expended program on immunization Leading to Failure of EPI*

Statements	Agree (%)	Disagree (%)	Don't Know (%)	Total
Do you believe immunization is safe?	359 (95.0%)	7 (1.9%)	12 (3.2%)	378 (100.0%)
Does your religion oppose childhood vaccinations?	124 (32.8%)	231 (61.1%)	23 (6.1%)	378 (100.0%)
Do you believe that the lack of regular outreach vaccination and vaccinator visits is a constrain to immunization?	247 (65.3%)	73 (19.3%)	58 (15.3%)	378 (100.0%)
Do you distrust in the vaccination program because it is supported by Western agendas?	168 (44.4%)	159 (42.1%)	51 (13.5%)	378 (100.0%)
Do concerns about the probable transmission of HIV or other infections dishearten participation in immunization?	80 (21.2%)	228 (60.3%)	70 (18.5%)	378 (100.0%)
Does your community against vaccination or immunization efforts?	102 (27.0%)	253 (66.9%)	23 (6.1%)	378 (100.0%)
According to your religious beliefs, do you consider vaccination to be permissible (halal)?	330 (87.3%)	28 (7.4%)	20 (5.3%)	378 (100.0%)
Have you ever been discouraged or advised by someone not to immunized your child?	151 (39.9%)	215 (56.9%)	12 (3.2%)	378 (100.0%)
Do you trust vaccinations are against your	75 (19.8%)	281	22 (5.8%)	378

cultural values?	(74.3%)	(100.0%)

Description of Table 1

A strong majority of respondents (95.0%) believe that immunization is safe, indicating a high level of confidence in vaccine safety. However, a minority (1.9%) disagreed, and 3.2% were uncertain. When asked whether children's immunization is against their faith or religion, 32.8% agreed, whereas a significant part, 61.1% disagreed, suggesting that most participants do not view immunization as religiously prohibited.

Structural constraints were also highlighted. A substantial number 65.3% of the participants, acknowledged the deficiency of consistent outreach vaccination and vaccinator visits to the field as a foremost impediment to immunization coverage, while 19.3% disagreed and 15.3% were unsure. Belief in conspiracy theories also emerged, with 44.4% agreeing that skepticism toward vaccination is due to its association with Western agendas, although 42.1% were found not to agreed and 13.5% were unsure regarding the statement asked.

Concerns about vaccination safety related to infectious diseases were less prevalent; only 21.2% believed that concerns of HIV or other contagious illnesses are a barrier, while the majority (60.3%) disagreed. Similarly, only a small proportion 27.0% specified that their community is in contradiction of immunization, compared to 66.9% who did not agree with that notion. Additionally, 87.3% confirmed that vaccination is halal in their religion, further reinforcing religious acceptance, although 7.4% disagreed and 5.3% persisted unsure.

Social influence plays a role in immunization decisions. About 39.9% reported that someone had discouraged them from vaccinating their children, while 56.9% stated otherwise. Cultural objections were minimal, with only 19.8% agreeing that vaccinations are against cultural values, whereas 74.3% disagreed.

4.2 Bi-variate Analysis

Table 2: *Higher the constraints to EPI, the lesser would be the acceptance to EPI and Immunization status.*

S.No	Independent Variable	Immunization Status			Chi-Square Value p=value
		Agree (%)	Disagree (%)	Don't Know (%)	
	Parental Education Level				
1	Agree	204 (54.0%)	41 (10.8%)	16 (4.2%)	χ^2=32.407 P=0.000
	Disagree	80 (21.2%)	15 (4.0%)	7 (1.9%)	
	Don't Know	6 (1.6%)	2 (0.5%)	7 (1.9%)	
	Standard of Household Living				
2	Agree	201 (53.2%)	44 (11.6%)	16 (4.2%)	χ^2=26.996 P=0.002
	Disagree	76 (20.1%)	20 (5.3%)	6 (1.6%)	
	Don't Know	5 (1.3%)	4 (1.1%)	6 (1.6%)	
	Inequality based on gender				
3	Agree	170 (45.0%)	61 (16.1%)	30 (7.9%)	χ^2=11.988 P=0.017
	Disagree	71 (18.8%)	24 (6.3%)	7 (1.9%)	
	Don't Know	4 (1.1%)	7 (1.9%)	4 (1.1%)	
	Women's Power and Role				
4	Agree	185 (49.0%)	55 (14.6%)	21 (5.6%)	χ^2=9.202 P=0.056
	Disagree	69 (18.3%)	27 (7.1%)	6 (1.6%)	
	Don't Know	7 (1.9%)	4 (1.1%)	4 (1.1%)	
5	Rural and Urban Regions				

