



Original Article

Assessment of Strengths and Weaknesses of Inactivated Polio Vaccine Practices in Qasimabad, Pakistan

Imdad Ali Channa¹, Khalida Naz Memon¹, Nimra Zaman¹

¹Department of Community Medicine and Public Health Sciences, Liaquat University of Medical and Health Sciences, Jamshoro, Sindh, Pakistan.



***Corresponding author:**

Nimra Zaman,
Department of Community
Medicine and Public Health
Sciences, Liaquat University of
Medical and Health Sciences,
Jamshoro, Sindh, Pakistan.

nzk1993@hotmail.com

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ABSTRACT

Objectives: The objectives of the study were to assess the strengths and weaknesses of inactivated polio vaccine (IPV) practices in Qasimabad, Pakistan.

Material and Methods: This cross-sectional survey study was conducted in Hyderabad, Sindh, from June 22, 2017, to September 22, 2017. It included seven expanded programs on immunization (EPI) centers in Taluka Qasimabad, as well as outreach settings. Data were collected through convenience sampling with the help of an EPI Monitoring Checklist and a pre-designed questionnaire. Statistical Package for the Social Sciences version 23.0 was used for the descriptive analysis.

Results: Six of the seven health facilities were found to be screening for missed opportunities. During power outages or load shedding, the majority of EPI centers (85.7%) had a backup plan in place. However, the major shortcoming was the failure to obtain parental consent before vaccination by vaccinators at all 7 (100%) EPI centers. At 5 (71.9%) of the centers, outreach activities to vaccinate children were organized, and IPV was only given to infants at 1 (19.2%) of the sessions. The vaccinator opened the vial before using it, and the used IPV vial was not discarded at the end of the outreach session. Because one center's vaccinator was female (19.2%), and another center's vaccinator was single (19.2%), no outreach activity was planned at those two locations.

Conclusion: This research highlights the benefits and drawbacks of the current EPI program for the IPV vaccine. The presence of EPI centers at all health facilities, as well as the availability of IPV and cold chain equipment, as well as permanent and fully-trained employees, are some of the most important strengths. Lack of pre-service training and adverse events following immunization vaccine training were identified as weaknesses. There are a lack of IPV refresher training, as well as improper arrangements for outreach vaccination sessions, and a lack of transportation for vaccinators.

Keywords: Strengths, Weaknesses, Inactivated polio vaccine, EPI centers, Immunization, vaccinators, Adverse event following immunization

INTRODUCTION

The introduction of a new vaccine into a country involves several steps and the support/ authorization of numerous policy stakeholders.^[1] Before the approval of a vaccine's introduction into the country, a strong evidence base of the vaccine's efficacy in preventing the disease of interest must be established.^[2] Before the introduction of inactivated polio vaccine (IPV), Nepal conducted a SWOT analysis of its immunization program. The SWOT analysis method was instrumental in the strategic formation process for IPV introduction in Nepal, as well as a chance for reflection, to identify gaps in Nepal's immunization system's activities. In December 2015, the

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World Health Organization conducted a post-introduction evaluation of vaccination in Bangladesh.^[1] Pakistan has taken a step toward a polio-free future by introducing IPV into its routine immunization schedule on August 24, 2015, to fulfill the global commitment and meet the objectives of the polio end game strategy.^[3] In Pakistan, two polio vaccines are currently used to combat the disease: The oral polio vaccine (OPV) and the IPV, also known as the “Salk vaccine.”^[4] When given to people, who have had multiple doses of OPV in the past, IPV is very effective in preventing paralytic poliomyelitis and improves intestinal immunity.^[5]

The study is unique in that IPV was introduced in Pakistan on the recommendation of a strategic advisory group of experts with no pre-introduction evaluation of the immunization system.^[6]

The current study is a post-introduction analysis on a small scale at a local level, to determine the strengths and weaknesses that will provide insight into where we stand now in terms of polio eradication, particularly in the case where the new vaccine (IPV) is introduced as part of establishing a routine immunization system.

