

# Evaluation of Household Perception about Polio Immunization, Prior and After the Direct Supervision of District Administration in Karachi

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## Abstract

**Objective:** To compare the change in the household perception about supplementary polio immunization to eradicate polio, prior and after taking special interest of the district administration Karachi from 2012 to 2016.

**Methods:** The study was conducted in the District Central, Karachi, about household perception of polio immunization on May, 2015 and April 2016. A total of 350 participants were enrolled in this study through non-probability consecutive sampling technique by healthcare workers visiting the household for supplementary polio immunization activities (SIAs). The perception of head of the families whether male or female with children were participated in this study. Study participants were enrolled after informed consent, inquired about the polio immunization team visits, access to immunization information (means of knowing health information), belief in the vaccination and knowledge of polio. The study participant's confidentiality and anonymity were maintained throughout the research process. The data collected was analyzed using SPSS version 21 (10 BM).

**Results:** The results were analyzed and compared with before and after the direct supervision of district administration of Karachi i.e 2012 and 2016, the results of the study indicated that the polio immunization team visits has been increased by 14% (67% to 81%); polio immunization information access increased by 5% (67% to 72%) as responded by respondents. Moreover, according to respondents the knowledge and awareness in polio vaccination has increased by 13% (55% to 68%), while the belief on polio vaccine has increased to 11% (63% to 74%).

**Conclusion:** In the central district of Karachi the household perception regarding polio immunization team visits, information access, knowledge and belief on Polio vaccine has increased significantly after the direct supervision of district administration Karachi.

**Keywords:** Polio Immunization, Vaccination, District administration, National Emergency Action Plan (NEAP), Karachi.

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## Introduction

The World Health Organization (WHO) has estimated that around 3,50,000 children develop poliomyelitis annually, thereby declaring polio as endemic globally in 1998<sup>1</sup>. In 2009 Pakistan comes in one of the four polio-endemic areas where wild polio virus (WPV) have never been eradicated, the

four countries are Afghanistan, India, Nigeria and Pakistan.

Poliomyelitis (polio) is an acute, communicable disease of humans caused by three poliovirus serotypes (types 1, 2 and 3, respectively). Poliovirus and disease Poliovirus is a human enterovirus of the Picornaviridae family. The virus is composed of a single-stranded, positive-sense RNA genome and a protein capsid. The three serotypes of poliovirus carry capsid proteins that differ slightly with regard to cellular receptor specificity and antigenicity. Most poliovirus infections cause asymptomatic viral replication limited to the alimentary tract. Most poliovirus infections cause asymptomatic viral replication limited to the alimentary tract. However, following an incubation period in immune-competent individuals

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ranged 4-35 days. Paralytic poliomyelitis occurs when the virus enters the central nervous system and replicates in anterior horn cells (i.e. motor neurons) of the spinal cord. Depending on the degree and extent of motor neurons affected, temporary or permanent paralysis of the affected muscles may ensue. Vaccine associated paralytic poliomyelitis (VAPP) is one of the rare adverse event. The global incidence of VAPP has been estimated at 4 cases per million birth cohort per year<sup>2</sup>. It is one of the major reasons of misperception for supplementary polio immunization activity.

Oral Polio Vaccine replaced (OPV) by IPV for ease of administration, suitability for mass vaccination campaigns, superior induction of mucosal immunity in the gut, and lower production costs. In 1974, OPV was recommended as part of the Expanded Program on Immunization (EPI) and OPV was again the vaccine of choice in 1988, when the World Health Assembly resolved to eradicate poliomyelitis globally by the year 2000.

Since the introduction of routine vaccination in the US, approximately 1.1 million cases of paralytic polio, and over 160,000 deaths have been prevented at a vaccination cost of approximately USD 1.7 billion. Due to treatment cost savings, polio vaccination generated a net benefit of approximately USD 180 billion.

The eradication of polio has been an extensive concern for most countries in the world since last two decades. Now Pakistan is one of the two remaining countries in the world with wild poliovirus (WPV) transmission, along with Afghanistan. The district Karachi administration is helping to make Pakistan polio free state by direct supervision on Polio Eradication Initiative supports the Government of Pakistan in polio eradication efforts to ensure Pakistan a polio-free status. No country being considered safe until the two years of last case disappear<sup>2,3</sup>. Polio eradication efforts has been mobilized globally through mass polio vaccination campaigns that delivered more than 20 billion doses of polio vaccine among children globally, resulting in the success in interrupting transmission in all except three countries (Nigeria, Pakistan and Afghanistan)<sup>3-4</sup>. These three countries were considered endemic till 2015, when Nigeria was removed from

the list in the month of September, 2015<sup>5</sup>. Pakistan, still continues to report wild poliovirus (WPV) cases, and is thereby accounted for majority of the caseload globally<sup>6</sup>. Though, the caseload has decreased in Pakistan compared to last years, Pakistan has come a long way in its struggle to eradicate polio. The national polio eradication program has made major strides in reaching children with immunization in all parts of the country. The current polio epidemiology remains the best we have ever seen in Pakistan. The number of cases has declined from 306 in 2014 to 54 in 2015, 20 in 2016, 8 in 2017. But still the situation is alarming as the country is responsible for endemic polio transmission globally<sup>6</sup>. Polio cases have been reported in different regions of Pakistan; i.e. Karachi, Quetta and Federal Administrative Tribal Areas (FATA)<sup>7</sup>.

