



EPI Pakistan



PAKISTAN IMPLEMENTATION RESEARCH FOR IMMUNIZATION

A compilation of project objectives,
results and recommendations



Alliance
for Health Policy
and Systems Research





PAKISTAN IMPLEMENTATION RESEARCH FOR IMMUNIZATION

A compilation of project objectives,
results and recommendations



Pakistan Implementation Research for Immunization – A compilation of project objectives, results and recommendations

© United Nations Children’s Fund (UNICEF), 2018

Permission is required to reproduce any part of this publication.

Please contact:

Implementation Research and Delivery Science (IRDS) Unit
Health Section
UNICEF
3 United Nations Plaza
New York, NY 100017

Design, layout and editing:
QUO Bangkok, Co., Ltd.

Photo credits

Cover	© UNICEF Pakistan/5751/Asad Zaidi
Page vi	© UNICEF/UN048373/Giacomo Pirozzi
Page 5	© UNICEF Pakistan/4455/Asad Zaidi
Pages 6-7	© UNICEF Pakistan/7030/Asad Zaidi
Page 14-15	© UNICEF Pakistan/5720/Asad Zaid
Pages 16-17	© UNICEF Pakistan/UNI167597/Asad Zaidi
Page 31	© UNICEF/UN048382/Giacomo Pirozzi
Page 43	© UNICEF/UN048384/Giacomo Pirozzi
Page 77	© UNICEF Pakistan/UNI181740/Asad Zaidi
Pages 78-79	© UNICEF Pakistan/UNI181946/Asad Zaidi
Pages 106-107	© UNICEF Pakistan/6120/Asad Zaidi
Pages 138-139	© UNICEF/UN0139379/Faran Tanveer
Page 167	© UNICEF/UN0139380/Waseem Niaz
Pages 168-169	© UNICEF Pakistan/5031/Asad Zaidi
Page 185	© UNICEF Pakistan/7300/Asad Zaidi

Cover photograph:

Children wait to be immunized against measles in Quetta, Balochistan.

CONTENTS

List of figures and tables	iv
Foreword	vii
Acknowledgements	ix
Acronyms	x
Executive summary	1
I THE PAKISTAN IMPLEMENTATION RESEARCH FOR IMMUNIZATION INITIATIVE: RATIONALE AND PROCESS	7
II RESEARCH PROJECTS	15
THEMATIC AREA 1	
Community and demand	17
Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District	18
Addressing community barriers to immunization in Rajanpur District	32
Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan: A feasibility study	44
Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts	58
THEMATIC AREA 2	
Immunization supply chain and performance management systems	79
Immunization supply chain and management performance system in Sindh	80
E-Vaccs: Assessment of barriers and enablers using the Consolidated Framework for Implementation Research in Punjab	94
THEMATIC AREA 3	
Human resources and service delivery	107
Strengthening supportive supervision: A case study of the Expanded Programme on Immunization in Sindh	108
Understanding accountability for human resources in the Expanded Programme on Immunization in Balochistan: Perspectives from government officials at provincial and district levels	126
THEMATIC AREA 4	
Building on the polio experience	139
Examining the mechanisms and effectiveness of multi-tiered, EPI-Polio synergy	140
Developing a three-dimensional narrative to counter polio vaccine refusal in Charsadda	154
III LESSONS LEARNED, CONCLUSIONS AND RECOMMENDATIONS	169
Annexes	
A Implementation research projects: Topics, locations and research teams	180
B Project objectives, key findings and recommendations	181

List of figures and tables

Figures

Figure 1	Pentavalent-3 coverage with traditional birth assistants, before and after intervention in Lal Jurio	19
Figure 2	Flow diagram of project activities: Intervention processes	22
Figure 3	Activities of TBAs and vaccinators in Salehpat	23
Figure 4	Change in vaccine-related knowledge by comparison of test scores pre- and post-training for TBAs and LHWs	25
Figure 5	Percentage change in vaccination coverage from the baseline in Sukkur District	25
Figure 6	Map of Rajanpur District	35
Figure 7	Immunization coverage after AI intervention	45
Figure 8	Age-wise distribution in months	49
Figure 9	Number of respondents and responses to IVR awareness messages	50
Figure 10	Distribution of reasons for not responding	51
Figure 11	Distribution of responses	51
Figure 12	Vaccination coverage, pre- and post-intervention survey	52
Figure 13	Social mobilization activities, implementation and their impact on vaccine hesitancy	63
Figure 14	Appropriateness of advocacy meetings to tackle vaccine hesitancy	64
Figure 15	Appropriateness of community group meetings/sessions to tackle vaccine hesitancy	64
Figure 16	Appropriateness of door-to-door visits for tackling vaccine hesitancy	65
Figure 17	Appropriateness of announcement in mosques for tackling vaccine hesitancy	65
Figure 18	Suggestions for more relevancy of activities to local context	66
Figure 19	Remedies to overcome low levels of trust and acceptability	67
Figure 20	Suggestions for improvement of immunization coverage	68
Figure 21	Lady health workers evaluation of performance of different strategies to address vaccine hesitancy	70
Figure 22	Suggestions for strategies to reduce vaccine hesitancy	70
Figure 23	Status of vaccine stock in the Sukkur District store (non-intervention district)	87
Figure 24	Status of vaccine stock in Ghotki District store (intervention district)	88
Figure 25	Vaccine wastage rate for August 2017 in the Sukkur District store (non-intervention district)	88
Figure 26	Vaccine wastage rate for August 2017 in the Ghotki District store (intervention district)	89
Figure 27	E-Vaccs coverage comparison of selected four districts	98
Figure 28	E-Vaccs attendance comparison of selected four districts	98
Figure 29	Age ranges of the vaccinators	103
Figure 30	Conceptual framework to measure implementation fidelity	112
Figure 31	Conceptual framework to measure implementation acceptability	112
Figure 32	Answerability, Enforcement and Responsibility Framework	128
Figure 33	Conceptual framework to explore stakeholders' viewpoint for synergized immunization outcomes Page	143

Tables

Table 1	Steps, key milestones and timeline of the Pakistan Implementation Research for Immunization Initiative	9
Table 2	Thematic areas, research topics and locations where the selected projects were conducted	12
Table 3	Characteristics of study arms	21
Table 4	Percentage change in vaccination coverage before and after the intervention in selected UCs	26
Table 5	FGDs and IDIs conducted with female health care providers	37
Table 6	FGDs and IDIs conducted with male health care providers	37
Table 7	Socio-demographic characteristics of the study participants	47
Table 8	Distribution of vaccination doses among children	49
Table 9	BHUs and type of respondents in Sargodha and Khushab Districts	62
Table 10	Community involvement	68
Table 11	Data collection sites	85
Table 12	Description of supply chain logistics at main district and <i>taluka</i> stores	86
Table 13	Description of logistics at service delivery points	87
Table 14	Data quality rating for Ghotki and Sukkur Districts	89
Table 15	Results of key informant interviews	91
Table 16	Data collection methods and study participants	114
Table 17	Observation of completeness of information filled in by supervisors on the EPI checklist for supervision	120
Table 18	Summary of participants selected for individual interviews and FGDs	144
Table 19	Data collection methods and research respondents	171



A girl stands by the entrance to the stabilization centre at Children's Hospital in the city of Multan, in Punjab Province.

Foreword

It gives us immense pleasure to present the outcomes of the Pakistan Implementation Research for Immunization Initiative in this comprehensive compilation of project objectives, results and recommendations. The Initiative consists of 10 implementation research projects under four overarching themes: community and demand, immunization supply chain and performance management, human resources and service delivery, and building on the polio experience.

As is often pointed out, immunization has immense potential to be a central pillar of universal health coverage, providing the infrastructure required for an effective and equitable primary healthcare system. Other parts of the health system can build on the immunization community's ability to reach populations in need, and by integrating with other parts of the health system, immunization can contribute to multiple Sustainable Development Goals as well as global health security and efforts against antimicrobial resistance.

The Pakistan Expanded Programme on Immunization (EPI) is a large platform for delivery of immunization and related services. Every year, it targets 7 million children under the age of 1 year, as well as 7 million pregnant women with life-saving vaccines. In recent years, the Pakistan EPI has seen significant successes. New vaccines have been added to the routine immunization schedule, and coverage with the pentavalent vaccine has risen to over 75 per cent across the nation.

However, despite these successes, EPI is not meeting its full potential. It has been challenging for Pakistan to reach its polio eradication, and measles and neonatal tetanus elimination goals, and there is wide variation and inequities in coverage of routine vaccines across provinces and population groups. Service delivery and demand challenges, which lead to irregular access and poor service utilization, are a key reason that performance is suboptimal. There is still much to be learned regarding ways to improve implementation and to scale-up innovation and practices that are proven to be effective.

Following a request from the federal and provincial EPI programmes in Pakistan Gavi, the Vaccine Alliance funded the Implementation Research for Immunization Initiative with the aim of generating high-quality information and evidence to better address key challenges in the immunization programme and policy implementation. With technical support from UNICEF and the Alliance for Health Policy and Systems Research at the World Health Organization, the initiative brought together a broad spectrum of decision-makers and frontline programme implementers from across EPI, as well as skilled researchers. The Pakistan Health Services Academy (HSA) provided logistical support to the research teams.

From its inception, the Pakistan Implementation Research for Immunization Initiative has focused on the top priorities of the immunization programme and on supporting informed action. This is not research for the sake of research but a concerted effort to enable smart and well-informed decisions for the future of immunization in Pakistan. Together with its partners, the Government of Pakistan will be able to use the evidence the Initiative has generated to improve the health and survival of Pakistan's children.



**Aida
Girma-Melaku**

Representative
UNICEF
Pakistan



**Hamidreza
Setayesh**

Senior Country
Manager for
Pakistan, Gavi,
the Vaccine
Alliance



**Stefan
Peterson**

Associate
Director,
Health,
UNICEF



**Abdul
Ghaffar**

Executive
Director,
Alliance for
Health Policy
and Systems
Research



**Assad
Hafeez**

Director General,
Federal Ministry
of National
Health Services
Regulation and
Coordination;
Executive Director,
Health Services
Academy, Pakistan

Acknowledgements

This compilation of project objectives, results and recommendations is a product of the Pakistan Implementation Research for Immunization Initiative. The initiative, which explored and assessed health system and implementation bottlenecks in Pakistan's Expanded Programme on Immunization (EPI), was launched in 2016 by federal and provincial EPI officials.

The immunization partners in Pakistan are grateful to Gavi, the Vaccine Alliance for providing financial support for the initiative, and in particular, to Hamidreza Setayesh and Anuradha Gupta for their interest and support for implementation research. Appreciation is given to UNICEF and the Alliance for Health Policy and Systems Research (AHPSR) at the World Health Organization for technical oversight and support. Pakistan Health Services Academy (HSA) provided administrative and logistic support for two technical workshops, which were key components of the initiative.

Special thanks are given to members of the research teams for their commitment to the initiative and to building strong immunization systems in Pakistan. It was only possible to complete all the research projects to a high standard and on time because of their dedication and hard work. In addition, invaluable contributions to the research were made by many federal and provincial EPI officials, including chief executive officers (CEOs), district health officers (DHOs), assistant superintendents of vaccination (ASVs), district superintendents of vaccination (DSVs), lady health supervisors (LHSs), lady health workers (LHWs) and vaccinators. It is also important to thank all the research participants, including numerous caregivers and community members, research assistants, translators and interviewers throughout Pakistan.

Kennedy Ongwae and Ayesha Durrani from UNICEF Pakistan, and Faraz Khalid (independent consultant) provided ongoing and essential technical support to research teams throughout the initiative. In addition, Kumanan Rasanathan from UNICEF New York and Nhan Tran from AHPSR provided remote support.

Asm Shahabuddin, Alyssa Sharkey and Andreas Hasman from the Implementation Research and Delivery Science (IRDS) Unit, UNICEF New York, and the UNICEF Regional Office for South Asia coordinated contributions, and edited and refined the project reports for this compilation.

Acronyms

ADHO	additional district health officer	KII	key-informant interview
AEFI	adverse events following immunization	LHS	lady health supervisor
AHPSR	Alliance for Health Policy and Systems Research	LHV	lady health visitor
AI	artificial intelligence	LHW	lady health worker
AKU	Aga Khan University	LMIS	Logistics Management Information System
ASV	assistant superintendent of vaccination	MLM	mid-level manager
BCG	bacille Calmette-Guerin (Bacillus Calmette–Guérin)	MNHSRC	Ministry of National Health Services, Regulation and Coordination
BHU	basic health unit	NCSRI	National Communication Strategy for Routine Immunization
CBV	community-based vaccination	NEAP	National Emergency Action Plan
CFIR	Consolidated Framework for Implementation Research	NGO	non-governmental organization
CHW	community health worker	NIDs	National Immunization Days
cMYP	comprehensive multi-year plan	N-STOP	National Stop Transmission of Polio
CRVS	civil registration and vital statistics	OPV	oral polio vaccine
CSO	civil society organization	PITB	Pakistan Information Technology Board
DHIS	District Health Information System	PPA	Pakistan Pediatric Association
DHO	district health officer	QIT	quality improvement team
DHMT	District Health Management Team	REC	Reaching Every Child
DSV	district superintendent of vaccination	RED	Reaching Every District
EDO	executive district officer	RHC	rural health centre
EPI	Expanded Programme on Immunization	RI	routine immunization
EOC	Emergency Operations Centre	SDP	service delivery point
FGD	focus group discussion	SHNS	school health and nutrition supervisor
FIG	fully immunized child	SIA	supplementary immunization activities
GPEI	Global Polio Eradication Initiative	TBA	traditional birth attendant
HRD	human resource development	TSV	<i>tehsil/taluka</i> (sub-district) supervisor of vaccination
HSA	Health Services Academy	UC	union council
IDI	in-depth interview	UNICEF	United Nations Children’s Fund
IEC	information, education and communication	USAID	United States Agency for International Development
IR	implementation research	VAN	Visibility and Analytics Network
IRB	Institutional Review Board	vLMIS	Vaccine Logistics Management Information System
IRDS	implementation research and delivery science	VPD	vaccine-preventable disease
		WHO	World Health Organization

Executive summary

Approximately half of all deaths among children under 5 years of age in Pakistan occur due to diarrhoea, pneumonia and meningitis, and many of these deaths can be prevented through vaccination. Despite considerable progress in immunization in the past few decades, immunization coverage remains low in Pakistan and there is still much to be learned regarding ways to improve implementation and scale up. Implementation research (IR) can produce the information needed to fill this knowledge gap by addressing key questions concerning programme and policy implementation.

IR integrates research methods and approaches within existing health programme implementation and policy-making cycles in order to improve service delivery and overcome bottlenecks. It can be used to explore and resolve barriers relating to a wide range of challenges (e.g., technical, behavioural, socio-cultural, financial and health systems), and can be a critical path to health systems strengthening.

This document summarizes the outcomes and key lessons learned from IR projects carried out as part of the Pakistan Implementation Research for Immunization Initiative between 2016 and 2018. The Initiative followed a request from the federal and provincial Expanded Programme on Immunization (EPI) in Pakistan, and was financially supported by Gavi, the Vaccine Alliance. Technical support for the initiative was provided by UNICEF and the Alliance for Health Systems and Policy Research (AHPSR), with administrative and logistical support from the Pakistan Health Services Academy (HSA).

The Implementation Research for Immunization Initiative

Gavi has identified the use of implementation research as a priority to improve immunization coverage and ensure equity in countries where coverage is still low. The Pakistan Implementation Research for Immunization Initiative was launched in 2016 to explore and assess health system and implementation bottlenecks facing EPI. The objectives of the Initiative are to:

- identify and describe current gaps and challenges in the implementation of EPI in Pakistan;
- engage decision-makers and implementers of the immunization programmes in implementation research;
- carry out priority implementation research to explore strategies for tackling EPI service delivery bottlenecks; and
- develop implementation research capacity at the national level.

Following an exploratory literature review, there was an open call for implementation research proposals. Provincial or federal EPI implementers and decision-makers in Pakistan working with at least one researcher affiliated with an academic or research institution were eligible to apply for grants of up to US\$20,000 each. Proposed studies had to be completed within nine months. Ultimately, a total of 36 proposals were received of which 10 projects were selected for funding. The selected projects fell into four broad thematic areas: community and demand, immunization supply chain and performance management systems, human resources and service delivery, and building on the polio experience (*see Annex A and Annex B*).

Community and demand

The IR projects in this category focus on the role of the community health workforce in engaging communities to increase demand. The project by Ahmed and colleagues¹ focuses on the problems with restricted access to immunization services in hard-to-reach areas and identifies referrals to immunization sites by community health workers (traditional birth attendants) as a viable solution to access problems. Community health workers know the community and are respected figures whom caregivers are already familiar with, which makes them effective in raising awareness and generating demand for immunization. However, the project also points to the need for expanded outreach services in hard-to-reach areas so that traditional birth attendants have vaccinators to refer children to, as well as effective incentive structures that enable their active engagement in child enrolment and vaccination.

The project by Younas and colleagues² also focuses on the community workforce, in this case the cadre of lady health workers (LHWs) and vaccinators, and their untapped potential to mobilize the community and increase demand for immunization. The key problem addressed is LHWs' insufficient focus on immunization social mobilization activities and the lack of human resources in underserved areas where LHWs could make a difference. Identified solutions include improving training on social mobilization among LHWs and vaccinators, reallocating human resources to underserved areas, and establishing a system of birth registration in the community that is managed by LHW and vaccinators.

Issues of lady health workers and social mobilization are also the focus of the project by Saleem and colleagues.³ In this study, parental hesitancy towards vaccination and the inability of the immunization programme to counter this hesitancy are identified as the main implementation problems. Solutions identified through this IR include a structuring and monitoring system to ensure counselling of parents about immunization, establishing or reactivating district communication committees to review social mobilization activities, and conducting an assessment of the training needs of staff involved in social mobilization.

The last project in this thematic area, by Khan and colleagues⁴ explores the feasibility of using mobile and artificial intelligence technology to address the implementation challenges of lack of awareness of vaccines and access to immunization services. They find that the use of text messages and automated voice calls contributed substantially to improving immunization coverage through increased demand.

Immunization supply chain and performance management systems

In the second thematic area of the selected IR projects, the focus is on the effectiveness of immunization and supply systems, and on ways to strengthen these systems. Altaf and colleagues⁵ address the problem of ineffective vaccine supply chain management, which leads to vaccines being wasted or losing their potency. They find that a web-based vaccine logistics management information system has significantly improved vaccine availability and had a positive effect on record keeping, data quality and on decision-making about vaccine distribution.

1 Community health worker's based referral system for improving the EPI coverage, Siraj Ahmed et al.

2 Addressing community barriers to immunization in Rajanpur district, Muhammad Younas et al.

3 Social mobilization campaign and immunization hesitancy: A case study of districts Sargodha and Khushab, Tariq Saleem et al.

4 Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan, Ejaz Ahmad Khan et al.

5 Immunization supply chain and management performance system, Arshad Altaf.

Mazhar and colleagues⁶ look at the low performance of some field vaccinators, and the resulting gaps in immunization coverage. In their project they established that E-Vaccs, an online performance management system, can significantly improve data accuracy, visibility and appreciation among vaccinators, and, over time, can improve quality and coverage. The authors recommend that dashboards are changed and additional features are added to improve acceptability and uptake among frontline workers, and suggest training in the use of E-Vaccs.

Human resources and service delivery

The third thematic area of the projects focuses on strategies for strengthening supportive supervision and ensuring human resource accountability. Tanzil and colleagues⁷ explore opportunities to strengthen supportive supervision of EPI services in Sindh, thereby improving quality and equity in immunization. They conclude that training modules for EPI supervisors should be updated to include interpersonal communication skills, a new incentive structure for supervisors should be put in place, and checklists and other practical tools should be improved to ensure more frequent and effective supervisory visits in the field.

Human resource accountability is also the focus in the project by Naveed and colleagues⁸. This project explores how a higher degree of accountability among EPI staff can improve access and quality of EPI in Balochistan. The team's findings show that ways to strengthen accountability systems include clearly setting out rules, regulations and procedures in policy and individual job descriptions; filling staffing gaps; and incentivizing higher degrees of accountability among immunization staff through performance-based pay and other incentives.

Building on the polio experience

Pakistan has a long history of polio eradication programming but the disease is still endemic in the country. Two IR projects focus on ways in which the polio experience can be used to strengthen routine immunization. UI-Haq and colleagues⁹ examine why there have been limited synergies between the polio programme and other immunization programmes, despite considerable political support for increased integration. They conclude that it is important to ensure clarity on the concept of synergy among different levels of stakeholders and recommend that there be practical guidelines on how to improve integration of immunization programmes.

Khan and colleagues¹⁰ look at how the polio programme has successfully dealt with caregiver refusals of vaccination. The recommendation for the immunization programme is to increase religious leaders' support through workshops and seminars; address the cultural dimension of vaccine refusals through social and traditional media; invest in training and support for vaccinators, and improve their technical knowledge of vaccines and immunization; and build capacity for interpersonal communication.

6 E-Vaccs: Qualitative assessment of the barriers and enablers in implementation using Consolidated Framework for Implementation Research, Shehneela Mazhar et al.

7 Exploring opportunities to strengthen supportive supervision of EPI services in Sindh, Sana Tanzil et al.

8 Understanding accountability apropos human resources in EPI, Balochistan, Zaeema Naveed et al.

9 Examining the mechanisms and effectiveness of multi-tiered, EPI-polio synergy, Zaeem UI-Haq et al.

10 Developing three-dimensional narrative to counter polio vaccine refusal in Charsadda, Sheraz Ahmad Khan et al.

Process and key lessons learned

In addition to identifying different strategies to tackle service delivery bottlenecks and improve immunization coverage, the Implementation Research for Immunization Initiative in Pakistan shows that IR can be done within a short time-period and on a relatively small budget. Importantly, this project successfully brought together researchers, EPI managers and policy-makers to generate information and evidence that is relevant for improving EPI and health systems strengthening in Pakistan.

Some challenges were encountered during and following the initiative, particularly relating to limited coordination among different partners and, to date, more work needs to be done to ensure better utilization of the results and recommendations to inform policies and programmes. Providing clear guidance and building capacity about research utilization among IR teams, as well as clarifying the roles and responsibilities of all involved could ensure better future health systems and implementation research in Pakistan and beyond.

In spite of these challenges, the Initiative had many successes and lessons learned. This work demonstrates that the involvement of programme implementers and policy makers in IR is key to the identification of implementation gaps and bottlenecks as well as key to generating potential solutions. In addition, strong government buy-in from the outset, and continuous technical support from partners and experts are important to the delivery of IR projects and to the effective use of the findings.



Two children show the painted tip of their finger, which indicates that they have been immunized against measles in Peshawar, Pakistan.



A lady health worker visits a very poor family, which is living in a makeshift shelter inside an impoverished informal settlement in the city of Karachi, Pakistan, to inform them of the need to immunize their children against measles.



**| THE PAKISTAN
IMPLEMENTATION
RESEARCH FOR
IMMUNIZATION
INITIATIVE: RATIONALE
AND PROCESS**

The Pakistan Implementation Research for Immunization Initiative: Rationale and process

This section presents the background to the Pakistan Implementation Research for Immunization Initiative, which started in 2016 as a collaboration between Expanded Programme on Immunization (EPI), and national and international partners. It summarizes the rationale for the initiative as well as its overall process and timeline. It concludes with an overview of the structure of the compilation.

Background

Approximately half of all deaths among children under 5 years of age in Pakistan occur due to diarrhoea, pneumonia and meningitis, and many of these deaths can be prevented through vaccination [1]. EPI was established in 1978 to enable delivery of vaccines to every child in the country. Despite considerable progress in the past few decades, immunization coverage remains low in Pakistan. The most recent Pakistan Demographic and Health Survey (PDHS, 2018) shows that only 66 per cent of children in Pakistan aged 12-23 months receive all basic vaccinations, compared to global vaccination coverage of 85 per cent, and only 51 per cent of children received all age-appropriate vaccinations [2].

While evidence of the efficacy of vaccines is well established, there is still much to be learned regarding how to improve implementation and scale up of this life-saving intervention, particularly for children and their families living in the most deprived settings. Implementation research (IR), defined as “[t]he integration of research methods and approaches within existing health programme implementation and policy making cycles in order to improve service delivery and overcome bottlenecks,” can produce the information needed to bridge this knowledge gap by addressing key questions concerning programme and policy implementation [3, 4]. IR can be used to examine barriers relating to technical, behavioural, socio-cultural, financial, and/or health systems challenges in real-world settings; identify strategies to overcome these barriers in real time (course correct); and promote the uptake of research findings to maximize implementation effectiveness [3, 4]. As such, implementation research is recognized as critical to strengthening health systems [5].

Despite its potential, the concept of embedding research into real-world policy, practice and implementation is somewhat new in global health and national health programmes, and uptake of implementation research has its challenges. These challenges include convincing in-country partners, including government counterparts, of the value of research; ensuring that research findings are timely and can be incorporated into existing funding and policy cycles; and disseminating findings to inform programmes in other settings.

Gavi, the Vaccine Alliance, has identified the use of implementation research as a priority to improve immunization coverage and ensure equity in countries where coverage is still low. The Implementation Research for Immunization initiative in Pakistan was launched in 2016 to explore and assess health system and implementation bottlenecks facing EPI. The project was initiated following EPI requests at both the federal and provincial levels in Pakistan, and was financially supported by Gavi, and technically supported by UNICEF and the Alliance for Health Policy and Systems Research (AHPSR), with administrative and logistical support from the Pakistan Health Services Academy (HSA).

Objectives of the initiative

The Pakistan Implementation Research for Immunization Initiative had the following objectives:

- Identify current gaps and challenges in the implementation of immunization programmes in Pakistan and review existing knowledge on these issues;
- Orient, sensitize and engage decision-makers and implementers of the immunization programmes in implementation research;
- Formulate, prioritize and conduct implementation research based on the barriers and challenges identified by decision-makers; and
- Develop implementation research capacity among local collaborators with governments as well as collaborating academic/research institutions and individuals.

Overview of the process

Key milestones and the timeline were developed at the beginning of the project (see Table 1).

TABLE 1
Steps, key milestones and timeline of the Pakistan Implementation Research for Immunization Initiative

Steps and key milestones	Timeline
1 Formation of steering committee and recruitment of external health system strengthening consultant	November 2016
2 Literature review (an exploratory study) to identify knowledge gaps	November to December 2016
3 IR orientation workshop and prioritization of key research questions	February 2017
4 Call for proposals, creation of shortlist and selection of research proposals for funding	March to April 2017
5 Protocol development workshop and revision of protocols	May to June 2017
6 Finalization of research methodology, data collection tools and data collection	July to September 2017
7 Synthesis of draft reports, review by UNICEF staff, and finalization of IR reports	October 2017 to January 2018
8 Dissemination workshop	March 2018

Formulation of steering committee and recruitment of local consultant

A steering committee comprised of representatives of all partners (UNICEF, AHPSR, HSA and EPI Pakistan) was established at the beginning of the project. A local health systems and implementation research consultant was recruited by UNICEF Pakistan to provide technical support to the research teams throughout the project period.

Literature review (an exploratory qualitative study)

To initiate the project, the Ministry of National Health Services Regulation and Coordination (MNHSRC) commissioned an exploratory study to identify the information gaps about system-level barriers impeding the optimal delivery of immunization services to children in Pakistan. The study started with a detailed literature review of peer-reviewed articles, government reports, EPI documents, WHO, UNICEF and Gavi reports, and other grey literature to document existing knowledge gap, status of, and barriers to immunization in Pakistan.

The review revealed stagnant or declining immunization coverage in the past few years. Examined through a systems lens, several factors were shown to contribute to the failure of the EPI to achieve its targets, including issues relating to service delivery, programme management, monitoring and evaluation, logistics, human resources management and financing, as well as an inability to understand and respond to community health-seeking behaviour and other demand-side issues. Results of the literature review are published elsewhere [6].

Orientation workshop on implementation research

The Pakistan HSA, in partnership with the AHPSR and UNICEF, organized a consultative workshop in Islamabad 1 to 3 February 2017. Key stakeholders from the health sector (specifically immunization programmes) were actively engaged and participated in the workshop. The objectives of the workshop were to identify current gaps and challenges in implementing immunization programmes in Pakistan, and to sensitize decision-makers and implementers on the use of implementation research as part of the programme design. Key findings of the exploratory study were shared, and participants' views were solicited to further shape the research agenda. The workshop also helped in formulating and prioritizing implementation research questions.

Call for proposals

Based on the findings of the literature review and analysis, in March 2017, the HSA issued a call for proposals for research seeking to enable the effective implementation of immunization in Pakistan. The call was issued through the HSA website [7] and local newspapers, and shared via email with well-reputed academic and research institutions, as well as civil society organizations (CSOs). Implementers who were working with at least one researcher affiliated with an academic or research institution were eligible to submit proposals in response to the call. Grants of up to US\$20,000 were made available to support research studies for up to 9 months' duration. Ultimately, a total of 36 proposals were received of which 10 projects were selected for funding.

Process and criteria for selecting projects

The 36 submitted proposals were assessed by an external committee of independent experts engaged in implementation research using a number of predefined criteria. The six criteria, which were given equal weight in the assessment, were:

- EPI decision-maker or programme implementer listed as a principal investigator
- justification for the choice of the study design and methods to address a primary research question
- research question addresses issues relevant to EPI implementation
- research has findings that intended audiences can act upon
- capacity of the research team to carry out the proposed study
- project is appropriate in terms of budget and timing

The scores of individual proposals according to the predefined criteria were shared with the steering committee, which held a series of teleconferences to shortlist the proposals. Ten proposals were ultimately selected, ensuring a strong mix of topics and geographical representation of the teams.

Selected projects

The ten selected research projects were supported through the Pakistan Implementation Research for Immunization Initiative. While the research projects explored a diverse set of implementation challenges and solutions across districts and provinces in Pakistan, all projects focussed on reducing immunization inequities. Topics studied by the IR teams included strategies for diminishing vaccine hesitancy via social mobilization and behavioural change communication, improved health workers' performance through the application of mobile technologies and supportive supervision, improved vaccine supply chain management, involvement of informal health workers for vaccine referrals, strategies for strengthening human resources accountability, and better synergy between EPI and polio programmes. The ten project topics covered four different thematic areas across a number of sites/districts within different provinces (see Table 2).

Protocol development workshop

A protocol development workshop for expert facilitators to provide technical assistance to the 10 selected research teams to refine their protocols was conducted at the HSA between 10 and 12 May 2017. The initial draft protocols submitted by the 10 selected teams were thoroughly reviewed prior to the workshop.

A researcher and an implementer from each of the 10 teams participated in the workshop and presented their research questions and planned methodologies. Facilitators from AHPSR, UNICEF and the HSA provided feedback to the participants on their research questions and best practices, and provided examples from other similar research projects. In addition, participants discussed the teams' financial agreements with the HSA, timelines for financial disbursements, deadlines for submission of key deliverables, and memoranda of understanding (MoU) with the respective provincial departments of health.

Between the protocol development workshop and deadline for final protocol submission, the health system consultant provided guidance to research teams through emails and phone calls on various aspects of the protocol.

Finalization of research methodology, data collection tools and data collection

After receiving the draft protocols, the locally recruited UNICEF consultant, staff from the Implementation Research and Delivery Science (IRDS) Unit and Immunization Unit at UNICEF's headquarters and AHPSR provided critical feedback to the research teams to refine methodology and data collection tools for each project. Further technical guidance on HSA's Institutional Review Board (IRB) guidelines was provided to the research teams. When teams submitted the revised protocols, they were reviewed again, and editorial revisions were suggested to ensure that protocols conform to the IRB's guidelines. Within a week of submission of the full protocols, IRB approval for all the ten teams was secured.

MoUs were approved and signed by respective provincial/district EPI authorities to implement the projects. Multiple methods/tools for ensuring quality in the research process, tracking progress and providing technical guidance to the research teams were discussed among the members of the steering committee. Throughout the research period, monthly follow-up teleconferences and at least one on-site visit were conducted by the consultant to track progress and provide technical guidance.

TABLE 2
Thematic areas, research topics and locations where the selected projects were conducted

Thematic area	Research topic	Study sites/ districts	Province
Community and demand	1 Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District	Sukkur	Sindh
	2 Addressing community barriers to immunization in Rajanpur District	Rajanpur	Punjab
	3 Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan: A feasibility study	Quetta	Balochistan
	4 Social mobilization campaign to tackle immunization hesitancy in Sargodha District and Khushab District	Sargodha and Khushab	Punjab
Immunization supply chain and performance management systems	5 Immunization supply chain and management performance system in Ghotki District and Sukkur District	Ghotki and Sukkur	Sindh
	6 E-Vaccs: Qualitative assessment of the barriers and enablers in implementation using the Consolidated Framework for Implementation Research in four districts	Lahore, Dera Ghazi Khan, Gujrat and Rawalpindi	Punjab
Human resources and service delivery	7 Exploring opportunities for strengthening supportive supervision: A case study of EPI services in Sindh Province	Hyderabad and Thatta	Sindh
	8 Understanding accountability for human resources in EPI, Balochistan: Perspective from the government officials in eight districts	Pishin, Harnai, Jhal Magsi, Killa Abdullah, Killa Saifullah	Balochistan
Building on the polio experience	9 Examining the mechanisms and effectiveness of multi-tiered, EPI-polio synergy in four provinces		In four provinces
	10 Developing a three-dimensional narrative to counter polio vaccine refusal in Charsadda District	Charsadda	Khyber Pakhtunkhwa

Synthesis of draft reports, review by UNICEF staff, and finalization of IR reports

A template to guide teams on the key sections to include within their final reports was developed by the consultant and shared with the research teams. The first drafts submitted by the teams were then reviewed mainly by the consultant, UNICEF Pakistan, and UNICEF regional office and headquarters. Written feedback was provided and a teleconference was conducted with each team to develop its final report.

Dissemination workshop

A dissemination and advocacy seminar, a collaboration between UNICEF, AHPSR and the HSA, was held at the HSA 12-13 March 2018 in Islamabad. Participants included representatives of implementing partners, federal and provincial EPI programmes, non-governmental organizations (NGOs), donors, academia, researcher and CSOs. The objective of the workshop was to disseminate the main findings of the research to the relevant audiences and stakeholders, and inform and sensitize top policy makers through advocacy messages on health system issues affecting the immunization programme in Pakistan.

On the first day of the seminar, teams made detailed presentations and received feedback from steering committee members on advocacy messages. The second day was chaired by the Federal Minister of Health and was well attended by a range of stakeholders. Each team's presentation was followed by a discussion on how the research findings could strengthen immunization programme implementation in Pakistan.

Structure of the compilation

This compilation is a comprehensive resource presenting summaries of all implementation research projects included within the Pakistan Implementation Research for Immunization Initiative. Each of the ten projects has its own chapter, including a project summary and a full project report. The ten projects are categorized into four broad themes (see Table 2):

Thematic area 1: Community and demand;

Thematic area 2: Immunization supply chain and performance management systems;

Thematic area 3: Human resources and service delivery

Thematic area 4: Building on the polio experience.

The final chapter of the compilation presents the lessons learned, conclusions and recommendations of the initiative.

References

- 1 Progress for Children: Beyond Averages – Learning from the MDGs. UNICEF, New York: 2015, <www.unicef.org/publications/files/Progress_for_Children_No._11_22June15.pdf>.
- 2 Pakistan Demographic and Health Survey 2017–2018: Key indicators, Islamabad, 2018, <[doi:10.2307/1973773](https://doi.org/10.2307/1973773)>.
- 3 Peters David H., et al., 'Implementation research: What it is and how to do it', *British Journal of Sports Medicine*, vol. 48, 2014, <[doi:10.1136/bmj.f6753](https://doi.org/10.1136/bmj.f6753)>.
- 4 Theobald, Sally, et al., 'Implementation research: new imperatives and opportunities in global health', *Lancet*, vol. 392, issue 10160, 2018, pp. 2214–2228, <[http://dx.doi.org/10.1016/S0140-6736\(18\)32205-0](http://dx.doi.org/10.1016/S0140-6736(18)32205-0)>.
- 5 Ghaffar A. et al., 'Strengthening health systems through embedded research', *Bulletin of the World Health Organization*, vol. 95, issue 2, 2017, <[doi:10.2471/BLT.16.189126](https://doi.org/10.2471/BLT.16.189126)>.
- 6 Shaikh Babar, T., Zaeem Haq, Nhan Tran and Assad Hafeez, 'Health system barriers and levers in implementation of the Expanded Program on Immunization (EPI) in Pakistan: an evidence informed situation analysis', *Public Health Reviews*, vol. 39, issue 1, 2018.
- 7 The call for proposals was launched at <www.hsa.edu.pk/?p=3866>, accessed 8 June 2018.



An infant is immunized against measles in the city of Quetta, Pakistan.



||

RESEARCH PROJECTS



Pathani, a female health worker, conducts a health, nutrition and hygiene session for a group of women and children in Sabhar bheel village, Umarkot District, Sindh Province, Pakistan.

A group of women are seated in a room with a thatched wall. They are wearing colorful headscarves and multiple white bangles. The woman in the foreground is wearing a pink and yellow patterned headscarf and a red top. The woman to her right is wearing a purple headscarf with a floral pattern and a white top. The background shows a thatched wall and other women in colorful clothing.

THEMATIC AREA 1

Community and demand

Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District

Key messages

- There are often an insufficient number of vaccinators in rural and hard-to-reach areas
- In hard-to-reach areas, community health workers, including traditional birth attendants, are primary providers of health care services
- A well-defined system of referrals for vaccination, as well as training and incentives for traditional birth attendants, has the potential to increase immunization coverage in remote and hard-to-reach areas

What is the problem?

Access to immunization is a real challenge in rural and hard-to-reach areas of Pakistan. Often vaccinators are not available and coverage with vaccines is low. In these areas, traditional birth attendants (TBAs) and lady health workers (LHWs) are important providers of care. TBAs are considered the first-level care providers for newborns and are trusted by communities. LHWs work as mobilizers for immunization, and in some areas, they administer injectable vaccines. TBAs are traditionally not involved in immunization.

This study was conducted in two hard-to-reach areas of Sukkur District in Sindh Province to determine if incentives and training for TBAs and LHWs can improve immunization coverage through referrals.

How was the research done?

The study took place over a five-month period in 2017. Low vaccination and hard-to-reach areas were identified. TBAs in one area were trained to refer children for vaccination, while in another area, LHWs were trained. TBAs were provided monetary incentives for the enrolment and completion of vaccination of each child. LHWs were not given incentives.

What solutions were identified in the research?

A A TBA-based rural referral system can increase coverage

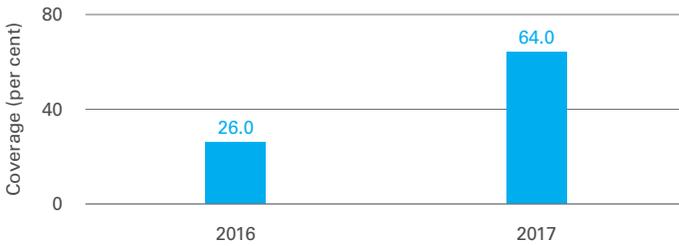
The study suggests that a TBA-based referral system can improve vaccine uptake and vaccine completion in hard-to-reach areas. Implementation of a system for referral is feasible due to the widespread availability of TBAs, and their acceptance by the community.

However, training is required to ensure that TBAs understand the immunization schedule, the names of vaccines, and the time interval between visits. For referrals to be effective, the immunization programme has to increase the availability of vaccination services in hard-to-reach areas so that a referral will lead to vaccination.

B Incentives motivate community health workers to vaccinate children

A monetary incentive for the enrolment and complete vaccination of children was shown to be a strong motivator for community health workers (CHWs) to engage in immunization. We still need to learn more about what is the most effective way to incentivize CHWs to engage in immunization and which particular incentives lead to increased coverage and equity.

FIGURE 1
Pentavalent-3 coverage with traditional birth assistants, before and after intervention in Lal Jurio



C Community health workers are effective social mobilizers for immunization

With the right training, CHWs can be effective social mobilizers, successfully convincing mothers to bring their children for vaccinations. They are known members of the community and can communicate with mothers. TBAs play a particularly important role in increasing immunization rates by convincing women to complete their children's full course of vaccines.

Recommended actions

- 1** A programme should be established to engage and train TBAs to refer children for required and timely immunizations.
- 2** In parallel with a TBA-based referral system, vaccinators should expand outreach in hard-to-reach areas, particularly for families for whom travelling long distances to fixed centres is prohibitive. TBAs can then arrange for eligible children to gather in a set location on the planned day for vaccination.
- 3** Consideration should be given to providing a monetary incentive to TBAs, for example per child enrolled or vaccines given following a referral.

For more information please contact:

Siraj Ahmed (NSTOP Officer, Sukkur), Ambreen Sahito, Assistant Professor (Isra University, Hyderabad), (ambreensahito@gmail.com); Zafar Fatmi, Professor (Aga Khan University Karachi); (zafar.fatmi@aku.edu)

Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District

Ambreen Sahito,¹ Siraj Ahmed,² and Zafar Fatmi³

¹ Department of Community Medicine, Isra University Hyderabad, Pakistan

² Ministry of Health, Government of Sindh, Pakistan

³ Department of Community Health Sciences, Aga Khan University, Karachi, Pakistan

Introduction

Vaccination is one of the most cost-effective public health interventions for preventing communicable diseases and reducing child mortality. However, despite its proven value, vaccination coverage remains sub-optimum in many low- and middle-income countries. Pakistan is a developing country and home to 10 million children under 2-years old [1]. The Expanded Programme on Immunization (EPI) was launched in Pakistan in 1978, but in the last decade, vaccination coverage has been stagnant [2]. Although there is variation across the country, overall vaccination coverage remains low [3-5]. Recently reported complete vaccination coverage was only 54 per cent. In addition to low enrolment of newborns in the immunization programme (for BCG), high dropout (or low completion rate) is also a challenge [4]. Inequities in vaccination coverage exist among provinces, and between urban and rural areas and socioeconomic groups, with coverage particularly low in remote areas [2, 4, 6].

Factors contributing to low immunization coverage include unavailability of resources and lack of knowledge, which cause low demand for vaccines [2, 7]. Demand-side barriers can be tackled by creating awareness and appropriate counselling to actively involve parents in immunization. However, at busy EPI centres, parents are often provided vaccination and registration cards without an explanation of the importance of vaccines, or counselling about possible side effects [6, 8, 9]. Vaccinators and vaccination supervisors constitute the main workforce of EPI. Chronic shortages and inequitable distribution of vaccinators, along with limited outreach activities due to logistic problems lead to poor vaccination coverage especially in rural areas. Poor geographical access in remote rural areas and limited opening hours of EPI centres are additional barriers to immunization in Pakistan [10-12].

Engagement of community health workers (CHWs) has been shown to increase immunization coverage in low- and middle-income countries [13, 14]. Pakistan has a rich network of community-based lady health workers (LHWs) who provide basic preventive maternal and child health services. LHWs primarily work as social mobilizers for vaccination. In addition, they participate in EPI campaigns against polio, measles and tetanus. Immunization coverage is comparatively better in areas served by LHWs [15-17]. However, LHWs only cover about 55 per cent of the population [15, 16]. In the 45 per cent of unserved areas, which are considered hard-to-reach, formal healthcare and vaccinators are not available. In these areas, maternal and child health care is provided by traditional birth attendants (TBAs). Although institutional deliveries have increased in Pakistan, 30 per cent births are still taking place outside health facilities. This proportion is higher in rural areas. Eighty per cent of home deliveries are facilitated by TBAs [4]. Besides

assisting in childbirth, many TBAs are hired by mothers to help in the post-natal period even if they have delivered within the formal healthcare sector. Therefore, TBAs are often first-level care providers for newborns. Special management efforts have been made to provide coverage in hard-to-reach areas during polio campaigns, which also involve TBAs. Despite the potential benefits, there have been few attempts to systematically involve TBAs to improve coverage for routine immunization. Considering this, a TBA-based referral system has been implemented for improving EPI-recommended childhood vaccination coverage.