The goal of the study was to identify the benefits and drawbacks of IPV practices in the expanded program on immunization (EPI) so that evidence-based recommendations could be made for the program planners and policy-makers, hence contributing toward polio-free Pakistan in near future.

MATERIAL AND METHODS

The goal of this study was to determine the benefits and drawbacks of the current IPV vaccine practices. The Research Ethics Committee of Liaquat University of Medical and Health Sciences, Jamshoro, as well as the concerned District Health Officer and all other relevant authorities, gave their approval to conduct the study.

This cross-sectional survey study was conducted in Hyderabad, Sindh, from June 22, 2017, to September 22, 2017. It included seven EPI centers in Taluka Qasimabad, as well as outreach settings. The data were collected from the study population using a convenience sampling technique. In the seven EPI centers of Taluka Qasimabad, there were only 15 vaccinators and four program managers. The study included all of them ($n = 19$). For each population, that is, vaccinators and EPI managers, a specific, validated, pre-tested, and translated questionnaire was administered. EPI Monitoring Checklist was also filled. Informed written consent was taken from respondents.

The program manager and all willing vaccinators were included in the study, regardless of their length of service on their post or any prior training in the field.

Data were entered into Statistical Package for the Social Sciences software version 23.0. Descriptive results were compiled by computing frequencies for categorical variables.

RESULTS

The current study uncovered several strengths and weaknesses in the EPI system, particularly when it came to IPV vaccination practices. Table 1 explains the demographic profile of the vaccinators and managers who participated in the study.

Table 2 reveals some of the evident weaknesses. At all 7 (100%) EPI centers, the major flaw was the failure of vaccinators to obtain parental consent before vaccination. Outreach activities to vaccinate children were organized at 5 (71.9%) centers, but IPV was only given to infants at 1 (19.2%) outreach session, where the vaccinator opened the vial before using it and the used IPV vial was not discarded at the end of the outreach session, indicating a major flaw in the system and casting doubt on its credibility [see the Appendix].

Table 1: Demographic details of population-A: Vaccinators and managers.

Demographic details of vaccinator	Number (n=15)	(%)
Vaccinator's age (years)		
20–30	3	20.0
31–40	4	26.7
>40	8	53.3
Vaccinator's gender		
Male	12	80.0
Female	3	20.0
Vaccinator's educational status		
Matriculation	3	20.0
Intermediate	5	33.3
Graduate	6	40.0
Postgraduate	1	6.7
Demographic details of EPI Managers	Number (n=4)	(%)
Manager's age (years)		
53	1	25
57	2	50
58	1	25
Manager's gender		
Male	4	100
Female	0	0.00
Manager's educational status		
Lower diploma	1	25
MD/MS	1	25
Graduate	2	50
Degree in public health	0	00
EPI manager's designation		
District health officer	1	25
Focal person EPI	1	25
District supervisor vaccinator	1	25
Tehsil supervisor vaccinator	1	25

When asked why they did not throw away the used vials during the outreach session, the vaccinators said, “We wanted to avoid wastage.” The reason for not giving the IPV to infants during outreach sessions was the low number of clients reported by managers and vaccinators, indicating a weakness. Two of the seven centers did not organize any outreach activities because one vaccinator was female (19.2%) and another had only one vaccinator posted (19.2%), which is another flaw in the system under investigation.

As indicated in Table 3, six of the seven health facilities were found to be screening for missed opportunities, indicating the system's strength. The absence of supporting staff at the EPIcenter was identified as a major flaw that hampered effective service delivery. During power outages or load shedding, the majority of EPI centers (65.7%) had a backup plan in place. There was only one EPI system where no such arrangement was observed. All seven EPI centers reported visits by government supervisors/monitors. Four (57.1%) centers were visited weekly, two biweekly, and 1 (19.2%) center was visited once a month. However, the most significant weakness was the lack of third-party monitoring, which is critical for the system's smooth operation and transparency. Waste disposal was observed at all seven EPI centers using various methods, including incineration at 3 (92.8%) EPI centers and burying waste in pits at 2 (28.5%), whereas 28.5% were burning it in open space with other waste, which was against standard procedures and a major flaw.