	Agree	183 (48.4%)	45 (11.9%)	33 (8.7%)	χ^2=10.583 P=0.032
	Disagree	72 (19.0%)	23 (6.1%)	7 (1.9%)	
	Don't Know	9 (2.4%)	1 (0.3%)	5 (1.3%)	
6	Accessibility to Health Facilities				
	Agree	226 (59.8%)	26 (6.9%)	9 (2.4%)	χ^2=17.270 P=0.002
	Disagree	74 (19.6%)	21 (5.6%)	7 (1.9%)	
	Don't Know	10 (2.6%)	2 (0.5%)	3 (0.8%)	
7	Poverty/Financial Factor				
	Agree	180 (47.6%)	66 (17.5%)	15 (4.0%)	χ^2=16.350 P=0.003
	Disagree	58 (15.3%)	37 (9.8%)	7 (1.9%)	
	Don't Know	10 (2.6%)	1 (0.3%)	4 (1.1%)	
8	Employment Status				
	Agree	178 (47.1%)	67 (17.7%)	16 (4.2%)	χ^2=13.622 P=0.009
	Disagree	70 (18.5%)	27 (7.1%)	5 (1.3%)	
	Don't Know	11 (2.9%)	0 (0.0%)	4 (1.1%)	
9	Anxiety/Side Effects				
	Agree	180 (47.6%)	59 (15.6%)	22 (5.8%)	χ^2=17.096 P=0.002
	Disagree	53 (14.0%)	40 (10.6%)	9 (2.4%)	
	Don't Know	9 (2.4%)	2 (0.5%)	4 (1.1%)	

Description of Table 2

According to the data finding, the maximum number 54.0% of respondents, supported vaccination and agreed that parental education is vital; in contrast, only 4.2% of participants were unsure, and 10.8% of individuals disagreed with the same question asked. The relation amongst the parental higher-level education and immunization status was found to be significantly ($p = 0.000$) strongly correlated. Additionally, household living levels also have a significant impact on vaccination rates; a majority, 53.2% of respondents from families with better living standards, supported vaccination, compared to 11.6% who opposed an additional solitary 4.2% who were found do not know about the question asked. The substantial ($p = 0.002$) correlation among immunization status and standard of household living.

Similarly, the data revealed a moderate correlation ($p = 0.017$) between immunization status and gender-based inequality, suggesting that gender inequality in the family as well as in the community influences vaccination coverage among children, particularly in the areas where females have little influence over decision-making regarding the family matter or children's immunization.

Likewise, a marginally significant correlation ($p=0.056$) was discovered between women's role and power and immunization status, confirming that the role and power of the women in the community is crucial in children's vaccination and routine immunization related matters, and that the ratio of the contagious illness decreased where women had little say in decision-making.

Regarding geographic factors that also influence vaccine reluctancy, to some extent a significant ($p = 0.032$) correlation between respondents' residences and vaccination was discovered. The results indicate that residents of areas where people have enough facilities, like urban setting, are more willing to participate and to back inoculation practices, and that there is a high vaccination rate in those areas.

It was also discovered that there was a solid, significant ($p = 0.002$) correlation among immunization status and the accessibility of health facilities. This indicates that individuals who live in areas with resources and facilities are more receptive to vaccination and have fewer barriers to it, whereas those who live in rural areas have logistical difficulties in getting vaccinations. Furthermore, a vastly significant ($p = 0.003$) correlation amongst immunization and poverty/financial factors was discovered. Financial restrictions also have a substantial impact on vaccination, mostly influencing the decisions of the parents. According to the results, financial hardships may be a significant barrier to immunization.

The status of immunization is affected both directly and indirectly by transportation and other expenses, even though the vaccinations are free. Furthermore, the findings designate a substantial correlation ($p = 0.009$) between immunization status and employment. The parents' job position also significantly influences vaccination uptake. The parents who work are well aware of their access to health care and immunization.

There was an extremely noteworthy ($p=0.002$) connotation among immunization status and the worries and adverse effects of the vaccination. Parents are terrified of needles and vaccinations, and while they all adore their kids, this fear greatly affects their choices.