Methods

The study site was Sukkur District in Sindh Province of Pakistan, which has a large geographical area (5,165 sq. km). It is a hub for economic activity and is divided into four *talukas* (sub-districts).

The sub-district of Salehpat was selected for an intervention involving TBAs, and the sub-district of Rohri was selected as a control involving LHWs. The selection of areas was done purposely in consultation with the district health administration. The two sub-districts had systematic differences in accessibility and health infrastructure (see Table 3). Salehpat is very remote with little infrastructure and few available health workers, while Rohri has comparatively better infrastructure with fair availability of healthcare staff [18].

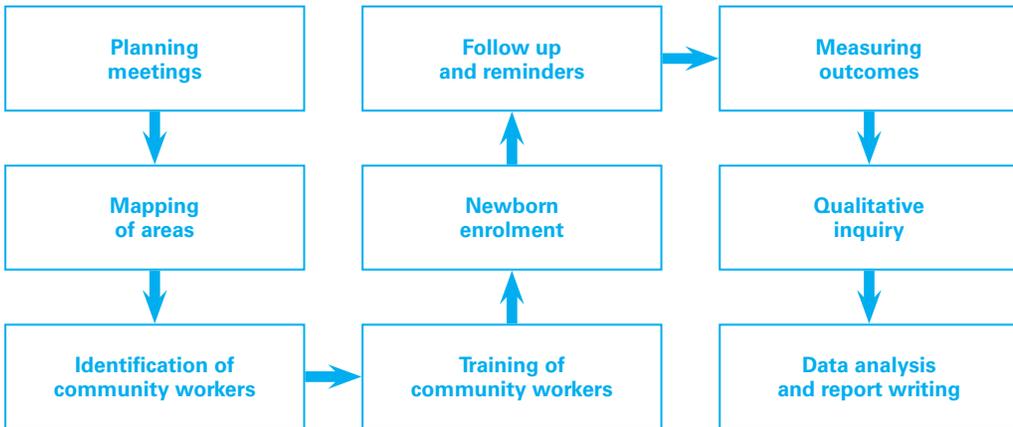
TABLE 3
Characteristics of study arms

	Rohri (LHW arm)	Salehpat (TBA arm)
Geography	Riverine or <i>kacha</i> area	Mostly desert spread over 80 km
Administrative units	11 UCs and 67 <i>dehs</i>	3 union councils and 87 <i>dehs</i>
Health facilities	16 health facilities and EPI centres	4 health facilities and EPI centres
Vaccination-related human resources	39 vaccinators and 239 LHWs	8 vaccinators and 7 LHWs

Study design

A mixed method study design was employed: a pre- and post-intervention design (quasi-experimental) with a control area (arm) coupled with a qualitative inquiry. The aim of the study was to assess the improvement in the newborn enrolment rate for BCG and vaccine completion (pentavalent-3) by engaging TBAs.

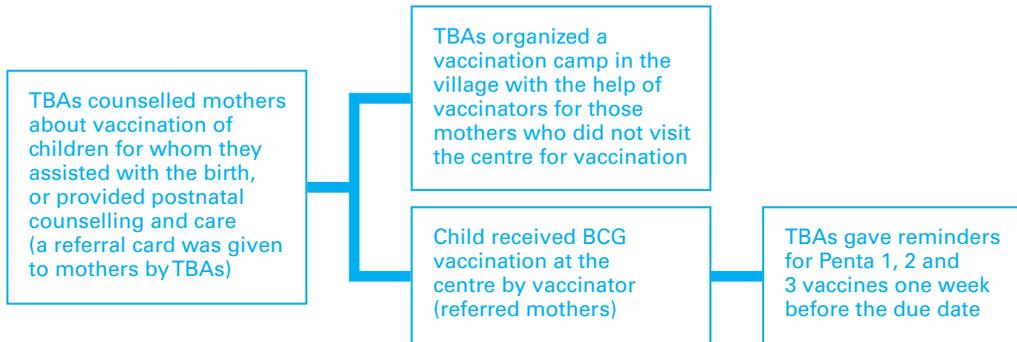
FIGURE 2
Flow diagram of project activities: Intervention processes



The following steps were undertaken to carry out the intervention:

- Strategic planning meetings were conducted with the district EPI staff at all levels from vaccinators, *tehsil/taluka* supervisors of vaccine (TSVs), district supervisors of vaccine (DSVs), district focal persons for vaccine, additional deputy commissioners (ADCs) and district health officers (DHOs).
- Scoping exercises with stakeholders were conducted to identify hard-to-reach areas. Two union councils (UCs), Laljurio Shabani in Salehpat and Ali Wahan in Rohri, were selected. Laljurio Shabani has a total population of 40,380, served by two vaccinators and three LHWs. Considering the paucity of formal healthcare workers, TBAs were trained in this UC. Ali Wahan has a population of 25,526, served by 12 LHWs and only one vaccinator. This UC was as the control or LHW arm (area) in the study.
- A combined meeting between TBAs and vaccinators was organized for a formal interaction between them. However, liaison between LHWs and vaccinators was already well established. In order to distinguish that the referral of child was made by a CHW, a card was given to TBAs in addition to a registration sheet for record keeping.
- TBAs and LHWs were trained for enrolment and referral of children for vaccination. They were also informed about vaccination, its importance, EPI schedules, common misconceptions and how to counsel parents. Several TBAs were accompanied by their male family members who were also trained to keep records of referral and vaccination.
- TBAs were given an incentive of 1,000 PKR (approximately US\$8.00), for each complete child vaccination (pentavalent-3) which they referred.

FIGURE 3
Activities of TBAs and vaccinators in Salehpat



The **sample size** was calculated using NCSS Pass version 8 software. Keeping 80 per cent statistical power and 5 per cent level of significance with at least 10 per cent expected reduction in dropout; a sample of 180 participants in the intervention arm (area), and 400 participants in the control arm (area) were included. Furthermore, keeping 5 per cent for non-response, the minimum sample was inflated to 190 in the intervention arm and 420 in the control arm. Although, for pragmatic reasons, there was a comparison of the intervention arm with overall district coverage, and there was a much larger sample for the control arm.

Data collection and analysis

A questionnaire was used to assess TBAs and LHWs vaccine-related knowledge before and after the training. The data from the administrative reports of the district EPI office was used for estimating the change in vaccination (BCG, pentavalent-3 and dropout) coverage. Dropout was calculated by subtracting Pentavalent-3 coverage from BCG coverage. Vaccination coverage was compared between the TBA and LHW arms. Both absolute and percentage change in coverage between pre- and post-intervention periods were calculated. The coverage level varied considerably in both arms because of differences in accessibility and infrastructure (described above). There were also comparisons of the coverage at the baseline and endline in each UC.

Data accuracy, consistency and completeness were ensured. A sub-sample of child enrolment was validated at two levels. First children's records were validated at the health centre from permanent registers of vaccination, and children were visited at their homes to check their name, ages, vaccination cards and BCG vaccination marks. Data were analysed with SPSS version 23. Pre- and post-knowledge levels were analysed using a paired t-test, and a chi-square was used for percentage change.

Qualitative study

The aims of the qualitative inquiry were to:

- determine the experience of TBAs and LHWs regarding the intervention, and
- determine the acceptance of TBAs by formal health care providers and perceived barriers of involvement of TBAs in vaccination.

Six in-depth interviews (IDIs) were conducted, which included the district focal person vaccine, DSV, TSV, vaccinators of respective two sub-districts and the National Stop Transmission of Polio (NSTOP) officer. Furthermore, two focus group discussions (FGDs) were carried out with LHWs and TBAs who were involved in the project. A few parents (12 in total) were also interviewed informally during visits to households. IDIs and FGDs were conducted using semi-structured interview guidelines. Data was translated and transcribed for thematic content analysis and narrative summaries were provided.

Ethical approval

The Ethical Review Board of the Health Services Academy Islamabad provided ethical approval. Informed, written consent was signed by study participants (thumb impressions were taken after reading aloud the consent form for illiterate participants). All interview questionnaires and transcripts from the qualitative interviews and discussions were given a unique identifier number, and participant's identification details were kept confidential.

Results

Description of programme areas, TBAs, LHWs and population

A total of 12 LHWs were trained, covering about 60 per cent of the total population in Ali Wahan, the selected LHW arm. All LHWs had formal education, and the age range was between 22 and 45 years old. While a total 23 TBAs were trained, covering 30 per cent of the population in Laljurio Shabani, the selected TBA intervention arm. TBAs had no formal education, and their ages ranged between 35 and 70 years old. They had experience ranging from 4 to 30 years in assisting births, which they gained informally through family members (mothers, grandmothers, aunts, sisters). On average, TBAs were assisting in three to five births in a month. TBAs do not charge fixed fees for services but everybody usually pays them what they can afford. They often receive presents like scarves or suits, or sometimes cash US\$2.50-4.50 (PKR 300-500). Three TBAs were also working on polio campaigns with a moderate stipend.

Change in knowledge about vaccination

The vaccine-related knowledge of both TBAs and LHWs increased significantly after training ($p = 0.00$). The overall increase in knowledge was higher for TBAs, who had a 250 per cent increase in score from the baseline (*see Figure 4*).

Vaccination coverage in programme areas

In the LHW arm, 56 children were enrolled in five months (150 days) for BCG. While in the TBA arm, 240 children were enrolled in only 40 days. Of these 240 children, 171 were vaccinated at the appropriate age (within one week of date suggested by vaccinator). However, the project team requested that TBAs stop the enrolment, as there were limited funds available to incentivize them and continue with the programme.

Table 4 and Figure 5 show vaccination coverage at baseline and during the intervention in both study arms and Sukkur District. The highest increase from the baseline (74 per cent BCG and 147 per cent pentavalent-3) was observed in the TBA arm.

Importantly, there was an overall 226 per cent increase in vaccine dropout in the the whole of Sukkur District. However in the TBA area, dropout decreased by 62 per cent from the baseline during the same period.

FIGURE 4
Change in vaccine-related knowledge by comparison of test scores pre- and post-training for TBAs and LHWs

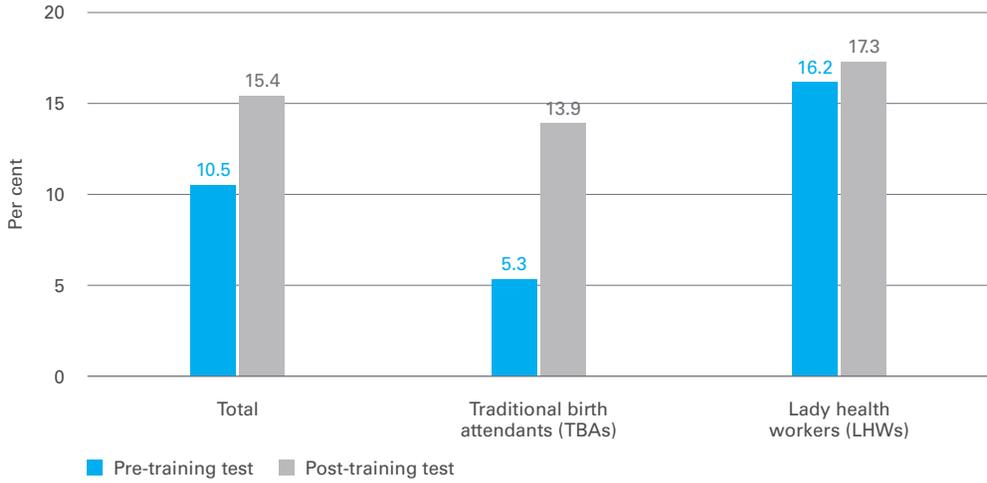


FIGURE 5
Percentage change in vaccination coverage from the baseline in Sukkur District

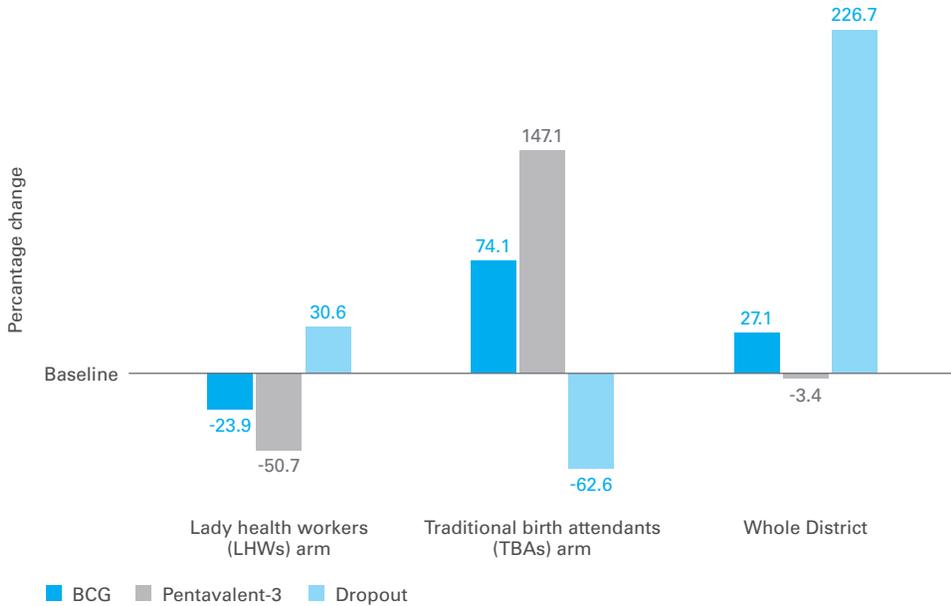


TABLE 4
Percentage change in vaccination coverage before and after the intervention in selected UCs

	LHW (UC Ali Wahan)			TBA (UC Lal Jurio)			Sukkur District		
	BCG	Penta-3	Dropout	BCG	Penta-3	Dropout	BCG	Penta-3	Dropout
2016	70%	41%	29%	59%	26%	33%	110%	73%	37%
2017	95%	54%	41%	81%	64%	17%	114%	83%	31%
Difference	25%	13%	12%	22%	38%	-16%	4%	10%	-5%
% Difference	35.71	31.71	41.38	37.30	146.20	-48.50	3.60	13.70	-13.50

Table 4 shows the vaccine coverage trend in both the TBA and LHW arms, and the control area of the whole of Sukkur District during 2016 and 2017. Overall in 2017, there was increase in BCG in both UCs (35.7 per cent in LHW and 37.29 per cent in TBA arm) and overall district (3.6 per cent) from 2016. Pentavalent-3 coverage in 2017 also increased in both arms in 2017, but it was substantially higher in the TBA arm (146.2 per cent) compared to LHW arm (31.71) from 2016.

Perceived effectiveness of the intervention by stakeholders

TBAs considered training to be useful in increasing their knowledge of vaccines and they felt empowered in counselling parents and referring children for vaccination. TBAs believed parents have become aware and responsible. Initially, TBAs had to work hard to motivate parents but now parents' attitudes have improved and they are coming to TBAs for vaccination.

Parents in remote villages considered TBAs very useful for vaccinating children. Since this was the first time their children ever had vaccines, parents wanted TBAs to continue receiving them.

All vaccinators agreed that TBAs were helpful in improving vaccination coverage and follow-ups for children. EPI managers welcomed the initiative of TBAs' involvement in routine vaccination. They reported that the coverage achieved in the TBA arm during this programme was the highest ever recorded in the UC.

TBAs were also acceptable to community (parents) and to the formal health system, as mentioned by vaccinators and the EPI focal person.

Facilitating factors for the programme

Coordination between TBAs and vaccinators was exemplary. In coordination with vaccinators, TBAs arranged vaccination camps in the villages. TBAs worked as mobilizers and, on a pre-arranged day they brought children for vaccination. This was made possible through organizing a combined meeting between TBAs and vaccinators, which has never been tried before in this area.

According to vaccinators and TSVs, TBAs were particularly important in reducing the dropout rate. They said that often families do not complete the vaccination course. TBAs were very helpful in convincing women to strive for vaccine completion. TSVs considered TBAs more effective because they are female, and culturally TBAs have easier access to homes. Being from the local community means that they know and can communicate with mothers easily, while vaccinators could not do that.

Incentive was one of the key motivating factors. This was acknowledged at all levels, including TBAs, TSVs, DSV and district managers.

Challenges encountered

In addition to electricity outages and vaccine unavailability, vaccinators had issues with service tenure. As one vaccinator said,

“Regardless of experience and qualification, we cannot be upgraded from grade 11.”

Vaccinators also considered the coverage area big, with a shortage of vaccinators available due to retirement. Both vaccinators and LHWs considered the polio campaign to be a hindrance to their work. Because of their frequent visits to households during polio activities, households do not pay much attention to them and parents expect all vaccinations to be done at their doorsteps.

Sustainability of the intervention

TBAs were motivated to work. When asked whether they are willing to work without monetary incentives, a few of them said that they are willing to work without money. One TBA said that although project had now been concluded, parents still ask about vaccinations for newborns. They still guide the parents, but are not putting in extra effort to ensure timely vaccination, since they do not have resources to move around the area. EPI staff considered monetary incentives as important factors for TBAs, since TBAs do not have any other sources of income.

EPI focal person and DHO considered this programme useful. However, they mentioned additional financial resources needed to engage TBAs were not available at district level.

Discussion

Although, TBAs play a significant role in maternal and child health service delivery in rural and hard-to-reach areas in Pakistan, no formal attempts have been made to utilize this workforce for improving EPI coverage. It seems that this is the first study attempting to generate a referral mechanism between TBAs and vaccinators in Pakistan. TBAs and community volunteers have been effective in improving maternal and child health; they also helped to increase vaccination coverage among children in low- and middle-income countries [19-25].

TBAs were enthusiastic and cooperated throughout project. Remembering vaccine names was difficult for TBAs, since names were in English. Therefore, TBAs were trained to remember the time interval between vaccine doses (visits) as required by the EPI schedule. A Nigerian study also relied on body memory tools for remembering immunization visits [21]. This strategy proved to be effective since TBAs not only remembered the interval but also referred children for timely vaccination. TBAs had little knowledge about vaccines at the start (baseline) but after training, vaccine-related knowledge increased significantly for TBAs. Studies conducted in India and Nigeria also showed improved knowledge of TBAs after training [20-22]. LHWs had refresher training regularly, and one such training session was conducted two months before the project training, so LHWs performed well on pre-tests as well [15, 16].

Pakistan’s routine immunization suffers from low enrolment with a particularly steep decline in coverage for pentavalent-3 vaccination due to high dropout rates after the first vaccination at birth. This pragmatic implementation research showed that TBAs increased the enrolment and completion of routine vaccination tremendously in a short period of time. Findings were similar with studies conducted in India, where involvement of community volunteers significantly increased the DPT3 coverage [19]. It was found that TBAs and vaccinators liaised well and they were in communication throughout the project.

This project aimed to generate a referral mechanism between TBAs and vaccinators, where TBAs were sending children to EPI centres. However, in some villages, due to long distances to facilities, families were reluctant to visit fixed centres. Instead, vaccination was carried out in villages by vaccinators. TBAs collected all eligible children in the village and called the vaccinator on a pre-arranged day for vaccination. This arrangement ensured vaccination of children at more convenient sites and reduced efforts of the vaccinator going door-to-door. In addition, vaccinator visits at a specific time provided opportunities for vaccinating eligible children not referred by TBAs in the same village. Most households expect that vaccinators visit their homes to complete the vaccination. It was also communicated by vaccinators of the area that because of polio campaigns, people now expected them to visit their homes for routine immunization as well. Only few households and parents visit the health centres. Previous literature from Pakistan also suggests that due to frequent visits by polio workers during national immunization days (NIDs), people expect vaccinators to visit homes for routine vaccination of children [12].

LHWs were covering only 60 per cent of population, and it was comparable to the national level [15, 16]. LHWs are engaged in polio activities, consuming their substantial workdays. LHWs' evaluation reports suggest that, on average, LHWs are spending 150 working days per year on polio related activities [16]. During this intervention, the only vaccinator in the LHW arm was transferred. However, another vaccinator from a neighbouring UC was visiting the LHW arm once a week. However, this arrangement decreased vaccination coverage in the LHW arm. Due to administrative changes as well as systematic differences in infrastructure it was impractical to compare the LHW and TBA areas for improvement in vaccination. Therefore, the team resorted to comparing the overall district-level coverage during the same period with the TBA intervention area. Although the TBA intervention area was one of the most remote in the district and had the lowest coverage, it showed significant improvement over its historical baseline as well as district coverage. In order to strengthen analysis, a comparison was also made with the previous year's (2016) vaccination coverage for the district during the same period and the geographical areas for the current year and this found significant improvement in enrolment of newborns for vaccination, particularly when it came to completion of vaccination.

The initiative's involvement of TBAs in vaccination was enthusiastically welcomed by all stakeholders including vaccinators, EPI managers and parents. A qualitative inquiry conducted in Chitral, Pakistan reported that due to proximity of TBAs with village women, they still have a pivotal role in promoting maternal and child health [26].

Provision of incentive was a major barrier in the continuation of the initiative. Since most community workers (including LHWs and some TBAs) were involved in polio campaigns, they usually all received incentives. This has created an environment in which volunteer work without incentives was difficult. We attempted to find volunteers without provision of incentives, but failed. Nonetheless, considering the minimal cost (US\$8) per complete vaccination of the child, it is worthwhile if the overall cost of the vaccination per child is considered. It should also be taken into account that the last mile might be covered due to TBAs involvement has the highest cost of coverage as was seen in the cost incurred during polio eradication programme. In the short term it is not possible for the government to train and provide a network of infrastructure and vaccinators to cover hard-to-reach areas in Pakistan. Thus, a policy decision needs to be made to provide coverage for these areas.

Conclusions and recommendations

About 40 per cent of the Pakistani population living in remote rural areas are not served by LHWs. A TBA-based referral system has potential to improve vaccine enrolment and vaccine completion in these unserved areas. This system is acceptable to population and feasible in hard-to-reach areas due to the availability of TBAs.

Extension of the formal healthcare system in these hard-to-reach areas would be a costly intervention in the short term. With the right training, female CHWs (TBAs and volunteers) can be effective social mobilizers for vaccination. They are known members of the community and can communicate with mothers effectively. TBAs played a particularly important role in bringing down default rates, which is the main concern of vaccination coverage in Pakistan.

A programme should be established to engage and train TBAs to refer children for timely immunization in hard-to-reach areas. In parallel with a TBA-based referral system, vaccinators should expand outreach in these areas, particularly for families for whom travelling long distances to fixed centres is prohibitive. TBAs can then arrange for eligible children to gather in a given area on the planned day of vaccination. Consideration should be given to providing a monetary incentive to TBAs.

Although there was an initial improvement in vaccine coverage in the TBA arm, due to the short project time, a steep decline in coverage followed one month later for the BCG vaccine. Therefore, a project with a reasonable extended time period would provide more answers for practical implementation of this strategy.

Since TBAs are not included in the formal health system the research team did not have an available listing of TBAs. The research team had to go village-to-village to identify TBAs. All identified TBAs covered only 30 per cent of the population. This means that a mapping of TBAs and similar workers are needed to undertake such initiatives.

References

- 1 United Nations Children's Fund, *State of the World's Children*, UNICEF, New York, 2009.
- 2 Owais, Aatekah, et al., 'Pakistan's Expanded Programme on Immunization: An overview in the context of polio eradication and strategies for improving coverage', *Vaccine*, vol. 31, issue 33, 2013, pp. 3313–3319.
- 3 National Institute of Population Studies (Pakistan) and ICF International, *Pakistan Demographic and Health Survey 1990/91*, Macro International, Islamabad, 1992, pp. 9–13.
- 4 National Institute of Population Studies (Pakistan) and ICF International, *Pakistan Demographic and Health Survey 2012-2013*, Macro International, Islamabad, 2012, p. 13.
- 5 National Institute of Population Studies (Pakistan), *Pakistan Demographic and Health Survey 2006–2007*, Macro International, Islamabad, 2008.
- 6 Khowaja, Asif Raza, et al., 'Routine EPI Coverage: Subdistrict inequalities and reasons for immunization failure in a rural setting in Pakistan', *Asia Pacific Journal of Public Health*, vol. 27, issue 2, 2011, pp. 1050–1059.
- 7 Bugvi, Ayesha Siddiq, et al., 'Factors Associated with Non-Utilization of Child Immunization in Pakistan: Evidence from the Demographic and Health Survey 2006-2007', *BMC Public Health*, vol. 14, issue 1, 2014, p. 232.
- 8 Sheikh, Sana and Syed Asad Ali, 'Predictors of Vaccination Card Retention in Children 12–59 Months Old in Karachi, Pakistan', *Oman Medical Journal*, vol. 29, issue 3, 2014, p. 190.
- 9 Owais, Aatekah, et al., 'Does Improving Maternal Knowledge of Vaccines Impact Infant Immunization Rates? A community-based randomized-controlled trial in Karachi, Pakistan', *BMC Public Health*, vol. 11, issue 1, 2011, p. 239.

- 10 Usman, Hussain R., et al., 'Determinants of Third Dose of Diphtheria–Tetanus–Pertussis (DTP) Completion Among Children Who Received DTP1 at Rural Immunization Centres in Pakistan: A cohort study', *Tropical Medicine and International Health*, vol. 15, issue 1, 2010, pp. 140–147.
- 11 Mangrio, Nawab Khan, Muhammad Mazhar Alam and Babar Tasneem Shaikh, 'Is Expanded Programme on Immunization Doing Enough? Viewpoint of health workers and managers in Sindh, Pakistan', *JPMA: Journal of the Pakistan Medical Association*, vol. 58, issue 2, 2008, p. 64.
- 12 Masud, Tayyeb and Kumari Vinodhani Navaratne, 'The Expanded Program on Immunization in Pakistan: Recommendations for improving performance', *Health Nutrition and Population (HNP) Discussion Paper*, 2012.
- 13 Fathima, Farah, et al., 'Assessment of 'Accredited Social Health Activists'—A national community health volunteer scheme in Karnataka State, India', *Journal of Health, Population and Nutrition*, vol. 33, issue 1, 2015, p. 137.
- 14 Maru Rushikesh M., 'The Community Health Volunteer Scheme in India: An evaluation', *Social Science and Medicine*, vol. 17, issue 19, 1983, pp. 1477–1483.
- 15 Hafeez, Assad, et al., 'Lady Health Workers Programme in Pakistan: Challenges, achievements and the way forward', *JPMA: Journal of the Pakistan Medical Association*, vol. 61, issue 3, 2011, p. 210.
- 16 Hunt, Simon, et al., *Lady Health Worker Programme: Third party evaluation of performance*, Oxford Policy Management, UK, 2009.
- 17 Afzal, Saira, et al., 'Effective Role of Lady Health Workers in Immunization of Children in Pakistan', *Pakistan Journal of Medical Sciences*, vol. 32, issue 6, 2016, pp. 1500–1505.
- 18 District Office Sukkur, 'District Sukkur Report, Expanded Program of Immunization', 2017.
- 19 Prinja, Shankar, et al., 'Effectiveness of Planning and Management Interventions for Improving Age-Appropriate Immunization in Rural India', *Bulletin of the World Health Organization*, vol. 88, issue 2, 2010, pp. 97–103.
- 20 Brennan, M., 'Training Traditional Birth Attendants Reduces Maternal Mortality and Morbidity', *Tropical Journal of Obstetrics and Gynaecology*, vol. 1, issue 1, 1988, p. 44.
- 21 Findley, S.E., et al., 'Comparison of High- Versus Low-Intensity Community Health Worker Intervention to Promote Newborn and Child Health in Northern Nigeria', *International Journal of Women's Health*, vol. 5, 2013, p. 717.
- 22 Kumar, Rajiv, J.S. Thakur and A.K. Aggarwal, 'Effect of Continuing Training on Knowledge and Practices of Traditional Birth Attendants about Maternal and Newborn Care', *Indian Journal of Public Health*, vol. 44, issue 4, 2000, pp. 118–123.
- 23 Main, Barbara, et al., 'Changes in Expanded Program for Immunization Coverage for Mother and Child in Krakor, Cambodia 1996–1998', *Tropical Medicine and International Health*, vol. 6, issue 7, 2001, pp. 526–528.
- 24 Rashid, Mahbubur, et al., 'Traditional Birth Attendants' Advice toward Breast-Feeding, Immunization and Oral Rehydration among Mothers in Rural Bangladesh', *Women and Health*, vol. 28, issue 3, 1999, pp. 33–44.
- 25 Research and Development Solutions, *Understanding MARVI: Assessment of the outreach community workers intervention in Umerkot*, RADS, 2014. <www.hands.org.pk/CV/UnderStandingMARVI.pdf>.
- 26 Shaikh, Babar, et al., 'Emerging Role of Traditional Birth Attendants in Mountainous Terrain: A qualitative exploratory study from Chitral District, Pakistan', *BMJ Open*, vol. 4, issue 11, 2014.



Women, some with their children, wait for services, at a basic health unit in Khangrah Village, in Muzaffargarh District in Punjab Province.

Addressing community barriers to immunization in Rajanpur District

Key messages

- **Rajanpur District is lagging behind the rest of Punjab and has the lowest immunization coverage in the province**
- **Shortages of human resources and supplies, lack of awareness about vaccines, and inadequate social mobilization are potential reasons for the lower coverage**
- **Birth registration of children in the community, review and reallocation of the community workforce, better monitoring and supportive supervision, and effective demand generation through social mobilization are among possible methods of improving immunization coverage**

What is the problem?

Punjab Province has an overall immunization coverage of 82 per cent for children aged 12-23 months. However, among all districts in Punjab, Rajanpur has the lowest immunization coverage at only 38 per cent. Shortage of human resources and supplies, lack of awareness about vaccines, and inadequate social mobilization are potential reasons for the lower immunization coverage in Rajanpur District.

Non-availability of health workers and vaccinators is considered a major barrier for immunization service delivery in the district. Inadequate regular monitoring and lack of supportive supervision of the workforce by the Expanded Programme on Immunization (EPI) may have detrimental effects on the quality of immunization services and coverage in the district.

The limited capacity of health workers to conduct social mobilization activities accentuates existing problems of insufficient community knowledge and misconceptions about immunization. There are particular problems relating to mothers giving birth at home and not knowing the site of the vaccination camps or not receiving information about immunization.

How was the research done?

The research aimed to explore community perception and acceptance, and relevance of social mobilization activities. Barriers to immunization and opportunities to address problems were also explored. Qualitative data were collected in 24 in-depth interviews and seven focus group discussions with lady health workers (LHWs), lady health supervisors (LHSs) and vaccinators. Additional in-depth interviews were conducted with district senior management.

What solutions were identified in the study?

A Demand generation through social mobilization

There is currently insufficient focus on immunization community-sensitization activities led by LHWs and vaccinators. This is an untapped potential that can be used to raise awareness of immunization in the community. Training and effective supervision, with a focus on demand creation, will be required.

B Reallocating the workforce to underserved areas

By reviewing their current allocation and redeploying skilled LHWs, vaccinators and social mobilizers to underserved areas, EPI can improve the quality of immunization and increase coverage. Effective monitoring and supervision can also contribute.

C Community-based birth registration

A solution to the problems of mothers giving birth at home, and not having exposure to and knowledge about immunization is to establish a community-based system for birth registration by LHWs, vaccinators or other health workers. This will enable the programme to track children and inform parents about the location of the vaccination camps. This increases the chances of uptake of vaccines.

Recommended actions

- 1 Trained LHWs and vaccinators should be reallocated to hard-to-reach and underserved areas.
- 2 Community health workers and vaccinators should be given additional training in social mobilization. Monitoring should focus on social mobilization activities.
- 3 Systems for monitoring and supportive supervision of LHWs and vaccinators should be strengthened.
- 4 A system for registration of births in the community by LHWs and vaccinators should be established.

For more information please contact:

Muhammad Younas, (dryounas_bsp@yahoo.com); N Rehan (Co-PI, Research Associates); Ms. Kanwal Qayyum, (kanwalqureshi@gmail.com)

Addressing community barriers to immunization in Rajanpur District

Muhammad Younas,¹ N. Rehan,² and Kanwal Qayyum³

¹ EPI Punjab

² Research Associates

Introduction

In 1978, the Extended Programme of Immunization (EPI) was initiated in Pakistan with the objective of reducing morbidity and mortality caused by six vaccine preventable diseases (VCDs). Initially donor agencies contributed budget for EPI activities and EPI Pakistan was a highly successful programme in the 1980s. However, international and donor agencies gradually withdrew their support, which resulted in a decrease of immunization coverage by the mid-1990s [1].

This led to the Government of Pakistan increasing budget allocations to EPI and so coverage began to improve again from 1998 onwards with little fluctuation from year to year. In July 2002, vaccination against hepatitis B was added to the routine immunization schedule of EPI, followed by pneumococcal vaccine in December 2013. However, coverage did not improve appreciably in many areas. There are many reasons for low immunization coverage and declining health indicators in Pakistan. Among the various core reasons, those most commonly observed are the lack of motivation of EPI staff, absence of vaccinators in inconvenient/hard-to reach-places for providing routine immunization, and technical problems with cold-chain maintenance [2].

A desk review of research on barriers to immunization in Pakistan identified a large number of factors responsible for the low coverage [2]. These include lack of fixed centres providing EPI services to cater to the entire community, inability of allocated resources to cover the target population politically influenced policies; ineffective monitoring; out-dated technology; lack of focus on disadvantaged groups; irrelevance of national policies after the 18th Amendment; non-involvement of the community and its representatives in government policy; poor management and supervision; inadequate infrastructure and transport issues, (such as no government dispensaries in some areas); focus only on polio immunization; lack of female team members, (known in Pakistan as lady health workers (LHWs)); no proper plan for social mobilization for routine immunization in any of the provinces; inaccessible health facilities; insufficient human resources including shortage of vaccinators due to low remuneration especially during National Immunization Days; inadequate knowledge of work areas; lack of private-sector involvement; lack of awareness on the part of the community; misconceptions; and societal restrictions on women.

Immunization coverage varies all across the country. In Punjab a recently conducted population-based health survey, the Punjab Health Survey Round – 1 (2016), found that the immunization coverage for infants aged 0-11 months is almost 74 per cent and coverage for children aged 12–23 months is approximately 82 per cent. This progress is significantly low in Rajanpur District, where immunization coverage was 54 per cent for children aged 0–11 months and 37.6 per cent for children aged 12–23 months. This is the lowest progress among all districts in Punjab.

In light of this situation, a study titled *Addressing Community Barriers to Immunization in Rajanpur District* was conducted in order to assess the present situation and suggest remedial measures.

Methods

Study design

Since our research objective focused on strengthening the Punjab EPI by incorporating the voices of people from local communities into their activities, we did not know the community perception and their reasons of low acceptability for routine immunization, an in-depth enquiry was needed, which was feasible through qualitative research.

Considering our specific objective we utilized 'exploratory qualitative enquiry', building upon constructivist paradigm, to gain insight and familiarity with immunization barriers that exist at the community level for low immunization coverage.

Study sites

The study was conducted in Rajanpur District, which is located in the extreme southwest part of Punjab, with a geographical span of 12,319 km² (see Figure 6).

FIGURE 6
Map of Rajanpur District



Rajanpur is one of only two districts of Punjab located west of the Indus River. The eastern side of Rajanpur is bordered by the river itself, while the Sulaiman Mountains make up the western border. It is bounded on the north by Dera Ghazi Khan District, to the west by Dera Bugti District of Balochistan, to the east by Muzaffargarh and Rahim Yar Khan districts, and to the south by the Kashmore District of Sindh.

The estimated population of Rajanpur is around 2 million, of which only 14.27 per cent is urban (Census, 2017). Eighty-two per cent of the population is below the middle wealth quintile, 64 per cent is within the lowest wealth quintile and 18 per cent is within the second wealth quintile. Rajanpur District is comprised of three *tehsils* (sub-division of a district): Rojhan, Rajanpur and Jampur, with additional adjoining tribal areas. The main spoken languages of Rajanpur District are Saraiki and Balochi, and the main livelihood is farming. Rajanpur has a total of 1,160 government schools out of which 41 per cent (480 schools) are for girls. The overall literacy rate for the district is less than 40 per cent. According to the Pakistan Social and Living Standard Survey 2014-2015, only 49 per cent of males and 25 per cent of females have ever attended a school [3].

Site selection

The site selection of the study areas and selection of poor communities of rural Kacha and the tribal area was done from three tehsils and one tribal area of Rajanpur District with the support of Rajanpur office of EPI Punjab, the district health officer (DHO) (preventive) and district superintendent vaccination (DSV). Rajanpur extended their extra support in order to ensure that fieldwork is completed in a given timeframe.

Data collection tools

Data from secondary sources were reviewed prior to the fieldwork. This helped to determine the sub-topics and questions for focus group discussions (FGDs) and in-depth interviews (IDIs). This data included published articles/reports and informal discussions with local EPI staff from the Rajanpur District. This data was useful in designing FGD and IDI tools.

Ethical approval of study and informed consent

The ethical approval of the study was obtained from Ethical Review Committee of the Health Services Academy (HSA) in Pakistan.

Informed consent was obtained prior to the data collection from each participant after explaining the purpose of the study; the potential risks and benefits of participation; the roles and responsibilities of field researchers and participants; permission for audio recording; assured confidentiality and planned use/dissemination of the study results. All FGDs and IDIs were conducted in venues where the participants indicated they were comfortable.

After seeking approval on tools from sponsors, a team was recruited comprised of male and female interviewers, who were familiar with local language and understood the local cultural dynamics. The recruitment was made on the basis of qualifications, previous experience, and knowledge of local language, norms and culture. The team was given two days training for data collection, orientation to EPI, immunization, tools, mock practice of tools, and development of the field plan.

Study participants

The team explored perceptions of community members regarding the low coverage of routine immunization in Rajanpur through FGDs and IDIs (males and females in separated settings), while FGDs and IDIs were conducted with health care providers at the grassroots level, including vaccinators, LHW and lady health visitors (LHVs). The details of FGDs and IDIs conducted are shown in Tables 5 and 6.

In addition to the data collected from community members and field staff of EPI, in-depth interviews with the administrative staff of the Health Department of Rajanpur were recorded. These included Interviews with CEO Rajanpur District, DHO (Preventive) Deputy DHO Rojhan, as well as UNICEF's Officer for Social Mobilization.

Data collection and analysis

The IDIs and FGDs were conducted by a team of two female interviewers, two male interviewers and two researchers. The data were collected in Urdu and Siraiki language at the interviewee's location of choice. All IDIs and FGDs were audio recorded except one with an interviewee who did not give consent to record the interview. On average, the IDIs/FGDs lasted for 60 to 90 minutes. Photos were also taken with the consent of participants.

TABLE 5
FGDs and IDIs conducted with female health care providers

Tehsil	Area	Union council	FGDs	IDIs
Rojhan	Rural	Rojhan Sharqi	1	1
	Kacha	Shah Wali	1	2
Jampur	Rural	Harrand	1	1
	Kacha	Kotla Deewan		2
Rajanpur	Rural	Noorpur Machiwala		2
	Kacha	Sahan Wala	1	1
Tribal area	Tribal	Marri		1
Total			4	10

TABLE 6
FGDs and IDIs conducted with male health care providers

Tehsil	Area	Union council	FGDs	IDIs
Rojhan	Rural	Rojhan Sharqi	1	1
	Kacha	Shah Wali		2
Jampur	Rural	Harrand		2
	Kacha	Kotla Deewan	1	1
Rajanpur	Rural	Noorpur Machiwala	1	1
	Kacha	Sahan Wala		2
Tribal area	Tribal	Marri		1
Total			3	10

All audio-recorded interviews were transcribed in Urdu and translated into English for analysis. Data were then coded and categorized into themes. A content analysis method was used to analyse and interpret the data.

Results

Low acceptability

Level of acceptability for routine immunization varied among different communities from complete refusal of immunization, to to dropout after the administration of Penta-1. In this study, the following factors were identified as causing low acceptability of immunization in Rajanpur District.

Factors related to caregiver, parents and families

Lack of knowledge about the importance of immunization

Low literacy levels combined with lack of community education activities by EPI were major reasons for knowledge gaps. Some women in the community think that a vaccine card is a precondition for immunization. Those women who want to avoid vaccination do not want to keep the vaccination card.

Long distance to a health facility

Access to a health facility influences uptake of vaccination. Parents may not take children to be vaccinated due to the difficulty in access. Even if a child falls sick, if access to a health facility is too difficult, parents may not take their children.

Lack of access to scheduled date of immunization

EPI staff inform fathers on which date the next vaccination is due by sending a text message on their mobile phones, since women are not allowed to keep mobile phones. At times, fathers forget to tell the mothers or they are not at home at the time of vaccination. This leads to a communication gap between mothers and EPI staff. As a result, a child may miss his/her dose.

Lack of resources to avail immunization and related facilities

Although all vaccinations are available free of cost to the community, and vaccinators try to approach the community at their doorstep, one reason for refusal is still affordability. As one of the women said:

“Many women would not get their children vaccinated because majority of women are very poor, they cannot spend money on medicines.”

Gender barriers

Absence of male family members in facilitating vaccination becomes a reason for dropout. Traditionally, community women do not speak to male vaccinators. In areas where LHWs are not appointed, there is a major problem of low coverage.

Community-level factors

Gender norms

Some communities will have objections to male vaccinators visiting their houses for any kind of vaccination. In areas where LHWs are not appointed, male vaccinators face great resistance and put their lives at risk. As one of the officials shared:

“Just few days back, during Eid holidays, we went into the Baloch community for TT vaccination for women. Vaccinators gave a shot to women. Baloch men had gone out to sell their cattle. When they came back and discovered they were like “how dare you to touch our women now we will ‘Kari’ (honour killing) you.” I intervened and got to know it’s just because there is no female vaccinators or LHWs for them.”

Growing conservatism

Communities that are influenced by religious groups show great resistance to vaccinating their children. In the Kacha area, people believe that vaccinations will cause impotency or infertility to their children later in life. These are the communities from Kacha that are influenced by religious elements. They believe vaccination is a genocide conspiracy against Muslims.

“In Shah Wali, areas where Bloch resides, the main issue is Maulana Abdul Aziz and his followers. They have extremist thoughts. Even we (EPI officials) are scared of going there to motivate people. If we try to convince them, they call us non-believers or Jewish agents, and ask us to get lost. They believe that these people (EPI) are committing genocide on the Muslim race. They propagate that if you get your male child vaccinated, he will become impotent.”

Access and distance to health facility

Acceptance of immunization services is largely influenced by whether a mother can access a health facility or not. In rural areas where health facilities are nearby, if a woman can access the facility she will demand her child be vaccinated or request treatment for a fever.

Facility-level factors

Unregistered newborns from home-based deliveries

In areas where LHWs have not been appointed, children are born at home. This absence of LHWs results in many children remaining unregistered and subsequently they miss their BCG dose.

EPI camps/service-point locations and community access

At times, the location of an EPI camp is unknown by the community. Operational hours are not convenient for people who work in the field. Women who work in the field do not know about the operational hours. In tribal areas, although a chief's place is known by everyone, a woman herself cannot take her children there due to local social norms of mobility.

Lack of supervisory staff

There is lack of community-level supervision of vaccinators' activities to ensure quality of services. In the whole district there is only one lady health supervisor (LHS) appointed, while only one assistant district health supervisor for vaccinators is working at the moment.