DISCUSSION

The current study uncovered several strengths and weaknesses in the expanded program on immunization

(EPI) system, specifically when it came to IPV vaccination practices. The presence of EPI centers at all health facilities, as well as the availability of IPV and cold chain equipment, as well as permanent and fully-trained employees, are some of the most important strengths. Lack of pre-service training and adverse events following immunization (AEFI) vaccine training were identified as weaknesses. There are a lack of IPV refresher training, as well as improper arrangements for outreach vaccination sessions, and a lack of transportation for vaccinators.

Strengths

IPV and cold chain equipment are both available

The results of the SWOT analysis of the Comprehensive Multi-Year Plan and the National Immunization Support Project revealed that all seven EPI centers have complete availability of IPV and cold chain equipment, which is consistent with the results of the SWOT analysis of the Comprehensive Multi-Year Plan and the National Immunization Support Project.^[7,8] The previous studies, on the other hand, found the exact opposite results, with a lack of IPV and no cold chain equipment.^[7,9]

In the event of a power outage, a backup plan is in place

A backup power system was available at six EPI centers in the event of an electricity outage, which is in line with a previous study's recommendation that a backup power system is required to keep the cold.

Table 2: Internal factors regarding vaccinators affecting IPV practices – strengths and weaknesses.

Variable	Strength		Weakness	
	Category	Number (%)	Category	Number (%)
Vaccinator's residence status	Within 5 km to EPIcenter	8 (53.03)	>10 km to EPIcenter	4 (26.6)
	5–10 km to EPIcenter	3 (20.0)		
Vaccinator's service status	Permanent	14 (93.3)	Temporary	1 (6.7)
Incentives for vaccine dispensers	Yes	0 (0)	No	15 (100.0)
Transportation to the vaccinator is available.	Yes	10 (66.7)	No	5 (33.3)
If yes, the vaccinator has access to a transportation facility	Provided by department	1 (6.7)	Own	9 (60.0)
			Public transport	2 (13.3)
The vaccinator was made aware of IPV	Yes	15 (100.0)	No	0
Vaccinator was trained about the basics of IPV?	Yes	14 (93.3)	No	1 (6.7)
Vaccinator has received fresher training for IPV?	Yes	1 (6.7)	No	14 (93.3)
Adverse events following immunization-related training	Yes	2 (13.3)	No	13 (86.7)
Outreach sessions	Yes	5 (33.3)	No	10 (66.7)
Is IPV administered during an outreach session?	Yes	2 (13.3)	No	3 (20.0)
Extra rewards for outreach activity	Yes	1 (6.7)	No	5 (33.3)
For immunization, there is a specific course/basic training	Yes	2 (13.3)	No	13 (86.7)
Refresher training in the area of vaccinations	Yes	15 (100)	No	0
Do you advise parents about IPV vaccination?	Yes	15 (100)	No	0

Table 3: Internal factors regarding EPI centers affecting IPV practices – strengths and weaknesses.

Variable	Strength		Weakness	
	Category	Number (%)	Category	Number (%)
Doctors and staff conduct screenings at health facilities to ensure that unvaccinated children are not missed	Yes	6 (85.7)	No	1 (14.2)
Is there any cold chain equipment on hand?	Yes	7 (100)	No	0
Is the temperature chart up to date?	Yes	6 (85.7)	No	1 (14.2)
Alternative plans in the event of a power outage?	Yes	6 (85.7)	No	1 (14.2)
Availability of IPV vaccine at EPIcenter	Yes	7 (100)	No	0 (0)
Does vaccine vial monitor the condition of IPV vaccines (grade)?	Grade-I	0	Grade-II	6 (85.7)
			Grade-III	1 (14.2)
Is it true that vaccine providers advise parents about IPV?	Yes	7 (100)	No	0
Outreach activity?	Yes	5 (71.42)	No	2 (28.57)
Is IPV administered to infants during an outreach session?	Yes	1 (14.28)	No	4 (57.1)
Is there a monthly movement plan for outreach activities?	Yes	5 (71.4)	No	2 (28.5)
Is there any third-party oversight or monitoring?	Yes	0	No	7 (100)

Availability of vaccinators

Vaccinator availability is one of the main reasons for limited access to immunization services.^[7] According to national EPI policy, each union council should have two vaccinators.^[8] Vaccinators were reported to be 100% available in this study.