In Pakistan, the polio virus continued to cripple children on account of insufficient number of polio vaccine reaching children<sup>8,9</sup>. The most important reason being responsible for the failure or limited success of the polio eradication program in Pakistan are misconceptions due to religious beliefs and cultural customs especially in tribal areas thereby decreasing vaccination coverage and increasing refusals for immunization<sup>9</sup>. A rumor related to vaccine contamination also spread that the vaccine may lead to infertility among immunized children<sup>10</sup>. Security risk, killing of polio workers and violence also significantly threatened polio eradication initiative in Pakistan<sup>9</sup>. Moreover, extensive migration in the division of Karachi, the most densely populated city of Pakistan, created an extensive unreachable population with unknown immunization status, thereby these migrants are also being held responsible for substantial polio virus transmission<sup>9</sup>. Importantly, the quality of supplementary immunization activities (SIAs) being inconsistent and the structurally weak polio eradication program were also the predominant reason for failure of polio eradication in Pakistan.

In the year 2000, the home delivery of oral polio vaccine (OPV) was initiated in Pakistan by Polio supplementary immunization activities (SIAs)<sup>11</sup>. Through SIA, every child less than 5 years of age is being tried to reach as multiple doses for children is required to develop sufficient immunity

against polio<sup>12,13</sup>. SIAs are implemented with the support of United Nation partners i.e. World Health Organization (WHO) and United Nation Children Education Fund (UNICEF)<sup>13</sup>. In SIAs every child less than 5 years irrespective of the immunization history is being tried to reach and administer oral polio vaccine (OPV)<sup>13</sup>. Though coverage of 90% during polio SIAs been identified in Pakistan, but actual coverage is questionable.

Pakistan being the country where polio virus has not been eradicated yet despite Polio Eradication being the high public health priority program, extensive support from donor agencies, and increased mass campaigns. It was hypothesized that administrative changes are desirable to effectively run the polio eradication campaign and achieve end polio target. Considering that at the national level, an emergency has been declared by the Government of Pakistan to limit the polio virus transmission and achieving polio eradication target. Thereby, the Prime Minister of Pakistan along with all four Chief Ministers of provinces, the Governor of Federally Administered Tribal Areas (FATA) and Prime Minister of Azad Jammu & Kashmir (AJ&K) approved the action plan to eradicate the polio from this country in 2011 known as National Emergency Action Plan (NEAP), being approved in 2011<sup>14</sup>. Moreover, in the year 2012 from the lessons learned from the Action Plan of 2011, it was augmented for 2012 with more focus on the oversight mechanism at federal, provincial & district levels<sup>14</sup>. Thus, there was a significant paradigm shift as the complete responsibility of eradication of polio was given to district administration with the purpose of limiting the circulation of polio virus, addressing obstacles and hurdles in effectively running polio campaign, and countering political and security problems that hampered previously the polio eradication campaign and achieving polio eradication goals and targets<sup>14</sup>. The present study was conducted to compare any change in the household perception about Polio immunization prior and after the direct supervision of District Administration in Karachi from 2012 to 2016.

## **Subjects and Methods**

This study was conducted in the District Central, Karachi division, Sindh from May, 2015 to April

2016. During this period a total of 350 participants (n=350) were enrolled in this study through non-probability consecutive sampling technique by healthcare male and female workers visiting the household for supplementary immunization activities. All the healthcare worker were trained for polio vaccination. The workers were also trained about the study and the questionnaire. Head of the family members either male or female were participated in this study. All those participants who have given consent to participate in this study and agreed for polio vaccination of their children were included while those who refused to give consent to participate in the study and also refused for vaccination of their children because of any reason were excluded from the study. Participants were included after taking informed written consent.

The study participants were inquired about the visit of polio immunization team, polio immunization information access, belief in polio immunization and knowledge of polio vaccination. These questions were basically emphasized over inquiring the health care utilization and health education with more precisely inquiring about polio vaccination both prior and after the direct control of district administration. The household members were inquired about the above mentioned closed ended questionnaire.

The present study was conducted according to ethical guidelines of Helenski declaration and Pakistan Medical and Research Council (PMRC). Written informed consent was obtained from all the participants prior to recruitment, where they were comprehensively explained about the study objective, research processes involved, risks and benefits associated with the research. Importantly, the study participant's confidentiality and anonymity were maintained throughout the research process.

## **Data Analysis**

The data collected was analyzed using SPSS version 21 (IOBM). The data recorded on the predesigned structured Proforma was entered in the SPSS software and validated for significance. Descriptive statistics were performed. The categorical variables (visit of polio immunization team, polio immunization information access, belief and knowledge of polio vaccination) prior and after control of

district administration were reported as frequency/percentage. p-value < 0.05 is significant.