Lack of human resources

Skilful and relevant human resources for fieldwork are one of the core needs of Rajanpur District. There are many union councils that are understaffed. There is only one LHS for tehsil Rojhan, and there is no nutrition officer, social mobilizer, nor communication officer appointed in the whole district. None of the vaccinators are trained for social mobilization.

“On paper LHVs are hired for Rojhan but actually they are working in Jampur.”

In conservative communities like Noorpur Machiwala, Asni, Shikarpur, In Jampur, Noorpir Manjiwal, Haji pur and Harrand, male vaccinators cannot work without the help of LHWs.

Cold chain

When asked about the quality of services that are offered to community, people frequently pointed to the presence of a cold box as an indication of good quality. However, they were not aware of the function of a cold box, but they observed vaccinators with a box with vaccine in it. It seems that EPI higher-level managers are putting emphasis on maintaining the cold chain, as one of the officials said:

“Now after the new budget of the health council, there is a refrigerator at every BHU. So now the electricity issue has also been solved with solar panel.”

Vaccinators are also aware of their duty to maintain the cold chain

"The storekeeper delivers the vaccine to the centre. After wrapping it in newspapers, the vaccine is put in cold boxes, where we keep it at a temperature between +2 to +80. If the temperature reaches above 80, the vaccine gets spoiled. We inject the vaccine in the thigh and Penta-1 in the arm."

However, maintaining the temperature of the cold chain is a problem in far-flung areas, for example, tribal mountainous areas and Kacha, particularly during summer. As one of the vaccinators said:

"When we go to a site, we carry vaccine in a cold box. Since there is no electricity here so there are no refrigerators. We get ice from a place about 30 kilometres from Mari or request some 'Dal', a sort of local transport going to Balochistan to bring some ice on return."

New syringes

People in the community are aware of that injection should be given with a new syringe. As people reported:

"He always uses a new syringe for each injection."

"After using the syringe, the vaccinator takes it with him."

People also mentioned this in FGDs,

"Every child is vaccinated with a new syringe, the syringe is opened in our presence and vaccine lies in the cold box."

A community member also reported the practice of disposal of syringe by a vaccinator.

"We have seen the messages about vaccination on TV, in the hospitals and on the walls. We have never seen the syringe but we asked the person if it is a new one."

Monitoring

Current EPI officials of Rajanpur conduct monitoring visits periodically on their own. Many vaccinators also verified this information.

"Our seniors, DHO, ASV, DSV visit the fields and check from the community about our work."

DHO Rajanpur office took the initiative of tracking performance of existing staff to rectify the issues in the field through a self-defined monitoring mechanism.

A monthly meeting of vaccinators is organized in the DHO's office to develop the next one-month plan with targets and providing an overview of their previous month's performance. In these meetings, feedback and advice on how to handle field issues is given, which EPI officials define as 'training'. LHWs do not attend these meetings, as they do not directly report to EPI.

DHO Rajanpur performs weekly and monthly analysis of EPI coverage, staff performance, and other self-defined indicators of personal interest. The charts are then displayed in his office. The analysis gives an insight into the existing officials and field staff in the current EPI coverage. Officials' visits and analysis of data showed the trend of the same mistakes being repeated by a few vaccinators. This has resulted in the forced retirement of 22 vaccinators on various performance issues during the period 2016 to 2017. These issues were misreporting/over-reporting of cases, fake entries in the register, mishandling of the cold chain, etc. From his monitoring experience, the DHO of Rajanpur mentioned the following example:

“Then there are issues in cold-chains. We got hold of frozen vaccines. The LHW said that the vaccinator had given her these vaccines when he left. She said that she couldn’t vaccinate the children on the same day. Since she did not have a refrigerator, she put it in the refrigerator of her neighbour. The neighbours had to leave for some other city in emergency and could not hand over the vaccine to her. By the time they came back the vaccine was frozen.”

“There is no mechanism of lodging any complaint against vaccination or EPI staff. I feel there must be some such mechanism.”

Updated map of Rajanpur and biometric system

EPI officials also indicated that the map of Rajanpur District needs to be updated, as some areas marked with having populations, in fact, mostly uninhabited. Officials also stated that EPI field staff are given android phones to track their work using a GIS app. GIS shows the area as having been fully covered by field staff. But Rajanpur officials have been concerned with the transparency and reliability of this app as an accurate indicator of coverage and have raised the issue with officials of EPI Punjab.

In addition, the biometric system being used, is not an ideal solution for ensuring attendance of all vaccinators. Officials say that the registry device is installed in CEO’s office of Rajanpur. For the vaccinators who work in other tehsils and tribal areas, it is impossible for them to travel 200–400 km (round trip) daily to register their attendance.

Support from local groups

One EPI officer mentioned that in sensitive areas, EPI Rajanpur was getting support from a few local groups who facilitated vaccinators to reach and access their community in their supervision. Earlier, EPI was paying them a nominal amount for this support.

Discussion

This implementation research aimed at strengthening the Punjab EPI by improving its social mobilization practices/activities for better immunization coverage by engaging poor communities in Rajanpur District. An in-depth enquiry from the communities of Kacha, rural and tribal areas, and a varied range of implementation gaps were observed. This is established from this current study that EPI the ‘communication component’ is neither sufficiently planned, nor prioritized.

A reasonable amount of global evidence has identified similar barriers for low coverage and community refusal of immunization that are caused by the absence of clear communication, lack of knowledge of immunization, lack of information on how to get vaccinations, and fear of side effects [4, 5]. These are similar barriers that have been identified in our study. Therefore, to bridge these implementation gaps, EPI needs to integrate a social mobilization strategy into EPI planning, structural support, capacity building and community involvement.

Conclusions and recommendations

Factors causing low acceptability of immunization varied among different communities, from complete refusal of immunization, to dropout after the administration of Penta-1. The lack of knowledge about the importance of immunization, long distance to health facilities, lack of knowledge of scheduled date of immunization, absence of male family members that causes dropout, and lack of resources for immunization and related facilities are the main causes of lack of demand and low immunization coverage in Rajanpur District. The communities greatly object to male vaccinators visiting their

houses for any kind of vaccination. In areas where LHWs are not appointed, male vaccinators face great resistance. Acceptance of immunization services is largely influenced by whether a mother can access a health facility or not. Communities that are under the influence of religious groups show great resistance to vaccinating their children. In Kacha, people believe that these vaccinations will cause impotency or infertility to their children later in life. Absence of LHWs results in many children's remaining unregistered and subsequently missing their BCG dose. In order to improve the immunization situation in the district, the following actions should be taken into consideration by the respective EPI authority in the district:

- Trained LHWs and vaccinators should be reallocated to hard-to-reach and underserved areas.
- Community health workers and vaccinators should be given additional training in social mobilization. Monitoring should focus on social mobilization activities.
- Systems for monitoring and supportive supervision of LHWs and vaccinators should be strengthened.
- A system for registration of births in the community by LHWs and vaccinators should be established.

References

- 1 SoSec KEMC, *Third Party Evaluation of Expanded Programme on Immunization, Punjab*, Islamabad, 2000.
- 2 Pakistan CSOs Coalition for Health and Immunization, *Status of Immunization Coverage and Maternal Child Healthcare in Punjab Province, Pakistan*, Islamabad, 2016.
- 3 Government of Pakistan, *Pakistan Social and Living Standards Measurement Survey (PSLM) 2014–2015*, Pakistan Bureau of Statistics, Statistics Division, Islamabad, 2016.
- 4 Debaje, Samadhan P., 'Communication and Mobilization Campaigns for Immunization (CMCI): Need of time for strengthening immunization services in India', *International Journal of Research in Medical Sciences*, vol. 2, issue 3, 2014, 830–831.
- 5 Opel, Douglas J., et al., 'Social Marketing as a Strategy to Increase Immunization Rates', *Archives of Pediatrics and Adolescent Medicine*, vol. 163, issue 5, 2009, pp. 432–437.



A Lady Health Worker, Shaida, using an illustration in a flip book as an aid, conducts a health and nutrition education session for a group of women, some of whom are accompanied by their children, at a health house (health centre) in Khangrah Village, in Muzaffargarh District in Punjab Province.

Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan: A feasibility study

Key messages

- Immunization coverage in Balochistan is among the lowest in Pakistan (16 per cent). Lack of knowledge about vaccines, difficulties accessing health facilities, myths and misperceptions are among the major causes of low coverage
- While conventional methods have failed, artificial intelligence (AI) has the potential to increase demand and coverage
- The use of AI-based SMS messages and reminders are a well-accepted and robust approach to increase awareness of immunization among caregivers. Reminders help children get all vaccines required and without delays.
- An AI-based approach should be scaled-up and necessary modifications should be made to optimize effectiveness

What is the problem?

Immunization is among the most cost-effective ways to prevent deaths from vaccine preventable diseases (VPDs), especially in children. In Pakistan, 54 per cent of children are fully immunized. However, Balochistan province is behind, with some estimates of coverage at only 16 per cent. Barriers to low immunization coverage include inaccessibility, and low literacy and demand.

In Balochistan, large segments of the catchment population must travel long distances to reach health facilities and there is limited outreach to remote communities. Distance, time and cost of travel as well as long waiting times at health facilities are barriers to immunization in the province.

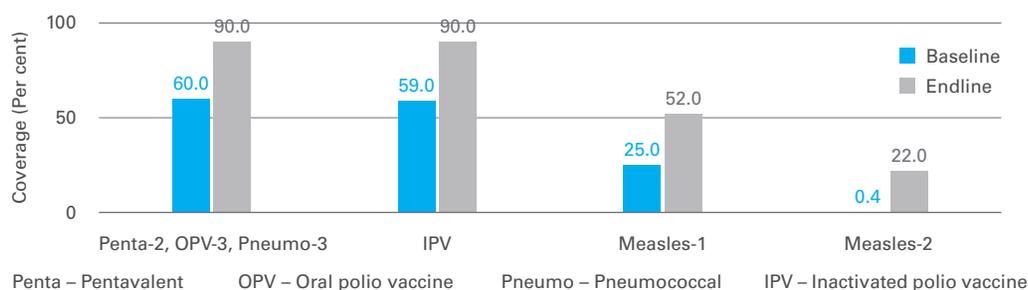
Myths and misconceptions easily spread in remote communities, which have high levels of illiteracy. In highly traditional communities, mothers often lack power in decision-making regarding immunization. Although the main decision-makers in households are usually men, they are rarely reached with information about immunization, and their knowledge of the benefits of vaccines is limited.

This study looked at the implementation of AI-based mHealth technology [SMS and interactive voice response (IVR) technology] in immunization in Quetta City in Balochistan Province. It assessed demand, acceptability and compliance with the new technology, and determined the effect on immunization coverage and dropout rates.

How was the research done?

A baseline survey was followed by the introduction of the technology, and the study completed with an endline survey. Baseline data were collected from 1,600 mothers within the catchment area of 75 basic health units (BHUs) in Quetta City. After SMS and IVR technology was introduced, an endline survey was conducted with 1,203 participants in the baseline. In addition, key informant interviews were conducted with district EPI officials and stakeholders, and three focus group discussions were held with three different groups of mothers.

FIGURE 7
Immunization coverage after AI intervention



What solutions were identified in the study?

A Technology-based solutions for increased accessibility and uptake of vaccines

AI technology has the potential to increase access through raised awareness. Rates of immunization coverage were significantly improved after the introduction of the AI-based technology in Quetta City. The provision of vaccine related information through SMS and voice call reminder services increased uptake and reduced delays in initiation of vaccination.

B AI-based solutions to address inequalities

SMS and voice call reminder services were considered very effective and appreciated by the parents. It was found that the technology helped children get their vaccinations on time.

Vaccine-related information through mobile phones helped to increase caregivers' awareness and diminish the myths around vaccines. This was particularly the case for caregivers with lower levels of education.

Through an AI approach it was possible to reach the concerned parents directly and inform them about vaccine-related information.

C Technology can strengthen the engagement of fathers

Because most mobile phones in Balochistan belong to men, the AI-based technology can be an effective way to engage husbands in decision-making through targeted messaging. This raises their awareness of the availability and benefits of immunization, and facilitates household acceptance and raises the likelihood of children receiving vaccines.

Recommended actions

- 1 AI-based technology has the potential to improve coverage and equity by raising awareness and tackling vaccine hesitancy. The technology should be scaled up in Balochistan and potentially, subsequently, across Pakistan.
- 2 AI is a robust intervention, which is well accepted by parents, and is feasible to implement.
- 3 The intervention should be implemented on a broader scale, and lessons learned should be documented. Respective improvement and modification of the approach should be made accordingly.

For more information please contact:

Ejaz Ahmed Khan, (ejaz@hsa.edu.pk); Muhammad Ishaque Panezai; Subhana Akber; Babar Shahid

Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan: A feasibility study

Ejaz Ahmad Khan,¹ Muhammad Ishaque Panezai,² Baber Shahid,¹ and Subhana Akbar¹

¹ Health services academy, Islamabad, Pakistan

² Expanded programme on immunization (EPI), government of Balochistan, Quetta, Pakistan

Introduction

Immunization is one of the most cost-effective interventions to prevent deaths from vaccine preventable diseases (VPDs), especially in children. While Pakistan has an overall routine immunization coverage of 54 per cent for fully immunized children, coverage in the province of Balochistan is much lower at 16 per cent [3,4] This is due to several barriers including challenging geography, low literacy and demand issues. Conventional methods have failed to improve this situation.

Balochistan is the largest province of Pakistan by area and also the least developed. It suffers from several political, tribal and border conflicts. The distances to health facilities for the catchment population are long with limited accessibility, and the facilities have little outreach. The female literacy rate in Balochistan is only 8 per cent [8], which makes it difficult to for women in the province to develop a thorough understanding of immunization and the importance of herd immunity in communities. Moreover, low awareness levels amongst healthcare providers, concern about vaccine safety and beliefs in local remedies are major demand-side barriers to immunization. Lack of timely information and low confidence in the quality of services are additional demand-side barriers. Outreach services are mainly offered by Lady Health Workers (LHWs) and there are only a limited number of vaccinators for immunizing pregnant mothers and children.

Methods

This study aimed to assess the feasibility of introducing an mHealth intervention using an artificial intelligence (AI) platform based on SMS and interactive voice recordings (IVRs) to remind and persuade parents to get their children vaccinated. This research specifically assessed the demand for, compliance with, and acceptability of this innovative technology to ensure the correct timing for vaccinations and reduce dropout rates in Quetta City. Successful implementation of the innovation is expected to:

- reduce the delay for initial vaccinations;
- reduce the delay in subsequent vaccinations; and
- increase the number of fully immunized children.

Study design

Data were collected in Quetta City through a mixture of qualitative and quantitative approaches. Baseline data were collected from 1,600 eligible mothers/parents within the catchment areas of 75 basic health units (BHUs) in Quetta, and the AI platform was instituted with SMS and IVRs from EPI Quetta. Daily reminders and IVRs were sent to the cell numbers in the database/records. Responses were noted on the AI platform. After a period of about two months, an endline survey of 1,203 participants was undertaken with

TABLE 7
Socio-demographic characteristics of the study participants
(n = 1,600)

Survey question number	Characteristics	Number of participants (%)	
1	Gender of children	Male	813 (50.8)
		Female	787 (49.2)
2	Father's age	Less than ≤ 35 years	1,007 (62.9)
		More than 35 years	593 (37.1)
3	Mother's age	Less than ≤ 30 years	1,080 (67.5)
		More than 30 years	520 (32.5)
4	Place of birth	Hospitals	1,082 (67.6)
		Private health facility	303 (18.9)
		Home delivered	215 (13.4)
5	Education	Illiterate	445 (27.8)
		Informal	96 (6.0)
		Primary (until grade V)	182 (11.4)
		Middle (until grade VII)	198 (12.4)
		Secondary	450 (28.1)
		Graduate (college)	177 (11.1)
		Post-graduate (university)	52 (3.3)
6	Occupation status	Employed	784 (49.0)
		Unemployed	209 (13.1)
		Business	607 (37.9)
7	Total household income (PKR)*	Less than 15,000	872 (54.5)
		16,000 – 30,000	588 (36.8)
		31,000 – 45,000	83 (5.2)
		More than 45,000	52 (3.3)
		No income	5 (0.3)
8	Ethnicity	Baloch	522 (32.6)
		Pakhtoon/Pathan	366 (22.9)
		Punjabi	145 (9.1)
		Urdu speaking	98 (6.1)
		Sindhi	63 (3.9)
		Other	406 (25.4)
9	Vaccination status of the child (as told by the mother)	Non-immunized	759 (47.4)
		Partially	774 (48.4)
		Fully	67 (4.2)
10	Type of mobile owned	Basic handset	1,085 (67.8)
		Android	492 (30.8)
		None	23 (1.4)

* 1 Pakistani ruppe (PKR) = 0.01 United States dollar (USD)

a loss of 400 participants due to seasonal migration to warmer cities in Sindh province. For the qualitative part, three key informant interviews (KIIs) were conducted; two KIIs with lady health supervisors and one KII with the WHO staff responsible for routine immunization. There were also three focus group discussions (FGDs) with homogenous groups of 6–10 mothers: one focus group was from an ethnic minority in a highly educated community. For both the KIIs and FGDs, the researchers used guidelines.

Data collection and analysis

Quantitative data was collected by trained data collectors using notes from face-to-face discussions and e-recordings with prior consent from the participants. If later it was realized that some responses were missing, the data collector tried approaching the respondent again. If a household refused to take part in providing data, or data remained incomplete, another household was randomly selected for data collection. Qualitative data were analysed by developing themes and by triangulation and description.

Quantitative data was analysed to determine descriptive results (frequency distribution) for socio-demographic variables and for demand variables. Inferential statistics (Chi-square) was used to find the association between the independent and dependent variables. We also analysed for the prospective data of the unimmunized/immunized children through the intervening AI platform. Data were collected, cleaned, coded and entered. Double entry in SPSS ensured correctness. All quantitative data and qualitative data (recording, notes) were kept confidential and in the possession of the principal investigator.

Ethical considerations

As this study involved personal information, we abided by the universal standards of ethical research. The Institutional Review Board (IRB) of the Health Services Academy was approached for the ethical permission for this research, which was obtained. We used informed consent from all the participants of this study and all records were kept confidential. There was no risk of harm to participants who were all asked to consent.

Results

Baseline survey

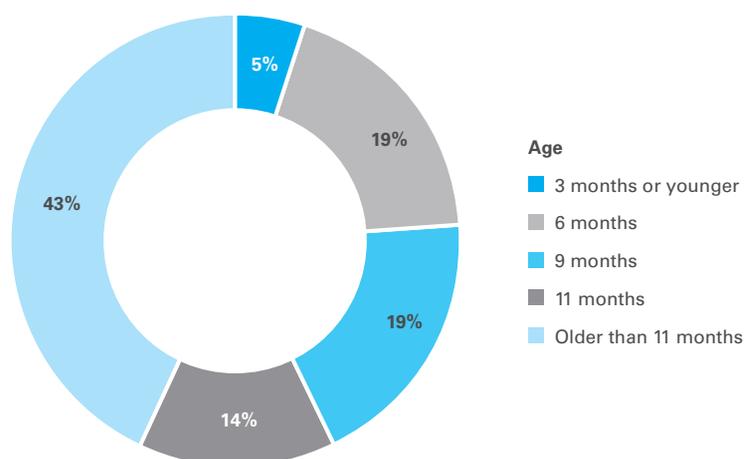
We included 1,600 children who were eligible according to the criteria, randomly selected, among which 1,539 (96.2 per cent) were younger than two years of age and 61 (3.8 per cent) were two or more years of age (*see Table 7*). Most of the respondents were either illiterate or had studied up to the secondary level. About half of the respondents were employed (49 per cent), and about one third (37.9 per cent) owned a business. Some respondents (13.1 per cent) were unemployed. Regarding the total household income of the respondents, most of them had an income of less than 30,000 Pakistani rupees per month. Very few (8.8 per cent) had an income above than 30,000 Pakistani rupees per month. Mobile handset ownership was high, as 67.8 per cent owned a basic handset and 30.8 per cent owned android mobile phones (*see Table 7*).

A majority of study respondents (91.6 per cent) had an immunization card. A large number of respondents identified a BHU as the place for vaccinating their children. Antigen vaccination was highest for *Bacillus Calmette-Guerin* (BCG) vaccine (92.2 per cent), oral polio vaccine (OPV) 0, 1, 2, 3 was 92 per cent, 86.1 per cent, 72. per cent, and 59.8 per cent respectively. More than half (59.1 per cent) of children had received an inactivated polio vaccine (IPV). Pentavalent 1, 2, 3 had been received by 86 per cent, 73 per cent and 60 per cent respectively. Pneumococcal vaccination also followed the similar pattern of Pneumo-1 being the most frequently received of all the three doses (*see Table 8*).

TABLE 8
Distribution of vaccination doses among children
(n = 1,600)

S. number	Characteristics	Vaccination	Number of children (%)
1	Age	Less than ≤ two years old	1,539 (96.2)
		More than two years old	61 (3.8)
2	At birth	BCG	1,475 (92.2)
		OPV-0	1,474 (92.1)
3	At 6 weeks	OPV-1	1,378 (86.1)
		Pentavalent-1	1,377 (86.1)
		Pneumococcal-1	1,376 (86.0)
4	At 10 weeks	OPV-2	1,161 (72.6)
		Pentavalent-2	1,164 (72.8)
		Pneumococcal-2	1,157 (72.3)
5	At 14 weeks	OPV-3	956 (59.8)
		Pentavalent-3	956 (59.8)
		Pneumococcal-3	957 (59.8)
		IPV	946 (59.1)
6	At 9 months	Measles-1	403 (25.2)
7	At 15 months	Measles-2	8 (0.5)

FIGURE 8
Age-wise distribution in months
(n = 1,600)



Measles remains the least vaccinated disease in the study, with the first dose (measles-1) received by only 25.2 per cent and the second dose (measles-2) almost negligible, with only 0.5 per cent of the surveyed children vaccinated. For 400 (25 per cent) of the children surveyed, the source of the vaccination for measles-1 was BHUs, but for measles-2, the source of vaccination was only 7 (0.4 per cent) for BHUs. No sources were reported for measles-1 and measles-2 among 1,196 (74.8 per cent) and 1,589 (99.3 per cent) of the children, respectively. Only 458 (28.6 per cent) of the children were found to be fully immunized before the age of one.

Age-wise distribution for immunization

Findings for age-wise distribution show that nearly 92.2 per cent of children were vaccinated for BCG and OPV-0 at the time of birth. At 6 weeks of age, almost 86.1 per cent of the children were vaccinated for OPV-1, pentavalent-1 and pneumococcal-1. At 10 weeks, almost 72.5 per cent of the children were vaccinated for OPV-2, pentavalent-2 and pneumococcal-2. At the age of 14 weeks, 50.8 per cent of the children were vaccinated for OPV-3, pentavalent-3, pneumococcal-3 and for IPV. However at 9 months of age, only 25.2 per cent children were vaccinated for measles-1 and measles-2, only 0.5 per cent of the children were vaccinated for it. Moreover, 398 (24.9 per cent) children were found to be fully immunized as per the definition stated earlier. Whereas, 1,202 (75.1 per cent) of the children were not fully immunized (see Table 8).

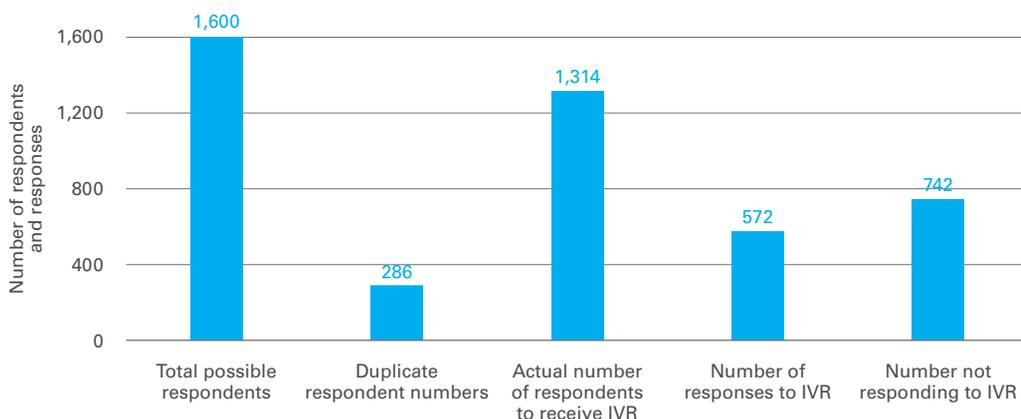
Feasibility of the artificial intelligence intervention

Following use of the AI platform, there was an increase in achieving full immunization coverage for both measles-1 and measles-2. The increase in measles-2 vaccination rates were highly encouraging, with an improvement from 0.5 per cent to 22 per cent among the sampled population. Delays in initial vaccinations and delays of subsequent vaccinations were reduced. The AI platform reminded parents about vaccinations even if they had forgotten the vaccination date or lost the vaccination card. It was also found that the AI platform facilitated sharing responsibility of vaccinations between both parents.

Response

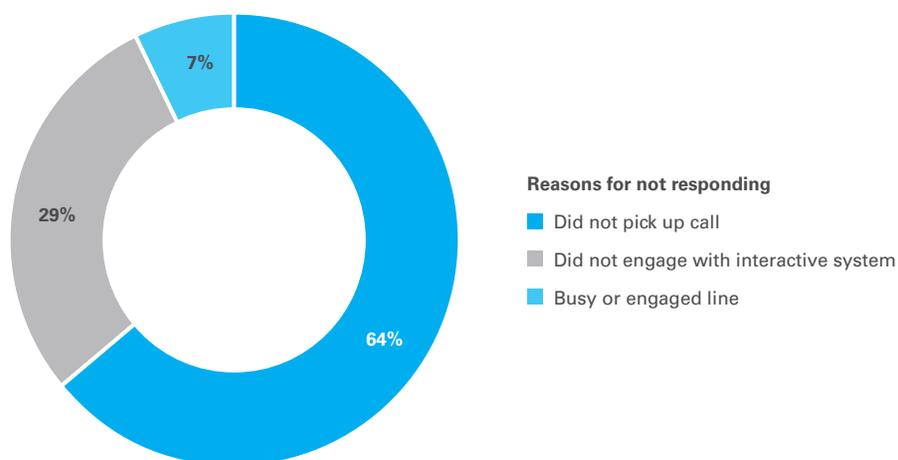
Out of 1,600 respondents of the baseline survey, 1,314 were found eligible for the intervention after removing 286 duplicate numbers. The 1,314, received messages from EPI, Quetta City. Out of the 1,314 who received messages, only 572 (22 per cent) responded to the IVR (see Figure 9).

FIGURE 9
Number of respondents and responses to IVR awareness messages



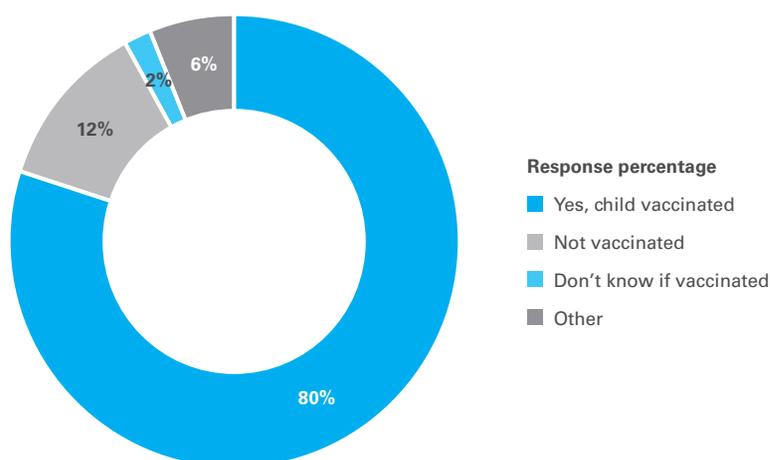
Out of those who did not respond to the IVR calls, 64 per cent did not pick up the call, 29 per cent did not choose any further option (by interacting with the system), and 7 per cent of the calls made went to busy, or engaged phone lines. (see Figure 10). When explored during FGDs, the main reasons for lack of response, were the low literacy rates of mothers; mobile phones being with women’s husbands, which rang when their husbands were at work; and not knowing how to respond further.

FIGURE 10
Distribution of reasons for not responding



Out of those who responded, most (80 per cent) reported that they had their child vaccinated on the due date (see Figure 11). This aspect was explored during KIs and the FGDs, and it was found that the timely awareness messages and IVR had persuaded parents to bring their children to the health centre for the due vaccinations.

FIGURE 11
Distribution of responses



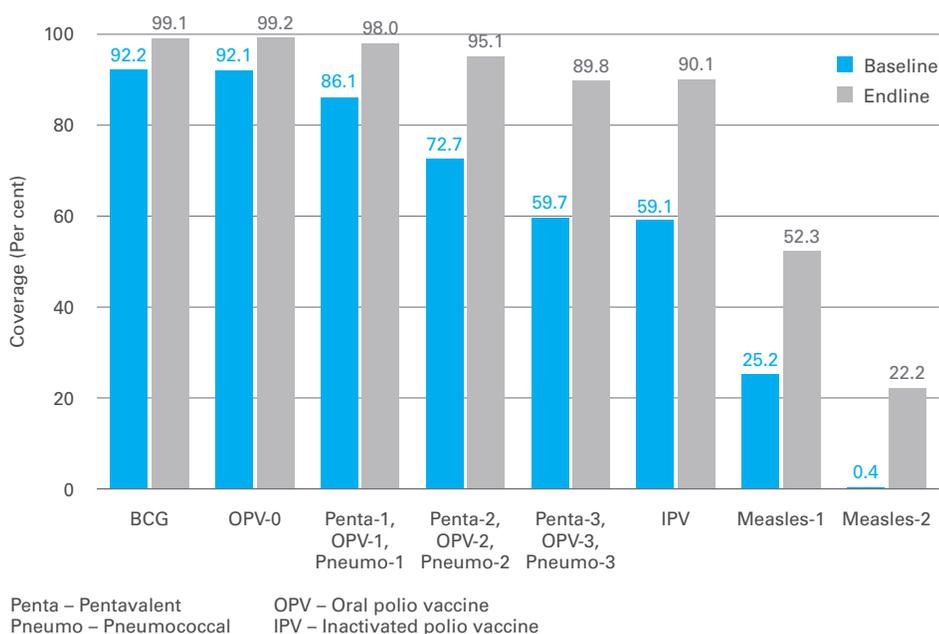
Delay in following vaccination date

Findings showed an increase in coverage for pentavalent, OPV and pneumococcal vaccines for first, second and third doses/boosters from the baseline to the endline data (see Figure 12). This reflects that the delay in following vaccinations was reduced by the AI intervention.

Fully immunized child (FIC) achievement trend

A fully immunized child is defined as the one who had received one dose of BCG, of pentavalent I, II, III; OPV I, II, III; and measles-1. There was a marked improvement in the FIC attainment following the intervention (see Figure 12). Furthermore, second doses of measles was markedly higher after the intervention.

FIGURE 12
Vaccination coverage, pre- and post-intervention surveys



Key informant interviews and focus group discussions

The interviews and FDGs in Balochistan identified barriers and enablers to immunization. One main reason mentioned by participants was the extremely low level of awareness of immunization. Other barriers to immunization mentioned were distance to the health centres, transportation, gender discrimination, and non-trained vaccinators that led to fears of about vaccine safety.

One LHS said, “parents find EPI centres far from their reach, they have problems with transportation, lose their vaccination cards, and are less educated, especially the mother. Even if they reach the EPI centre, most of the vaccinators are not well trained. Wrong injections do occur resulting in injury and disability to the child. Myths and religious beliefs are also among the barriers.”

One of the WHO officers also highlighted accessibility to health centres and pressure on EPI staff: “One vaccinator has to cover more than 300 sq km area, and there is one EPI vaccination centre in 600 to 700 km distance. Parents also suffer the issues of distance and reaching the EPI centres to get their children vaccinated. It would be great if the AI could just improve measles coverage by 10-20 per cent, and it will be great success.”

One caregiver argued that people *“still have fears of some haram ingredients in the vaccine and they have old fashioned perceptions about vaccination. These need to be addressed.”*

Regarding the SMS and calls, the majority of the participants found them to be useful reminders for the timing of vaccination for children. According to the mothers, registered contact numbers were for mobile phones that were usually with the fathers and this is the way they received timely information about vaccinating the child. In some instances, even if the father is working outside or is not available, he can later inform the mother or the family to get the child vaccinated at the due date and time. This was considered a big advantage of using AI in getting children vaccinated. Some mothers suggested that the importance of getting vaccinations could be increased by making the vaccination card a document that is required for eligibility for school admission or for applying for passports in the country.

Generally participants viewed the use of AI as beneficial in ensuring that children get all the needed vaccines. Some of the mothers were annoyed about repeated calls and suggested that calls should be made only on the date of immunization. Participants suggested that the AI should be further developed with inclusion of child’s photo as proof, followed by SMS confirmation and data updated in the electronic records.

Discussion

Acceptability

The community, especially mothers, appreciated the new method of approach and reminders for vaccinating their children. There was a high level of acceptance and desire to continue using the SMS and IVR services. One possible reason is that during the last decade, ownership of a handset among the populations has increased enormously, particularly in low- and middle-income countries (LMICs). This has provided an opportunity to health professionals to reach out to communities, target groups and vulnerable populations with ease and effectiveness [20]. Studies using mHealth interventions elsewhere demonstrate high acceptability of mobile-based health initiatives in multiple settings. For clinical interventions, and for their intermediate outcome measures, the cooperation of the parents and the communities has been documented [21–27]. For our study, which focused on immunization, we found that a significant proportion of parents showed high acceptability towards the reminders. This was equally balanced between low-literacy and high-literacy populations within the sample of group.

Demand

In the key informant interviews, health professionals and implementators had suggestions for scaling-up the intervention. Participants in FGDs also highlighted the importance of expanding SMS and IVR based services to other areas. Further improvements leading to completely computerized vaccination card systems, LHWs and vaccinators having children’s vaccination cards on their handsets, and regular reminders to parents on the due date were some of the recommendations from the major stakeholders of immunization programmes.

Reduced delay in initiation of vaccinations

It is well documented from a number of countries that delays in initiation of vaccinations is common. The DPT3 vaccine has been found to be delayed by almost 11 weeks in LMICs. This delay is more pronounced for newly introduced vaccines [29]. In our study, despite BCG and OPV0 usually having good coverage (above 80 per cent) in most of the cases, it was encouraging that the intervention improved this to 95–99 per cent coverage. Evidence showed that the booster dose on the designated date was also improved,

increasing coverage of second and third boosters of pentavalent, OPV and pneumococcal vaccines. The results show that uptake of both the first and second vaccines increased remarkably after the intervention, especially for the second dose of measles. This is significant because measles compliance remains compromised and delays lead to gaps in immunity and frequent outbreaks of the vaccine preventable diseases. Different approaches and integration of efforts and programmes with innovative solutions are frequently recommended in literature for LMICs. Use of mHealth technology to initially bypass and then to support the health systems in LMICs, has resulted in decreasing delays in service delivery. Many studies have documented shortening the delays in accessing healthcare and health services, both for curative and preventive medicine [30–32].

Delays in following vaccination by date

Long delays in the initial dose often results in missing the booster or next doses of the antigen, and its concomitantly administered vaccines [33–35]. Following the timelines for vaccinations is imperative to maintain good herd immunity in a population. Other studies from different settings show that differences in achieving the next date of vaccination has implications for infant and childhood morbidity and mortality [29,36]. There is a limit to delay (up to two weeks to a month) and beyond that immunity cannot be boosted appropriately, and a child becomes susceptible to disease [37]. Parents' education and awareness levels, distance from the facility, vaccine stocks, vaccinators' education levels, and location of birth can potentially contribute to delays in timely immunization [35,38,39]. In the feasibility study of AI interventions, one of the important intermediate outcomes was finding out if delays were shortened for the following vaccination date. By comparing the vaccination percentages for each antigen for baseline data and the endline data, and understanding from the KIIs and the FGDs, it is evident that the delays for the following vaccination dates were markedly reduced. The usual dropouts and delays in vaccination were successfully addressed, as is evident from the difference in vaccination rate trends, for all nine antigens. Experiences from similar low-income countries show that SMS reminders have resulted in a decrease in dropout rates and fewer delays in vaccination schedules [40]. Ethnic communities from developed nations have also used simple tools, such as calendars, to improve the vaccination coverage effectively [35].

Fully immunized child achievement trends

Vaccinations on time lead to achievement of a fully immunized child (FIC) among children under two years of age. Children from developed as well as from developing countries fail to achieve this status due to many factors as explained previously. Inadvertent delays between DPT1 and DPT3, and measles lead to typical lag and delays in achieving FIC status among children [35, 37–39]. Receiving measles vaccinations along with BCG, OPV I, II, III, Penta I, II, I II, and Pneumo I, II, III are considered to constitute FIC as defined by WHO. The comparative results show an upward trend in the uptake of all the antigens for FIC, especially for third doses and measles-1 and 2. Barriers to FIC include parental education, parental attitude and knowledge, failure of the immunization system, and lack of proper communication and information. Literature provides evidence that timely information and communication can improve vaccination by one dose [41, 42]. Awareness and reminders through AI have thus been successful in improving FIC coverage in the feasibility study.

Strengths and limitations of the study

The study population included both illiterate and educated mothers, which provided a broader understanding in the KIIs and FGDs. Mothers welcomed the SMS and IVR, and tried to comply accordingly. Data collection was as accurate as possible. A comparatively large sample size was also a strength.

There were challenges in the implementation of the intervention. The telecom service provider could not expand it to all cellular networks. Later in the project, a universal SMS portal was used for awareness outreach to all of the registered sample population. Targeting each child with specific SMS or IVR was not possible in the current set-up of the AI, although the set-up improved at the end of the project. There was also a loss of 28 children who died of non-vaccine-related causes during the study. About 300 of more families left the intervention area during the winter to go to Karachi and other cities in Sindh where they usually go to meet their relatives and enjoy milder weather. Therefore, by the end, the study had a smaller sample size of 1,203 participants instead of the 1,600 sample size it had for the baseline.

Conclusion and recommendations

This study showed marked improvement in the up-take of vaccination for the children following the introduction of the AI-based intervention. Discussions with the mothers and other stakeholders showed the intervention to be widely accepted and an important tool in increasing demand for vaccines in the community. The intervention has the potential to become more technically sound and user friendly. The potential for using technology to improve coverage is promising.

The study's findings led to the following recommendations:

- AI-based intervention has the potential to improve immunization coverage and equity in immunization, and to generate demand and address vaccine-related vaccine hesitancy. The technology should be scaled up in Balochistan and subsequently across Pakistan.
- As the AI-based intervention is implemented and scaled up, lessons learned should be well documented to allow other locations to benefit from the initiative.
- The technology should be developed based on working with the community to meet the needs expressed at the local level.

References

- 1 Nishtar, Sania, et al., 'Pakistan's Health System: Performance and prospects after the 18th Constitutional Amendment', *Lancet*, vol. 381, issue 9884, 2013, pp. 2193–2206.
- 2 Khan, Tariq and Javaria Qazi, 'Measles Outbreaks in Pakistan: Causes of the tragedy and future implications', *Epidemiol Reports*, 2014.
- 3 National Institute of Population Studies (Pakistan), *Pakistan Demographic and Health Survey 2012–2013*, 2013, p. 392, <<https://dhsprogram.com/pubs/pdf/FR290/FR290.pdf>>.
- 4 Bugvi, Ayesha Siddiqa, et al., 'Factors Associated with Non-Utilization of Child Immunization in Pakistan: Evidence from the Demographic and Health Survey 2006-2007', *BMC Public Health*, vol. 14, issue 1, 2014, p. 232.
- 5 Barros, Aluísio J.D., et al., 'Equity in Maternal, Newborn, and Child Health Interventions in Countdown to 2015: A retrospective review of survey data from 54 countries', *Lancet*, vol. 379, issue 9822, 2012, pp. 1225–1233.
- 6 Quddus, Arshad, et al., 'Neonatal Tetanus: Mortality rate and risk factors in Loralai District, Pakistan', *International Journal of Epidemiology*, vol. 31, issue 3, 2002, pp. 648–653.
- 7 Ul Haque, Minhaj, et al., *The Pakistan Expanded Program on Immunization and the National Immunization Support Project: An economic analysis*, The World Bank, 2016.
- 8 Kim, Jooseop, Harold Alderman and Peter Orazem, *Can cultural barriers be overcome in girls' schooling? The community support program in rural Balochistan*, The World Bank Development Research Group, 1998.

- 9 Kolstad, Jonathan T. and Michael E. Chernew, 'Quality and Consumer Decision Making in the Market for Health Insurance and Health Care Services', *Medical Care Research and Review*, vol. 66, issue 1, 2009, pp. 28–52.
- 10 Montagu, Dominic, 'Franchising of Health Services in Low-Income Countries', *Health Policy Plan*, vol. 17, issue 2, 2002, pp. 121–130.
- 11 Becker-Olsen, Karen L. and Ronald Paul Hill, 'The Impact of Sponsor Fit on Brand Equity: The case of nonprofit service providers', *Journal Service Research*, vol. 9, issue 1, 2006, pp. 73–83.
- 12 Milovic, Boris and Milan Milovic, 'Prediction and Decision Making in Health Care Using Data Mining', *Kuwait Chapter of Arabian Journal of Business and Management Review*, vol. 1, issue 12, 2012, pp. 126–136.
- 13 Lisboa, Paulo J. and Azzam F.G. Taktak, 'The Use of Artificial Neural Networks in Decision Support in Cancer: A systematic review', *Neural Networks*, vol. 19, issue 4, 2006, pp. 408–415.
- 14 Green, Andrew, et al., 'Using Costing as a District Planning and Management Tool in Balochistan, Pakistan', *Health Policy Plan*, vol. 16, issue 2, 2001, pp. 180–186.
- 15 Mutua, Martin Kavao, et al., 'Fully Immunized Child: Coverage, timing and sequencing of routine immunization in an urban poor settlement in Nairobi, Kenya', *Tropical Medicine and Health*, vol. 44, issue 1, 2016, p. 13.
- 16 Awoh, Abiyemi Benita and Emma Plugge, 'Immunisation Coverage in Rural–Urban Migrant Children in Low and Middle-Income Countries (LMICs): A systematic review and meta-analysis', *Journal of Epidemiology and Community Health*, vol. 70, issue 3, 2015, pp. 305–311.
- 17 Loevinsohn, Benjamin, Rathavuth Hong and Varun Gauri, 'Will More Inputs Improve the Delivery of Health Services?: Analysis of district vaccination coverage in Pakistan', *International Journal of Health Policy and Management*, vol. 21, issue 1, 2006, pp. 45–54.
- 18 Wilson, Kumanan, Katherine Atkinson and Shelley Deeks, 'Opportunities for Utilizing New Technologies to Increase Vaccine Confidence', *Expert Review of Vaccines*, vol. 13, issue 8, 2014, pp. 969–977.
- 19 Abaza, Haitham and Michael Marschollek, 'mHealth Application Areas and Technology Combinations*. A comparison of literature from high and low/middle income countries', *Methods of Information in Medicine*, vol. 56, issue 7, 2017, pp. 105–122.
- 20 Crocker-Buque, Tim, et al., 'Immunization, Urbanization and Slums – A systematic review of factors and interventions', *BMC Public Health*, vol. 17, issue 1, 2017, p. 556.
- 21 Zhou, Huan, et al., 'Impact of Text Message Reminders on Caregivers' Adherence to a Home Fortification Program Against Child Anemia in Rural Western China: A cluster-randomized controlled trial', *American Journal of Public Health*, vol. 106, issue 7, 2016, pp. 1256–1262.
- 22 Nurmatov, Ulugbek, et al., 'Effectiveness of mHealth Interventions for Maternal, Newborn and Child Health in Low- and Middle-Income Countries: Systematic review and meta-analysis', *Global Journal of Health Science*, vol. 6, issue 1, 2016, p. 10401.
- 23 Colaci, Daniela, Simran Chaudhri and Ashwin Vasan, 'mHealth Interventions in Low-Income Countries to Address Maternal Health: A systematic review', *Annals of Global Health*, vol. 82, issue 5, 2016, pp. 922–935.
- 24 Tamrat, Tigest and Stan Kachnowski, 'Special Delivery: An analysis of mhealth in maternal and newborn health programs and their outcomes around the world', *Maternal and Child Health Journal*, vol. 16, issue 5, 2012, pp. 1092–1101.
- 25 Nurmatov, Ulugbek, et al., 'Effectiveness of mHealth Interventions for Maternal, Newborn and Child Health in Low- and Middle-Income Countries: Systematic review and meta-analysis', *Global Journal of Health Science*, vol. 6, issue 1, 2016, <www.jogh.org/documents/issue201601/jogh-06-010401.pdf>.
- 26 Hall, Charles S., et al., 'Assessing the Impact of mHealth Interventions in Low- and Middle-Income Countries – What has been shown to work?', *Global Health Action*, vol. 7, issue 1, 2014.
- 27 Higgs, Elizabeth S., et al., 'Understanding the Role of mHealth and Other Media Interventions for Behavior Change to Enhance Child Survival and Development in Low- and Middle-Income Countries: An evidence review', *Journal of Health Communication*, vol. 19, issue sup1, 2014, pp. 164–189, <www.tandfonline.com/doi/abs/10.1080/10810730.2014.929763>.