5. DISCUSSION

The findings reveal that the majority 95.0% of the participants were found to agreed that the immunization is safe. Results were in line with the findings of Dubé et al. (2018). Public trust in immunization initiatives has been weakened by disinformation, vaccination hesitation, religious misunderstandings, and suspicion of Western-led health campaigns. WHO (2021) confirmed that belief in immunization programs is crucial in order to achieve herd immunity, mainly in developing regions. Some of the respondents, 32.8%, supposed and linked the vaccination and immunization with religion and their belief system, whereas a high number, 61.1% disagreed and said that immunization is not against their religion. The above findings show that while religious worries persevere among the community to some extent, the majority of the public admit and recognize the degree to which vaccinations are compatible with their religious views. Results were in line with the findings of Khan et al. (2021), highlighting how religious academics can countersign vaccination campaigns to help reduce vaccine reluctancy because no religion forbids people from getting care or necessities.

A substantial and maximum part 65.3% of participants agreed with the statement that the irregular visits of the vaccination team and outreach vaccination are a constraint to immunization, whereas a little number, 19.3% disagreed. Research by WHO (2020) highlights that outreach vaccination teams can mitigate this issue by ensuring regular visits and better service delivery. Nearly half 44.04% of the individuals were agreed that disbelief about Western involvement and agenda affects childhood immunization coverage and uptake, despite the fact that approximately the same proportion 42.1% were also disagreed with the same statement. This distrust is frequently fueled by historical, political, and social factors, as noted by Larson et al. (2020), who found that narratives surrounding Western-led immunization campaigns have contributed to skepticism.

A little part 21.2% of the respondents show the dread and anxiety of HIV or other contagious illness as a constraint or obstacle in the way of quality immunization; however, a large portion 60.3% of participants were disagreed, and also some 18.5% of people were also found who were unsure. This concern is largely driven by misinformation, and the results were in line with the findings of WHO (2018), which recommends targeted messaging and healthcare worker training to counteract such fears. A maximum 66.9% of respondents were found to agree that their community supports the vaccination, while a little number, 27.0% of the individuals were disagreed, which shows favor with vaccination. The research findings were in line with the outcome of Orenstein & Ahmed, (2017), emphasizing that community-based approaches, including the involvement of religious and political leaders, have proven effective in increasing vaccine coverage.

A high number, 87.3% were agreed that vaccination is halal in their religion; however, a little number 7.4% were still disagreed. So, it designates that trust and belief system specifically from a religious point of view have proven successful in increasing vaccination rates and coverage. Research by Ali et al. (2020) confirms that religious decrees (fatwas) supporting vaccines have contributed to increasing immunization rates among Muslim communities. Similarly, some part 39.9% of the viewers agreed that they were disheartened by someone in their community, and he/she may not allow their children to be immunized, even though an extreme 56.9% of the individuals did not agree. The findings show the societal and

cultural influence on the people while they are living, and the misconception leads to vaccine reluctancy among the people, specifically among the public who has less information about vaccination.

A little part, 19.08% of individuals, were found to agree regarding the statement that the immunization is against their cultural values, despite the fact that a high number, 74.03% of the respondents, disagreed and only a few, 5.08% of the people, were unsure regarding the same statement asked. Results were in line with the findings of Ali et al. (2020) note that traditional beliefs may influence vaccine uptake, emphasizing the need for culturally sensitive health campaigns.

6. CONCLUSION

This study assessed community perception and constraints to the Expanded Program on Immunization (EPI) in District Peshawar. Findings indicate high awareness of vaccine safety and religious acceptability. However, vaccine reluctancy perseveres due to misinformation, religious misconceptions, accessibility issues, and socioeconomic barriers. Key factors such as parental education, income, gender roles, and healthcare access were found to influence immunization coverage. The findings emphasize the need for targeted interventions through key stakeholders to enhance vaccination coverage and address structural and cultural barriers.

6.1 Recommendations

1. **Awareness Campaigns:** Promote accurate vaccine information through local media, schools, and mosques to counter myths and fears.
2. **Community Engagement:** Involve religious scholars, health care providers and community elders to recommend and advocate for immunization.
3. **Service Accessibility:** Expand mobile teams and outreach services, particularly in rural and remote areas.
4. **Women Empowerment:** Support women's involvement in health decisions and increase female healthcare worker presence.
5. **Healthcare Provider and Vaccinator Training:** Train vaccinators in communication skills to build trust and address community concerns.
6. **Targeted Policy Interventions:** Focus on high-risk areas with tailored strategies to reduce socioeconomic and logistical barriers.

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