Vaccinators have received IPV training

Approximately 93.3% of vaccine recipients received basic IPV training. This finding is consistent with the findings of a previous study, which found that healthcare personnel training is an important factor in the success of any immunization program.^[10]

Vaccinators are residents of the area

The location of vaccine recipients is critical. Local vaccinators who live close to vaccination centers are more trustworthy to the community and save government resources such as travel funds.^[11]

Vaccinators' employment status

The majority of the vaccinators in this study (93%) were permanent employees, which is an advantage because employees with job security perform better, whereas those with low job security perform poorly.^[12,13]

Vaccinators' expertise and advice to parents

This study found that vaccine providers had adequate knowledge of IPV and were actively and effectively counseling parents about the vaccine before administering

it. The findings of this study are consistent with the previous research, which found that primary care professionals involved in the vaccination process play a critical role in educating parents about the vaccine's safety and effectiveness. As a result, health professionals must have a basic understanding of diseases and vaccines, as well as the ability to build a trusting relationship with patients.^[14]

Supervision/monitoring

For EPI district management, a district focal person and district supervisor vaccinators (DSVs) are available. The fact that all 7 (100%) EPI centers were visited by a government supervisor, which is following the National Immunization Support Program (NISP) recommendation that immunization activities be supervised by the district health management team, is a strength of the system under investigation.^[6]

Managerial training for EPI

This study's strength is that all 4 (100%) managers were previously trained on IPV, which is consistent with the findings of the comprehensive Multi-Year Plan, which found that untrained program managers were a weakness.^[15]

Weaknesses

Vaccinators do not need to take a pre-service course

In the current study, 86.7% of vaccinators said that they were appointed as vaccinators without any prior basic course or training in immunization, while only 6.7% said that they

were specifically trained after being appointed as vaccinators in EPI, Pakistan, indicating a weakness in service delivery.

Vaccines are transported in insufficient quantities due to a lack of transportation facilities

Only one vaccinator was provided transportation by the department; 60.0% of vaccinators used their mode of transportation (motorbike), and 13.3% use public transportation. This finding is also in line with a previous study, which identified transportation as a problem in healthcare facilities. Vaccinators receive an insufficient reimbursement for fuel.^[16]

There is no vaccination refresher training for vaccinators

This weakness is also revealed in this SWOT analysis, which shows that 93.3% of vaccine recipients do not receive IPV refresher training. In the SWOT analysis of Pakistan's comprehensive Multi-Year Plan, insufficient refresher training for vaccines is identified as a weakness.^[15] Furthermore, the previous study stated that continuing education and knowledge updates should be an important part of any successful health program.^[16]

Vaccinators who have not been trained to deal with AEFI

The majority of vaccinators (86.7%) were not trained for AEFI, which is necessary for vaccinators, so this is a major flaw, according to a WHO report. Vaccine providers and physicians receive adequate training so that they are aware of the most common vaccine-related reactions.^[17] Another study found that AEFI investigation, notification, and communication are effective ways to eliminate false information and boost vaccination confidence.^[18]

There are no incentives for vaccine providers

The lack of incentives for vaccine providers was one of the major flaws identified in this analysis. According to the previous research, incentives have a significant impact on health workers' motivation to work harder.^[19]

Ineffective outreach sessions

Out of 15 vaccinators, 10 (66.7%) did not perform vaccinations during outreach sessions, and only 5 (71.4%) of the seven EPI centers planned outreach activities to vaccinate children. Furthermore, IPV was only given to infants once (14.2%). IPV was not given to infants at 4 (57.1%) outreach sessions due to a low number of clients, and two centers did not arrange outreach sessions due to the unavailability of male vaccinators. These findings are consistent with those of a previous study, which found that outreach vaccination centers were inconsistent, which was deemed a major flaw.^[20]