- 28 Hartzler, Andrea L. and Thomas Wetter, 'Engaging Patients through Mobile Phones: Demonstrator services, success factors, and future opportunities in low and middle-income countries', *Yearbook of Medical Informatics*, vol. 9, issue 1, 2014, pp. 182–194, <www.ncbi.nlm.nih.gov/pmc/articles/PMC4287059/>.
- 29 Clark, Andrew and Colin Sanderson, 'Timing of Children's Vaccinations in 45 Low-Income and Middle-Income Countries: An analysis of survey data', *Lancet*, vol. 373, issue 9674, 2009, pp. 1543–1549, <www.sciencedirect.com/science/article/pii/S0140673609603172>.
- 30 Oliveira, Fabricia da Silva, et al., 'Vaccination Coverage and Compliance with Three Recommended Schedules of 10-Valent Pneumococcal Conjugate Vaccine During the First Year of its Introduction in Brazil: A cross-sectional study', *PLOS One*, vol. 10, issue 6, 2015.
- 31 Lassi, Zohra S., et al., 'Interventions to Improve Neonatal Health and Later Survival: An overview of systematic reviews', *EBioMedicine*, vol. 2, issue 8, 2015, pp. 985–1000.
- 32 Manakongtreecheep, Kasidet, 'SMS-Reminder for Vaccination in Africa: Research from published, unpublished and grey literature', *Pan African Medical Journal*, vol. 27, issue sup3, 2017, p. 23.
- 33 Bailly, Anne-Charlotte, et al., 'Timeliness of Vaccination in Infants Followed by Primary-Care Pediatricians in France', *Human Vaccines & Immunotherapeutics*, vol. 14, issue 4, 2017, pp. 1018–1023.
- 34 O'Donnell, Shauna, et al., 'Determinants of Under-Immunization and Cumulative Time Spent Under-Immunized in a Quebec Cohort', *Vaccine*, vol. 35, issue 43, 2017, pp. 5924–5931.
- 35 Gibson, Dustin G., et al., 'Individual Level Determinants for Not Receiving Immunization, Receiving Immunization with Delay, and Being Severely Underimmunized Among Rural Western Kenyan Children', *Vaccine*, vol. 33, issue 48, 2015, pp. 6778–6785.
- 36 Buttery, Jim P. and Stephen M. Graham, 'Immunisation Timing: The protective layer in vaccine coverage', *Lancet*, vol. 373, issue 9674, 2009, pp. 1499–1500, <www.sciencedirect.com/science/article/pii/S0140673609603408>.
- 37 Gras, Pauline, et al., 'What Timing of Vaccination is Potentially Dangerous for Children Younger than 2 Years?', *Human Vaccinations & Immunotherapeutics*, vol. 12, issue 8, 2016, pp. 2046–2052.
- 38 Mohammadbeigi, Abolfazl, et al., 'Survival Analysis for Predictive Factors of Delay Vaccination in Iranian Children', *International Journal of Preventive Medicine*, vol. 6, issue 1, 2015, p. 119.
- 39 Mvula, Hazzie, et al., 'Predictors of Uptake and Timeliness of Newly Introduced Pneumococcal and Rotavirus Vaccines, and of Measles Vaccine in Rural Malawi: A population cohort study', *PLOS One*, vol. 11, issue 5, 2016.
- 40 Domek, Gretchen J., et al., 'SMS Text Message Reminders to Improve Infant Vaccination Coverage in Guatemala: A pilot randomized controlled trial', *Vaccine*, vol. 34, issue 21, 2016, pp. 2437–2443.
- 41 Oyo-lta, Angela, et al., 'Cochrane Review: Interventions for improving coverage of child immunization in low- and middle-income countries', *The Cochrane Database of Systematic Reviews*, vol. 7, issue 3, 2012, pp. 959–1012, <<http://dx.doi.org/10.1002/ebch.1847>>.
- 42 Rainey, Jeanette J., et al., 'Reasons Related to Non-Vaccination and Under-Vaccination of Children in Low and Middle Income Countries: Findings from a systematic review of the published literature, 1999-2009', *Vaccine*, vol. 29, issue 46, 2011, pp. 8215–8221, <www.sciencedirect.com/science/article/pii/S0264410X11013661>.

Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts

Key messages

- Immunization hesitancy is a major factor behind poor demand or low uptake of vaccines for children
- Social mobilization activities such as animated series, social media activism and SMS usage are often not implemented as planned
- Absence of effective monitoring, non-functional district communication committees, insufficient domestic resources and lack of involvement of civil society are key challenges
- Adequate financial and human resources at the community level are a prerequisite for effective implementation of social mobilization activities

What is the problem?

Vaccine hesitancy is the delay in acceptance or refusal of vaccines despite availability of vaccination services. Lack of awareness and misconceptions about vaccines can drive vaccine hesitancy and diminish demand for immunization, especially in more deprived and marginalized areas.

Successful vaccination programmes ensure caregivers have adequate knowledge and information to accept immunization and make informed decisions regarding vaccines. Social mobilization campaigns that are adequately planned, funded and integrated with service delivery can contribute to increased and equitable immunization coverage.

Immunization decision-making is a complex process susceptible to many factors. If people are not engaged appropriately via communication and social mobilization, doubts about the trade-offs between the benefits and potential side effects will persist.

The objective of this study was to explore strategies for improved social mobilization to reduce vaccine hesitancy in two districts in Punjab, Pakistan.

How was the research done?

A mixture of quantitative and qualitative approaches was applied to collect data from a diverse group of respondents in Sargodha and Khushab districts.

Quantitative data were collected from community health workers, including vaccinators, lady health workers (LHWs) and lady health supervisors (LHSs), and school health and nutrition supervisors. In addition, qualitative data were collected from officials of top management in EPI in Punjab and other stakeholders.

What solutions were identified in the study?

A Strategies for social mobilization

Several strategies for social and community mobilization were shown to be highly effective in addressing vaccine hesitancy. Advocacy meetings with local influencers, community group sessions, door-to-door visits by community health workers and religious leader announcements in mosques are considered the most relevant and appropriate interventions.

B Involvement of community health workers

LHWs, LHSs and vaccinators are trusted by the community because they are recruited locally and understand the customs and culture in the local context. Involving these community health workers in social mobilization activities is therefore sustainable and effective. However, in some cases negative attitudes towards vaccines and immunization hinder trust towards these groups of health service providers.

C Community engagement

The research showed that actively involving communities in social mobilization activities increases the acceptance of interventions, such as immunization. Community engagement is most effective in rural and hard-to-reach areas when community health workers are skilled in interpersonal communication and information education communication. The active participation of local leaders, teachers and health department officials in social mobilization increases its effectiveness and also improves the performance of community health workers.

Recommended actions

- 1 A structured monitoring system should be put in place to ensure that vaccinators properly counsel parents and mothers about benefits and potential adverse effects of immunization.
- 2 Communication committees at the district and divisional levels should be established or reactivated. These committees should regularly monitor social and community mobilization activities and provide feedback to EPI officials.
- 3 Availability and use of media, public service messages, brochures, pamphlets and descriptive-cum-pictorial materials should be ensured to enable LHWs to disseminate vaccine-related information and encourage retention of the vaccination card.
- 4 Education sessions should be organized with conservative and illiterate segments of the population.
- 5 Training needs assessment of staff involved in social mobilization should be conducted.

For more information please contact:

Tariq Saleem; Masood Sarwar Awan; Muhammad Nauman Malik,
(naumanmalik10@gmail.com)

Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts

Tariq Saleem,¹ Masood Sarwar Awan,² and Muhammad Nauman Malik³

¹ District surveillance coordinator, health department Punjab, Punjab, Pakistan

² Professor of economics, department of economics, university of Sargodha, Sargodha, Pakistan

³ Lecturer, department of economics, university of Sargodha, Sargodha, Pakistan

Introduction

In Pakistan, the rate of fully immunized children remained at 82 per cent during the period 2014–2015, falling short of the national target of 90 per cent [1]. In Punjab province, the rate of fully immunized children remained at 81 per cent [2]. In South Asia, blatant refusal of immunization is diminishing but is being replaced with ‘immunization hesitancy,’ in which parents are weighing the arguments for and against vaccination [3]. This hesitancy may not be checked by demand generation or mobilization activities of the Expanded Programme on Immunization (EPI). Therefore, it is important to identify system failures and to consider the implementation of social mobilization campaigns as an intervention in absolute or in partial capacity against vaccine hesitancy/reluctance that is cultivated by various influences existing in local communities.

Under-coverage of immunization is caused by both demand and supply factors such as poverty, competing family priorities, perceived benefits from the health services, acceptability of immunization services, problems with the outreach services and availability of services [4]. In Pakistan, similar factors are adversely affecting both national and sub-national rates of immunization coverage [5].

Vaccine hesitancy refers to the delay in acceptance or refusal of vaccination despite the availability of vaccination services. It is complex and context specific, varying across time, place and types vaccinations, and is influenced by factors such as complacency, convenience and confidence ([6, 7, 8, 9]. Interventions that tackle demand-side challenges include knowledge generation and awareness-raising activities, communication campaigns and provision of incentives to seek care [10]. Lack of awareness and misconception eliminates the demand for immunization of children, especially in deprived and marginalized groups [11]. Furthermore, it is observed that on the ground, EPI staff face many difficulties in flood prone areas, and with security issues, along with problems of incorrect understanding of vaccinations in areas or within groups with low socio-economic and education levels [12].

Social mobilization campaigns that are sufficiently planned, funded and integrated with service delivery can help EPI [13]. The success of vaccination programmes depends upon people having sufficient knowledge to make an informed decision to receive appropriate vaccines [14, 15]. If people are not engaged appropriately through appropriate design and implementation of social mobilization activities for generating demand, doubts about the trade-offs between the benefit and harm of vaccinations, and fears about side effects persist [16, 17, 18, 19, 20]. Knowledge and awareness through successful interventions often increase coverage of child immunization [21, 22]. It is required to assess social mobilization campaigns of EPI for both their good practices and deficiencies.

The overarching objective of this study was to explore strategies for improving social mobilization campaign activities to decrease immunization hesitancy in the Sargodha and Khushab districts of Pakistan. This study particularly explored issues around appropriateness/relevance, acceptability and fidelity of social mobilization campaign activities in these two districts.

Methods

Study design

Both quantitative and qualitative approaches were used to collect data from a diverse group of respondents. First, a semi-structured questionnaire was used to collect data from different stakeholders involved in a social mobilization campaigns at the union council level, such as school health and nutrition supervisors (SHNSs), lady health supervisors (LHSs), lady health workers (LHWs) and vaccinators. The union council is the lowest administrative hierarchical level where EPI and basic health unit (BHU) staff conduct their mobilization activities. The questionnaire for EPI staff covered the topics of the degree of appropriateness for mobilization activities in the local context, acceptability and trust that people conferred on the local mobilizers, community involvement in activities, and the acceptability of new changes in programme by staff. In addition, questions were asked about adherence, frequency of activities, quality of performance, effectiveness of collaborators in relation to their envisioned role, and suggestions for improvement. Adherence of activities addressed which practices were being implemented and which were not. In-depth interviews primarily focused on questions related to policy implementation.

Focus-group discussions (FGDs) were conducted with community members to find out their general perception regarding the overall appropriateness and acceptability of mobilization activities. This helped in the interpretation of the survey results, and was needed to triangulate the FGD findings to gain a more meaningful interpretation of survey results. Key-informant interviews (KIIs), conducted with the higher management of EPI in the provincial capital city of Lahore, provided information on what has been achieved and what has not in relation to national and provincial communication policy targets.

Study sites

The study sites were Sargodha and Khushab districts, where surveys and FGDs were conducted. The full immunization coverage rates in Sargodha and Khushab districts are 68 per cent and 66 per cent respectively for children and youth aged 12–23 years [1]. Sargodha and Khushab districts are composed of 7 and 4 *tehsils* (sub-districts), and 161 and 51 union councils, respectively [23]. Each union council is provided with at least one BHU.

Sampling and sample size

For the quantitative survey, four types of respondents (SHNS, LHS, LHW and vaccinator) from each BHU were interviewed. Fifty BHUs were selected, each in a different union council from both Sargodha and Khushab districts, by using the probability proportional to size (PPS) methodology as the sampling technique for the survey (*see Table 9*).

The aim was to have for each selected BHU, one of each type of the four respondents. This held true for Sargodha District. However, in Khushab District, the planned respondents fell short to due to different reasons, including vacancies in the position of SHNS and more than one BHU under the same person as LHS or vaccinator. Convenience sampling was used for FGDs and KIIs. One FGD was conducted with community members/parents in each district, along with the interviews in the EPI Punjab office in Lahore with higher management.

TABLE 9
BHUs and type of respondents in Sargodha and Khushab Districts

Detail of BHUs		Detail of respondents						
Sr. No.	Tehsil (sub-district) name	Total BHUs	Selected BHUs	SHNSs	LHSs	LHWs	Vaccinators	Total
Sargodha District								
1	Sargodha	45	20	20	19	20	19	78
2	Sillanwalli	16	6	6	6	6	6	24
3	Shahpur	12	4	4	4	4	4	16
4	Sahiwal	12	5	5	5	5	5	20
5	Kot Momin	16	7	7	7	7	7	28
6	Bhalwal	14	6	6	6	6	6	24
7	Bhera	09	2	2	2	2	2	8
Sub-total Sargodha District		124	50	50	49	50	49	198
Khushab District								
1	Khushab	16	23	0	13	23	23	59
2	Quaidabad	07	08	0	4	8	8	20
3	Noorpur Thal	12	11	0	7	11	11	29
4	Naushera	08	08	0	7	8	8	23
Sub-total Khushab District		43	50	0	31	50	50	131
Total Sargodha and Khushab Districts		167	100	50	80	100	99	329

Data collection and analysis

Data collection was undertaken in August and September 2017. Before beginning data collection, pretesting of the quantitative questionnaire was done in two BHUs (one in each district) and with all four types of respondents in each BHU.

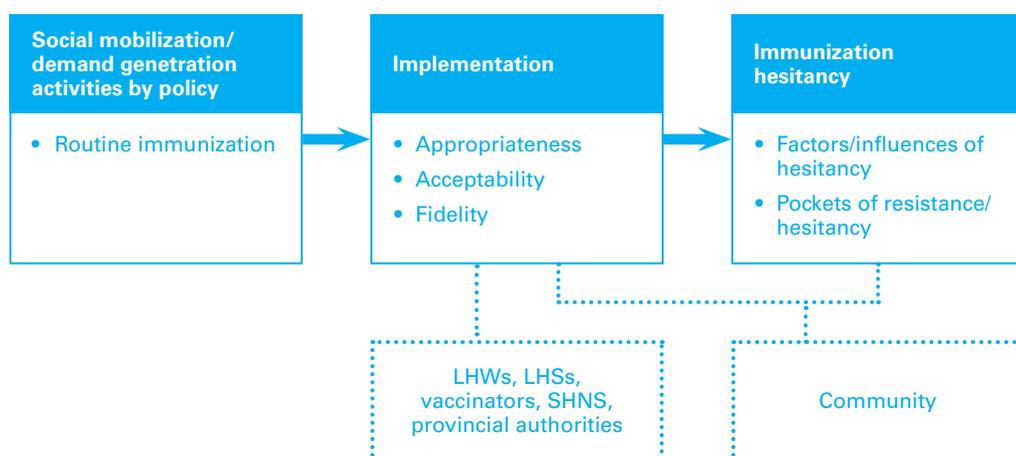
A team of scholars from the University of Sargodha collected and edited the data, and each team in the field had a team leader who was part of a teaching faculty in a university. All data collectors were familiar with the context of Sargodha and Khushab districts. Before collection of data, all collectors received training on the study's objectives, implementation phases, its benefits, a brief about the donors and their role in the completion of this study, and questionnaire and data collection guidelines.

The software package SPSS was used for quantitative data analysis. The closed-ended questions offered options such as *Very poor, Poor, Average, Good and Very good, or Don't use, Very rarely, Rarely, Occasionally and Frequently, or Not effective, Least effective, Moderately effective and Most effective*. The quantitative results were formulated and reported as percentages in this study. Qualitative data was analysed with a thorough review of the transcriptions of FGDs and KIIs.

Theoretical framework

For this research, the study applied a theoretical framework that illustrated that the demand generation activities of EPI staff at the grassroots level were effective as interventions to decrease immunization hesitancy if appropriate to context and acceptable and as per given policy. Appropriateness of mobilization activities is judged by the intensity of demand generation/mobilization activities to the local context of immunization hesitancy. Acceptability of mobilization activities is judged by the trust that people conferred on the local mobilizers, community involvement in activities and the acceptance of new changes in the programme by staff.

FIGURE 13
Social mobilization activities, implementation and their impact on vaccine hesitancy



Ethical approval

Ethical approval to conduct this study was obtained from the Institutional Review Board of the Health Services Academy, Islamabad. Prior to each quantitative interview, FGD and KII, verbal consent was obtained from the respondents.

Results

Appropriateness or relevance of the social mobilization activities

In this section, appropriateness of different social and community mobilization activities are assessed.

Advocacy meetings

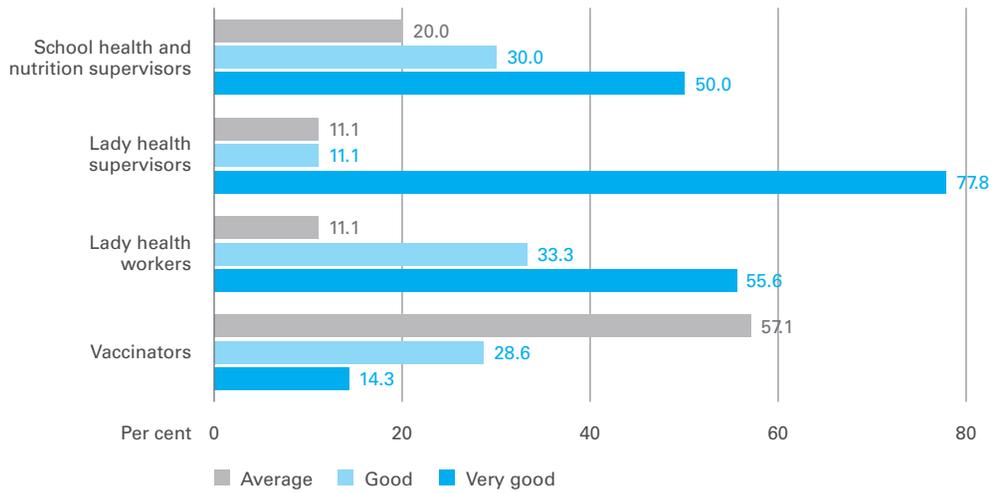
Among the four types of respondents in this study, the majority of SHNSs, LHSs and LHWs considered advocacy meetings as a very good strategy, while the majority of vaccinators rated them average against immunization hesitancy (see Figure 14).

Community group meetings/sessions

All categories of respondents were in favour of community meetings (see Figure 15) at smaller or informal scale with respect to routine immunization, and called for meeting to be much more intensive during supplementary immunization activities (SIAs), and National Immunization Days/Sub-National Immunization Days (NIDs/SNIDs).

The majority of the responses were 'Good' and 'Very good' with respect to appropriateness/relevancy on the issue of immunization hesitancy in the local context.

FIGURE 14
Appropriateness of advocacy meetings to tackle vaccine hesitancy



Door-to-door visits

Door-to-door visits by LHWs and vaccinators were considered as one of the best strategies for addressing community members’ vaccine hesitancy.

Health sessions

All of the respondents in the survey endorsed health session activities as an appropriate strategy to address immunization hesitancy.

Announcements on mosque speaker

All the LHWs supported the use of announcements as appropriate, and half of the LHSs rated it as a ‘Very good’ strategy (see Figure 17).

In FGDs, there was a common voice of endorsement of social mobilization activities as appropriate and relevant.

FIGURE 15
Appropriateness of community group meetings/sessions to tackle vaccine hesitancy

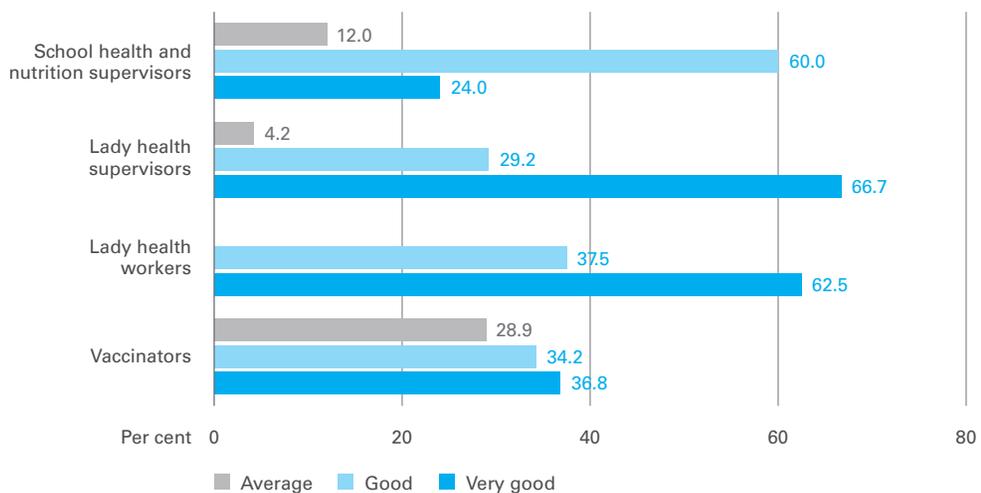


FIGURE 16
Appropriateness of door-to-door visits for tackling vaccine hesitancy

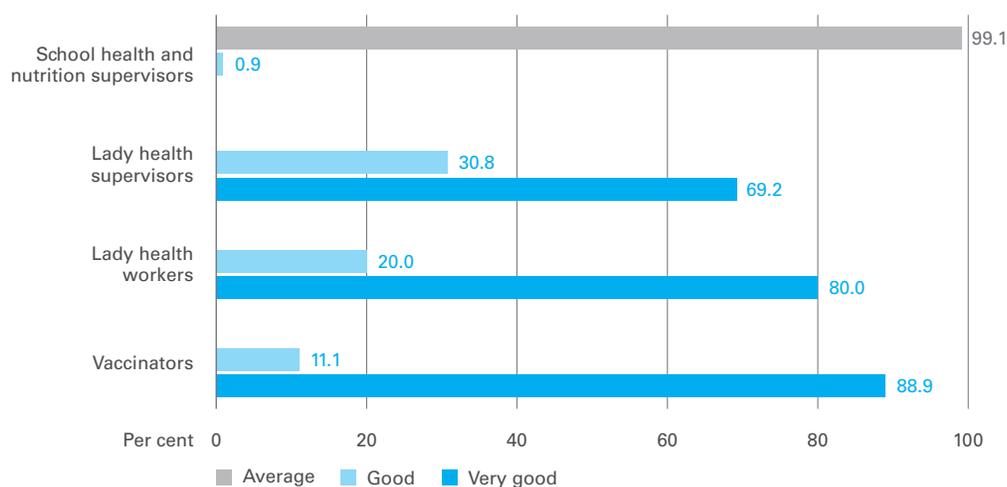
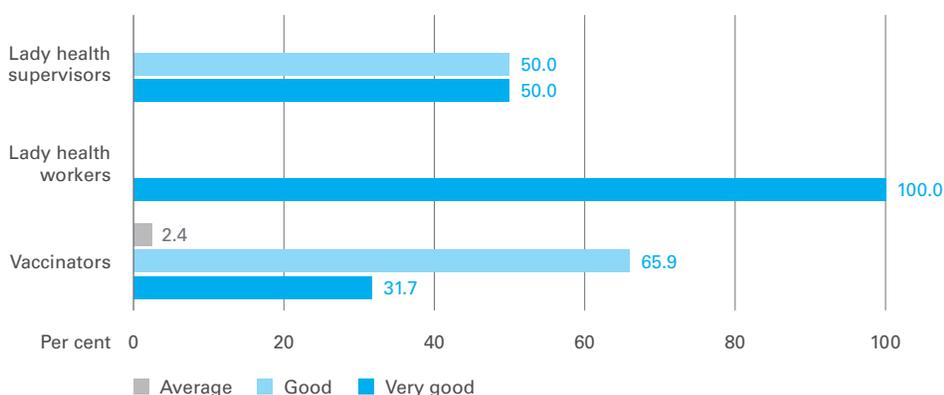


FIGURE 17
Appropriateness of announcement in mosques for tackling vaccine hesitancy

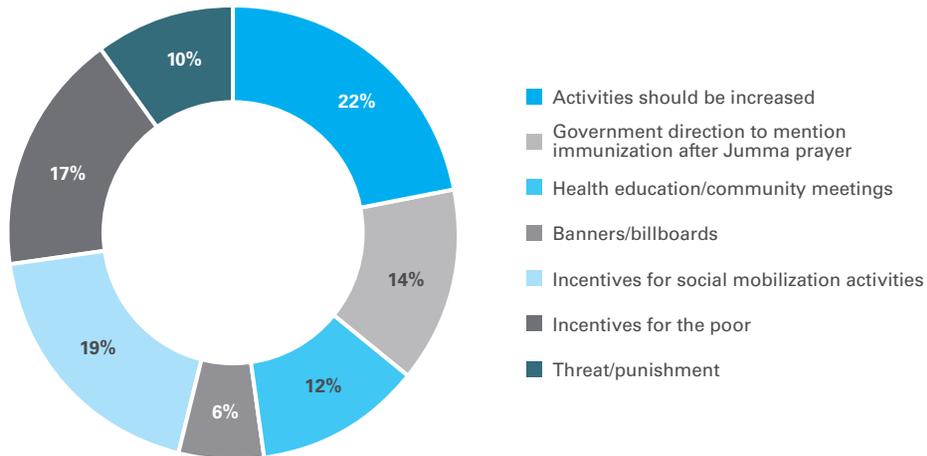


Suggestions for appropriateness/relevancy

To improve relevance, 22 per cent of the total respondents suggested increasing the frequency of social mobilization activities (see Figure 18).

About 14 per cent mentioned that government should explicitly issue orders to the *imam masjids* (mosques) with the help of the Auqaf Department and different sects' religious heads to explain the importance of immunization after Jumma prayers so that people are reminded to abide by the schedule of the vaccination cards and vaccinators' visits to the local community. About 12 per cent of the respondents favoured introducing community health sessions in which the local health facility team could address health education in the local community on regular basis. In FGDs, there was the suggestion to use a notable person from the local area for such health education sessions where men, exclusively, are invited. As mentioned by one of the FGD participants, "the government can use the presence of a notable person from the local area for health education lectures where community people should be invited".

FIGURE 18
Suggestions for more relevancy of activities to local context



About 19 per cent of the respondents suggested increasing funds for conducting social and community gatherings and meetings either in the budget of BHU or specific to EPI. Steps for demand generation in certain impoverished groups, such as the brick kiln community, riverine tenants and nomadic people, need to be specifically targeted to persuade them to receive immunizations. Seventeen per cent of the respondents said to give these groups either monetary or non-monetary incentives to stick to their schedules of vaccinations.

Acceptability and trust for union council level implementers

More than 80 per cent of the respondents mentioned that the level of community trust towards union council level EPI implementers was categorized as ‘Good’ and ‘Very good’.
 – As one FDG participant responded:

“We trust them!”

There are various reasons for this. Some 61 per cent of the respondents mention that because SHNSs, LHSs and LHWs belong to the local area, community trust towards them is strong. One of the FGD participants explained about a social mobilization staff member:

“Yes, we know him and he even meets us while moving in or out of our local area as he is native and from out local area”

Benefits of originating from the local community also include the same local language, customs and traditions. In addressing the question of whether local women understand the way knowledge/information is delivered, one of the participants answered,

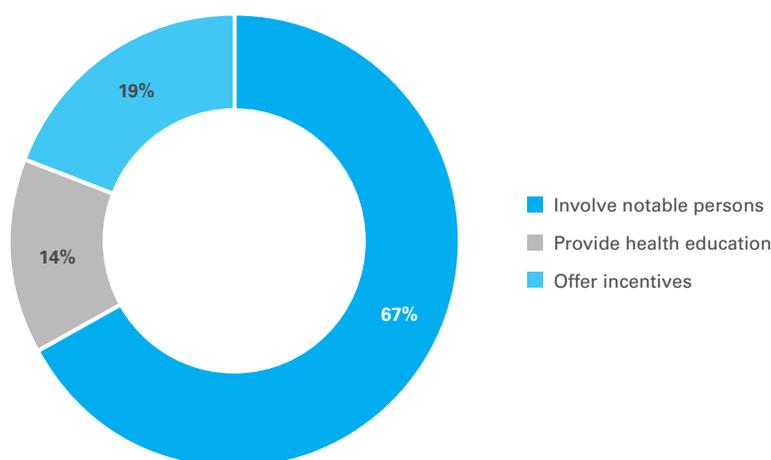
“Yeah! Our women understand their language and talking style, and they understand what is being communicated to them because we have same language.”

Other trust-winning factors mentioned include experience (19 per cent), good reputation (11 per cent) and good behaviour (9 per cent). About 16 per cent of the respondents felt that trust is very poor where negative attitudes toward vaccinations encourages immunization hesitancy. More than 80 per cent of the responses fall in the category of ‘customary norms’, which covers disinterested behaviour towards government workers due to general dissatisfaction with the government. It also covers the issues where vaccinators of particular *baradari* (extended network of relatives belonging to same caste

and usually living in the same area). are not acceptable or where vaccinators are from a particular *baradari* that a local-area conflict or strife with the targeted area population.

As a means to increase immunization coverage, it was suggested by 67 per cent to involve more notable people from the local area (see Figure 19). At the same time, 14 per cent of the respondents said conducting periodic health sessions communicating health-related information, addressing the importance of complete immunization and cooperation with EPI staff and social mobilization activities, irrespective of their personal differences and vested interests, would help increase coverage.

FIGURE 19
Remedies to overcome low levels of trust and acceptability



One of the FDG participants stated:

"In villages, we have ignorance. Therefore, open publicity should be done as other departments do, like the agriculture department's education extension service. There should be health education awareness."

Acceptability of community involvement

The collective outcome of community involvement is supposed to be ownership, satisfaction and credibility of an intervention. The majority of survey respondents endorsed community involvement as satisfactory and impressive (see Table 10). As one of the FDG participants mentioned,

"We all help and support them whatever they (EPI staff) want to do. There is no hurdle from the community."

People from local communities with greater awareness of immunization are usually more educated, have good social reputations, and have high involvement in social mobilization activities.

About 42 per cent of respondents mentioned that people, including those who are illiterate, appear busy with personal work, and are not particularly interested in EPI staff activities or are not concerned with the general awareness and benefits of immunization to the community.

It is suggested that in order to improve the scale and reach of social mobilization activities, more resources and funds, and an increase in community links are needed.

TABLE 10
Community involvement

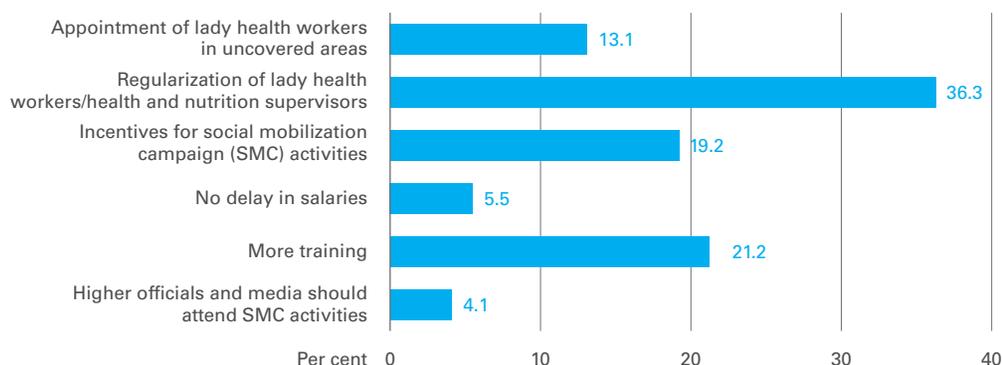
Level of community involvement in social mobilization campaigns			Reasons	
Very poor	16.5%	Low involvement	Stubborn/illiterate	41.6%
			Busy in personal work	41.6%
			Want either repeated requests or incentives	16.9%
Total (approximately) of respondents answering 'Very poor'				100.0%
Average	28.3%	High involvement	Awareness	46.7%
Good	23.7%		Native identity	26.7%
Very good	31.6%		Experience	17.5%
			Good reputation	4.2%
			Good behaviour	5.0%
Total (approximately) for respondents answering 'Average', 'Good' or 'Very good'				100.0%

Acceptability of new changes

Several strategies were suggested for the improvement of immunization coverage (see Figure 20), such as minimizing delays in the disbursement of salaries to motivate LHWs, regularizing their services (36 per cent), and appointing LHWs in areas not already covered so that new changes could be implemented to relax the burden of mobilization of vaccinators in those areas.

Another suggestion from respondents for improvement was that more training should be carried out rather than interpersonal communication and information education communication (21 per cent).

FIGURE 20
Suggestions for improvement of immunization coverage



Fidelity

Fidelity means the degree to which an intervention was implemented as it was designed in an original protocol, plan or policy.

Adherence of activities

Among the mobilization activities prescribed by the National Communication Strategy for Routine Immunization (NCSRI) Pakistan [24], advocacy meetings, community meetings, announcements using mosque speakers, health sessions and door-to-door visits are currently practiced (see Figure 21).

Advocacy meetings are held to try to influence and solicit help from policy makers, politicians, social leaders, business people, religious leaders and administrative officials (both in the public and private sector) in terms of policy-making, legislation and resource allocation for the success of immunization [24]. In local settings, such advocacy meetings also aim to solicit help from local politicians, landlords and influential people in the area to support immunization.

Door-to-door visits are heavily used to combat immunization hesitancy by LHWs (51.5 per cent) and LHSs (16.5 per cent), as they know this activity is of prime importance because when vaccinators visit any area for immunization of children at kit stations or health houses, the LHWs are supposed to have sensitized and reminded mothers about vaccination beforehand. Vaccinators are making mosque announcements (41.1 per cent). Health sessions are conducted between door-to-door visits and community meetings deliver knowledge on mother and child health including immunization.

Intensity of performance

Both LHWs and LHSs mentioned that health sessions organized by LHWs and announcements from mosques about immunization were considered as 'very good' strategies to tackle vaccine hesitancy (see Figure 21). Regarding door-to-door visits and organization of community group sessions, more than 50 per cent of the LHWs, and about 39 per cent of LHSs found these 'very good' strategies, whereas 57 per cent of the vaccinators found these 'very good' strategies. About 77 per cent of the LHWs, 73 per cent of the LHSs and 57 per cent of the vaccinators found advocacy meetings a 'very good' social mobilization strategy to tackle vaccine hesitancy.

Strategies to improve performance

As far as general suggestions for improvement (see Figure 22), 17 per cent of the respondents suggested more active participation of local social leaders to overcome immunization hesitancy. About 2 per cent of the respondents suggested increasing the number of vaccinators and 10 per cent suggested increasing the number of LHWs by filling vacant posts. About 13 per cent of the respondents suggested appointing LHWs in those areas that are still out of reach and currently uncovered. It was also mentioned in FGDs that this suggestion should be conveyed to higher authorities:

"You should convey the message of appointment of LHWs in areas where they are not working."

About 14 per cent of respondents suggested rationalizing the burden of LHWs, as it is very hard for them to conduct social mobilization activities in the field.

Almost 4 per cent suggested that mosques should be given clear orders to help health facility staff, whereas 8.1 per cent said that the local *imam masjid* should be responsible for reminding community members about the importance of immunization. About 12 per cent suggested the number of pamphlets, banners and posters should be increased so that they can be displayed in the other places in the community in addition to in the BHUs.

FIGURE 21
Lady health workers evaluation of performance of different strategies to address vaccine hesitancy

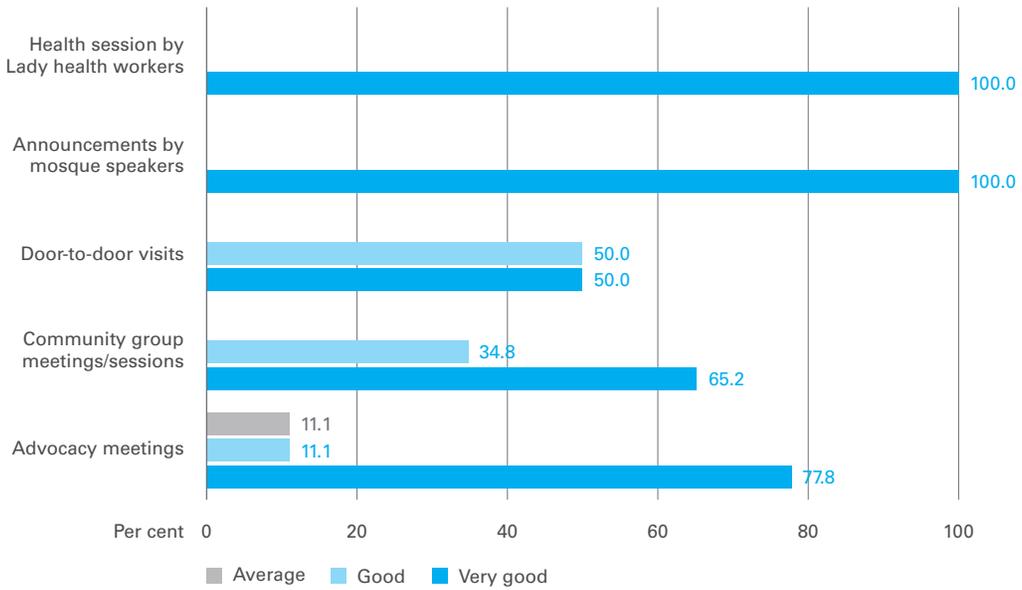
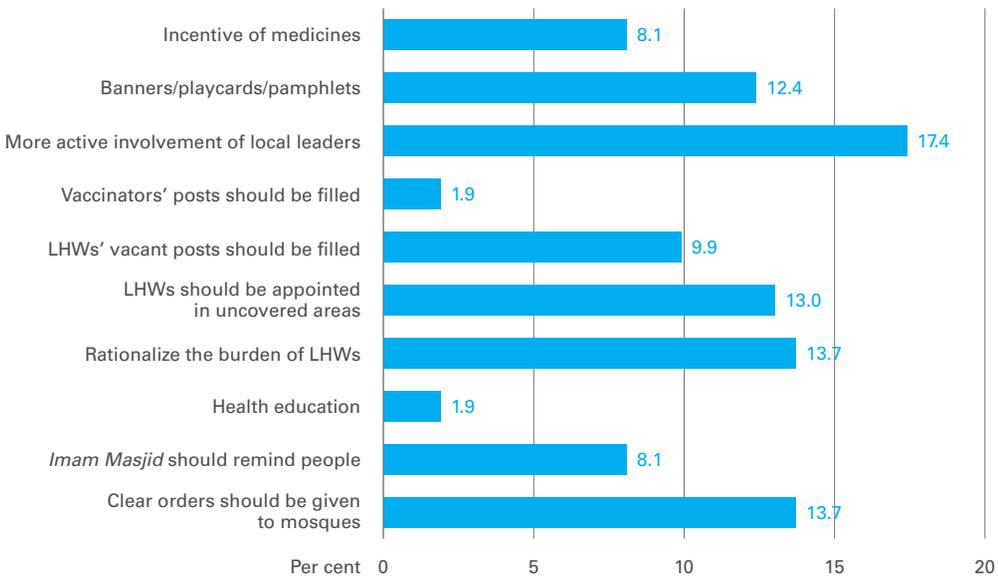


FIGURE 22
Suggestions for strategies to reduce vaccine hesitancy



Civil society organizations (CSOs) should be mobilized to help eliminate immunization hesitancy in target groups and targeted areas [24]. On the topic of CSO engagement, one official stated,

“Very few! We may have one or two [CSOs] only! In my view, they don’t work so much. The experience of other provinces in this domain is not good and so we didn’t go after them. They usually pull out from the field after six months to one year, and the whole structure [of interaction and support with them] comes down.”

It is proposed in NCSRI (2015) [24] to develop specific material to engage religious leaders, politicians, and health care workers. There is already the practice of writing material with a focus on polio; however, there is no such practice of developing specific material for groups on a 'regular basis' that can help address broader immunization issues at the community level. As one official said,

"Special written material is prepared only when there is some high level of resistance or refusal from the area."

Similarly, it was recommended that material be developed emphasizing the importance of retaining vaccination cards, which are the only recorded means of adherence to vaccination schedules at home and also serve to inform health and socio-economic surveys.

There was mention of some material in need of updating, including an animated series for awareness and vaccine uptake persuasion,

"Yeah! We have this MEENA film [animated film] on routine immunization BUT it is old material [episodes] and not new. We show the old material to people."

Discussion

In the context of Pakistan, there are various studies that found knowledge, awareness, and socio-economic factors as major determinants of low uptake and low demand for immunization. Moreover, these studies recommend customized social mobilization and awareness initiatives [11, 12, 25, 26, 27, 28]. This study found that advocacy meetings, community meetings, announcements in mosques about immunization sessions or mention of immunization significance in periodic religious sermons, door-to-door visits and health sessions were appropriate and relevant to the local context of immunization hesitancy. These are all examples of health communication that are being endorsed to combat immunization hesitancy in various reviews of national and international studies [29, 30, 31, 32, 33].