**Results**

The results of the study showed that the respondents were 106 (30.30%) male while 244 (69.70%) females out of 350 (n=350) respondents (Table 01). The result also showed that the polio immunization team visits has been increased by 14% (67% to 81%), polio immunization information access increased by 5% (67% to 72%) as responded by the respondents (Table 2). Moreover, according to respondents the knowledge and belief in polio vaccination has increased by 13% (55% to 68%) and 11% (63% to 74%) respectively (Table 3). The results clearly highlighted that the visits, belief has been significantly improvement in polio immunization after the direct supervision of district administration in Karachi from the year 2012 to 2016.

Table. 1 Number of respondents

S.No.	Respondents	Result
1	Male	106 (30.3%)
2	Female	244 (69.7%)
3	Total	350

Table. 2 Response of respondents before and after direct supervision of district administration of Karachi

S.No.	Questionnaire	Positive 2016	Positive 2012
1	Polio Team Visit Frequency / Regularity	284 (81%)	234 (67%)
2	Polio information access	252 (72%)	234 (67%)
3	Knowledge of Polio vaccine	238(68%)	199 (55%)
4	Believe on Polio vaccination	259 (74%)	220 (63%)

Table. 3 Final result

S	Questionnaire	Response 2016 - 2012	Enhancement (%)
1	Polio Team Visit Frequency / Regularity	284 (81%)-234 (67%)	14
2	Polio information access	252 (72%)-234 (67%)	05
3	Knowledge of Polio vaccine	238(68%)-199 (55%)	13
4	Believe on Polio vaccination	259 (74%)-220 (63%)	11

**Discussion**

The results of the present study highlighted that there was considerable change in household perception relevance to efficiency of polio immunization after the direct supervision of district administration in Karachi from 2012 to 2016. The present study conducted was important as it gave valid information about the general population perspective on the efficiency of polio immunization as a result of giving direct supervision to district administration. Thus, it is evident that for the purpose of running the Polio Eradication Initiative (PEI)effectively as highlighted in the National Emergency Action Plan (NEAP), the office of deputy commissioner along with his sub-ordinates has effective led the PEI and played an effective and substantial significant role in aligning and co-coordinating all concerned departments, other stakeholders (i.e. national and international NGOs) in preparing and implementing the high quality and effective campaign as per the guidelines of NEAP<sup>15</sup>. The district administration control had led to the improved supervision and management, better monitoring, improved facilitation, better technical guidance, adequate feedback and taking appropriate measures as desirable eventually leading to the improved service delivery<sup>16-18</sup>. The district administration control had led to the improved planning, monitoring, management and better supervision. For proper supervision, travelling to remote sites are involved which is not always possible due to scarcity and insufficient funds available. However, as deputy commissioner has other responsibilities as well and more mobile thus could address logistic difficulties more effectively, thereby improving supervision. Moreover, ten days prior to campaign at the district level, meeting is supervised by deputy commissioner to review and analyze the future polio campaign. If the preparation is found inadequate, the campaign is being deferred till complete preparation is done for improved efficacy of the polio vaccination campaign.

The current study findings can be related to previous studies conducted. It has been reported that the health workers could play a significant role in avoiding missed opportunities for immunization through better training and supervision as the providers could potentially encourage and discourage the parental perception about the process of immu-

nization<sup>19,20</sup>. Furthermore, it has been reported that mothers who perceive that healthcare workers are trained and environment is supportive for them, they are more likely to comply and complete the children immunization<sup>21,22</sup>. The study conducted in the rural India reported that Pulse Polio Immunization campaign was successful on account of reasons identified as efficient organization, and ease of access to immunization services<sup>23</sup>. A retrospective study conducted in noncompliant communities' trend of noncompliant households decreased by 79% from 16,331 in 2013 to 3394 in 2016 and unmet needs interventions were effective in reducing the number of noncompliant households<sup>24</sup>. Importantly, earlier study has reported that poor management and allocation of finances at the regional/district level, leading to inefficiencies in vaccine delivery and a pervasive lack of accountability in meeting immunization targets .

The present study conducted had number of limitations. Firstly, the study was conducted at only district of Karachi division. Secondly, households were enrolled randomly, which would have induced the selection bias. Moreover, limited only to 350 participants were enrolled in this study from only district, thereby limiting the generalizability and external validity of the study findings. Moreover, the participants were inquired about both prior and after the control of district administration about Polio Immunization. Inquiring the study participants about prior district administration control would have potentially induced the recall bias. Importantly, a multicenter study with adequate household members being recruited from different divisions and districts of Pakistan hospital is desirable to better identify the effectiveness of household perception about Polio Immunization. Thus, consecutive sampling technique, limited number of study participants and recruitment from only study site had limited the generalizability of the study findings. We recommend such study should be conducted in rural and urban areas to improve the belief and importance of Polio vaccine and make Pakistan Polio free state.

## Conclusion

The household perception about the Polio Immunization is significantly improved after the direct supervision and monitoring of the office of Deputy Commissioner of District Administration in Karachi. Polio immunization team visit, information access, knowledge and belief on polio immunization program has improved to a considerable extent.

## Conflict of Interest

Authors have no conflict of interests and no grant/funding from any organization for this study.

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