Vaccine vial monitor (VVM) (Number 6)

There was no IPV vial in Grade I of VVM, 85.7% of centers had VVM of IPV vials in Grade II, and 14.2% of centers had VVM of IPV vials in Grade III, which is a flaw because, according to NISP, using expired vaccines or vaccines that become ineffective due to improper temperature control can cause epidemics, leading to mistrust among beneficiaries.^[7] VVM and other cold chain monitoring equipment have also been recommended in the previous studies to improve vaccine quality.^[8]

EPI managers must be qualified

Although the program managers in this study had graduate and postgraduate degrees, none of them had a management degree, contrary to a previous study's recommendation that management degrees should be required for managerial positions.^[8] A previous study found that insufficient management skills were one of the most important reasons for immunization failure.^[6]

Managers of expanded program immunization have additional responsibilities

Other than EPI, the extra responsibilities assigned to the EPI manager/focal person at the district level were also identified as a flaw in this analysis. Overworked health managers with multiple responsibilities have already been identified as a major flaw in the system.^[5]

Inadequate waste disposal

The majority of the time, improper waste disposal is observed in the current study, particularly non-compliance with pit disposal and waste burning in the open air.

There was no third-party oversight or monitoring

In this study, it was discovered that there was no third-party supervision or monitoring at all 7 (100%) EPI centers. This is in contrast to the recommendations of NISP, which state that third-party validation should be done on an annual basis.^[7]

Following are a few of the recommendations/implications for policy and practice based on the research findings:

- Vaccinators should receive training on counseling parents and caregivers, ethics and counseling practices, IPV practices, and interpersonal communication
- Systematic outreach sessions must be established
- A pre-service course/training for vaccine providers should be made mandatory
- Vaccinators may be provided with transportation to make their jobs easier
- Vaccinators should be trained on AEFI, and an AEFI kit should be provided because this adverse event can occur

- at any time during the injectable vaccination process
- Third-party monitoring and supervision of EPI is recommended to improve vaccination coverage
- The district EPI manager should not be given additional responsibilities and should have a management or public health background.

Our study has few limitations

This study was conducted at a local level, small sample size, and with convenience sampling. Extrapolation of results to different settings (regional or national) should be cautiously done.

As all the possible respondents participated in the survey, it is less likely that convenience sampling would have introduced any bias in the results.

CONCLUSION

The current EPI program has clear and significant strengths and weaknesses that are intrinsic to the IPV vaccine itself. The system's most significant strengths were its 100% availability of IPV and cold chain equipment. The majority of vaccinators are full-time employees who have completed IPV training. Program management ensured that EPI centers were supervised and monitored regularly. On the other hand, poor planning for outreach vaccination sessions, lack of pre-service course/training, lack of refresher training about IPV, and lack of training about AEFI for vaccinators was among the major weaknesses identified.

Declaration of patient consent

The Institutional Review Board (IRB) permission was obtained for the study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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APPENDIX

EPI Monitoring Checklist
<ul style="list-style-type: none"> ● District ● Taluka ● Code of Epi center ● Number of vaccinators ● Type of health facility ● Screening at facility ● Record maintenance ● Temperature chart maintenance ● Availability of cold chain equipment ● Alternative arrangements during electricity breakdown ● IPV vaccine availability ● Waste management ● Informed consent to immunize ● Counseling of parents about IPV ● Outreach activity ● Monthly movement plan for outreach activity available? ● Monthly movement plan followed as per schedule ● 3rd party supervision/monitoring ● Vaccine vial monitor condition of IPV vaccines (grade) <p>Source: Checklist is partially adapted from, Checklists for Vaccines and Immunization (Dr. Carsten Mantel WHO/FWC/IVB/EPI) and partially modified according to this study</p>

Questionnaire for vaccinators:

1. Code of vaccinator? _____
2. Age:
 - <20 years
 - 20–30 years
 - 31–40
 - >40 years
3. Gender:
 - Male
 - Female
4. Marital status?
 - Single
 - Married
 - Separated
 - Divorced
 - Widowed
5. Address (optional)? _____
6. Residential distance?
 - Within 5 km to EPIcenter
 - 5–10 km to EPIcenter
 - More than 10 km to EPIcenter

7. Educational status?

- Matriculation
- Intermediate
- Graduate
- Postgraduate

8. Service status?

- Temporary
- Permanent

9. Period of service?

- Below 10 years
- 11 years–20 years
- More than 20 years

10. Experience as a vaccinator?

- Below 10 years
- 11 years–20 years
- More than 20 years

11. The income per month?1

- Less than 12,000 PKR
- 13,000–60,000 PKR
- More than 60,000 PKR

12. Transport facilities?

- Ye
- No

If yes

- Own
- Provided by department
- Public transport

13. Particular course/basic training for immunization?

- Yes
- No

14. Refresher training?

- Yes
- No

If yes, how many times: _____

15. Informed about IPV?

- Yes
- No

16. Basic training for IPV?

- Yes
- No

1. <https://www.quora.com/What-are-the-salary-levels-of-upper-middle-and-lower-level-classes-in-India-along-with-the-poor-and-affluent>

17. Refresher training for IPV?

- Yes
- No

18. Training about AEFI?²

- Yes
- No

19. Per month registration of children?

- Up to 100
- 101–200
- 201–300
- More than 300

20. Per day vaccination of children?

- Up to 25
- 26–50
- 51–75
- More than 75

21. Outreach sessions?

- Yes
- No

If yes

a) How frequent?

- Weekly
- Fortnightly
- Monthly
- Others _____

b) How many houses are visited per month?

- Up to 50
- 51–100
- 101–150
- More than 150

If not, why?

- Lack of transport
- No POL
- No incentives
- Negligence
- Others

22. Extra incentives for outreach?

- Yes
- No

23. Do your council about IPV vaccination to parents?

- Yes
- No

If no, why _____

2. Adverse event following immunization

24. Do you maintain a record of IPV vaccination?

- Yes
- No

If no, why _____

25. Do you feel any resistance to IPV from parents?

- Yes
- No

If yes details _____

26. Hurdles against immunization?

- Lack of education
- Lack of awareness
- Lack of facilities
- Myths against immunization
- Don't know

27. Do you convey your field experience regarding IPV to your managers?

- Yes
- No

If no, why _____ -

28. Do you try to solve the problem regarding IPV by yourself?

- Yes
- No

If yes, how? _____

If no, why? _____

SOURCE: Questionnaire is partially adapted from, GAVI and Evaluation Report District MATIARI Submitted by: HEALTH AND NUTRITION DEVELOPMENT SOCIETY Strengthening and Enhancing Health Accessibility Through community mobilization in District Matiari (SEHAT)” and partially modified according to this study.

Questionnaire for EPI manager

1. Age: _____

2. Gender:

- Male
- Female

3. Qualification: _____

4. Designation: _____

5. Responsibilities other than EPI:

6. Trained for vaccine management?

- Yes
- No

7. Refresher training?

- Yes
- No

8. Training about IPV vaccine?

- Yes
- No

9. Supervision/monitoring of EPI centers?

- Yes
- No

10. Availability of IPV vaccine?

- According to target
- More than target
- Less than target

11. Arrangement for waste management?

- Yes
- No

12. Arrangement for cold chain management?

- Yes
- No

13. Alternative arrangement during electricity breakdown?

- Yes
- No

14. Are vaccinators trained for IPV?

- Yes
- No

15. Are outreach sessions being held?

- Yes
- No

16. Mobility for outreach sessions?

- Yes
- No

If yes, number of vehicles? _____

17. Incentives for vaccinators?

- Yes
- No

Source: This is partially adapted from, "Children's Vaccine Program at PATH. Guidelines for Implementing Supportive Supervision: (A step-by-step guide with tools to support immunization. Seattle© PATH (2003). And partially modified according to this study.