Some of the community-level suggestions and study results justify the **appropriateness and relevance** of social mobilization tools including advocacy meetings and community meetings to address vaccine hesitancy of people belonging to different traditions, backgrounds, ethnic identities, geographic areas, occupation groups etc., as envisaged MoNHSRC [24]. Such meetings for *dairajaats* (geographically isolated groups of people from main dense village settlements and/or areas not covered by LHWs) and resistant communities were conducted by EPI/BHU staff in support of one another. Local influencers would visit households known to resist or hesitate, along with EPI staff. In some instances, support from local administrative/revenue department was arranged. LHWs and LHSs organized health committees/support groups to streamline door-to-door visits and health sessions as mentioned by Zhu et al. (2014) [28]. Door-to-door visits are very much in line with the local context because:

- Often women are not being permitted by their husbands and/or in-laws to leave the house during the day to attend women's meetings/health sessions arranged for awareness.
- Women in isolated communities, such as *dairajaat*, brick kiln worker communities or nomadic groups are difficult to gather (especially in the absence of any incentive, either monetary or non-monetary) for group awareness sessions, as they are busy with their own work.

- There are various religious beliefs prevalent in local areas that do not allow pregnant women to come out of the house or to speak with others outside the home, even in the early months after giving birth. Such reasons make these women the most vulnerable cases where awareness and information should be provided at home to ensure proper information on health care and immunization coverage.

Health sessions come under Integrated Reproductive Maternal Newborn Child Health Programme. The environment of the health sessions is more intimate than 'community meetings' and more dialogue-oriented than 'door-to-door visits,' as they allow for cross-discussions among women, LHSs and LHWs. Announcements made from mosques about immunization sessions and the significance of immunization are found to be appropriate and relevant, as many people are motivated by religious instruction. However, in some areas, this means cannot be used as *imam masjids* say that it is forbidden by the government to use the loudspeaker for anything other than the *azan* (the wake up call for Muslims to offer prayer in mosques). It is reported that often the announcement is not made in all the mosques, owing to various sects and sub-sects in the Islamic religion. This can mean that people belonging to a specific sect may feel slighted if the announcement is not made in the mosque of their particular sect.

In terms of *acceptability*, this study found that primarily the local identity of community-level mobilization staff helped them to win trust of people relative to good behaviour and experience. Moreover, low community involvement in mobilization activities often involves illiterate people, such as nomadic or migrating *pathan/afghan* families, who are the least likely to attend mobilization activities. Part of the reason may be their extreme deprivation and poverty, or lack of awareness of community activities. To build community links, a WHO (2017) study found that more time allocation in routine working hours and resources are required [34]. Since the inception of EPI in 1978, this study found that LHWs involvement is still hailed as being the most acceptable new change [35].

This study found that activities like advocacy meetings, community meetings, announcements from mosque speakers, health sessions and door-to-door visits are being carried out on a regular basis. This was not the case for SMS/voice messages, marketing on transit vehicles, local radio, public service messages in local cinemas and on TV, animated series on CDs, and banners and billboards. Among other envisaged social mobilization policy initiatives, this study found that communication committees had not been established, nor had any new animated series been developed, or old existing series (*MEENA*) updated. In addition, CSOs had not been taken on-board through any formal structure. One reason might be of the inconsistent nature of CSOs due to non-sustainable financial resources. Training needs assessments have not been conducted yet. Monitoring of social and community mobilization activities is being delegated away from the responsibility of current partners and stakeholders on an *ad-hoc* basis. In areas not covered, vaccinators could more easily determine needs if LHWs were working in these areas. Immunization significance had not been incorporated into the curriculum of primary schools. LHWs needed more written material with proper pictorial descriptions to be used in health sessions and community meetings. Efforts for mobilization of resources are not in line with how they were originally envisioned.

Limitations and strengths of the study

This study is the first one in local contexts to assess social mobilization campaigns to combat immunization hesitancy based on the criteria of IR outcomes, i.e., appropriateness, acceptability and fidelity. This study was conducted in two districts of Punjab Province; therefore, the findings might not be applicable for the entire country.

However, use of both quantitative and qualitative approaches and collection of data from a wide range of respondents made this study effective as it captured the actual social mobilization activities in Punjab and potential strategies to tackle vaccine hesitancy.

Conclusion and recommendations

The suggestions for improvement of immunization coverage in this study would require increases in financial resources. For example, the programme must endorse the existing activities of the community staff and give them sufficient time and finances to ensure their active involvement in the social mobilization activities within their working hours. The study also points toward the formulation of surveillance and monitoring of social mobilization activities on regular basis in the existing administrative structure. Following are the strategic and/or tactical systemic initiatives that are being put forward by this study to improve the social mobilization implementation for routine immunization of EPI.

- There has been no structural system in place for monitoring vaccinators to check whether they are properly counselling parents, particularly mothers, about adverse events following immunization (AEFI). District supervisors vaccination (DSVs) and assistant district supervisors vaccination (ASVs) do not check such factors from vaccinators working in the field. Some feedback performa can be managed by ASVs and DSVs in the target areas.
- LHSs are monitoring LHWs but there is no structural system for LHSs to routinely and directly ask mothers what they are learning from LHWs. LHSs should have a system in place to check what the level of awareness is from the work of the LHWs.
- Appoint LHWs in 'uncovered areas' to extend the outreach of the mobilization operation in such areas.
- It is recommended to establish communication committees at district and/or divisional levels that can regularly monitor the social and community mobilization activities of EPI in the area. They should be mandated to monitor and observe the mobilization activities and share feedback with concerned district CEOs. This feedback would help authorities to understand the local context of immunization hesitancy. It is pertinent to mention that health education officers are already posted in district headquarters and district health offices. An administrative mechanism can be proposed to establish a permanent synergy of EPI social mobilization staff and health education officers to help alleviate immunization hesitancy. Improved coordination should be developed between SHNSs in BHUs, district health education officers and the staff of the Polio Eradication Initiative (PEI).
- The significance of vaccination card retention should be highlighted.
- It is recommended to plan health education sessions/lectures with emphasis on pre-emptive measures of immunization, particularly to the students and teachers of *madressah* who are thought to be the most conservative segment of population. For this task, coordination should be initiated at the highest provincial forum where endorsement has to be taken in written consent from different religious and sectarian leaders. Following this, union council health education officers (UCMOs) at the district level, in coordination with union council medical officers and SHNSs could plan to deliver lectures in local areas.
- Pamphlets, brochures, descriptive and pictorial material and other explanatory material are not properly provided. LHWs report that the material is not available to use for door-to-door visits and health sessions. It is recommended that this material be provided to LHWs and LHSs on a regular basis.

- It is advised to properly advertise the efficacy, benefits and parameters of EPI with the help of a sufficient number of banners and billboards, with proper display areas in the community rather than just the in the BHU building facilities.
- It is recommended that training needs assessments are conducted for staff who are dealing with communication and social/community mobilization at a grassroots level. These assessments would give evidence-based information about what is lacking and avoid haphazard training. This is important for the interpersonal communication skills necessary for social and community mobilization.
- Most of the initiatives and recommendations require financial support, especially for sustainability in the long run and especially for social mobilization, community mobilization and communication initiatives. This includes printing of descriptive and pictorial material, banners, electronic media campaigns etc. Provincial authorities are advised to facilitate business/corporate alliances for funding/aid on sustainable basis.
- Develop entertainment education or animated education, similar to but updated from the existing *MEENA* series, showing the advantages of immunization. This should have proper dissemination and be shown to children in schools.
- Take CSOs on board for social mobilization as they can help in linking to local communities. Active CSOs could be the good entry points for social and community mobilization activities.
- Under the powers of UCMO, monetary or non-monetary incentives for extremely poor individuals should be introduced to ensure they have knowledge of and access to vaccinations. However, this provision should accompany a proper system of checks and balances for transparency.

References

- 1 Government of Pakistan, 'Pakistan Social and Living Standards Measurement Survey (2014–2015)', Pakistan Bureau of Statistics, Statistics Division, Islamabad, 2015.
- 2 Government of Punjab, 'Punjab Health Survey, Round-I, 2016', Bureau of Statistics, Planning and Development Department, 2016.
- 3 Hasman, Andreas and Douglas J. Noble, 'Childhood Immunisation in South Asia – Overcoming the hurdles to progress', *Perspectives in Public Health*, vol. 136, issue 5, 2016, pp. 273–277.
- 4 Ataguba, John E., Kenneth O. Ojo and Hyacinth E. Ichoku, 'Explaining Socio-Economic Inequalities in Immunization Coverage in Nigeria', *Health Policy and Planning*, vol. 31, issue 9, 2016, pp. 1212–1224.
- 5 Husain, Sara and Saad B. Omer, 'Routine Immunization Services in Pakistan: Seeing beyond the numbers/Les Services de Vaccination Systematique au Pakistan: Voir au-dela des chiffres', *Eastern Mediterranean Health Journal*, vol. 22, issue 3, 2016, pp. 201–211.
- 6 MacDonald, Noni E., 'Vaccine Hesitancy: Definition, scope and determinants', *Vaccine*, vol. 33, issue 34, 2015, pp. 4161–4164.
- 7 Larson, Heidi J., et al., 'Measuring Vaccine Hesitancy: The development of a survey tool', *Vaccine*, vol. 33, issue 34, 2015, pp. 4165–4175.
- 8 Dubé, Eve, et al., 'Mapping Vaccine Hesitancy—Country specific characteristics of a global phenomenon', *Vaccine*, vol. 32, issue 49, 2014, 6649–6654.
- 9 Marti, Melanie, et al., 'Assessments of Global Drivers of Vaccine Hesitancy in 2014 – Looking beyond safety concerns', *PLoS One*, vol. 12, issue 3, 2017, <<http://dx.doi.org/10.1371/journal.pone.0172310>>.
- 10 Johri, Mira, et al., 'Strategies to Increase the Demand for Childhood Vaccination in Low- and Middle-Income Countries: A systematic review and meta-analysis', *Bulletin of World Health Organisation*, vol. 93, issue 5, 2015, pp. 339–346C, <<http://dx.doi.org/10.2471/BLT.14.146951>>.

- 11 United Nations Children's Fund, *Knowledge, Awareness, Practices and Behavior (KAPB) – National 2014*, UNICEF, 2014.
- 12 Ahmed, Vaqar and Sofia Ahmed, 'Poverty and Social Impact Analysis of Expanded Program on Immunization in Pakistan', Working Paper no. 143, Sustainable Development Policy Institute, Islamabad, 2014.
- 13 Shrimp, Lora, 'Strengthening Immunization Programs: The Communication Component, USAID', Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development, Arlington, Virginia, 2004, p. 29.
- 14 Shahrabani, Shosh, Uri Benzion and Gregory Yom Din, 'Factors Affecting Nurses' Decision to get the Flu Vaccine', *European Journal of Health Economics*, vol. 10, issue 2, 2009, pp. 227–231.
- 15 Zyngier, Suzanne, et al., 'Knowledge Transfer: Examining a public vaccination initiative in a digital age', Proceedings of the 44th Hawaii International Conference on System Sciences, 4–7 Jan 2011, IEEE Computer Society, 2011, <<http://dx.doi.org/10.1109/HICSS.2011.277>>.
- 16 Casiday, Rachel, et al., 'A Survey of UK Parental Attitudes to the MMR Vaccine and Trust in Medical Authority', *Vaccine*, vol. 24, issue 2, 2006, pp. 177–184.
- 17 Hadjikoimi, Irene, K.V. Niekerk and C. Scott, 'MMR Catch up Campaign: Reasons for refusal to consent', *Archives of Disease in Childhood*, vol. 91, issue 7, 2006, p. 621.
- 18 Mills, Edward, et al., 'Systematic Review of Qualitative Studies Exploring Parental Beliefs and Attitudes Toward Childhood Vaccination Identifies Common Barriers to Vaccination', *Journal of Clinical Epidemiology*, vol. 58, issue 11, 2005, pp. 1081–1088.
- 19 Pearce, Anna, et al., 'Factors Associated with Uptake of Measles, Mumps, and Rubella Vaccine (MMR) and Use of Single Antigen Vaccines in a Contemporary UK Cohort: Prospective cohort study', *BMJ*, vol. 336, issue 7647, 2008, pp. 754–757.
- 20 Taylor, James A., et al., 'Association Between Parents' Preferences and Perceptions of Barriers to Vaccination and the Immunization Status of their Children: A study from pediatric research in office settings and the National Medical Association', *Pediatrics*, vol. 110, issue 6, 2002, pp. 1110–1116.
- 21 Saeterdal, Ingvil, et al., 'Interventions Aimed at Communities to Inform and/or Educate about Early Childhood Vaccination', *Cochrane Database of Systematic Reviews*, vol. 11, issue 11, 2014, <<http://dx.doi.org/10.1002/14651858.CD010232.pub2>>.
- 22 Usman, Hussain, et al., 'Randomized Controlled Trial to Improve Childhood Immunization Adherence in Rural Pakistan: Redesigned immunization card and maternal education', *Tropical Medicine & International Health*, vol. 16, issue 3, 2011, pp. 334–342, <<http://dx.doi.org/10.1111/j.1365-3156.2010.02698>>.
- 23 Government of Punjab, 'Punjab Development Statistics 2015', Bureau of Statistics, Pakistan, 2015.
- 24 Ministry of National Health Services, 'Regulation and Coordination, National Communication Strategy for Routine Immunization Pakistan 2015–2018', UNICEF, EPI, 2015.
- 25 Bugvi, Ayesha S., et al., 'Factors Associated with Non-Utilization of Child Immunization in Pakistan: Evidence from the Demographic and Health Survey 2006–07', *BMC Public Health*, vol. 14, issue 1, 2014, p. 232.
- 26 Lorenz, Christian and Muhammad Khalid, 'Influencing Factors on Vaccination Uptake in Pakistan', *The Journal of the Pakistan Medical Association*, vol. 62, issue 1, 2012, pp. 59–61.
- 27 Khan, Rana Ejaz Ali and Iqra Aslam, 'Child Immunization in Pakistan: Socio-institutional and regional aspects', *Asian Journal of Economic Modeling*, vol. 5, issue 1, 2017, pp. 49–56.
- 28 Zhu, Nina, et al., 'Lady Health Workers in Pakistan: Improving access to health care for rural women and families', Women and Health Initiative, Harvard School of Public Health, 2014, <<https://cdn2.sph.harvard.edu/wp-content/uploads/sites/32/2014/09/HSPH-Pakistan5.pdf>>.
- 29 Goldstein, Susan, Noni E. MacDonald and Sherine Guirguis, 'Health Communication and Vaccine Hesitancy', *Vaccine*, vol. 33, issue 34, 2015, pp. 4212–4214.
- 30 Dubé, Eve, Dominique Gagnon and Noni E. MacDonald, 'Strategies Intended to Address Vaccine Hesitancy: Review of published reviews', *Vaccine*, vol. 33, issue 34, 2015, pp. 4191–4203.

- 31 Jarrett, Caitlin, et al., 'Strategies for Addressing Vaccine Hesitancy – A systematic review', *Vaccine*, vol. 33, issue 34, 2015, pp. 4180–4190.
- 32 Schuster, Melanie, Juhani Eskola and Philippe Duclos, 'Review of Vaccine Hesitancy: Rationale, remit and methods', *Vaccine*, vol. 33, issue 34, 2015, pp. 4157–4160.
- 33 Sadaf, Alina, et al., 'A Systematic Review of Interventions for Reducing Parental Vaccine Refusal and Vaccine Hesitancy', *Vaccine*, vol. 31, issue 40, 2013, pp. 4293–4304.
- 34 World Health Organization, 'Manual of EPI, PEI & VM – 2017' Dr Muhammad Mehroz Saleem, <<https://en-gb.facebook.com/PEIEPISynergy>>.
- 35 Hafeez, Assad, et al., 'Lady Health Workers Programme in Pakistan: Challenges, achievements and the way forward', *JPMA: Journal of the Pakistan Medical Association*, vol. 61, issue 3, 2011, p. 210.



Fazal Abbas, a government vaccinator prepares measles vaccination for Skakil Waqas (2) during a field visit in Sheikhupura district, Punjab province, Pakistan.



Farrukh, a government vaccinator, going for a field visit to Bahder wala village in Nankana District, Punjab Province, Pakistan.



THEMATIC AREA 2

**Immunization supply
chain and performance
management systems**

Immunization supply chain and management performance system in Sindh

Key messages

- Since 2013, the Pakistan web-based Vaccine Logistics Management Information System (vLMIS) has included a Visibility and Analytics Network (VAN) to enhance data visibility, analysis and action
- VAN has helped to build capacity of people at every level, define processes for routine data analysis and quality improvement, and refine the technology to ensure that the correct data are selected and displayed at each level to enable effective analysis and appropriate action

What is the problem?

The storage and transportation of vaccines is challenging, with most vaccines having to be kept consistently at a temperature between 2°C and 8°C. Ineffective supply chain management led to vaccines being wasted or losing their potency. Poor visibility in the supply chain, for example when an overview of what vaccines are available in which facilities, is a major cause of inefficiency.

Since 2013, Pakistan's web-based Vaccine Logistics Management Information System (vLMIS) has included a Visibility and Analytics Network (VAN), which aims to enhance data visibility, analysis and action for the immunization supply chain.

How was the research done?

This study was undertaken in Sindh between August and October 2017 to assess the effectiveness of the VAN approach in improving the supply and availability of stocks at service delivery points.

The status of stocks in facilities within Ghotki District (which used the VAN approach) was compared to the status of stocks in facilities in Sukkur District (which did not use the approach). In total, 52 facilities were assessed. Interviews with senior managers were also undertaken to identify enabling factors and barriers in the roll out of the VAN approach.

What solutions were identified in the study?

A VAN significantly improved vaccine availability

Across large storage facilities and smaller service delivery points, the supply and availability of stocks were found to be significantly better in the VAN district than in the non-VAN district.

B VAN had a positive effect on record keeping and decision-making

Almost all managers in the VAN district used vLMIS data for decision making compared to none in the non-VAN district. In addition, in the VAN-using district of Ghotki all cold stores were maintaining stock registers and issuing receipt vouchers compared to only 50 per cent in the non-VAN-using district of Sukkur.

In the Ghotki, all service delivery points had a supply that matched requisitioned quantities; while in Sukkur there was only a match in a single-service delivery point.

C VAN prevented stock outs and over stocks

Stock outs were much more frequent in the non-VAN districts than in the VAN district. Whereas there were stock outs in only 10 per cent of service delivery points in the VAN district, in the non-VAN district it was almost half. The non-VAN district was also over-stocked with BCG and tetanus toxoid vaccines, and had a higher vaccine wastage rate.

D VAN improved data quality

Significant data quality issues were observed in vLMIS reporting in the non-VAN district. Stock available did not match what was in the stock register, and the record of dry stock, such syringes and safety boxes, was missing in all service delivery points in the non-VAN district.

Recommended actions

- 1** VAN should be rolled out in all districts of Sindh, and options for introduction across Pakistan should be identified.
- 2** VAN should be integrated in vLMIS;
- 3** District health management should be trained in VAN principles;
- 4** Pooling of resources can be one approach to establish VAN across Sindh Province.

For more information please contact:

Arshad Altaf, (arshad.altaf@gmail.com); Agha Muhammad Ashfaq;
Anees Siddiqui

Immunization supply chain and management performance system in Sindh

Arshad Altaf,¹ Agha Muhammad Ashfaq,² and Anees Siddiqui¹

¹ Frontiers in Public Health, Karachi, Pakistan

² EPI Health Department of Sindh, Karachi, Pakistan

Introduction

Pakistan has been facing immunization-related challenges and, of all the vaccine-preventable diseases, polio has been a major issue. Pakistan is among the three remaining countries (Afghanistan and Nigeria are the other two) striving to eradicate polio. At the time of filing this report in November 2017, there were five cases reported one each from Punjab (Lodhran District), Sindh (Karachi, Gulshan e Iqbal town), Khyber Pakhtunkhwa (Lakki Marwat District), Balochistan (Killa Abdullah) and Gilgit Baltistan (Diamir) [1]. Efforts to increase immunization coverage have been ongoing at national and international levels. However, despite these efforts, there is still a high burden of avoidable child morbidity and mortality. Routine immunization in the country is still faced with challenges. In short, progress has been comparatively slow. Inaccessibility to EPI services and outreach activities, high dropout and default rates, and poor vaccine and cold chain management are some of the challenges hindering efforts to improve EPI coverage [2].

A recent publication based on a literature review of public health and polio issues concluded that having a programmatic, system-wide, socio-cultural and ethical approach is needed for policy makers and the programme managers in Pakistan to address the multitude of barriers to polio vaccination. A plan of action developed within the ethical norms could potentially lead to success [3]. A Cochrane review published in 2016, in which four studies from Pakistan were selected, concluded that improved service provision may improve childhood immunization coverage [4].

In May 2013, a supply chain and logistical management project was tasked by USAID and the Government of Pakistan to expand the web-based Logistics Management Information System (LMIS) to include a supply chain logistics management system. Through strategic-level meetings with all stakeholders, a common vision was developed on the design of a comprehensive, sustainable and automated Vaccine Logistics Management Information System (vLMIS) <http://v.lmis.gov.pk>. The project enhanced the system to strengthen the logistics and inventory management of vaccines in a comprehensive manner, including adapting the existing LMIS and GS1 barcoding to meet the needs of vaccines and related commodities (e.g., diluents and syringes) as well as cold chain equipment.

The Pakistan vLMIS project used a Visibility and Analytics Network (VAN) approach to enhance data visibility, analysis and action for the immunization supply chain by integrating principles and quality improvement processes into existing team structures at the national level, in Sindh Province and in three pilots at the district level in Pakistan. The VAN approach built capacity of people at each level, defined processes for routine data analysis and action (quality improvement), and refined technology to ensure that the correct data is selected and displayed at each level to enable effective analysis and appropriate action. It has been demonstrated elsewhere that when the quality

improvement teams (QITs) meet regularly to review and use data for decision making, significant improvements can be observed in supply chain performance. In addition, findings show that improving data visibility is not as effective as the combination of improved data visibility along with team analysis and decision-making. Early lessons learned from country VAN experience in Tanzania, Ethiopia, Kenya and Pakistan showed that the approach was helpful at an early stage in identifying gaps in data dashboards. The users appreciated the idea of performance monitoring and the approach may be helpful in identifying root causes of problems as well as better action planning [5].

Rationale

The Pakistan vLMIS project was implemented in all 29 districts of Sindh, supported by the USAID funded Deliver Project. The project improved logistics and management services at different levels of storage facilities, including district and sub-district (*taluka*) levels, after which the vaccine reached the service delivery point (SDPs). SDPs are within the EPI centres, and clients visit these centres to receive immunization services. All this information was recorded in vLMIS in addition to maintaining inventory. There is a dearth of literature on the assessment of VAN approach in Pakistan. The final evaluation report of the Deliver Project focussed on effectiveness of the LMIS component of the project but did not specifically mention VAN component [6]. A similar logistics and management project report from Kenya mentions the effectiveness of the VAN approach but does not provide much further detail [7]. Another report from Mozambique describes transitioning to the VAN approach and mentions that the tools used there will be freely available to adopt [8]. The report from Mozambique also does not provide any details of final results. The present work and report can be used as a key reference by policy makers locally, and other stakeholders can also use the work and tools to develop their own implementation research assessment.

Research question

Can the VAN approach improve the supply and availability of stocks at SDPs in EPI Sindh?

Specific objectives

- 1 To assess effectiveness of VAN approach in improving the supply and availability of stocks at SDPs by comparing the situation in intervention and non-intervention districts;
- 2 To explore enabling factors and barriers in the roll out of the VAN approach.

Methods

This implementation research utilized a quantitative and qualitative approach to collect data in two districts of Sindh. The data were collected between August and October 2017. Ghotki District was the VAN-intervention district and Sukkur District was the non-intervention district. These districts were selected because of their similar socio-demographic indicators, close vicinity, almost similar number of union councils (UCs) and feasibility of conducting the research. The EPI storage facilities were evaluated and personnel involved in data entry were interviewed using a pre-tested data collection tool that contained questions related to supply chain management. One-on-one in-depth interviews of key informants who were senior management personnel of the VAN project were also conducted.

Data collection tools

Based on a previously developed and tested supply chain management assessment tool in Pakistan, a new tool was developed that had quantitative and semi-structured questions (attached in annexure). The tool was pre-tested and improvements were made that were related to the structured questions for 'outcome indicators' and a new section added which was related to 'process indicators.'

The data collection tool for the key informant interviews was developed by the research team. Initially, a set of relevant questions was drafted that were circulated to Health Services Academy and UNICEF. The tool was finalized after receiving feedback.

The quantitative data collection tool contained following sections:

- 1 Purpose of research
- 2 Details of implementers and investigators
- 3 Consent, privacy and confidentiality
- 4 Participant's right to refusal
- 5 Details of store from where data was collected
- 6 Details of team collecting data
- 7 LMIS utilization
- 8 Stock status (details of each vaccine and related supplies, stock register, physical count, status of stock, etc.)
- 9 Details of how the record is maintained
- 10 Regularity of MIS reporting
- 11 Usage of USAID-supplied hardware
- 12 Semi-structured questions used as process indicators

The qualitative data collection tool used for in-depth interviews of key informants had three key sections for the relevant questions:

- 1 Performance assessment of QIT/VAN model
- 2 Adoption mechanisms
- 3 Support system required for scaling up

Descriptions of supply chain related facilities evaluated

District stores: These are medium- to large-size storage facilities in each district. The vaccine supplies are delivered here from the Divisional Warehouse in Sukkur. No immunization facility is offered here (this is for storage only).

Taluka or tehsil (sub-district) stores: Most of these stores are housed in *taluka* headquarter hospitals. The designated EPI staff from the SDPs collect supplies from the *taluka* or *tehsil* stores.

Service delivery points (SDPs)/EPI centres: These are the EPI centres where immunization services are provided or vaccinators take the vaccines and supplies from here to go into the field from SDPs.

Study setting

The study was conducted in two districts of Sindh Province, Ghotki and Sukkur. The two districts have a number of similarities: they are close to each other and the size of the population is almost the same, with Ghotki having an approximate population of 1.6 million and Sukkur's population is 1.4 million, according to the latest Pakistan Demographic Survey (2017); and cultural and traditional practices resemble each other. Both districts have an agricultural economy with the slight difference that Sukkur is also a trading hub due to its central location in the province. Cotton and rice are two of the main crops of this region. Brick making is a common practice in the plains of both districts. According to January to August 2018 vLMIS data, the EPI coverage rate for Ghotki was 64.1 per cent and for Sukkur it was 57 per cent.

Study sample

Quantitative

The study sample was comprised of supply stores in the two districts and their sub-stores. In both districts, the main supply stores were included. Besides the main stores in Ghotki, sub-district stores in five *talukas* were included as well. Similarly, in Sukkur sub-stores in five *tehsils* were also included. The SDP stores were located throughout each district. In Ghotki, there were 53 SDPs out of which 20 were randomly selected and evaluated. In Sukkur there were 63 SDPs and 20 were randomly selected and assessed (see Table 11). A proper sample-size calculation was not performed because of the small number in total. The number 20 was selected because it was almost half the size of all facilities and these were randomized to keep an element of generalizability. For the randomly selected stores, if the selected store was found to be unavailable at the day of the visit the next nearest one was selected to replace it.

Qualitative

The key informants for the qualitative segment were selected purposively. It was decided that leadership of provincial EPI, and the provincial and federal senior management of the Deliver Project should be interviewed.

TABLE 11
Data collection sites

Ghotki District		Sukkur District	
Main district store	Selected (1)	Main district store	Selected (1)
Five <i>taluka</i> stores	Take all approach (5)	Five <i>taluka</i> stores	Take all approach (5)
SDPs	53 (20 randomly selected)	SDPs	63 (20 randomly selected)

Ethical clearance

The proposal was reviewed and ethical clearance obtained from the Institutional Review Board of the Health Services Academy, Pakistan, prior to data collecting any data. Verbal consent was obtained from all participants.

Data management and analysis

All quantitative data were collected on printed questionnaires, which were in Microsoft Excel format. After collecting information and checking stocks, data collectors rechecked the same questionnaire for any missing information and completed it the same evening in order to ensure that nothing was missed or incorrect. All data were entered in Microsoft Excel format and this was also used for generating frequencies and the necessary graphs.

Data from in-depth interviews were collected by the research team and analysed manually. No software was used for this purpose. Content analysis was performed and themes were generated for each specific area.

Results

A total of 52 Sindh EPI's logistics and management facilities were evaluated in this study. Out of these, one in each district was the main supply store (2 total), five in each district (10 altogether) were *taluka* stores, and 20 from each district (40 altogether) were SDPs in the EPI centres.

In the 12 EPI storage facilities in both districts (two main district and 10 sub-district facilities), there was marked difference between the processes in the intervention and non-intervention districts (*see Table 12*). For example, in Ghotki, the intervention district, 83.3 per cent of managers were using MIS data for decision-making related to vaccines and supplies; whereas no MIS-based data was available in the non-intervention district of Sukkur. In the intervention district, the percentage of supply that matched with requisitioned from quantities was also 83.3 per cent, while in the non-intervention district this match was only 33.3 per cent. Working hardware was 100 per cent in the intervention district compared to 50 per cent in the non-intervention district.

In the SDPs ($n = 40$) the situation was similar (*see Table 13*). In the intervention district 90 per cent of the stores were maintaining stock registers compared to 40 per cent in the non-intervention district. Receipt vouchers were maintained in 100 per cent of the facilities in Ghotki and in Sukkur only 60 per cent of the SDPs were maintaining receipt vouchers. The proportion of SDPs where the supply matched with the requisitions from quantities was 100 per cent in Ghotki compared to 35 per cent in Sukkur. Stock outs were reported from 10 per cent of the SDPs in the intervention district compared to 40 per cent in the non-intervention district.

TABLE 12
Description of supply chain logistics at main district and *taluka* stores
($n = 12$)

Variables	Ghotki District ($n = 6$)	Sukkur District ($n = 6$)
Number MIS trained store keepers	6 (100.0%)	4 (66.6%)
Number of managers using MIS data for decisions	5 (83.3%)	2 (0.0%)
Number of stores maintaining stock registers	6 (100.0%)	3 (50.0%)
Number of stores maintaining issue receipt vouchers	6 (100.0%)	3 (50.0%)
Number of stores whose supply matched with requisitioned quantities	5 (83.3%)	2 (33.3%)
Number of stores where hardware is available	6 (100.0%)	4 (66.6%)
Number of stores where hardware is available and working	6 (100.0%)	3 (50.0%)
Number of stores where Internet is available	6 (100.0%)	3 (50.0%)
Number of SDPs with updated vaccine distribution plans	6 (100.0%)	0

TABLE 13
Description of logistics at service delivery points
(n = 40)

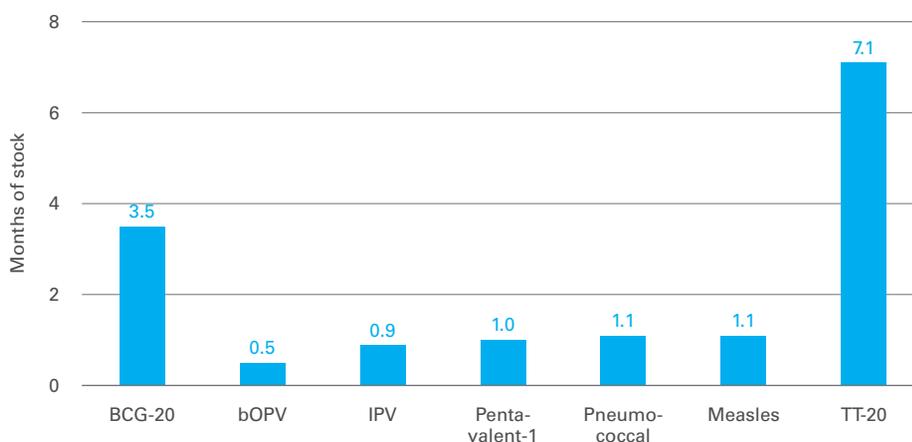
Variables	Ghotki District (n = 20)	Sukkur District (n = 20)
Number of SDPs with stock outs	2 (40%)	8 (40%)
Number of SDPs maintaining stock registers	18 (90%)	8 (40%)
Number of SDPs maintaining issue receipt vouchers	20 (100%)	12 (60%)
Number of SDPs whose supply matched with requisitioned quantities	20 (100%)	7 (35%)

Status of one-month antigen stock

The stock data for the month of August 2017 was collected and reviewed for the intervention and non-intervention districts (see Figure 23 and Figure 24). If any store has stock of more than one and a half months, that is considered as 'over stock' by EPI and is a negative performance indicator. Stock of less than one month is also taken as a negative performance indicator.

In Figure 23, the district store in Sukkur had OPV and IPV for less than one month while pentavalent 1, pneumococcal and measles were available for one or 1.1 months. Sukkur was overstocked for BCG and tetanus toxoid (TT). In Figure 24, the district store Ghotki was slightly overstocked for some antigens but it was not understocked.

FIGURE 23
Status of vaccine stock in the Sukkur District store (non-intervention district)



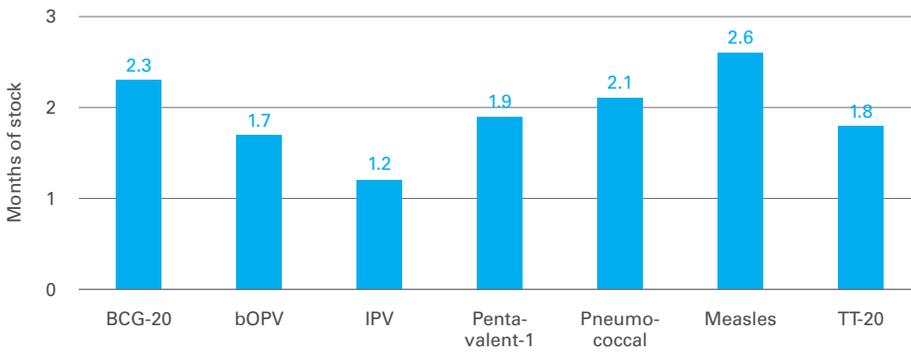
EPI benchmark for stock:

Overstock > 1.5

Adequate 1 – 1.5

Understock 0.5 – 1

FIGURE 24
Status of vaccine stock in Ghotki District store (intervention district)



Wastage rates

The vaccine wastage rate is a key indicator of supply chain management. EPI allowable wastage rates for each antigen are:

- BCG vaccine – 50 per cent
- Bivalent oral polio vaccine (bOPV) – 20 per cent
- Inactivated polio vaccine (IPV) – 50 per cent
- Pentavalent vaccine – 5 per cent
- Pneumococcal vaccine – 10 per cent
- Measles vaccine – 20 per cent
- Tetanus toxoid – 20 per cent

Overall the vaccine wastage rate was high in the non-intervention Sukkur District compared to the VAN-intervention Ghotki District (*see Figure 25*). For example, wastage of BCG was 46.7 per cent in Sukkur compared to 33.9 per cent in Ghotki, OPV was 13.5 per cent in Sukkur compared to 9.5 per cent in Ghotki, and pneumococcal was 11.4 per cent in Sukkur compared to 7.4 per cent in Ghotki. However, the pentavalent wastage was higher in the Ghotki than in Sukkur.

FIGURE 25
Vaccine wastage rate for August 2017 in the Sukkur District store (non-intervention district)

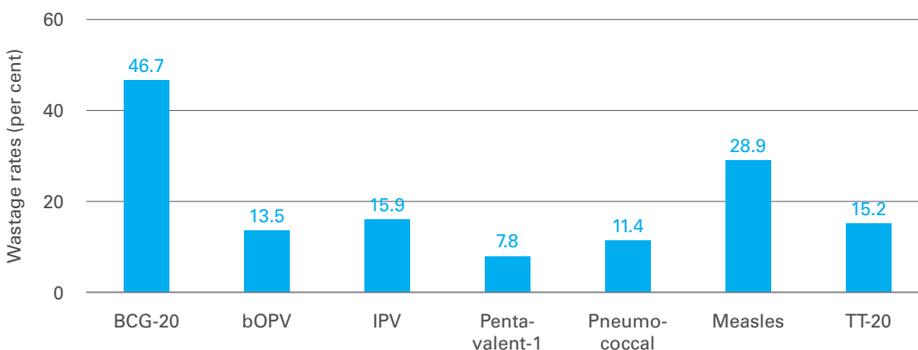
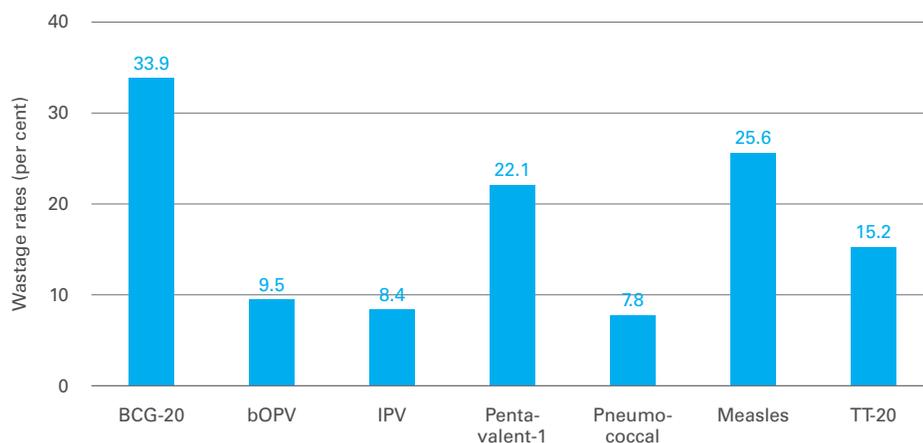


FIGURE 26
Vaccine wastage rate for August 2017 in the Ghotki District store
(intervention district)



Quality assurance of data at the district level

Significant data quality issues were observed in the district store in Sukkur in vLMIS reporting, and data didn't match what was entered into the stock register, where entries were also not up to date. There were also discrepancies in stock actually available on hand and what was entered in the stock registers. Minor data errors were recorded in receiving from divisional stores and issuance to *taluka* stores. No record of dry stock, such as syringes and safety boxes, was maintained in the stock registers in the district store in Sukkur.

TABLE 14
Data quality rating for Ghotki and Sukkur Districts

Districts	Data quality rating	
	Ghotki	Sukkur
Discrepancies	A	C
Discrepancies in opening and closing balance	A	B
Discrepancies in <i>stock in hand</i> (physical verification)	A	B
Discrepancies in receiving from divisional store	A	A
Discrepancies in issuance to <i>tehsil/taluka</i>	A	A

Overall Good Data Quality: "A" – Overall error in reported results less than 10 per cent

Minor Data Quality Issues: "B" – Overall error in reported results between 10 per cent and 30 per cent

Major Data Quality Issues: "C" – Over 30 per cent overall error in reported results.

Results of in depth interviews

Three in-depth interviews were conducted between 26 September and 3 October 2017. The key informants were:

- 1 Country Director, Deliver Project
- 2 Team Leader/Director, VAN Sindh
- 3 Director, EPI Sindh

Whilst the responses of key informants were diverse, they were relevant and useful in giving an overview about the impact of the project.

Benefits of QIT/VAN model and its usefulness

One of the KII respondents was of the view that since there is nothing on government financing on monitoring of immunization at the district or sub-district levels, this was the first such on the ground initiative. He was also of the opinion that this was the first data-guided monitoring in which technology was effectively used. *“Supply chain realization has been brought in in Pakistan by the vLMIS/VAN project, and vLMIS and VAN are pioneers of monitoring.”*

Another respondent said that the VAN approach built capacity at each level and defined the processes for routine immunization. VAN ensured that correct data was used at the district and sub-district levels. *“Receiving of data generated on a fortnightly and monthly basis and even at quarterly basis at district and tehsil levels was not properly followed.”*

It was mentioned by director of VAN that, because of the placement of a QIT at the district level, the data became more organized. Micro-management and timely analysis of data enabled district managers to make decisions and provide accountability for immunization services. There was improved visibility of data not only at the district level but also at the provincial level. *“It was for the first time that district officials sat together to analyse the data and took actions as well as made monitoring plans collectively.”*

Evidence of process improvement and positive changes

On the question of evidence available related to process improvement and positive changes that were a result of VAN's implementation, respondents found that there was clear visibility of wastage and how to calculate such wastage was a key factor. In addition, the cold chain process became visible as a result of vLMIS. It was mentioned that stock forecasting and utilization of vaccines improved, which helped in averting wastage at the immunization centres. There was also a comment that there was a marked decrease in wastage rates in VAN districts along with a decrease in stock out. The quality of uploaded data also improved on vLMIS.

Technological support required to scale up VAN

One of the key informants commented that VAN and vLMIS should be merged. There should be capacity building in QIT in the monitoring and evaluation framework at the provincial level. He suggested using a business intelligence tool in Pakistan for actionable results. *“The Governments of Sindh and Pakistan need to seriously revise monitoring of immunization, Punjab is an example.”* It was mentioned that, as a result of the project, human resources at the district level, such as coordinators as well as the lower staff, are well versed in VAN indicators, targets and goals.

No new recruitment at the district level is required. They can transfer these skills and technical expertise to other districts. *“One trained coordinator can easily train personnel of three districts, which will surely be a cost-effective strategy to train other districts.”* One of the key informants responded that not much is needed, as we only need to train the districts on QIT protocols and the Health Department has to only designate dedicated staff to implement QIT. *“With some strategic planning, showing leadership and taking bold decisions related to accountability, a world of difference can be made in supply chain and immunization management.”* Further results of the in-depth interviews are described in Table 15.

TABLE 15
Results of key informant interviews

Name of key informant/questions	Respondent 1	Respondent 2	Respondent 3
Benefits observed by relevant authorities	<ul style="list-style-type: none"> • VAN benefits could be used to its fullest because of short life 	<ul style="list-style-type: none"> • Helped in data analysis and making decisions at district level • Improvement in supply chain performance • Data visibility 	<ul style="list-style-type: none"> • Quality data recording • Timely reporting and uploading of data • Almost zero stock outs • Decrease in wastage rates of different antigens • Improvements in coverage
Challenges encountered during the implementation of the project	<ul style="list-style-type: none"> • Resources were low but team work and effective management helped • QIT staff were from the government but they were not dedicated M&E staff 	<ul style="list-style-type: none"> • At health facility level and above proper data generation 	<ul style="list-style-type: none"> • Power and Internet connectivity • Limited computer skills of some relevant staff • Issues with data quality/mistakes found in reported data
Management or technical changes required to scale up VAN	<ul style="list-style-type: none"> • To sustain VAN it has to be integrated in VLMIS • VAN can be deployed in Sindh as base has been established 	<ul style="list-style-type: none"> • Skill development of vaccinators, LHWs and others at district and <i>taluka</i> level 	<ul style="list-style-type: none"> • Local managers should be properly trained on VAN principles and approach
Willingness of the provincial leadership to scale up such an initiative	<ul style="list-style-type: none"> • The senior hierarchy of Sindh is keen to scale up 	<ul style="list-style-type: none"> • The whole programme is chaired by a senior MNA who directly oversees the targets and indicators 	<ul style="list-style-type: none"> • The Sindh health department is willing to scale up but would require donor support
The culture of inconsistency and lack of implementation	<ul style="list-style-type: none"> • Pakistan has progressed in immunization • WB lead multi-donor trust fund was based on disbursement link indicator and one of the indicator was VLMIS 	<ul style="list-style-type: none"> • Because VAN team at the district level was experienced and from government all were well connected from top to lower tiers 	<ul style="list-style-type: none"> • These issues are prevalent in donor supported projects and continuity should always be thought of in the beginning • Funds should be allocated for continuity
Human capacity requirement to scale up	<ul style="list-style-type: none"> • Application of same model • QIT master trainers • 2–3 year long model • Engagement of local organizations 	<ul style="list-style-type: none"> • No new recruitment is required • Only refreshers needed 	<ul style="list-style-type: none"> • QIT master trainers
Numerical resources needed to scale up	<ul style="list-style-type: none"> • US\$ 1 million was sufficient for one year • Enough money available in NISP which should be used for VLMIS/VAN monitoring • US\$ 5 million to CHEMONICS can establish this system 	<ul style="list-style-type: none"> • Project planners and developers are better judges of this number 	<ul style="list-style-type: none"> • Components like training and hardware will need some support • Health department has to dedicate human resource and logistics
Role of development partners if VAN has to scale up	<ul style="list-style-type: none"> • Pooling resources for example with nutrition supply chain • Supply chain realization in Pakistan has been brought by USAID 	<ul style="list-style-type: none"> • In the adjacent districts of VAN same coordinators and relevant staff can be used 	<ul style="list-style-type: none"> • Initial support from donors is necessary

Discussion

The findings of this implementation research study indicate that the VAN project made a positive impact in supply chain management in Ghotki District where it was implemented. This study was unique, as it had both quantitative and a qualitative components. The quantitative component focused on collecting data from the EPI supply chain storage facilities and included one-to-one interaction with the personnel involved. The situation in the intervention district (Ghotki) was better than in the non-intervention district (Sukkur). The project finished sometime back but most of the vLMIS operations remained functional. The final evaluation report of the Deliver Project concluded that it helped in improving the operation and performance of supply chains. Trends in indicators of supply chain performance, i.e., reporting rates, consumption, wastage rates and vaccine coverage, increased significantly in the project-supported provinces and data accuracy helped the managers in making decisions [6].

The benefits of the VAN approach have been documented globally. Kenya's Ministry of Health, through its National Vaccines and Immunization Programme (NVIP) has embraced the concept of a VAN initiative, as a way to accelerate progress towards its health goals. Kenya envisages that VAN will transform its vaccine supply chain and enhance programme performance [7]. Mozambique's immunization programme follows a traditional EPI model for immunization supply chain and associated information systems across all provinces. Their model is largely policy driven and implemented through annual plans. In contrast, the VAN Reference Model uses a more fluid approach that adjusts based on what is or is not working at the service-delivery level, as evidenced by an ongoing stream of data. VAN would add a small group of highly skilled workers who are encouraged to make or recommend adjustments based on the data as and when they deem appropriate [8].

The study researchers could not find recent coverage rates for Ghotki and Sukkur districts. The 2012-13 coverage rates mentioned on the federal EPI website (http://epi.gov.pk/?page_id=378) are 65.6 per cent for Punjab, 29.1 per cent for Sindh, 52.7 per cent for Khyber Pakhtunkhwa, and 16.4 per cent for Balochistan. A real-time comparison can only be made with more recent coverage data for Sukkur and Ghotki districts of Sindh.

The key results of quantitative assessment, such as storage of stock or vaccine wastage, indicate that in the intervention district for both the situation of stock for one month and wastage were better in the intervention district.

The project was able to establish provincial-level VAN teams and QITs and equip them with the ability to analyse EPI-related data and provide them with the capacity to take actions on a regular basis to incrementally improve the EPI supply chain in the intervention district.

The qualitative component of this implementation research focused on gathering information from key informants, mainly about lessons learned and whether intervention can be replicated at a larger scale. Two project-related staff members were of the opinion that it should be replicated in all districts, as limited human resources are required. They also cited short project duration as a key challenge but were of the opinion that VAN helped in producing a critical mass of trained personnel who can be useful as master trainers or at least can be used in the adjacent districts. The benefits of the project cited were zero stock out, decreased wastage rates and improved coverage during the life of the project. The government-related key informant was of the view that projects such as VAN can be replicated but will require long-term donor support. One of the key findings from the qualitative part of the study that should be noted is that there is enough money

available in the national immunization support programme and it should be used for vLMIS as well as VAN. There was also a recommendation to pool resources, for example, with the nutrition supply chain.

Limitations of the study

This research had certain limitations that need to be kept in mind before drawing any conclusion. Only able descriptive results were compared and comments on causality cannot be based on this comparison. Furthermore, it was not possible to control for all possible variables while selecting districts. The results could have been different had we been able to address these limitations. However, this simple assessment showed that there are benefits in adapting the VAN approach.

Conclusions and recommendations

VAN helped in improving supply chain management issues in the district in which it was implemented. This suggests that important improvements in the system will be gained by scaling up this project to other districts in Pakistan.

A current initiative supported by GAVI, the Vaccine Alliance in Pakistan involves the tracking of vaccinators, which will help in improving the performance of the vaccinator as well as provide evidence to corroborate vaccine consumption data. This initiative will also decrease duplication, as details of union councils will be covered in the application data. However, there is a need to integrate vLMIS, and the GAVI tracking system into one vLMIS to reduce further work for the vaccinator, who currently needs to draft paper reports about consumption of vaccine for incorporating in vLMIS. In addition, the District Health Information System (DHIS) should also be integrated to step towards a uniform reporting system.

References

- 1 End Polio, Polio case detail, 2017, Islamabad, <<https://www.endpolio.com.pk/polio-cases-detail-2017>> (accessed on 15 November 2017).
- 2 Immunization Times, 2009, <https://www.unicef.org/pakistan/Final_Immunization_Times.pdf>.
- 3 Basharat and Shaikh. 'Polio immunization in Pakistan: Ethical issues and challenges', *Public Health Reviews*, vol. 38, issue 6.
- 4 Oyo-Ita, Angela, et al. 'Interventions for improving coverage of childhood immunisation in low- and middle-income countries', *Cochrane Database System Review*, vol. 10, issue 7.
- 5 Global Health Supply Chain-Chemonics, Dar es Salaam, Tanzania, <www.slideshare.net/inSupply/early-lessons-in-adapting-visibility-and-analytics-networks-van-to-improve-health-supply-chain-performance>, (accessed on 2 February 2016).
- 6 USAID, 2016, USAID Deliver Project: Final Country Report Pakistan, <http://deliver.jsi.com/wp-content/uploads/2017/01/FinaCounRepo_PK.pdf>.
- 7 JSI, John Snow Inc. Continuous improvement for immunization supply chain using a Visibility and Analytics Network: The case of Kenya. <www.technet-21.org/images/tc2017/Posters/KENYA-VISIBILITY-AND-ANALYTICS-NETWORK_JSI.pdf>, (accessed on 1 February 2018).
- 8 Village Reach White paper: Enhanced Visibility, Analytics and Improvement for the Mozambique Immunization Supply Chain. April 2015. <www.villagereach.org/wp-content/uploads/2016/07/Enhanced-Visibility-Analytics-and-Improvement-for-Mozambique.pdf>. (accessed on 1st February 2018).

E-Vaccs: Assessment of barriers and enablers using the Consolidated Framework for Implementation Research in Punjab

Key messages

- Low vaccinator performance is a major barrier in immunization
- E-Vaccs is an online performance management system in Punjab Province that tracks immunization coverage and the performance of vaccinators
- A system such as E-Vaccs can effectively improve immunization coverage through improved planning of vaccine delivery and effective tracking of children who have missed vaccination
- Implementation challenges include insufficient acceptance of new technology among frontline staff and inadequate capacity for data entry and utilization
- Enhanced technology features and improved training can increase acceptance and use

What is the problem?

The low performance of some field vaccinators and resulting gaps in immunization coverage are major challenges for the immunization programme in Pakistan's Punjab Province. In order to tackle these challenges, a performance management system, E-Vaccs, was developed and introduced across the province. The system has subsequently been introduced in other provinces.

E-Vaccs produces data dashboards that show overviews of vaccinators' performance. These data are cross-referenced with information about immunization coverage. The expectation is that the E-Vaccs system can be an important tool in planning and delivering immunization services.

Although a standard version of E-Vaccs was introduced in all districts of Punjab, the dashboard showed uneven implementation of the system and variations in its use. This study explores reasons behind these variations as well as barriers and enablers in the implementation of E-Vaccs.

How was the research done?

The study took place in four districts of Punjab Province: Lahore, Rawalpindi, Gujrat and Dera Ghazi Khan. Interviews were conducted in these districts with staff involved in management (i.e., deputy and assistant superintendents, executive district officers and the provincial EPI director), operations (i.e., vaccinators) and support/technical assistance (i.e., EPI and health roadmap team members from the provincial Ministry of Health).

What solutions were identified in the study?

A Better data accuracy, visibility and appreciation can improve implementation

Respondents from three of the four districts reported low data accuracy in the use of E-Vaccs. Double counting, absence of mobile/Internet networks, and cumbersome and time-consuming data-entry procedures were highlighted as E-Vaccs implementation barriers.

Simplifying data entry and raising awareness of the importance of data accuracy among frontline staff is an effective way to improve implementation.

B Technical enhancements can make the system easier to use

Participants in the study agreed that E-Vaccs improved vaccinator performance and immunization outcomes. However, strategic technical enhancements could improve acceptance and use of the tool by frontline workers. Technical enhancements could include a 'due defaulter' option to track the children who missed vaccination, confirmation of data successfully sent, user-friendly dashboards, location tracker of vaccinated children, an iOS version of the app, and inclusion of each vaccinator's work status in the application, for example on leave, training or supplementary immunization activities (SIAs). Ensuring the presence of mobile networks, and providing allowances for sufficient fuel and maintenance of motorbikes and mobile phones may increase the performance of the vaccinators.

C Training is an effective way to improve capacity

E-Vaccs relies on mobile technology and vaccinators must be familiar with touch-screen smartphones and mobile applications. Older vaccinators in particular have difficulties operating mobile phones for recording and uploading data. Periodic hands-on training can help vaccinators learn and understand how to operate the application that will improve uptake and use.

Recommended actions

- 1** E-Vaccs should be used in every health facility in Punjab. This will allow the government to gather data required for effective planning of vaccine delivery, including creating target lists for vaccinators and calling attention to children who dropped out.
- 2** E-Vaccs dashboards should be changed to meet the requirements of vaccinators and planning. This work would ideally be guided by exploratory research to ascertain these needs.
- 3** Additional features should be added to the E-Vaccs application to improve acceptability and uptake among frontline workers. Features should be added to address the time consumed in double data entry by reducing register-based data entry. This will ease the workload on vaccinators.
- 4** A system should be devised for routine repair, maintenance and replacement of faulty phones.
- 5** Periodic training should be organized for vaccinators and supervisors to build capacity in the use of E-Vaccs and similar technology.

For more information please contact:

Shehneela Mazhar, (shehneelamazhar786@gmail.com); Eefa Tabassum, (eefatabassum@gmail.com); Ahmed Razzak; Saad Akbar

E-Vaccs: Assessment of barriers and enablers using the Consolidated Framework for Implementation Research in Punjab

Munir Ahmed,¹ Shehneela Mazhar,² Eefa Tabassum,³ Ahmed Razzak⁴ and Saad Akbar⁵

1 Director General of Health Punjab

2 Research and Communications Consultant

3 Monitoring and Evaluation Specialist

4 Senior Associate Consultant, Acasus

5 Managing Director, Akademos

Introduction

E-Vaccs is a performance management system that was developed for the vaccination workforce in the province of the Punjab Province, Pakistan in 2014 by the Expanded Programme on Immunization (EPI)¹ and Pakistan Information Technology Board (PITB).² The system was put in place to help fulfil the mission of vaccinating every child in the country by addressing the vulnerabilities, such as low geographic coverage and poor performance of field vaccinators, within the EPI programme. Through E-Vaccs, EPI and the executive district officers (EDOs) can use dashboards to see the broader overview of the performance in each district, including each individual vaccinator's activity and which areas had not been covered by the field workers. However, despite application of a uniform version of E-Vaccs in all the districts of Punjab, the dashboard showed varied performances in different districts in terms of coverage and attendance of vaccinators. Responses to the data findings can improve coverage and performance and contribute to the achievement of overall immunization targets. Deployment of E-Vaccs is being replicated in other provinces, though there is still no evidence available regarding the performance of these various districts on the E-Vaccs dashboard. The study was carried out to investigate this research gap by investigating different barriers and enablers in the implementation of E-Vaccs. The study used qualitative methods to inform stakeholders and is aiming to tap the true potential of the application.

The study objectives were to explore:

- opinions of the end-users (vaccinators) and involved stakeholders on the perceived benefits of E-Vaccs in immunization in Pakistan;
- opinions of the end-users (vaccinators) and involved stakeholders on the perceived barriers in the adoption of E-Vaccs for digitization (of immunization data) and its subsequent monitoring and evaluation;
- reasons behind varied performance of different districts on E-Vaccs dashboard; and
- suggestions for improving E-Vaccs to make it more beneficial for end-users (vaccinators) and involved stakeholders.

1 Expanded Programme on Immunization (EPI) in Pakistan is responsible for coordinating and overseeing all immunization efforts in the country.

2 Pakistan Information Technology Board (PITB) is an autonomous body set by Government of the Punjab that provides the foundation for Punjab's innovation economy.

Methods

Study design

Qualitative methods for data collection were used to enable study subjects to provide their own perceptions about possible barriers and enablers in the implementation of E-Vaccs implementation. Four study districts were selected based on attendance and coverage rates as proxy indicators of successful implementation of E-Vaccs. Semi-structured open-ended qualitative questionnaires were used to collect data through key informant interviews (KIIs). These interviews focused on three aspects of E-Vaccs: management, operations and support/technical assistance provision. Data were analysed under the five domains of the Consolidated Framework for Implementation Research (CFIR). These broader themes are composed of 39 constructs.

The study instruments were translated to Urdu and pre-testing of study tools was carried out before data collection. Informed consent was obtained to ensure voluntary participation of all respondents. The study also adhered to ethical protocols of unbiased data collection [1, 2].

As the objectives were to investigate enablers and barriers in effective implementation of E-Vaccs, the districts that were included in the study were those with extreme performances with regard to E-Vaccs. Some had high vaccination coverage indicators based on data from the Multi-Indicator Cluster Survey (MICS) 2013 and Punjab Health Services (PHS), 2016.

After analysing data from November 2015 to July 2017, the following four districts were selected for the study (see *Figure 27* and *Figure 28*):

- Lahore: Urban hub, average performer on both E-Vaccs indicators (geographical coverage, child-level data) and overall immunization coverage indicators
- Gujrat: High performer on E-Vaccs as well as overall immunization coverage
- Dera Ghazi Khan: Better on E-Vaccs indicators but struggling with immunization coverage
- Rawalpindi: Average to poor performer on E-vaccs and average performance in vaccination coverage

Sampling and sample size

As the end-users, vaccinators are at the heart of the implementation of E-Vaccs in Punjab. However, other line stakeholders are equally important for the smooth functioning of this system. In addition to vaccinators (operations), interviews were conducted with managers and support/technical assistance providers.

In the management category the following personnel were interviewed:

- Assistant supervisors of vaccination (ASVs)
- District supervisors of vaccination (DSVs)
- Executive district officers (EDOs) for health/chief executive officer (CEO) for the district
- EPI Director

In the operations category, four vaccinators from each district were interviewed.

In the support/technical assistance provider category, PITB, EPI and Roadmap Team members were interviewed.

FIGURE 27
E-Vaccs coverage comparison of selected four districts

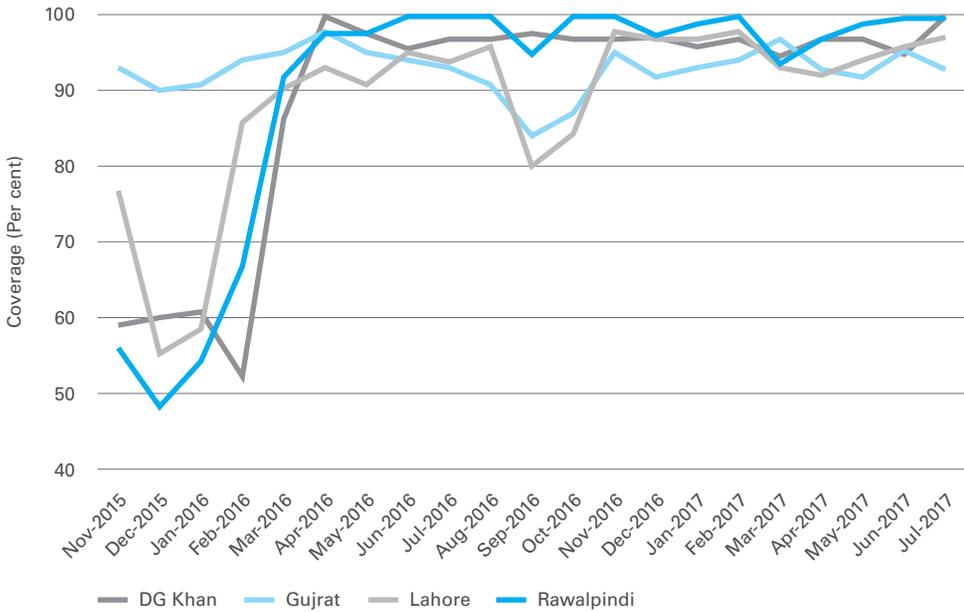
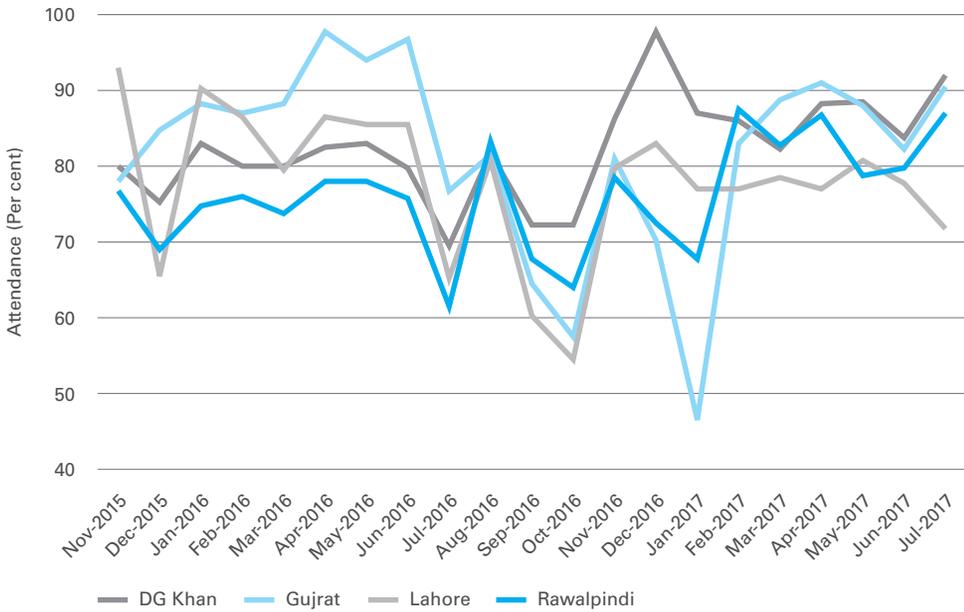


FIGURE 28
E-Vaccs attendance comparison of selected four districts



Data collection and analysis

Data were analysed under five domains of the CFIR:

- 1 Intervention Characteristics** include eight constructs (e.g., relative advantage, adaptability, trialability, complexity etc.) that refer to features of intervention that might influence any implementation.
- 2 Inner Setting** includes 12 constructs (e.g., implementation climate, leadership engagement etc.) that refer to features of the implementing agency/stakeholders that might affect the process of implementation.
- 3 Outer Setting** includes four constructs (e.g., peer pressure, external policy and incentives etc.) that refer to features of the external context or environment that might influence implementation.
- 4 Characteristics of Individuals** include five constructs (e.g., self-efficacy, knowledge and beliefs about the intervention etc.) that refer to studying attributes of individuals involved that might influence implementation [3].
- 5 Implementation Process** includes eight constructs (e.g., engagement of appropriate individuals in the implementation and use of the intervention, reflecting, and evaluating etc.) that strategize who might Influence the implementation process.

Results

Domain 1: Intervention Characteristics: Evidence of strength and quality barriers and enablers

A key indicator of whether the E-Vaccs system is being used efficiently is the data that vaccinators submit through the application. While vaccinators have little control over location data picked up through the application, what they do control is child-level information provided through the application.

Vaccinators had varying opinions on this domain. All vaccinators from Gujrat reported 100 per cent accuracy in the data being reported, while vaccinators from Dera Ghazi Khan and Rawalpindi showed low confidence in the accuracy of the data submitted. Participants from Dera Ghazi Khan reported that they perform much better than the data shows but are unable to send each and every entry due to technical issues. Vaccinators from Rawalpindi, however, identified a need for higher visibility in the data being sent in by vaccinators so that they are better able to identify gaps and send in more accurate data. One vaccinator said:

“The E-Vaccs application shows less of our actual work. It does not show our original work, like how many children have been vaccinated. That is because of shortage of time. One person cannot do so many tasks. He has to enter the data, he has to inoculate, and he has to enter it on the register too. If one does that many tasks then one who comes for vaccination (parents and children) do not give the vaccinator much time (would not wait that much).”

Almost all the vaccinators in all the districts unanimously agreed that E-Vaccs was a great application, however, some strong contributing factors were hampering its use. Most vaccinators in all the districts mentioned the problem of double data entry creating problems. This means that before E-Vaccs, the vaccinators recorded information on children in registers only. However, with the introduction of the application, they have to do it twice, which is time consuming, and when coupled with worn out mobile phones and lack of Internet and mobile networks, it becomes ‘stressing’ (in the vaccinators’ word) to use E-Vaccs for recording and uploading child-level data. Another vaccinator said:

“Now it has become difficult and time taking to enter data as compared to olden times when we would manually enter data on the vaccination card due to double data entry (i.e., on registers (on cards too) as well as in the app.”

Managers (ASVs, DSVs, DHOs and CEOs) in all districts agreed that the data being reported through E-Vaccs was accurate and vaccinators rarely feel the need to misreport data. District managers reported that multiple checks are in place to limit the ability of the vaccinators to report fake entries. However, lack of option of ‘leave’ in the application in terms of the work status of the vaccinator at times encourages them to try other methods (to ensure their attendance and that they make use of sanctioned leave as well). In addition to this, the same vaccinators are also being engaged in polio campaigns. There is not any option in the dashboard or the application that could show their status in terms of work like engagement in the polio campaigns, or undergoing some training or refreshers etc. One vaccinator in Rawalpindi said:

“The option of leave is not there in application. We take leave and are out of city but at the end of the month, we get calls to explain why our attendance is low.”

Vaccinators in all the districts had a mixed message on the usability of the application specifically pertaining to ease of use, reporting app crashes, role of efficiency in data entry and overall quantity of effort required. While most of the vaccinators praised the role of E-Vaccs in improving health outcomes (improvement of coverage of immunization) and reported that the app does not crash typically, they were also unhappy with the amount of data and type of fields the app required participants to enter. Moreover, around one third of the vaccinators argued that reporting their attendance via E-Vaccs was time consuming, particularly when they have to go back to re-enter their location.

“Basically when we send data daily we get call from supervision staff/DDO around 2 pm to 3 pm that our attendance has not been marked even though we would have marked it from our side. These things really frustrate us.”

Other necessary changes to E-Vaccs as well as to its dashboards were highlighted in order to make the system useful. Specifically, to reduce drop-out rates and refusals, improving case forwarding and managing of defaulter children, and getting data of every vaccinated child, the department will need to think of new innovations in the immunization delivery system. Some helpful suggestions were shared, for example, the inclusion of a ‘due defaulter option’ in the application, confirmation of successfully sent data, simplification of dashboards, additional features relating to the confirmation of exact location of children, an iOS version of the app and inclusion of a work status option for vaccinators (e.g., leave, training, polio campaigns etc.).

Domain 2: Outer Setting

As per regulations, vaccinators are given 15 litres of fuel per month along with an official motorbike. All the vaccinators in all four districts unanimously reported that they do not receive anything from the government for maintenance or repairing of the motorbikes. Regarding fuel disbursements, none of the vaccinators in Rawalpindi had received fuel reimbursements in the previous two quarters. A vaccinator in a KII in Rawalpindi notes:

“The billing section asks for their percentage (bribe) for processing our requests of reimbursing our fuel receipts and our supervisors are aware of that. That’s how our system is.”

Although the situation in terms of monthly receipt of fuel/reimbursement of fuel quota was better in Gujrat and Dera Ghazi Khan, in Lahore, around half of vaccinators reported issues with fuel availability. Ultimately, these vaccinators were buying fuel themselves.

“We don’t get bike fuel regularly. Sometimes they say this is not available. For example right now I’ve a slip in my pocket that says fuel is not available.”

Domain 3: Inner Setting

Other factors hindering the effective implementation of E-Vaccs included a faulty network particularly in remote rural areas, ending of mobile credits and the using up of data packages far earlier than the end of month due to the number of entries. The issue of faulty networks was reported unanimously by all the vaccinators in Gujrat and around half of the vaccinators in the remaining three districts. ASVs, DSVs, DHO Preventives and CEOs also commented that vaccinators have slow Internet speeds particularly in rural areas, which makes it a time consuming job to upload data.

“Application is non-functional in rural areas due to poor networks.”

Participants were discontent about the insufficient resources for effective usage of the system. To successfully use the E-Vaccs system to track vaccinator performance, vaccinators must have sufficient fuel and budget for repair and maintenance of their android devices and vehicles used to commute to kit-stations. Vaccinators were specifically unhappy about the quality of the phones given to them because of lack of provisions for repair or replacement. Mobile phones were in a poor condition after three years of usage in the field. One third of the vaccinators had to purchase their own phones.

“The phone provided stopped working within a month and it still hasn’t been replaced by the management. So I am using my personal phone”;
“...extremely dissatisfied with the performance of phone and network.”

Almost all the vaccinators also pointed out issues about the application itself their responses with comments such as: application gets stuck, we need to reinstall application, we need to rush to find Wi-Fi to send data, parents of next children in the row waiting to be inoculated pressure us [asking] why are we delaying it.

ASVs and DSVs agreed with these points, and understood it is difficult to enter data, especially on dates when larger numbers of children are being vaccinated. A DSV in Rawalpindi said:

“Vaccinators complain about their phone getting stuck a lot of the time. The phone’s storage is not compatible with the heavy duty data vaccinators have to submit on the system, therefore it gets stuck quite often.”
“The phone’s battery consumes a lot of energy and gets low after every 2 hours; because uploading pictures and data takes a lot of battery life and Internet capacity.”

Another issue noted by about half of the vaccinators in Lahore and Rawalpindi was incorrect GPS coordinates where the problem is more aggravated in cantonment areas and adjoining areas of Rawalpindi and the Islamabad border (also called as twin cities). In Rawalpindi an ASV interviewee said:

“Specifically, in cantonment areas and adjoining areas of Kahuta Research Laboratories, vaccinators complain about incorrect GPS coordinates. Rawalpindi and Islamabad being called as twin cities, the problem of GPS coordinates is there in the areas on the borderline of the two cities, too.”

Almost all the vaccinators in all the districts confirmed that on-going support after the introduction of the application was high, which was helping them. However, vaccinators unanimously shared that the issues in the E-Vaccs application and their tools (mobile phones and the Internet) were the factors acting as barriers in smooth deployment of E-Vaccs. Vaccinators in almost all the districts shared that as government continued to add more features to the application (this refers to introduction of an upgraded versions of the application), it continued to provide full support to the vaccinators in understanding the system and continuously using it in proper manner. District managers from

almost all the districts supported the feedback provided by the vaccinators. However, the DSV and ASV of Dera Ghazi Khan voiced concerns on the amount of training and capacity building being provided to vaccinators on E-Vaccs, especially regarding old vaccinators who are not used to using android phones.

Interviews showed strong support for the level of training and capacity building provided to all vaccinators across all four districts. It was evident that participants felt difficulty in multiple aspects of using the E-Vaccs system initially, which included usage of touch-screen smartphones, getting accustomed to technology as opposed to paper-based registers and using the application itself. However, all participants agreed that the department of health and PITB provided full support to ensure vaccinators did not face difficulty in any of these aspects.

All vaccinators agreed that the impact of E-Vaccs on performance and outcomes of this system have been positive but require some improvements to enhance the system even further. Vaccinators agreed that this is perhaps the most efficient way to track vaccinator attendance and movements through GPS coordinates and has had a positive impact on overall immunization service delivery across Punjab. District managers also supported this claim, as they are eventually the real users of this new monitoring system and cited numerous examples of how the system has improved the health system at large. In addition, district managers also pointed out that using the dashboard helps them navigate through each vaccinator's daily performance in real time very efficiently. However, if applied, the recommendations given by them in further improving the application and dashboard (as mentioned in detail previously and in the chapter of recommendations) would enable all stakeholders to tap the true potential of this system. In a KII, a DHO Preventative from Lahore stated:

"Before vaccinators used to tell us that they had vaccinated that number of children and when we check the data it showed 99-100 per cent [accurate] but when a third party verified them they came to know that it was not more than 60 per cent. So now this is useful because it shows GPS based location and secondly when they vaccinate newly born babies they have to enter their data and they are even bring [record] those children which were being skipped before."

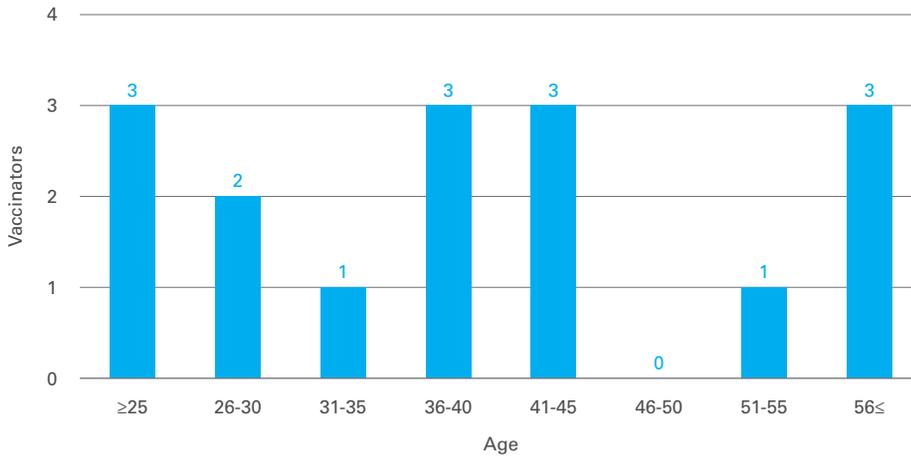
"It is a great application. The real time monitoring through dashboard enables you to track performance of your vaccinators in a better way."

Domain 4: Characteristics of Individuals

On ease of use, vaccinators and district managers (ASVs, DSVs, DHOs and CEOs) specifically pointed out lower acceptance and increased difficulty in usage of E-Vaccs app among older vaccinators. Older vaccinators and the fact that the vaccinator might not have used an android mobile before the usage of E-Vaccs, meant that there were higher numbers of problems at the time of recording and uploading child-level data through the application. This direct relationship between learning to use new technologies and the associated difficulties is confirmed by studies [4]. Figure 29 shows the age ranges of the respondents and the difficulties reported by them in using E-Vaccs are listed in the next paragraph. However, step-by-step guidance and continuous support can decrease the frequency of errors by the users [5] and management has reported the same as well. A DHO from Gujrat noted:

"It is something quite understandable that somebody who has not used an android phone throughout his life is suddenly made to use it as a part of job with a threat that it will be the indicator of his performance."

FIGURE 29
Age ranges of the vaccinators



This is why district-level managers in all the districts pushed for standardized periodic training to help and facilitate the vaccinators in order to tap the true potential of the application and support its use. Additional training should be given to vaccinators with less knowledge of smartphone use in areas like Dera Ghazi Khan, where phone ownership among the general population remains relatively low, and where community health workers such as vaccinators of the area can be key players in mHealth. Training for mobile phone and application use can help them work efficiently and disseminate information such as vaccination history of the child and reminders for routine visits to patients [6, 7].

Discussion

In a cross comparison of all four study districts and the corresponding data as per the E-Vaccs dashboard, Gujrat and Lahore are better performing, the performance of Rawalpindi has not noticeably improved and Dera Ghazi Khan was found to be far behind the other districts.

Lahore, being a hub of activity and in the spot-light as the provincial capital, having a relatively higher educational status of vaccinators (especially inclusion of new vaccinators who are much more familiar with android usage), having a strong existing monitoring and evaluation system in use by ASVs, DSVs, and DHOs, and having continuous support by management teams, is performing better on the E-Vaccs dashboard compared to other districts.

Gujrat was found to be following the ‘carrot and stick’ approach to motivation, whereby vaccinators who have performed better as compared to others in terms of attendance and meeting their targets of immunizing children have had their performances rewarded in the form of cash prizes. Strict monitoring by the CEO and the trickle-down effect of this commitment in the hierarchy also has enabled Gujrat to perform better compared to other districts in Punjab.

Rawalpindi is still struggling with positive environmental samples for polio. As a result, it is part of the smaller supplementary immunization activities (SIA), in addition to National Immunization Days (NIDs) nearly every month. The same vaccinators who conduct routine immunization of children are engaged in these SIAs. Therefore, the lack

of an option of 'leave' or 'engagement in polio campaigns' within E-Vaccs affects the routine immunization targets of the vaccinators. Parents sometimes wait, but other times visit some other government hospitals to get their children vaccinated. Further, extremely delayed reimbursement of fuel expenses and 'profiteering' by the Accounts Section for reimbursement of fuel receipts (which was reported by all the vaccinators) is lowering the morale of the vaccinators to work.

In Dera Ghazi Khan, governance was found to be comparatively weak. In addition, weak or the complete absence of Warid (one of the major networks in Pakistan) signals to upload data, far and widespread geographical locations and, above all, lack of possession of ID cards by caretakers were key reasons for comparatively lower performance by Dera Ghazi Khan as compared to the other districts.

Recommendations

Following the qualitative analysis, the recommendations below were made to EPI to try to ensure more effective implementation of E-Vaccs:

- 1 E-Vaccs should be used in every health facility in Punjab. While the provincial government has ensured a holistic approach to ensure all areas of Punjab are fully vaccinated, more customization of E-Vaccs is required to improve programme performance. To achieve its coverage targets, Punjab must now look at its weakest districts and create plans to ensure effective implementation. While the current system has helped achieve gains in more than 30 districts, a renewed strategy is required to scale up to the whole province. This will allow the government to gather data required for effective planning of vaccine delivery, including creating target lists for vaccinators and capturing children who have dropped out.
- 2 Additional features should be added to the E-Vaccs application to improve acceptability and uptake among frontline workers. Also, E-Vaccs dashboards should be changed to meet the requirements vaccinators and planning. This work would ideally be guided by exploratory research to ascertain these needs. A system that allocates a unique identifier for each child that enters the vaccination system can allow district teams to track this child across his or her life cycle. With each child uniquely identified, and the corresponding contact details of each child stored and visible, vaccinators can easily ensure that once a child enters the system they do not leave the system without getting all vaccines in the immunization schedule. Government programmes looking to introduce E-Vaccs are advised to implement unique identifiers from the outset to ensure every child born and vaccinated is recorded in the vaccine delivery monitoring system.
- 3 More features should be added in the app to reduce time consumed in double data entry by reducing register-based data entry. This will ease the workload on vaccinators. Double data entry leads to incomplete data. It is also strongly recommended to include the option of due defaulter in the app for children to be immunized next in the row. Adding a confirmation message following successfully sent data would help vaccinators. In addition, an option of work status of the vaccinator, such as: On leave, On training, Engaged in polio campaign, should be added to the app to help managers and micro-planners.
- 4 Fuel disbursements in particular should be reviewed and improved along with evidence of profiteering by the accounts department.
5. In addition, current incorrect GPS coordinates for cantonment and border areas in Rawalpindi and Islamabad should be fixed.

6. A system should be devised for routine repair, maintenance and replacement of faulty phones.
7. The government of Punjab has made Warid SIMs the official network to be used in the E-Vaccs mobile phones. However, this study found that Warid signals are not sufficient in many areas of Punjab. Therefore, a small survey should be carried out to identify which mobile SIMs have adequate signals in the respective areas of vaccinators. Alternatively, some system should be devised for vaccinators to use a SIM of their own, and be reimbursed for that accordingly. Keeping in view the high amount of data that each vaccinator has to send via E-Vaccs, the Internet package in official SIMs of E-Vaccs should be upgraded from 2G to 3G/4G.
8. Periodic training should be organized for vaccinators and supervisors to build capacity in the use of E-Vaccs and similar technology. Standard methods should be devised for these trainings, specifically for newly hired and older vaccinators. Periodic, standardized refresher courses should be organized.

Conclusions

Significant vaccination activity takes place at government-managed fixed centres, which includes basic health units, rural health centres, *tehsil* (sub-district) headquarters and district headquarters. There are more than 3,000 such fixed facilities across Punjab, where an estimated 500,000 children are vaccinated. While lady health visitors are asked to record this activity inside permanent registers, none of these data are digitized and there is little monitoring of vaccination activity at these fixed sites.

The E-Vaccs application, combined with detailed trainings of lady health visitors on its use, can allow the government to gather data for around 20 per cent of its target population. Data from E-Vaccs allow for better planning for vaccine replenishment and requisition, creating target lists for vaccinators and reducing dropout.

This research has shown that implementation of E-Vaccs can be made more effective by adding additional features to the existing app, improving dashboards, and improving training, network coverage and technical support.

References

- 1 Mertens, D.M., *Ethics and social justice in ethnocultural qualitative research*, in *Qualitative strategies for ethnocultural research*, edited by D.K. Nagata, L. Kohn-Wood, and L.A. Suzuki, US: American Psychological Association, Washington, DC pp. 61–84.
- 2 Floridi, Luciano. and Mariarosaria Taddeo, 'What is data ethics?', *Philosophical Transactions, Royal Society*, article 374, 2016, <<https://royalsocietypublishing.org/doi/10.1098/rsta.2016.0360>>.
- 3 Damschroder, Laura, J. et al., 'Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science', *Implementation Science*, vol. 4, issue 50, 2009, <<https://doi.org/10.1186/1748-5908-4-50>>.
- 4 Arning Katrin and Martina Ziefle, *Different Perspectives on Technology Acceptance: The Role of Technology Type and Age*, in *HCI and Usability for e-Inclusion* edited by Holzinger A. and Miesenberger, K. USA 2009. Lecture Notes in Computer Science, vol. 5889, Springer, Berlin, Heidelberg.
- 5 Barnard, Yvonne et al., 'Learning to use new technologies by older adults: Perceived difficulties, experimentation behavior and usability', *Computers in Human Behavior*, vol. 29, 2013, pp. 1715–1724.
- 6 Mahmud N., J. Rodriguez and J. Nesbit, 'A text message-based intervention to bridge the healthcare communication gap in the rural developing world', *Technology and Healthcare*, vol. 18, 2010, pp. 137–144.
- 7 Holeman, I. et al., 'Mobile health for cancer in low income countries', *European Journal Cancer Care (Engl)*, vol. 23, 2014, pp. 750–756. <[doi:10.1111/ecc.12250](https://doi.org/10.1111/ecc.12250)>.



Community health workers and vaccinators travel from community to community across the desert landscapes of Balochistan Province, Pakistan, in a bid to immunize every child against measles as part of the October 2018 national campaign.

THEMATIC AREA 3

Human resources and service delivery



Strengthening supportive supervision: A case study of the Expanded Programme on Immunization in Sindh

Key messages

- Despite recent improvements, Sindh remains behind other provinces of Pakistan in terms of immunization coverage
- Weak supportive supervision is a major factor in suboptimal immunization service delivery
- Direction, guidance and training for supervisors conducting supportive supervision need further improvement. Training modules for interpersonal communications and guidance for supervisory visits should be developed, and regular technical refresher training for the supervisors is needed
- The geographic distribution of supportive supervisors, as well as incentives offered to them to improve quality, should be reviewed and revamped

What is the problem?

The rate of children who are fully immunized in Sindh remains low, and is behind several other provinces in Pakistan.

Supportive supervision is a process that helps health staff to improve their knowledge, skills and work performance. Weak supervision and monitoring can cause suboptimal performance, whereas improved supportive supervision can positively affect immunization indicators and the practices of service providers.

In 2015, following the introduction of a new EPI policy in Sindh, training on supportive supervision was introduced for EPI managers. However, there is a dearth of relevant evidence to determine and address the factors influencing the successful implementation of supportive supervision.

This research project on immunization system strengthening documents the current state, and explores barriers and facilitators of the implementation of the supportive supervision system for EPI in Sindh.

How was the research done?

A qualitative study was undertaken to assess the current state of implementation of supportive supervision for routine immunization services in two districts of Sindh Province. The study also documented barriers and facilitators to supportive supervision, and generated evidence required to improve its implementation.

Interviews and focus group discussions in Hyderabad and Thatta districts of Sindh Province were conducted to provide insights and generate recommendations for improvements to supportive supervision.

What solutions were identified in the study?

A Need for clear policy direction and guidance

Updated EPI policy and guidance on supportive supervision can provide practical directions and a clear description of the aims and objectives. Current lack of clear direction and guidance leads to insufficient clarity among stakeholders about the role

and scope of supportive supervision in improving immunization services. This leads some EPI supervisors to perceive the aim of supervision to be the effective policing of vaccinations.

B Improved quality training

A national training module for supervisors on supportive supervision enables standardized training that can be effectively monitored. Training modules on interpersonal communication skills and up-to-date technical knowledge can be included.

C Increased number of supervision visits

Regular supervision in the workplace is an effective way to improve the quality of immunization services. More supervisors and optimization of their geographical distribution may lead to more supervisory visits taking place. Monetary and non-monetary incentives for supervisors will ensure recognition and appreciation, and will build supervisors' motivation to conduct visits.

D Better checklists

Redesigned checklists for supervisory visits can lead to better data recording and enable additional support to be provided where it is most needed. Eventually that will result in improved quality in service provision.

Recommended actions

- 1** The training module for EPI supervisors should be updated and translated into local languages.
- 2** Training should include modules on interpersonal communication skills and regular technical refresher training for supervisors.
- 3** Guidance for supervisory visits in the field should be developed and checklists should be updated and field tested.
- 4** An improved incentive structure for supervisors should be introduced and carefully monitored.

For more information please contact:

Sana Tanzil; Yasmeen Suleman (hanifgodil@hotmail.com); Lubna Baig; Dure Samin Akram, (dsakram@gmail.com)

Strengthening supportive supervision: A case study of the Expanded Programme on Immunization in Sindh

Dure-Samin Akram,¹ Lubna Baig,² Sana Tanzil,² and Yasmeen Suleman¹

¹ Health, Education & Literacy Programme (HELP)

² APPNA Institute of Public Health, Jinnah Sindh Medical University, Karachi

Introduction

The Expanded Programme on Immunization (EPI) is a nationwide government programme in Pakistan providing immunization services. EPI was launched in 1978, initially providing protective antigens against tuberculosis, poliomyelitis, diphtheria, pertussis and tetanus. Gradually, over the years, vaccines against measles, hepatitis B, Hemophilus influenzae type b (Hib), pneumococcal vaccine and rotavirus were added to the immunization schedule [1]. EPI also protects pregnant women and newborns against tetanus. The programme provides both facility-based and outreach services [1]. According to the comprehensive multi-year plan (cMYP), the aim of the programme is to support provinces and districts in providing high-quality immunization services to prevent death, illness and disability due to vaccine-preventable diseases (VPDs) and to contribute to the strengthening of national health systems [1, 2].

Although persistent efforts by EPI have led to an improvement in the vaccination coverage of children aged 12–23 months in recent years, 29 per cent in 2012 [2] and 35 per cent in 2014 [3], the vaccination rate of fully immunized children remains below the EPI target. Similarly, measles vaccine coverage has increased from 45 per cent in 2012 to 53 per cent in 2014, but also is still far below the EPI target of 90 per cent coverage. Ensuring effective management of available resources and optimum performance of current human resources working at various levels are crucial challenges for EPI, especially in Sindh and Baluchistan provinces, which are lagging behind other provinces of Pakistan in terms of immunization coverage [2, 3].

An inadequate number of supervisory staff, lack of training, and insufficient skills for effective monitoring and supervision are major factors that can affect accountability in delivery of quality immunization services [4, 5]. In the current EPI administrative setup, district superintendents of vaccination (DSV) and *taluka* (sub-district) superintendents of vaccination (TSV) are responsible for the supervision of immunization services [6]. In addition, the district health officials, including district health officers (DHOs), additional district health officers (ADHOs) and district EPI focal persons are also responsible for supervising the programme at their respective levels. At the provincial level, programme managers and deputy programme managers are responsible [6]. However, monitoring is done infrequently and/or the monitoring personnel lack the capacity required to perform the task [6].

Supportive supervision is a process of helping health staff improve their knowledge, skills and work performance. It is carried out in a respectful and non-authoritarian way [7]. Supportive supervision focuses on monitoring performance towards goals, using data for decision-making, and is dependent on regular follow-up with staff to ensure that tasks are being implemented correctly. According to a study from Georgia, supportive supervision

can have independent positive effects on immunization programme indicators [8]. A similar study conducted in Odisha, India, found positive effects of supportive supervision on the knowledge and practices of routine immunization service providers [9].

In 2002, WHO and its partners developed the Reaching Every District (RED) strategy for increasing and sustaining high levels of routine immunization. The RED strategy has five components, one of which is supportive supervision [10]. The results of an evaluation of the RED strategy conducted in 2005 in five countries in Africa showed that the RED approach contributed significantly to strengthening immunization systems and improving the delivery of vaccines [10]. After its successful implementation in African countries, the RED strategy was piloted by UNICEF in several districts in Pakistan. The strategy has been adapted in Pakistan and mentioned in the latest National EPI Policy 2015.

Following the introduction of the new policy in 2015, training on supportive supervision was introduced for EPI managers responsible for monitoring. However, there was a dearth of relevant evidence to determine and address the factors influencing the successful implementation of supportive supervision. There was a need to generate provincial-level evidence on feasibility, acceptability, current skills, perceptions and expectations regarding supportive supervision in local contexts. This study aims to obtain a holistic view of the current state of implementation of supportive supervision for routine immunization services in Sindh. It also aims to document barriers and facilitators to the process, thereby establishing the scientific evidence required to improve implementation of supportive supervision for routine immunization services in Sindh.

Methods

Study design

At the outset, an Implementation Research Protocol Development Workshop was organized by the Health Services Academy (HSA) and supported by the Ministry of National Health Services, Regulations and Coordination (MNHSRC) to determine the specific scope of this study, and define its goals and objectives. The workshop provided an opportunity for adequate dialogue between the EPI implementers, and national and international experts in implementation research.

The study also entailed a detailed desk review of existing EPI policy regarding supportive supervision to better understand the current role of various EPI stakeholders in supportive supervision of immunization services. The study included a review of Module 4 of the Mid-Level Manager Training by the World Health Organization (WHO), which contains guidelines for implementation of supportive supervision. The purpose of this desk review was to understand basic skills and work protocols that should be followed by those responsible for supportive supervision of immunization services [8].

Two conceptual frameworks were adapted from previously conducted studies to describe the fidelity and acceptability in the implementation of supportive supervision. Fidelity was defined using four major constructs: adherence, frequency, quality and responsiveness (*see Figure 30*). Acceptability was described using specific constructs such as affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness and self-efficacy [11, 12] (*see Figure 31*). The two conceptual frameworks helped in designing data collection tools and defining the scope of this study. This meant that the case study of supportive supervision in EPI in Sindh was designed and conducted using an exploratory qualitative research approach.

FIGURE 30
Conceptual framework to measure implementation fidelity

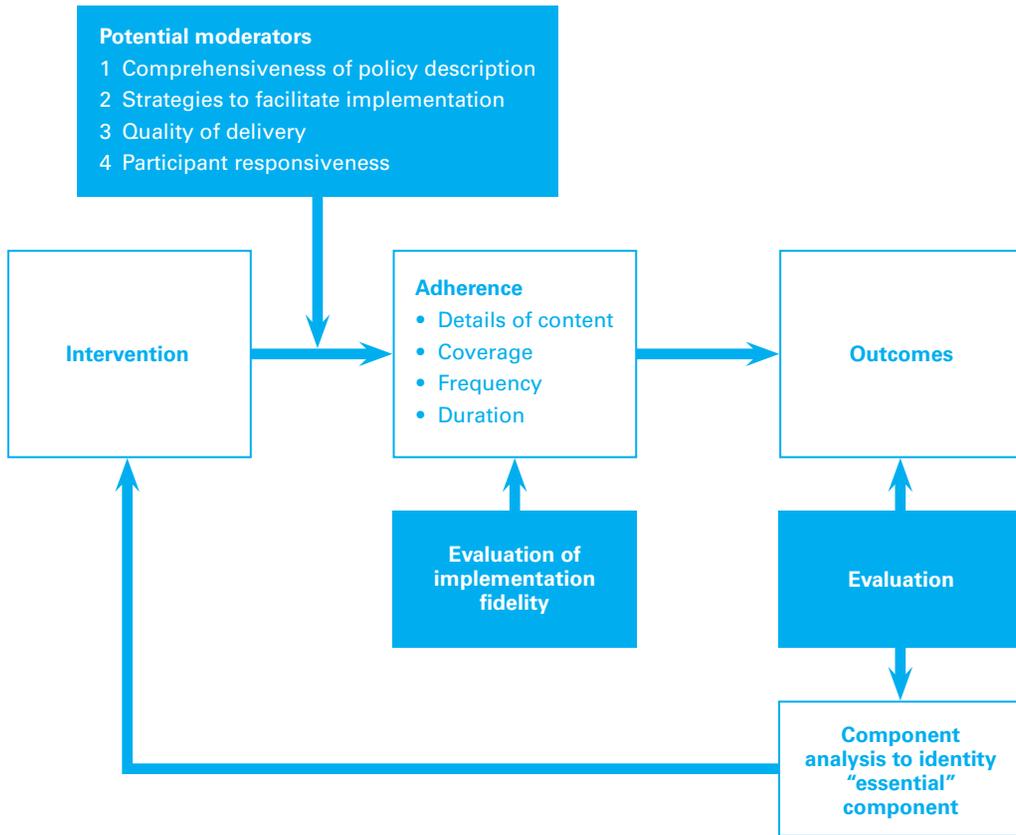


FIGURE 31
Conceptual framework to measure implementation acceptability

Acceptability						
A multi-faceted construct that reflects the extent to which people delivering or receiving a healthcare intervention consider it to be appropriate, based on anticipated or experiential cognitive and emotional responses to the intervention.						
Affective attitude How an individual feels about the intervention	Burden The perceived amount of effort that is required to participate in the intervention	Ethicality The extent to which the intervention fits in well with an individual's value system	Intervention coherence The extent to which the participant understands the intervention and how it works	Opportunity costs The extent to which benefits, profits or values must be given up to engage in the intervention	Perceived effectiveness The extent to which the intervention is perceived as likely to achieve its purpose	Self-efficacy The participant's confidence that they can perform the behaviour(s) required to participate in the intervention

This study was conducted in Sindh Province in two districts, Hyderabad and Thatta, which had completed mid-level manager (MLM) training at the beginning of the study and were implementing supportive supervision. The majority of Hyderabad District is urban with extended peri-urban or semi-rural communities. Thatta District has a mostly rural population. The two districts were purposefully chosen to obtain a representative view of the situation in Sindh Province regarding supportive supervision, and to identify and appreciate possible differences in implementation of supportive supervision in urban and rural settings.

The qualitative data was collected using multiple techniques including in-depth interviews (IDIs), focus group discussions (FGDs), observations of the supervisory checklist implementation, and document review (*see Table 16*). The FGDs and IDIs were conducted with purposefully selected stakeholders of EPI in Sindh who were working at different levels.

The interview guidelines for FGDs and IDIs were developed on the basis of the conceptual frameworks for fidelity and acceptability. Separate guidelines were developed for specific groups of stakeholders and translated into Urdu. The guidelines comprised of a list of open-ended questions, probes and instructions for the interviewer to administer during the IDIs and FGDs. An observation checklist was developed to record quality and coverage of information reported by supervisors, including completeness of reported information. The guidelines were pre-tested by conducting IDIs and FGDs with researchers themselves and with EPI personnel in Karachi, following which the guidelines for vaccinators were simplified, and further probes were added to interview guidelines designed for EPI supervisors.

All FGDs and IDIs were conducted in local languages, i.e., Urdu, by the co-investigators themselves who were researchers and had ample experience of qualitative research. The researchers were accompanied by a trained note taker, who took notes of the discussions and interactions between the respondents and the interviewer. All FGDs and IDIs were conducted after obtaining written informed consent for participation in the study and permission for video recording of the FGDs or IDIs. With the exception of one policy maker, all participants granted permission for video recording of the interviews. Privacy and confidentiality of all study participants was maintained, and only the interviewer and the note taker were present in the room with the respondents.

FGDs were conducted in Thatta and Hyderabad, organized in the DHO's office and respective offices of policy makers and the EPI project director. Between six and nine respondents participated in each FGD. Each IDI was approximately 30 minutes, and the average duration of an FGD was 40 minutes.

Initially, a total of eight FGDs were planned with TSVs and vaccinators in Thatta and Hyderabad (two with each group per city). However, due to the limited number of TSVs, only one FGD was conducted with TSVs in Thatta District, and none in Hyderabad District. In total eleven IDIs were conducted, including an interview with the EPI Project Director in Sindh, and one interview with a DSV, vaccinator and DHO in each of the two districts. Interviews were also conducted with representatives of UNICEF and WHO in Sindh (*see Table 16*). Two additional interviews were conducted with ADHOs in Thatta, and with one TSV in Hyderabad in place of the planned FGD with TSVs.

An independent researcher with sufficient experience of working with EPI centres and having a good understanding of the EPI documentation process was identified and trained to observe and verify EPI records and checklists for supportive supervision in both study districts. The observations were conducted using a specific checklist adapted from the EPI supervisory checklist. This checklist served as the main tool to record observations about the quality and completeness of the EPI implementation by EPI supervisors. The

observation was conducted for fixed EPI facilities as well as for outreach immunization services with the help of a specifically designed checklist for this purpose. Five EPI checklists were verified in each of the two study districts for five different EPI facilities.

The desk review included existing EPI policy documents to enhance the understanding of the role of supportive supervision in current policy. The purpose was to identify the possible strengths and weaknesses in existing policy in regard to supportive supervision. The document review also included the WHO MLM Training Manual Module 4, which contains guidelines for implementation, along with the basic skills and mechanisms of supportive supervision [8]. This manual is the current reference document for EPI Pakistan.

One monthly meeting was attended in each study district to obtain an overview of the feedback mechanisms, responses and approaches of district health authorities to the challenges. The same researcher who conducted observations attended the meetings. The researcher took written notes on important observations, such as feedback given to supervisors on their performance and relevant proceedings. Each meeting was also video recorded.

Study participants and sampling

TABLE 16
Data collection methods and study participants

Data collection method	Respondents		
	Karachi (pre-testing)	Hyderabad	Thatta
In-depth interviews (IDIs)	Immunization officer, UNICEF (n = 1) Head of office, EPI Sindh, WHO (n = 1) EPI Project Director (n = 1)	District health officer (DHO) (n = 1) District superintendent of vaccination (DSV) (n = 1) <i>taluka</i> (sub-district) superintendent of vaccination (TSV) (n = 1) Vaccinator (n = 1)	DHO (n = 1) Additional DHO (n = 1) DSV (n = 1) Vaccinator (n = 1)
Focus group discussions (FGDs)		2 FGDs with vaccinators	1 FGD with TSVs 2 FGDs with vaccinators
Observations	EPI checklists of supportive supervision (n = 10) Monthly review meetings at district level (n = 2)		

Data analysis

The data collected through FGDs and IDIs were transcribed and translated from Urdu to English. The content analysis was conducted by two researchers and interpreted to identify emerging themes and sub-themes. The data were analysed by the same researchers who were involved in data collection using the conceptual frameworks of fidelity and acceptability. After analysis of the transcripts, the two researchers developed an analysis grid to determine major themes and subthemes emerging from the data. Simultaneously, a qualitative research expert from the study team also analysed the data to provide input regarding emerging themes and subthemes to address any possible disagreements between the co-investigators.

Information from the checklists was entered into the qualitative data analysis software, Statistical Package for the Social Sciences (SPSS), and frequencies were calculated for completion of all content of the observations. A detailed document review of the EPI policy and training module enhanced the understanding about the process of supportive supervision and the role of the supervisors. Participation in monthly EPI district meetings also helped in better understanding of actual practices and feedback mechanisms.

All sources of information supplemented the results of the FGDs and IDIs, and provided support in developing meaningful and evidence-based conclusions. Hence, conclusions were drawn after triangulation and interpretation of information from different methods. The data analysis process was supervised by senior members of the study team who have extensive experience and skills in qualitative research.

Results

Review of EPI policy regarding supportive supervision of immunization services

The National EPI Policy 2015 is the strategic basis for implementation of immunization services in Pakistan. The policy was developed by the federal EPI, with technical assistance from WHO and UNICEF. Several stakeholders, including provincial EPI offices and national and international non-government organizations (NGOs) participated in the process. A detailed review of the policy revealed that the RED strategy has ambitious guidelines for supervision and monitoring, but does not clearly give direction on effective supportive supervision. The policy does not mention any specific implementation strategy nor does it assign specific roles and responsibilities of various EPI cadres for supportive supervision and programme implementation.

Training Manual

The WHO training module for supportive supervision is part of MLM trainings and is not available in local languages. The English language version of this module was selected for review. The module is designed to provide a detailed orientation to supervisors about the role of supportive supervision, but it is only offered to DHOs and ADHOs. The fact that DSVs and TSVs do not receive this training limits its use.

It is unclear from the training manual whether the MLM is checking vaccinators or supervisors. The training manual deals with storage, cold chain, stacking, stock management but there is little regarding the actual administration of vaccines, filling out of cards and counselling. A supervisor's checklist provides sufficient information about administrative aspects, including monitoring of facilities, but has no indicators related to supervision of supervisors, and no guidance on dealing with clients, counselling by vaccinators, and recording and management of the adverse events following immunizations (AEFIs).

Perceptions about supportive supervision

The FGDs and IDIs indicated varied perceptions among respondents about supportive supervision of immunization services. Most respondents perceived supportive supervision and monitoring as the same thing. A few of the supervisors openly mentioned lack of clarity and knowledge regarding the differences between the two. One of the supervisors said: *"There is not much difference, almost both are same."* A respondent from the vaccinator group said: *"Monitoring is done just to keep an eye that nothing is stolen."* According to one of the policy makers: *"Supportive supervision means you must be technically strong."*

The respondents from the District Health Management Team (DHMT), policy makers and vaccinators who perceived supportive supervision and monitoring as two different activities predominantly believed supervision to be better than monitoring. Providing support to vaccinators to help solve issues related to their performance and service quality was seen as the main purpose of supportive supervision.

Optimal utilization of the workforce, an increased sense of responsibility and improved performance of immunization services were mentioned as the major outcomes of effective supportive supervision. As one policy maker said: *"...it contributes to betterment of practices."* A respondent from the DHMT said, *"Supportive supervision improves performance of immunization services."*

Vaccinators largely believed that the current implementation of supportive supervision by EPI Sindh is below expectations and effectiveness is of poor quality. In addition, there is a lack of trained supervisors, a dearth of field visits by supervisors and too much scolding of vaccinators by supervisors. One vaccinator said: *"Vaccinators do not expect much from the supervisor because they have not received any such training."*

Components of supportive supervision implemented by EPI, Sindh

As the most important components of effective implementation of supportive supervision, respondents identified:

- 1 visits to vaccinators at health facilities and community outreach,
- 2 filled-in EPI supervisory checklists,
- 3 provision of support to vaccinators as required, and
- 4 verification of immunization records and feedback to vaccinators.

All respondents confirmed that supervisory visits are conducted by all four tiers (TSV, DSV, EPI focal persons and DHO/ADHO) of EPI supervisors. For all visits, they use the same EPI supervisory checklist and check performance against indicators.

Almost all the respondents emphasized the importance of checking immunization records as an integral part of supervisory activity. They mentioned that supervisors verify the records of immunization coverage from the registers at facilities and conduct coverage cluster surveys to assess immunization coverage in outreach. As one of the vaccinators responded: *"They check registers and visit in the field and take cluster too."*

The frequency of visits by each supervisory tier was reported differently. More than three quarters of vaccinators and supervisors mentioned more frequent visits by TSVs compared to those by DSVs and DHOs/ADHOs. The majority of respondents mentioned monthly supervisory visits by TSVs. Some vaccinators also mentioned that the frequency of visits to a facility varies with its performance, with a minimum one monthly visit.

Most support provided by EPI supervisors was technical support by TSVs and DSVs, such as training of vaccinators to fill gaps in knowledge and skills, and support and guidance to improve immunization coverage including organizing crash programmes of immunization.

One to two vaccinators at each study site mentioned that sometimes, when there is a huge crowd of children for vaccination and they are overburdened, supervisors help them in vaccinating. One of the respondents said: *"If there is a big crowd they do help in vaccination as TSVs are from us."*

Complaints to DHOs and issuance of letters by DHOs asking for reasons for poor performance and delay or discontinuation in salary were mentioned as the major punishment mechanisms for poorly performing vaccinators by most of the respondents. Only a few vaccinators and supervisors reported the existence of any reward mechanisms, which ranged widely from applause for a well-performing vaccinator in a monthly meeting at the DHO's office, to awarding a certificate or a financial incentive. One of the vaccinators said: *"...fuel money is performance based; if a vaccinator is doing well he gets 400 in salary as fuel money."*

Competency of supervisors involved in supportive supervision of EPI services

All respondents emphasized that the supervisor must be a competent person with updated knowledge of routine immunization in order to be able to effectively resolve any performance-related issues that the service provider may have. Job seniority and capability to work as a supervisor are major criteria practiced by EPI for promoting a vaccinator to supervisor, as mentioned by most of the respondents. Table 17 summarizes the description of competencies of supervisors as reported by the respondents.

Different levels of qualification for the selection of supervisors in EPI Sindh, for example 10 and 12 grades of schooling, were reported by respondents from DHMT and EPI supervisors respectively.

One of the policy makers mentioned that the supervisors are selected from the same area where supervision is supposed to take place. Two of the vaccinators mentioned the existence of the practice of getting a promotion to the post of supervisor by paying a bribe to the concerned clerk.

Training of supervisors

Respondents from DHMT mentioned that DHOs train supervisors and teach them how to support vaccinators. Giving vaccinations, filling in the supervisors' checklist, respecting vaccinators and talking to vaccinators politely in their own language were mentioned as main topics currently included in the training of supportive supervision conducted by DHOs. DHOs also update supervisors on new developments in EPI in the monthly EPI review meeting. They also mentioned that EPI conducts training of supervisors.

Unlike respondents from DHMT, supervisors pointed out that there is no proper training for them, and that DHOs provide only informal training. As one of the TSVs said: *"There's a lot of difference in learning and getting trained properly."* All the EPI supervisors pointed out the lack of any written protocol or guidelines for supervisors to conduct supervisory visits (see Table 17).

Almost all the respondents emphasized the need for specific and formal supervisor training. The importance of training in interpersonal communication skills was also emphasized by DHOs.

Almost every respondent reported a severe lack of skills and training of concerned personnel involved in supportive supervision. Frontline supervisors, i.e., TSVs and DSVs, also mentioned lack any written guidelines.

According to some supervisors, requests to attend MLM trainings conducted by EPI were not entertained. As one of the supervisors said: *"MLM trainings were conducted in April and it was clearly written on the letter that TSV and DSV are not allowed to attend training"*

Roles and responsibilities

According to almost all the respondents representing different stakeholder groups, the predominant role of DHMT, particularly DHO, is administration of vertical programmes including EPI. DHMT mainly oversees the process of supportive supervision. DHOs are responsible at the district level and manage immunization services as well as support vaccinators and EPI supervisors at all levels.

According to both DSVs and TSVs, DHMT maintains accountability among all EPI personnel. DHOs also perform field visits and develop their own reports, as well as maintain accountability among supervisors by verifying supervisors' reports with their own reports in monthly meetings. The predominant responsibility of TSVs and DSVs, as pointed out by the majority of respondents, is to assess whether an immunization service facility is performing well and to provide the support needed to correct any gaps identified in the performance of vaccinators. All supervisors and a few vaccinators among the respondents also mentioned that TSVs report to DSVs on a weekly basis, while DSVs also pay visits to each facility.

Factors affecting implementation of supportive supervision

The following programme issues were identified as factors affecting the implementation of supportive supervision.

Shortage and poor distribution of human resource

A major concern repeatedly mentioned by respondents was the shortage of human resources required for performing supportive supervision, as well as their inappropriate geographical distribution. One of the vaccinator stated, *"In five UCs (Union Councils) there is one TSV instead there should be one TSV for two UCs."*

Lack of capacity of supervisors

Trainings for MLM have been conducted in all districts but as one representative from a UN agency said: *"If you mean districts, we have covered all districts, but if you think all personnel have been trained then it is not like that. It's a two-year training plan."*

Training for MLM is part of their general training on EPI, which in most cases is covered in four to 11 days.

EPI trainings were given as training-of-trainers to trickle down to district and sub-district levels. However, the trainings for front-line supervisors have not been held yet. As one of the vaccinators said: *"DSVs themselves haven't received any training yet. I told you they were appointed four months ago. Now only if they (newly appointed supervisors) are trained and told what do they have to do. Only then can they perform."*

Lack of mobility of supervisors

A few of the respondents from the supervisors group mentioned that supervision, especially in far flung areas, is hampered by inadequate transport facilities. They further emphasized that though the supervisors are provided with a vehicle by EPI, its repair and maintenance remains an issue. They mentioned that support for fuel provided by EPI is inadequate and is not provided on a regular basis.

Multi-tasking by supervisors

Almost all EPI personnel involved in supervision, from the provincial level to the *taluka* level, are expected to perform multiple tasks. A provincial-level officer said: *"There are a few additional things in it. What the DHO will see, he will check the programme management, will see the absentees as well, if a paramedic has any issue, he will look into that also."*

In addition to their supervisory duties, almost all the DSVs and TSVs are given extra tasks to perform. These include participation in administrative work and polio campaigns. Multi-tasking affects their primary responsibilities of supervision. As one district official said: *“If you give them multiple jobs, then they are unable to fulfil basic jobs like EPI. As with polio, it takes fifteen days.”*

Lack of appreciation and incentives

Many of the respondents pointed out that lack of monetary and non-monetary incentives affects the performance of EPI supervisors, and they stressed the need for regular recognition and appreciation for staff motivation. One of the respondents mentioned: *“Instead of motivating them, they are scolded and pressured.”*

Lack of accountability of the monitors

There is lack of commitment amongst almost all EPI personnel involved in the supervisory work. As one of the officers said: *“There is lack of commitment and accountability needs to improve.”*

According to one of the representatives of a developmental partner, *“Monitoring of that monitor is not done.”* Another respondent said: *“The main thing is there is no accountability; nobody is held accountable.”*

Political influence

Two of the vaccinators mentioned political influence as one of the reasons for lack of commitment and poor performance of supervisors. One of the respondents stated: *“Political influences are there in poor performance.”* Another respondent said, *“Political issues; yes, it is everywhere.”*

Recommendations by the respondents to improve supportive supervision

Most of the respondents stressed the need for appropriate placement of trained staff for the purpose of supportive supervision and capacity building of DSVs and TSVs. Supervisors and the development partners recommended provision of appropriate transport facilities especially in hard-to-reach areas. The strengthening of coordination mechanisms was recommended by one of the development partners, *“EPI Sindh, needs to have better coordination and needs further improvement.”*

Observation of completeness and quality of information collected by supervisors using the EPI checklist

Table 17 summarizes the frequency by which selected items on the EPI checklist are correctly filled in by supervisors as part of supportive supervision of immunization services in Sindh. These observations point to the poor quality of data collection by supervisors. A comparison of the two study districts (Hyderabad and Thatta) shows relatively better quality of data collection in Hyderabad.

These observations support the conclusion that there is a lack of capacity for quality supportive supervision and a need for training of supervisors as mentioned by respondents.

TABLE 17
Observation of completeness of information filled in by supervisors on EPI checklists for supervision

Items correctly filled in by supervisors EPI checklist	Hyderabad (n = 5)	Thatta (n = 5)
Date of visit	4	3
District name	5	3
<i>Taluka</i> name	5	3
Union council name	4	3
Health facility type	2	1
EPI manpower number at facility	3	4
Shortage of vaccines	5	3
Information about vaccine storage	4	3
Availability and use of safety boxes	5	2
Working cold-chain equipment available	5	4
Display of updated vaccination monitoring chart	3	3
Monthly outreach activity plan duly approved and signed by facility in charge	3	4
Updated list of defaulters available with vaccinators	4	3

Discussion

This study provides a holistic view of the current level of implementation of supportive supervision in Sindh. The analysis of the current EPI policy concluded that though the policy mentions monitoring of immunization services, it lacks specific direction and does not provide clear description of the aims and objectives of supportive supervision.

This study found that despite considerable ambiguity in the understanding of the differences between monitoring and supervision, supportive supervision of immunization services has good acceptability among all EPI cadres who appreciated its usefulness in enhancing the quality of immunization services and ensuring accountability. The fidelity of supportive supervision varies widely across districts and has been severely affected by programme-related challenges, including lack of skilled personnel, poor logistical support and lack of clarity on the roles and responsibilities of supervisors at all levels.

The detailed review of the WHO training module found that it provides a comprehensive and detailed description, and structured guidelines about the role and activities of the EPI supervisors; however, personnel who are currently performing supervision are not being trained on this module. The content of the training module directly addresses the needs of EPI personnel but requires translation into the local language for training of frontline supervisors.

This study identified a considerable lack of clarity among EPI stakeholders regarding the actual role and scope of supportive supervision in improving immunization services. Many of the EPI supervisors, including DSVs and TSVs, perceived supervision as an

activity with the aim of policing service providers and were not able to differentiate between monitoring and supportive supervision. This reflects the prevailing misunderstanding regarding the role of supportive supervision in immunization, which may affect implementation. The misinterpretation of the objectives of supervision is consistent with Bradley's study, which found that supervision was perceived by immunization personnel as inspection, primarily to find the faults and weaknesses among healthcare service providers [13].

The study identified a severe need for specific skills required for effective implementation of supportive supervision. These include training of supervisors in interpersonal communication skills, technical capacity building and updates on new developments. The translation of the training module for EPI personnel involved with supportive supervision into the local language can improve its implementation. Moreover, practice of regular refresher trainings on supportive supervision needs to be adapted to strengthen its implementation in long run. This finding is consistent with the study conducted by Som and colleagues [9].

This study found that there are various components of supportive supervision. The supervisor should perform various activities on supervisory visits, including assessing vaccinators' techniques for giving vaccines and counselling skills, evaluation of vaccine storage equipment, and practices and verification of coverage records. This requires sound knowledge, specific technical and managerial skills, and specific competencies among all designated EPI supervisors. Monthly review meetings conducted in each district by DHOs were identified as the main platform for the discussion of performance of the service providers and supervisors, as well as the forum for providing feedback. Most of the respondents were satisfied with the conduct of monthly meetings and acknowledged these meetings as learning opportunities. The importance of such review meetings is supported by Shimp and colleagues, who analysed data from 200 review meetings of immunization services and concluded that review meetings helped in building the technical capacity of immunization staff who attended these meetings [14].

The study also identified quality issues in filling in the EPI checklist for supportive supervision by TSVs and DSVs for observed EPI facilities. This validates the reported lack of competence and need of training, as well as low performance motivation among EPI supervisors in Sindh. Lack of necessary skills or low self-efficacy to perform assigned tasks may result in low performance and work as a barrier. A study conducted in Benin concluded that the lack of motivation, poor coordination and inadequate management skills were major barriers to supervision of services [15].

Political influence was identified as another factor influencing supportive supervision. Poor performance of EPI itself was found to hinder its performance including existing accountability mechanisms, such as supportive supervision. In the current situation, supportive supervision may not be able to improve the quality of immunization services until system issues are addressed. Availability of essential logistics, supply-chain management and financial resources could complement the supportive supervision strategy in improving immunization service delivery [16].

Strengths and limitations

The major strengths of this study were that it gathered the data from multiple cadres of EPI Sindh and other stakeholders, and captured perspectives from urban as well as rural settings. The study used methodological triangulation for FGDs, IDIs and desk reviews of documented observation simultaneously as methods of data collection. This enhances in-depth understanding and increases trustworthiness of the study findings. The study tools were designed using specific frameworks and pre-tested for lingual and cognitive validity to improve the quality of information and credibility and dependability of the study findings.

The study had limitations as well. First, the IDIs with TSVs were not completed in one study district due to a limited number of TSVs. This may have resulted in failure to explore unique perspectives from those who were left out because of context-related factors, such as sub-optimal working conditions due to lack of equipment or standard protocols. Second, only a few observations were made to assess the quality of reporting by supervisors; the selection of facilities for observation was based on checklists provided by DHMT. This means that the possibility of biased selection of facilities with more regular and adequate supervision cannot be ruled out.

Implications for policy and programme

This study provides an in-depth understanding of the current situation of EPI Sindh with regard to implementing supportive supervision of immunization services. It identifies key gaps from the policy to programme levels that should be filled to improve the performance of EPI Sindh. Lessons learned from this study can have long-term policy and programme implications for EPI at both the provincial and national levels. It calls for the attention of all relevant stakeholders by revealing the programme's lack of infrastructure and implementation processes to support the performance of service providers or vaccinators. The study findings suggest extensive changes and developments are needed to make accountability mechanisms effective and to ensure its acceptability and fidelity at all levels of EPI Sindh. A new EPI policy with sufficient descriptions of each stakeholder and specific strategies may help the programme and can increase the acceptability for supportive supervision and supervisors at large.

Conclusions and recommendations

The study concludes that supportive supervision itself has good acceptability among all EPI personnel; however, there are many ambiguities among all cadres of EPI personnel regarding the actual role of supervisors and supportive supervision. The fidelity of supportive supervision varies widely across the districts, and is severely affected by programme-related challenges, such as lack of comprehensive policy and training guidelines. The EPI policy should provide specific guidelines for recruitment and training of supervisors. This should include the introduction of aptitude tests for selection of personnel and the training of TSVs and DSVs in local languages. The training should also include positive methodologies for improving the performance of vaccinators, including counselling, example setting and demonstrations.

The study found that supervisors lacked motivation mainly due to the absence of regular performance-based incentives and no monitoring of accountability. Improved feedback mechanisms need to be developed to enhance the accountability of EPI stakeholders, particularly frontline workers including supervisors. This may require formal appraisals on a regular basis and provision of financial incentives for good performance. The study shows a lack of clarity on the role and responsibilities of supervisors at all levels. The perception of supervision has to be revised from 'policing' to 'support'.

The study findings indicate that there is poor logistic support to supervisors, particularly for field transportation, and a severe need for provision of adequate logistics for supervisory visits. This requires efficient and transparent use of designated funds for fuel and transportation of frontline workers including EPI supervisors.

References

- 1 Health Department of Sindh, 'Expanded Programme on Immunization (EPI) 2017', <<http://sindhhealth.gov.pk/EPI>>, accessed on 18 June 2017.
- 2 National Institute of Population Studies (NIPS) [Pakistan] and ICF International. 2013, *Pakistan Demographic and Health Survey 2012–2013*. Islamabad, Pakistan, and Calverton, Maryland, USA: NIPS and ICF International.
- 3 UNICEF and Sindh Bureau of Statistics 2014, *Sindh Multiple Indicator Cluster Survey 2014, Key Findings*. Karachi, Pakistan: UNICEF and Sindh Bureau of Statistics.
- 4 Masud T., and K. V. Navaratne, 'The Expanded Program on Immunization: Recommendations for Improving Performance,' Washington DC. The International Bank for Reconstruction and Development/ The World Bank. April 2012. <<https://openknowledge.worldbank.org/bitstream/handle/10986/13579/NonAsciiFileName0.pdf?sequence=1>>.
- 5 Husain S, and S.B. Omer, 'Routine immunization services in Pakistan: seeing beyond the numbers/Les services de vaccination systématique au Pakistan: voir au-delà des chiffres,' *East Mediterranean Health Journal*, vol. 22, issue 3, 2016 March, p.203.
- 6 Impact of Infrastructure on Immunization Coverage, 'Research And Development Solutions Policy Briefs', Series No. 11, June 2012, <http://www.resdev.org/files/policy_brief/11/11.pdf> accessed on 15 April 2017.
- 7 World Health Organization. 'Training for mid-level managers: Module-4', The EPI Coverage Survey. Geneva: WHO Expanded Programme on Immunization, 2008. <http://apps.who.int/iris/bitstream/10665/70184/4/WHO_IVB_08.04_eng.pdf>.
- 8 Djibuti Mamuka, et al., 'The role of supportive supervision on immunization program outcome-a randomized field trial from Georgia.' *BMC International Health and Human Rights*, vol. 9, suppl. 1, October 2009.
- 9 Som Meena, et al., 'Effect of supportive supervision on routine immunization service delivery-a randomized post-test study in Odisha,' *Global Journal of Health Science*, vol. 6, issue 6, p. 61. November 2014.
- 10 World Health Organization, 'Expanded Programme on Immunization of the Department of Immunization,' *Vaccines and Biologicals The RED Strategy*. <www.who.int/immunization/programmes_systems/service_delivery/red/en>.
- 11 Christopher, Carroll, et al., 'A conceptual framework for implementation fidelity,' *Implementation science*, vol. 2, issue 40, 2007.
- 12 Sekhon Mandeep, Martin Cartwright and Jill J. Francis, 'Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework,' *BMC Health Services Research*. vol. 17, issue 1, 2017, p. 88.
- 13 Bradley Susan, et al., 'District health managers' perceptions of supervision in Malawi and Tanzania,' *Human Resources for Health*. Vol. 11, issue 1, 2013, p. 43.

Understanding accountability for human resources in the Expanded Programme on Immunization in Balochistan: Perspectives from government officials at provincial and district levels

Key messages

- **Weak systems for human resource accountability can have a detrimental effect on the effectiveness, efficiency and quality of health care delivery**
- **Clearly articulated rules, regulations or procedures governing the workforce, as well as job descriptions are a first step to strengthening accountability systems**
- **Strong accountability systems require good data recording and management**
- **Incentives and strategic allocation of existing human resources are ways to improve immunization outcomes through stronger accountability**

What is the problem?

The health workforce plays a central role in health systems and is a determinant of effectiveness, efficiency and quality in health care delivery. Most health systems have in place accountability systems to define staff duties, obligations and objectives (responsibilities); require staff to justify decisions in some contexts (answerability); and regulate incentives for good performance and sanctions for poor performance (enforcement). However, weak accountability systems could negatively affect service delivery and ultimately cause poor health outcomes.

This exploratory qualitative study was carried out to better understand the perspectives of provincial-level and district-level health managers on challenges relating to human resource accountability. It also aimed to identify potential strategies for the management of inefficiencies, demotivation and absenteeism, thereby strengthening the accountability systems in order to improve the performance of the immunization programme.

How was the research done?

The qualitative study was carried out between June and November 2017 to explore issues related to human resource accountability in the Expanded Programme on Immunization (EPI). Five districts in Balochistan were purposively selected based on immunization coverage (either very high or very low), and Human Development Index (HDI) ranking. Interviews were conducted with 42 vaccinators, 4 district health officers (DHOs), 4 District Superintendents of Vaccination (DSVs) and 3 provincial EPI staff using a semi-structured questionnaire. A thematic content analysis was conducted.

What solutions were identified in the study?

A Human resource policy and job descriptions

The study found that when there is no written human resource policy and no detailed description of rules, regulations or procedures governing the workforce, this can adversely affect programme performance. Clear job

descriptions and terms of reference are also often missing. Participants described this gap in current accountability systems as a barrier to programme performance because responsibilities are not clear.

B Good data management and recording systems

Accountability systems are much stronger when there is good record keeping and data reporting. A regular training schedule with frequent refreshers not only on vaccine administration but also on vaccine management and communication skills.

C Addressing staff shortages

The study also found that accountability systems in Balochistan are undermined by a severe shortage of staff. Unfilled positions and high levels of absenteeism mean that staff members are overworked and not able to meet the demand. This again affects the quality of services and record keeping. Balochistan's immunization programme is addressing these issues through potential recruitment of new vaccinators and restructuring immunization service delivery into EPI centres. A review of the allocation of existing human resources and reallocation if possible could be another way to address staff shortages.

D Performance-based incentives and expressions of appreciation

There was broad support among participants for the introduction of performance-based incentives and a transparent system for promotion, which would improve motivation and acceptance of performance monitoring and supervision. Most participants saw low salaries, and lack of incentives and defined benefits, such as health insurance and paid vacation for frontline staff, as major factors in system underperformance.

Recommended actions

- 1** Adapt the National EPI Policy to tailor it to the provincial context and intensify implementation. Include descriptions of rules, regulations and procedures governing the workforce.
- 2** Review the current allocation of vaccinators and reallocate to fill gaps. Increase recruitment of new vaccinators and other EPI staff as required.
- 3** Develop clear job descriptions and terms of reference for all EPI staff, specifying responsibilities and objectives.
- 4** Review current incentive structures and institute changes as required.

For more information please contact:

Zaeema Naveed, (zaeema_arif@hotmail.com); Abid Saeed, (abidsaeed25@gmail.com); Aftab Kakar, (draftabkakar@gmail.com); Nada Alnaji, (nada.alnaji@unmc.edu); Gaurav Kumar (gaurav.kumar@unmc.edu)

Understanding accountability for human resources in the Expanded Programme on Immunization in Balochistan: Perspectives from government officials at provincial and district levels

Zaeema Naveed,¹ Abid Saeed,² Aftab Kakar,³ Nada Alnaji,³ and Gaurav Kumar⁴

1 Department of Epidemiology, University of Nebraska Medical Center, Omaha, Nebraska

2 Provincial FELTP Technical Support officer Program, Provincial Disease Surveillance and Rapid Response Unit (PDSRU) Balochistan, Provincial Directorate of Health Quetta

3 N-STOP (FELTP), Balochistan

4 Department of Epidemiology, University of Nebraska Medical Center, Omaha, Nebraska

Introduction

The Expanded Programme on Immunization (EPI) was established in Pakistan as a vertical programme in 1978 [1]. It was executed under the federal Ministry of Health and the national health policy [2] until the country's 18th amendment in 2010 that devolved legislative and executive functions to the provinces [3]. The amendment, although considered propitious with the advent of provincial autonomy, also raised concerns that some provinces might lack the capacity to manage the new responsibilities they were given [4, 5, 6].

Today, the local-level frontline workforce for routine immunization is comprised of vaccinators who serve in both static facility-based areas and out-of-catchment (outreach) areas [7]. Major providers of immunization services include basic health units (BHUs) and rural health centres (RHCs) [8]. The immunization programme is supported by external resources from donors, such as Gavi, the Vaccine Alliance and UNICEF [9] and local development funds [10].

Balochistan Province, with a scattered population over large, hard-to-reach and security-compromised areas [11], is estimated to have the lowest EPI coverage of all provinces in the country [12]. According to the 2012 Demographic and Health Survey, only 16.4 per cent of children aged 12–23 months had all routine vaccinations. Coverage estimates for rural and urban areas within the province were 12.3 per cent and 35.9 per cent respectively [13].

Implementation bottlenecks and study objectives

According to the Comprehensive Multi-Year Plan (cMYP) 2014–2018, there is neither a provincial immunization policy nor a human resource (HR) management policy in place in Balochistan [14]. The cMYP also states that provincial EPI annual plans are not comprehensive enough, and lack of effective coordination among executive district officers (EDOs) and the provincial EPI coordinator. The programme also suffers from HR issues such as limited qualified technical staff for vaccination, surveillance, monitoring, evaluation and cold chain management [15, 16]. Further, the performance of vaccinators is not optimal, which may be due to the burden from HR shortages, demotivation, negligence, and lack of a proper service structure (career development/promotion policies) and job descriptions.

A strong health workforce is a vital component of the World Health Organization (WHO) health system framework [17]. Demotivation leading to poor performance and absenteeism can be a crucial reason behind an inefficient immunization programme. Apart from lack of funding, weak administration and lack of accountability can be important barriers to the success of immunization programmes [18, 19]. In order to develop an effective monitoring, supervision, and accountability system, it is important to investigate the factors that lead to lack of responsibility, especially at the frontline workforce level. This is a crucial knowledge gap at both provincial and district levels for Balochistan's immunization programme.

This study aimed to address this knowledge gap by exploring HR accountability challenges hindering immunization service delivery and factors influencing implementation outcomes, as well as identifying potential strategies for management of inefficiency, demotivation and absenteeism.

Methods

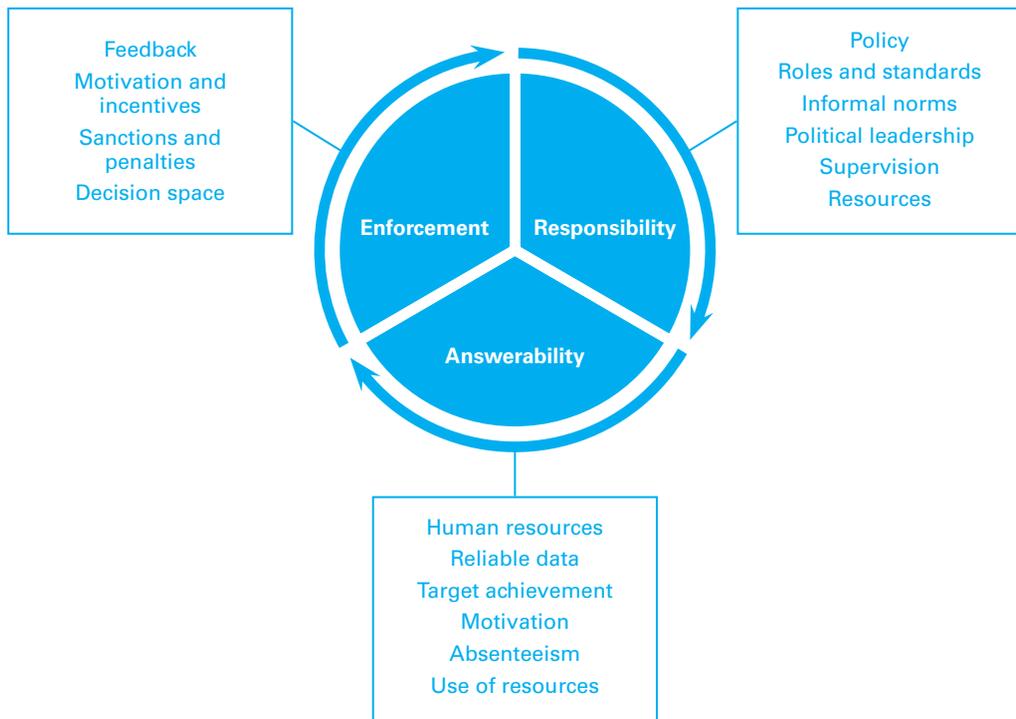
Study design and conceptual framework

An exploratory qualitative study was conducted to better understand the perspectives of provincial and district level health officials on HR accountability challenges. The qualitative study design enabled a holistic approach to explore complex realities, latent or evident, constructed by individuals specifically in the context of their everyday interactions [20]. The study was broadly guided by the conceptual framework, which includes the three most frequently described dimensions of accountability in the literature: answerability, enforcement and responsibility.

- Answerability determines the condition to inform, elucidate and justify decisions and actions to those affected by these decisions and to those who established the rules.
- Enforcement regulates the capability to reward good performance or execute sanctions to reprimand bad performance against set standards in an agreement between parties.
- Responsibility requires that all actors should have clearly defined duties, objectives and performance standards [21, 22].

The elements affecting each of the three dimensions were assigned based on the three types of actors: stakeholders, providers and patients/citizens, playing important individual and interlinked roles regarding accountability as described in the health governance framework by Brinkerhoff and Bossert [23]. Here, stakeholders include policymakers and politicians in health ministries, provincial departments of health and district health management teams. Providers are represented by the health workforce operating within the primary health care facilities or outreach workers within the district health system. Patients/citizens are the local community. The conduct of answerability advocates changes by providing reliable data, efficient use of supplies and funding, achievement of targets, an increase in motivation and decrease absenteeism. Finally, the conduct of enforcement promotes change through motivation and incentives, and sanctions and penalties.

FIGURE 32
Answerability, Enforcement and Responsibility Framework



Study population and sampling

Purposive sampling was used to select the study areas while a combination of purposive and random sampling was used to select the study participants from within each district. The five districts, Pishin, Harnai, Jhal Magsi, Killa Abdullah and Killa Saifullah, were chosen based on vaccination coverage and information provided by the principal investigator (PI) of the study as well as a review of each district’s Human Development Index (HDI). According to data for January and February 2017, Harnai and Jhal Magsi had the poorest coverage for all routine vaccines. Additionally, the HDI for these districts were in low (0.29) and medium ranges (0.43) respectively [26]. Killa Abdullah and Killa Saifullah are high-risk districts with low immunization coverage and high population movement as they border Afghanistan and have three refugee camps. Pishin was selected because of its high vaccination coverage (more than 80 per cent for each vaccine) and comparatively high HDI (0.6). This selection enabled the researchers to explore diverse districts to investigate the different issues faced by EPI in Balochistan.

Ten vaccinators were selected randomly from every district except for Harnai and Killa Abdullah, where only five and seven vaccinators were recruited, respectively, due to data saturation. In addition, four district health officers (DHOs), four district superintendents of vaccination/assistant superintendents of vaccination (DSVs/ASVs) and three provincial EPI staff were interviewed. The total sample size was 52, which was sufficient for result saturation.

Data collection and analysis

Data were collected by trained data collectors at the respective workplaces of the participants. Interview guides were designed adopting relevant components of the health governance framework suggested by Brinkerhoff and Bossert [23]. From the literature review and health indicators of the province, findings showed that answerability is low. Thus, the major focus of the questions for the participants was to explore the phenomena of responsibility and enforcement; their existence and the effect on answerability. Field guides were pretested before administration and changes made accordingly.

The questions were semi-structured and open-ended, and each interview lasted for 30-60 minutes. The questionnaire was divided into four specific portions. The first set of questions explored the existence and implementation of policy, rules and regulation regarding human resource management and development, along with the availability of material and monetary resources. The second part of the interview determined the level of community support and mobilization in relation to the accomplishment of targets by the immunization staff. The next section addressed the potential role enforcement could play in enhancing answerability. The last section asked the participants to identify major challenges they faced that hindered their performance and to suggest practical potential solutions for overcoming these challenges.

The interviews were conducted in Urdu and Pashto according to the interviewee's preference and were recorded, whenever consented to by the interviewee. Recordings were supplemented by written notes focusing particularly on facial expressions. The interviews were transcribed and translated back into English. Two researchers worked separately on translation and developed consensus on key findings. The study was a thematic content analysis characterized by coding and categorization of data to explore large amounts of textual information [24, 25]. Transcribed documents were entered into MAXQDA12 and analysed through inductive and deductive approaches. The former comprised the major process, as the research team did not have any priory definitive or elaboration theories, structures or detailed frameworks for the phenomenon under study. The deductive approach was limited to the broad topics of responsibility, answerability and enforcement that were carried into results as major themes with subthemes that had no predetermined theories for the data supporting them but evolved inductively. Semantic codes were developed and grouped under both a priori and new categories. Categories with the same latent/manifest contextual information were collapsed and combined into major themes.

Ethical considerations

The study was approved by the internal review board of the Health Services Academy. Participants signed an informed consent form that explained the purpose of study in detail and assured confidentiality of responses and data. Verbal and written permission was obtained for audio recording of the interview.

Results

The median age of participants was 40 years (mean = 39.5). They had a median education of 12 years (mean = 13.3) and a median work experience of 17 years (mean = 15.9). The results were compiled under four major predetermined themes of responsibility, answerability, enforcement and potential solutions. Each major theme comprised sub-themes that emerged through thematic content analysis.

Responsibility

The non-existence of HR policy

All participants indicated that there is no HR policy document for the EPI. One interviewee stated:

"We do not have anything known as the human resource policy, we don't even have a provincial health policy let alone the EPI policy."

Documented job description

The majority of participants reported receiving only an appointment letter when they assumed their position, which they called by various terms, such as "order copy," "job order," "contract copy" and "job notification." One vaccinator stated:

"At the time of appointment, we received only one order copy in which it was mentioned that I am appointed as a vaccinator, and my prime job is vaccination. No other description was written on that."

Some interviewees did acknowledge that they were told verbally about their responsibilities, although none reported receiving a proper job description in written form.

Staff training and orientation policies

When asked if they received formal training after being hired, almost half of vaccinators reported receiving it, whereas the others denied receiving it, with some refuting getting any training at all.

"Yes, orientation and training are given at the time of hiring about our job description, roles and responsibilities and vaccination. Then we are attached with senior fellows to train us practically."

"People might have given orientation and might have been told about stuff, but I don't know about it, I didn't get any such thing as training."

Answerability

HR shortage

The problem of a shortage of vaccinators was voiced unanimously. One such response was,

"the vaccinators are deficient in number, I look after both the static centre, and outreach and my work is affected. It is very evident that due to fewer vaccinators, the staff is overburdened"

Some vaccinators expressed the need for female vaccinators; "We have less vaccinators. In Pishin, 12 of our UCs have no vaccinator. It is a widely-scattered district touching the Pak Afghan border; we need more vaccinators and especially female vaccinators who can easily go inside each house and vaccinate each child during outreach activity." The shortage demotivates for the vaccinators, "We are overburdened with the vaccination work due to lack of vaccinators and due to polio campaigns." Another vaccinator mentioned, "The new format of data entry is so long that in the time that we used to vaccinate ten children in the past, now in the same time we cover one child. Filling the proforma takes a lot of time."

Senior officials had a similar response; "We have 943 vaccinators available, but our requirement is 1,685. We have demanded it a lot of times from Chief Minister (CM) at each forum and each review meeting."

About employee turnover, the consensus was nobody resigns.

Lack of resources

The second major constraint that demotivates and hinders vaccinator performance identified by participants was lack of resources, including material, monetary and logistic resources both for static and outreach activities. Needs frequently mentioned by frontline staff included ice-lined refrigerators (ILRs), bikes and vehicles, petrol, oil and lubricants (POLs), solar panels to keep ILRs running, travelling and daily allowances (TA/DA), and office space.

"We don't have enough bikes, vehicles, money for their repair and ILRs but the major issues are corruption in funds and resources. Money does come for these things but is not properly utilized."

Another vaccinator explained:

"We have fewer resources and budget for something like vehicles and POLs for outreach activity. In the past, we used to get 400 rupees per diem, but now we get 200 rupees as TA/DA of outreach. Earlier, we used to get 3 litres of petrol and now 1 litre for our bike for outreach that is a total 13 litres a month. It is not sufficient for covering widely scattered areas of the district for outreach, and this is very demotivating."

Poor community mobilization as a performance constraint

The third major limitation to performance was lack of community mobilization.

"People are not aware of the importance of routine immunization. Doctors are also not cooperative with us, if they refer children to vaccinators in the hospital and educate parents regarding routine immunization it will be good"

"Social mobilization is very much needed. The community is very rigid; chronic refusals are more in number due to lack of education and awareness."

Availability of district human resource development (HRD) budget

A key complaint that vaccinators made was of the lack of a district HR budget and the absence of a specific person responsible for any such activities. However, some senior staff did mention that partner organizations provide support and budget for the training. A few mentioned that district budgets are available, although deficient and varied.

"Yes, I think the budget is there, but we get very less training."

Trainings as a part of HRD

Some participants said that training does occur but on very irregular basis. However, the rest (n = 14), proclaimed having no training at all. As one vaccinator stated, "No regular training, HRD activities or refreshers are available. These are rare and occasionally conducted when a new vaccine comes or something like that. There is no budget with the district for this."

Enforcement

Salary and benefit structure

When asked about their salary and benefits structure, all participants said that they get a regular monthly salary that is never delayed. However, they did complain about their salary being too low and that there is no defined benefit system including health insurance or paid vacation. Regarding the service structure and promotions, stark variance was observed between higher level and frontline staff. One of the vaccinators said: "We don't have a service structure for vaccinators, we get inducted as a vaccinator in scale 5 and retire in the same scale, and there is no promotion system." In contrast, a senior official stated: "they are appointed in grade 5 and promote till 16th grade and retire".

Supervision and assistance

With a few exceptions, most interviewees indicated that a district supervision plan is in place, however, some questioned whether or not the supervisory plan is followed to the fullest.

"This thing is not on the ground, only in papers everything is present, and we usually get monitored and supervised only during the campaigns."

Third-party monitors were also mentioned with regard to monitoring activities.

"At district level, DHO, DSV, ASV, WHO, UNICEF and monitors from provincial EPI do the supervision and monitoring of all union councils."

Disciplinary measures and accountability procedures

The majority of front-line workers denied having any specific discipline procedures or protocols and were of the view that DHOs do whatever they consider best. A vaccinator mentioned: "DHO is the authority, if any complaint comes, he sets up inquiry and asks for explanation but there have never been any terminations. I think there may be a system, but we never saw it being implemented." However, one senior official mentioned an interesting and possibly effective intervention to avert absenteeism and to monitor performance known as E-Vaccs that Punjab is already using.

"To monitor the performance of vaccinators, EPI Balochistan has taken support from Punjab Institute of Technology Board (PITB), they have provided us with software (E-Vaccs) free for three years. This has created a problem for vaccinators who didn't perform honestly. Now, 25 vaccinators of Quetta district have been issued a notice for their low performance by secretary health and pay has been stopped."

Performance evaluation

Most respondents said there is no such thing as performance evaluation or refresher training.

"There is no performance evaluation for us. We were told they will start in 2017 but it still has not started"

An opposing statement came from another vaccinator from Kila Saifullah.

"Yes, each month EPI review meeting is held with the support of UNICEF for performance evaluation by district EPI coordinator supported by UNICEF."

Lack of appreciation and incentives

The most common sources of demotivation mentioned by the respondents were lack of appreciation and lack of performance-based incentives. Participants discussed the importance of incentives not just in the form of money, but also in terms of promotions, salary bonus, verbal appreciation, prizes and certificates.

"Indeed, it plays an important role, if the staff is working hard and he/she is dutiful, and still he/she is not appreciated and not given any incentive, prize or certificate he /she is badly discouraged and demotivated."

Lack of feedback and remedial actions

Another major source of demotivation identified was lack of feedback and corrective actions based on data and complaints submitted by the vaccinators.

"We always send our reports, issues, and recommendations to higher-ups, but we never get any feedback or action on highlighted issues to date."

Lack of monetary and material resources

Another major demotivator was lack of budget for material resources. As one vaccinator explained:

"We have fewer resources and budget for something like vehicles and POL for outreach activity. In the past, we used to get 400 rupees as periderm, but now we get 200 rupees as TA/DA of outreach. Earlier, we used to get 3 litres petrol and now 1 liter for our bike for outreach that is a total 13 litres a month. It is not sufficient for covering widely scattered areas of the district for outreach, and this is very demotivating."

Solutions to major challenges

As shown above, the major challenges identified include lack of resources, lack of community mobilization, deficient vaccinators, lack of appreciation, poor monitoring and supervision, difficult geographical access, unclear roles and responsibilities, absenteeism and delayed corrective actions.

Participants identified some solutions to these specific challenges. However, most of the solutions were brief and generalized with no specification of time, place or person responsible.

"Female vaccinators are scant in our province. There should be more employment of female vaccinators so that they may also go inside the houses."

"Religious leaders should be more involved to create awareness about vaccination in the community and government should instruct teachers, and they should tell parents about routine immunization."

"DHO and DSV should pay more visits to the centres and outreach to supervise and monitor."

"There should be a separate committee for ensuring accountability in the EPI with new measures."

"If the pilot implementation of E-Vaccs is successful, that may be expanded to monitor vaccinators performance better and reduce the absenteeism and disorganization."

Discussion

Vaccination coverage in Balochistan is significantly lower than other regions in Pakistan, 16.4 per cent versus 65.6 per cent in Punjab, 29 per cent in Sindh and 52.7 per cent in Khyber Pakhtunkhwa (KP) [12]. This alarmingly low vaccination coverage requires an urgent plan of action to improve the EPI in this region. HR accountability issues may contribute to the current challenges of the EPI and resulting low coverage.

The current study aimed to explore these HR accountability issues in the context of local settings with key stakeholders working in EPI in Balochistan. The study utilized qualitative methods to investigate the factors associated with the HR accountability, and revealed that HR accountability is complicated and is affected by an amalgam of influences. The factors range from availability of human and material resources to community mobilization and participation, with everything having a basis in the EPI policy. In addition, the wide variety of factors affects motivation and sense of responsibility of the front-line staff, resulting in poor immunization coverage. The existence of these factors and the relationship among them led us to develop a conceptual framework (see Figure 32) that encompasses the three major dimensions of accountability (responsibility, answerability and enforcement) that not only govern associations of various human resource issues but also govern the actors fundamental to each dimension.

Perceived challenges for EPI staff and managers can be classified into three levels: staff level, management level and community level. At the staff level, the EPI in Balochistan suffers from a severe shortage of staff and current staff members are overworked and are not able to meet the high demand. Balochistan's cMYP appears to address some of the issues, such as the potential hiring of more vaccinators and development of more EPI centres, but this is yet to be implemented. The shortage becomes even more troublesome when vaccinators are employed in additional polio immunization campaigns. The adverse effect that staff shortages can have on immunization coverage in other settings has been established in the literature [27, 28].

In addition, most participants complained of low salaries and lack of incentives provided by the EPI. The issues of staff shortages and low salaries are very often encountered in developing country settings [29, 30]. Although financial incentives to staff should be considered, more innovative non-financial incentives should be utilized to ensure that the staff members are motivated to deliver services. Evidence from other developing countries in utilizing non-financial incentives shows great promise. For instance, a study in Ethiopia with community health workers showed that the level of motivation is high using non-financial incentives such as ongoing mentoring, training, certification, awards (non-financial) and celebrations [31]. A study conducted in Kenya also showed that non-financial incentives play an important role concerning increasing motivation of health professionals [32].

At the management level, the lack of clear job description, formal training, supervision and accountability process were all challenges that emerged in the results. The need for a clear job description was identified in the evaluation of other health programmes in Pakistan [33], suggesting that this is not unique to Balochistan Province. A clear job description is vital to measure achievements against expectations and responsibilities. In addition, results show that a supervision plan is in place, but accountability strategies are not well developed within EPI. A study conducted in Georgia found that provider-based interventions, such as supportive supervision, can have positive effects on immunization programme indicators [34]. Staff training and refreshers were mentioned by many respondents, and dissatisfaction was expressed by most. The HR policy needs to incorporate a proper and comprehensive training schedule not only about vaccination schedules but also administration, storage, adverse events following vaccination (AEFV), record keeping and communication skills.

Although the research questions were not focused on community mobilization, this topic emerged in several interviews. Important barriers for community mobilization that were identified included the lack of community awareness on the importance of vaccinations, and the lack of support and coordination between health providers and EPI services. In addition, the negative impact of deaths due to vaccines that occurred in Pakistan a few years ago was emphasized in some interviews. Further research is needed to evaluate the most common barriers to community mobilization, and the lack of trust between the community and the vaccination programme. This was out of the scope of the current study. Most of the best practices in the literature are based on community mobilization through education and information dissemination, and are found to have significant improvement in vaccination coverage [35-38].

The credibility of the findings was ensured using multiple procedures. The data collectors had no difficulty in establishing prolonged engagement as they are a part of the programme and understand the culture. Source and analyst triangulation was established. Different cadres were interviewed for information and data was analysed independently by two researchers to look at different aspects of information. Due to time limitations, no negative case analysis or member checks and external audits could be performed but it can be argued that as saturation was attained in each district, there is

a strong likelihood that these results are robust. Although the districts were selected purposely to have maximum variation so that it is more generalizable at the provincial level, there may still be unexplored factors specific to other districts. Given the timeline, this study may be considered as a formative study that can be repeated on a larger scale.

Conclusion and recommendations

The findings of this study suggest that the non-existence of a provincial immunization policy is seen as a main barrier to programme performance in Balochistan. There, it is recommended that Pakistan's national immunization policy be adapted by the Balochistan provincial health department with the inclusion of provincial strategies. Furthermore, unlike the cMYP, the provincial immunization policy document should include a detailed description of rules, regulations and procedures based on the local context. Development of clear job descriptions and TORs followed by hiring and appointments of new staff members should be initiated as soon as possible. However, this must be preceded by a proper needs assessment within each district based on the geography, distribution of already present immunization staff and the population. The above suggestion needs a bottom-up approach starting with a baseline needs assessment at each district steered by EDOs at the district level with stewardship and approval at the provincial level.

The situation analysis and needs assessment should be carried out at the district level to evaluate availability and functionality of material resources including office space, cold-chain equipment, logistics, and petrol oil and lubricants (POLs) with essential replacements accomplished according to priority and budget availability.

In addition, findings of this study strongly support the need for modification and proper implementation of a training schedule with more frequent refreshers not only on vaccine administration but also on vaccine management and communication skills. This needs to be accomplished locally at the district level and implemented by ASVs, DSVs and EDOs. Record keeping is vital to ensuring that staff is accountable for practicing what they learn in training sessions. Another important intervention to boost the motivation and sense of responsibility of the front-line workers is a well-defined incentive and appreciation system. To secure budget, the EPI team prepares and submits Planning Commission form number one (PC1) to the provincial government. Upon approval, EPI receives the funds. PC1 has a documented incentive and appreciation strategy for best performers; however, everything is still on paper only, and this has never been implemented. The EDOs should see that the approved budget is properly used.

Community mobilization and orientation were considered important factors affecting staff motivation. With this in mind, it is recommended that a comprehensive community mobilization programme is designed and implemented. In the context of Balochistan, educational sessions, postal or telephonic reminders, and parental incentive schemes (some monetary benefits on initiating and then regularly following up for updating immunization status of the child) may prove to be successful. These programmes can be initiated as a pilot in a few of the districts and then expanded based on outcomes.

The cMYP mentions the hiring of community health volunteers and union council support officers. This sounds like a promising initiative, and these staff members must have a strong knowledge base and be well trained in communication skills. Further, although the Lady Health Worker (LHW) programme has terms of reference, these frontline workers have been consistently participating in polio campaigns. Apart from their existing role in disseminating information, it may be valuable to train LHWs in vaccination, not for static or outreach sessions but specifically for those children that they find unvaccinated or overdue for their next doses during home visits.

References

- 1 World Health Organization. 'Pakistan Expanded Programme on immunization', <www.emro.who.int/pak/programmes/expanded-programme-on-immunization.html>, accessed 11 November 2017.
- 2 Owais, A, et al., 'Pakistan's Expanded Program on Immunization: An overview in the context of polio eradication and strategies for improving coverage', *Vaccine*, vol. 31, issue 33, 2013, pp. 3313–3319, <doi: <https://doi-org.library1.unmc.edu/10.1016/j.vaccine.2013.05.015>>.
- 3 Masud T. and K.V. Navaratne, 'The Expanded Program on Immunization: Recommendations for Improving Performance', Washington DC. The International Bank for Reconstruction and Development, The World Bank. April 2012. <<https://openknowledge.worldbank.org/bitstream/handle/10986/13579/NonAsciiFileName0.pdf?sequence=1>>.
- 4 Mazhar A, and Shaikh B.T., 'Reforms in Pakistan: Decisive times for improving maternal and child health', *Health Policy*, vol. 8, issue 1, 2012, pp. 24–32.
- 5 Nishtar Sania and Meboob, A. Bilal, 'Pakistan prepares to abolish ministry of health', *The Lancet*, vol. 378, issue 9792, 2011 pp. 648–649.
- 6 Bossert T.J., Mitchell A.D., 'Health sector decentralization and local decision-making: Decision space, institutional capacities and accountability in Pakistan', *Social Science Medicine*, vol. 72, issue 1, 2011, pp. 39–48.
- 7 Hasan Q, A. Bosan and K. Bile, 'A review of EPI progress in Pakistan towards achieving coverage targets: Present situation and the way forward', 2010.
- 8 Ahmed J, Shaikh B., 'The state of affairs at primary health care facilities in Pakistan: Where is the state's stewardship?' *Eastern Mediterranean Health Journal*, vol. 17, issue 7, 2011, p.619.
- 9 Alliance G., 'Investing in immunization through the GAVI alliance: The evidence base', Geneva: GAVI, the Vaccine Alliance., 2010.
- 10 Husain S. and S.B. Omer, 'Routine immunization services in Pakistan: Seeing beyond the numbers', *Eastern Mediterranean Health Journal*. vol. 22, issue 3, 2016, p. 201.
- 11 EPI Pakistan, 'Comprehensive multi-year plan, immunization program of Pakistan', 2014, <<http://epi.gov.pk/wp-content/uploads/2014/09/FAT.pdf>>.
- 12 NIPS and ICF, Pakistan demographic and health survey 2012–2013. PDHS. 2012.
- 13 Javaid U, J. Jahangir, 'Balochistan: A key factor in global politics', *South Asian Studies*. vol. 30, issue 2, 2015, p.91.
- 14 EPI Pakistan, 'Comprehensive multiyear plan immunization program of Balochistan province', 2014.
- 15 Dräger Sidrig, Gulin Gedik and Mario R. Dal Poz, 'Health workforce issues and the global fund to fight AIDS, tuberculosis and malaria: An analytical review', *Human Resources for Health*, vol. 4, issue 1, 2006, p. 23.
- 16 GAVI, Joint appraisal report, 2016, <<http://www.gavi.org/country/pakistan/documents>>, accessed 18 October, 2017.
- 17 World Health Organization, Health services development; the WHO health system framework. <www.wpro.who.int/health_services/health_systems_framework/en>, accessed 23 October 2017.
- 18 Brinkerhoff D., 'Accountability and health systems: Overview framework and strategies', 2003.
- 19 Pyone T., H. Smith and N. van den Broek, 'Frameworks to assess health systems governance: A systematic review', *Health Policy Plan*, vol. 32, issue 5, 2017 pp.710–722.
- 20 Erlingsson C. and P. Brysiewicz, 'Orientation among multiple truths: An introduction to qualitative research', *African Journal of Emergency Medicine*, vol. 3, issue 2, 2013, pp. 92–99.
- 21 Akpanuko E.E and I.E. Asogwa, 'Accountability: A synthesis', *International Journal of Finance and Accounting*, vol. 2, issue 3, 2013, pp. 164–173.
- 22 Brinkerhoff, D.W., 'Accountability and health systems: Toward conceptual clarity and policy relevance', *Health Policy Plan*, vol. 19, issue 2004, pp. 371–379.

- 23 Brinkerhoff, D.W and T.J. Bossert, 'Health governance: Principal-agent linkages and health system strengthening', *Health Policy Plan*, vol. 29, issue 6, 2013, 685–693.
- 24 Vaismoradi M, H. Turunen and T. Bondas, 'Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study', *Nursing and Health Sciences*, vol. 15, issue 3, 2013, pp. 398–405.
- 25 Joffe Hélène and Lucy Yardley, 'Content and thematic analysis', *Research methods for clinical and health psychology*. Sage, London, 2004, pp. 56–68.
- 26 SPDC. *Social development in Pakistan: Annual review 2014–2015*. Social Policy and Development Center, Karachi, Pakistan, 2016, <<http://www.spdc.org.pk/Data/Publication/PDF/AR2014-15.pdf>>.
- 27 Chootipongchaivat Sarocha, et al., 'Vaccination program in a resource-limited setting: A case study in the Philippines', *Vaccine*, vol. 34, issue 40, 2016, pp. 4814–4819.
- 28 Chen L., et al., 'Human resources for health: Overcoming the crisis', *The Lancet*, vol. 364, issue 9449, pp.1984–1990.
- 29 Mangrio N.K., M.M, Alam and B.T. Shaikh, 'Is expanded program on immunization doing enough? viewpoint of health workers and managers in Sindh, Pakistan', *Journal of the Pakistan Medical Association*, vol. 58, issue 2, 2008, pp. 64–67.
- 30 Mothiba, Tebogo, and Flora M. Tladi, 'Challenges faced by professional nurses when implementing the expanded program on immunization at rural clinics in Capricorn district, Limpopo', *African journal of primary Health Care & Family Medicine*, vol. 8, issue 2, 2016, pp. 1–5.
- 31 Amare Yared, 'Non-financial incentives for voluntary community health workers: A qualitative study', Working Paper No. 1, The last Ten Kilometers Project, JSI Research & training Institute Inc., Addis Abbada. 2009.
- 32 Mathauer Inke and Ingo Imhoff, 'Health worker motivation in Africa: The role of non-financial incentives and human resource management tools', *Human Resources for Health*, vol. 4, issue 1, p. 24.
- 33 USAID, *Assessment of district health supervisory system*, Pakistan Initiative for Mothers and Newborns, Islamabad, 2006.
- 34 Djibuti Mamuka, et al., 'The role of supportive supervision on immunization program outcome-a randomized field trial from Georgia', *BMC international Health and Human Rights*, vol. 9, issue 1, 2009; suppl. 11.
- 35 Banerjee, Abhijit, Esther Duflo, Rachel Glennerster and Dhruva Kothari, 'Improving immunization coverage in rural India: Clustered randomized controlled evaluation of immunization campaigns with and without incentives', *BMJ*. 2010, <doi: <https://doi.org/10.1136/bmj.c2220>>.
- 36 Bond Lyndal, et al., 'Infectious disease: Increases in vaccination coverage for children in child care, 1997 to 2000: An evaluation of the impact of government incentives and initiatives', *Australian and New Zealand Journal of Public Health*, vol. 26, issue 1, 2002, 58–64.
- 37 Shourie, S, et al., 'A cluster randomized controlled trial of a web-based decision aid to support parents' decisions about their child's measles mumps and rubella (MMR) vaccination', *Vaccine*, vol. 5, issue 31, 2013, pp. 6003–6010.
- 38 Vora Surabhi, et al., 'Effect of a novel birth intervention and reminder-recall on on-time immunization compliance in high-risk children', *Human Vaccines*, vol. 5, issue 6, 2009, pp. 395–402.



On 10 July 2017, a frontline health worker marks the finger of a child who has been immunized against polio in Shahin Muslim Town in Peshawar District, Khyber Pakhtunkhwa Province, Pakistan.



THEMATIC AREA 4

**Building on the polio
experience**

Examining the mechanisms and effectiveness of multi-tiered, EPI-Polio synergy

Key messages

- Pakistan is considered to be one of the polio endemic countries
- Synergy between EPI and the Polio programme has been a long-standing concern in Pakistan. Although most of the polio and EPI stakeholders consider that synergy of these two programmes is important, many officials, especially at the provincial and district levels, do not have a clear understanding about the concept of synergy
- It is evident that transitioning of resources (i.e., data sharing by the Polio Programme for routine immunization micro-plans) between EPI and the Polio Programme can bring mutual benefits at different levels
- The national ministry should take the lead in developing clear operational guidelines of the synergy endorsed by the federal and provincial levels of EPI and polio decision makers, and lead in the implementation of the guidelines

What is the problem?

Despite significant improvement over the past five years, Pakistan remains one of the three countries where polio is still endemic. Strengthening routine immunization (RI) is the key to ensuring that every last child is immunized with a polio vaccine. However, about one third of the children aged 2 years do not receive basic vaccinations in Pakistan.

Polio activities can strengthen RI and other public health interventions. Guidance is available to absorb polio resources into immunization and other public health programmes.

The Government of Pakistan advised a phase of synergy between EPI and the Polio Programme. However, minimum information is available on how EPI and the Polio Programme in Pakistan are working in a “synergized” way. This study explores the concept of synergy and its implementation, along with barriers and enablers to this important prerequisite of the polio legacy in Pakistan.

How was the research done?

Thirty interviews were conducted with EPI stakeholders (programme managers and policy makers) belonging to the national ministry and four provinces in Pakistan. In addition, eight focus-group discussions were conducted with EPI vaccinators and community-based vaccination (CBV) workers in two provinces (Punjab and Khyber Pakhtunkhwa), where two different models of synergy were reported. Thematic content analysis was carried out to analyse and report qualitative data.

What solutions were identified in the study?

A Bridge gaps in polio-EPI synergy policy direction and implementation of guidelines

Although all polio and EPI stakeholders understand the importance of synergizing these two components, gaps still exist in terms of understanding the concept of synergy, policy direction and implementation of the guidelines. Several interventions

and strategies developed by the Polio Programme can be adopted by the EPI. For example, data sharing for RI micro-plans and gradual involvement of the Polio Programme's CBVs into RI have been useful.

B Sharing and leveraging knowledge

The Polio Programme in Pakistan has had much experience dealing with vaccine hesitancy and community misconceptions about vaccines. Polio communication in Pakistan adopted a strategic approach of using local channels more than mass media, with frontline workers playing a pivotal role. Such lessons learned are important and useful for EPI for generating demand by tackling vaccine hesitancy.

C Transitioning assets and resources

Although WHO recommends 50 per cent of the polio staff should spend time on immunization activities, this rate is only 18 per cent in Pakistan. So, there is an opportunity for synergy by sharing polio resources to include EPI. Having a joint office for both polio and EPI staff, organizing joint meetings to discuss both polio and EPI issues and sharing data and capacity building activities can benefit both programmes.

Recommended actions

- 1 It is important to ensure clarity on the concept of synergy, particularly among the polio and EPI officials at the district and provincial levels.
- 2 There should be operational guidelines for synergy and clarity on the guidance from higher policy makers from both polio and EPI is crucial. The national ministry should take the lead and bridge the gaps in terms of policy direction and implementation of the synergy guidelines.
- 3 Polio and EPI leadership should develop clear action points of synergy and facilitate the administrative process to make those synergized activities happen at national, provincial and district levels.

For more information please contact:

Zaeem Ul-Haq (zaeemdr@gmail.com); Arshad Chandio, (arshadchandio@hotmail.com); Shamsa Rizwan, (shamsa_zafar@hotmail.com); Faisal Iqbal; Ayesha Naeem; Saad Karim

Examining the mechanisms and effectiveness of multi-tiered, EPI-Polio synergy

Zaeem Ul-Haq¹ Arshad Chandio,² Shamsa Rizwan,³ Faisal Iqbal,⁴ Ayesha Naeem,⁵ and Saad Karim⁶

¹ Health Services Academy, Islamabad, Pakistan

² Deputy Programme Manager, EPI, Islamabad, Pakistan

³ Child Advocacy International, Islamabad, Pakistan

⁴ International Labour Organization, Islamabad, Pakistan

⁵ Child Advocacy International, Islamabad, Pakistan

⁶ Medical College, Karachi, Pakistan

Introduction

Poliomyelitis (polio) may be a distant memory for a large part of the world; however, the disease still exists in some places, mainly affecting the young children [1]. When the Global Polio Eradication Initiative (GPEI) began in 1988, more than 350,000 children were becoming paralysed every year. Today, the occurrence of polio is less than 1 per cent of that number, reported from only three countries, including Pakistan [2]. The countries that still have polio are faced with several challenges including poverty, political conflict, poor sanitation and weak health systems. Historically, primary healthcare, especially immunization programmes, have performed sub-optimally in these countries [3]. For this reason, strengthening of routine immunization (RI) is key to ensuring that every child is immunized with the polio vaccine [4, 5, 6].

Pakistan, where polio is still endemic, has made significant immunization progress during past five years. Yet, about one third of its two-year-old children still do not receive even the basic vaccinations [7]. The country has isolated subpopulations with persistent polio that benefit little from high immunity among the surrounding population and that continue to act as a reservoir of the virus [8]. Moreover, some places in Pakistan continue to have poor sewerage systems and have grappled with terrorism for a long period of time [9]. The former facilitates the survival of the polio virus in the environment while the latter often turns a public health problem into a security issue [10]. In 2014, polio was declared an emergency, and a high-level Emergency Operations Centre (EOC) for polio was established, directly supervised by the Prime Minister at the federal level and the Chief Minister at the provincial level [11]. Under EOC, a National Emergency Action Plan (NEAP) is developed each year to document progress and devise plans for next year [11].

Since 2014, polio has consistently declined in Pakistan: 306 cases were reported in 2014, which dropped to 54 in 2015, 20 in 2016 and 8 in 2017 [12]. With the possibility of ending polio in sight, steps for the post-polio phase are underway. Evidence suggests that polio eradication can be achieved only with stronger health systems and bottom-up community engagement [13]. Numerous studies have shown that polio activities can strengthen RI and other public health interventions [14, 15, 16]. An important argument, however, is that these effects are not automatic; they have to be deliberately planned [17]. Guidance is available for this planning to absorb polio resources into immunization and other public health programmes during post-polio times [6,18]. The GPEI's Polio Eradication and Endgame Strategic Plan 2013–2018 outlines a roadmap for successfully eradicating polio.

The plan includes replacing the oral polio vaccine (OPV) with the injectable counterpart, called IPV, an enhanced system of RI, and effective planning for the 'legacy' of polio resources to be mainstreamed into other public health programmes [5, 19].

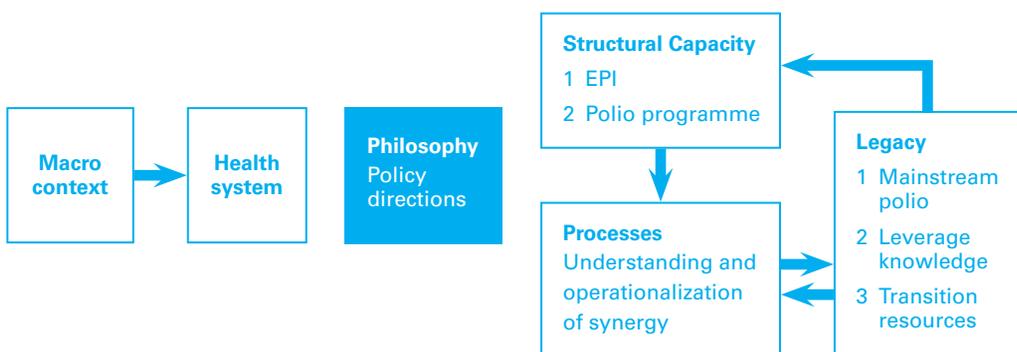
According to the World Health Organization (WHO), 'legacy' pertains to the post-polio phase and consists of three elements: mainstreaming polio, leveraging knowledge, and transitioning assets and resources into the larger system [5]. Owing to the continued polio-endemic status of the country, the Government of Pakistan advised a phase of synergy between EPI and the Polio Programme to ensure the legacy of polio and, ultimately, the sustainability of the polio-free status of the country [11]. How EPI and the Polio Eradication Initiative (PEI or the Polio Programme) in Pakistan can work together, in a 'synergized' way, to pave the way for the legacy is an important question. Minimum information, however, is available about it. A recent supplement of a peer-reviewed journal dedicated to the polio legacy published 50 articles from all relevant countries, except Pakistan [4]. Our study bridges this gap by exploring the concept of synergy and its implementation, along with barriers and enablers to this important prerequisite of polio legacy in the country.

Methods

Conceptual framework

In their work, Handler and colleagues have proposed a framework that explains important relationships among various components of a public health system and provides a basis for examining their performance [20]. According to the authors, it is the interaction between the macro-context, public health system, overall purpose and philosophy, and structural capacity of a system that influences the implementation processes and ultimately the outcomes [20]. We adapt this framework (*see Figure 33*) for our study and propose that it is the interaction of the overall macro-context and guidance on polio eradication that influence the public health system and policy, causing an interaction between structural units (EPI and the Polio Programme), leading to synergized activities that are required to reach polio legacy. Exploring the *understanding of the concept*, i.e., the way two programmes interpret synergy; and its *operationalization*, i.e., how the two are implementing synergized activities within the overall *context* (political ownership, funding etc.) can be helpful in determining *future directions* that can expedite the next phase of polio legacy.

FIGURE 33
Conceptual framework to explore stakeholders' viewpoint for synergized immunization outcomes



Specific objectives of the study were to:

- Document current understanding of the Polio Programme-EPI synergy and its operationalization at various levels.
- Explore the context of the two programmes and perceptions of programme personnel in relation to multi-level synergy, including the enablers and barriers.
- Outline the best ways to utilize synergy in the future.

Study design, participants and setting

Using a narrative design [21], this study was conducted at the national level, covering all of Pakistan. The participants included officials from the national ministry and all four provinces (see Table 18). In addition, there were discussions with EPI vaccinators and community-based vaccination (CBV) workers in two provinces (Punjab and Khyber Pakhtunkhwa), from where two different models of synergy were reported. Purposive sampling was used, and all officials from government and partner agencies working at the federal, provincial and district levels who interface with synergized activities of EPI and the Polio Programme were invited to participate in the study. During some of the interviews, other potential respondents who could provide useful information on the subject, i.e., snowball sampling, were asked questions [22]. Some of the study participants were interviewed in person at their office, health facility or a neutral place (e.g., cafés). The purpose was to have these discussions at places where the respondents were easily accessible and comfortable while talking. Some of the participants were interviewed over the telephone.

TABLE 18
Summary of participants selected for individual interviews and FGDs
(n = 112)

Individual interviews (n = 30)

Level	Category: Ministry/department, programme or organization				Number of participants
	Ministry/ Department of Health	EPI	Polio Programme	Partner organization	
Federal	1	2	3	4	10
Provincial	2	5	4	4	15
District	1	2	2	0	5
Sub-total individual interviews	4	9	9	8	30

Focus group discussions (FDGs) (n = 82)

Province	District	Category	Number of FDGs	Number of participants
Punjab	Rawalpindi	Vaccinator	4	28
Khyber Pakhtunkhwa	Peshawar	CBV worker	3	46
Khyber Pakhtunkhwa	Peshawar	CBV worker supervisor	1	8
Sub-total FDGs			8	82
Total participants involved in individual interviews and FGDs				112

Data collection, processing and analysis

The interview/discussion guide was developed using the focus areas outlined in the conceptual framework of this study (see Figure 33). Our inquiry was directed at exploring the current understanding of Polio Programme–EPI synergy and its operationalization at various levels. It also included discussion of the context in which two programmes were implementing synergy and the perceived enablers and barriers, along with suggestions for improving synergy and ensuring legacy in the future. A team of two experienced interviewers conducted the semi-structured individual interviews and focus group discussions (FGDs).

Individual interviews were deemed appropriate for programme managers and policy makers to fit in with their busy schedules, while FGDs were adopted for vaccinators and CBV workers, as it enabled collecting information from more people in a short time. Written consent was obtained before beginning the discussions. At the start of an FGD, the moderator briefly described the objectives, and asked for permission for tape-recording the discussion. Detailed, verbatim notes of the discussion were taken where permission for tape-recording was not granted. A typical interview started with broad questions about the concept of synergy and its implementation. The discussion then evolved depending upon the responses and the programme area in which the respondent had a specific role.

Most of these interviews were conducted using a mix of Urdu and English language, and their duration ranged from half an hour to about two hours. No incentive or payment was offered to the respondents at any point. Data collection was carried out from 15 July 2017 to 7 November 2017. The study was supported through funds provided by Gavi, the Vaccine Alliance in partnership with Health Services Academy (HSA) Islamabad (a public health academic institute) and UNICEF. Ethical clearance was obtained from the Institutional Review Board (IRB) of HSA Islamabad.

Thematic content analysis [23] was carried out on the full transcripts of the individual interviews and FGDs. Two members of the study team carried out the analysis. First, they agreed on a method of coding guided by the conceptual framework. Following this, they independently analysed three initial transcripts and met again to see the concordance between their coding. Points where their codes did not match were debated and a consensus reached. This helped in the development of a final code sheet that was used for coding all transcripts [23]. Manual coding was done on the transcripts using this code sheet to identify the significant statements across individual interviews. Subsequent readings of these significant statements helped to identify sub-themes emerging within these patterns. Equal attention was given to the divergent themes, which were points that were not shared by the majority of respondents but which were significant [23, 24].

Results

Overall, a total 112 men and women participated in the study. Among them, 30 were individually interviewed, while 82 participated in the eight FGDs at the district level (see Table 18). Themes and sub-themes that emerged from these interviews and discussions are summarized below.

Clarity about synergy

Senior officials from the Ministry of National Health Services, Regulations and Coordination (NHSRC) were clear on what synergy is and how it should be implemented. According to these officials, essential steps have been taken and clarity provided in the NEAP document. The objective is to make optimal use of polio resources and improve RI in the country.

“The inclusion of IPV into the EPI schedule has been in place since 2015. NEAP, which is a policy document, emphasizes synergy between the two. The agenda of the meetings of the prime minister’s task force already contains strengthening of RI. A synergy team has been constituted. All of this will improve RI which is necessary for maintaining the polio-free status of the country once polio programme ceases to exist.” – Official, NHSRC

The participants from both the provincial- and district-levels, while identifying NEAP as the key policy document, noted that operational guidelines agreed by all parties are still needed and not available.

“The root of synergy lies in NEAP. It identifies that polio cases are not being controlled due to weak RI. So one of the key strategies to eradicate polio is to boost RI, which will ultimately help polio eradication. But there is no framework in place that binds all stakeholders to share the data and the micro-plans etc.”
– Polio Programme official, Balochistan

While many agreed on the absence of a detailed policy and felt the need for one, there were also some dissenting voices. These participants did not see the need for policy and thought that it was the intent and the action that was more important than mere documents.

“I think everyone here, whether EPI, Polio [Programme] or ministry, we all understand the importance of synergy. NEAP already provides a direction on synergy. So I think now it is the time to focus on implementing things. There is no rocket science about what EPI needs to do, and under a devolved system, what the provinces need to do.” – Polio Programme official, federal level

Operationalization of synergy

Whether or not the concept of synergy was clear or operational guidelines available, the participants had much to share about the current activities that they thought were a mark of synergy between the two programmes.

Two models

Two synergy models are currently being implemented in the country. The province of Punjab has unified the top-most programme positions, both for the Polio Programme and EPI into one, under the leadership of Programme Manager of EPI. Other provinces have retained the design of two separate programmes, as it exists at the federal level.

“In Punjab there is one person who is looking after the Polio Programme as well as RI. Since he works on both sides, his PEI subordinates too cannot shy away from getting reports on measles and other VPDs [vaccine preventable diseases]. So in this way, trickling from top to bottom, this message of one programme and not the two is conveyed.” – EPI official, Punjab

In the provinces of Sindh, Khyber Pakhtunkhwa and Balochistan, which have continued with two separate programmes, the concept of synergy flows solely from NEAP with high priority or tier-1 districts being the focus of synergized programming. The focus of synergy therefore has shifted to CBV workers in these provinces.

“Recently, the EOC coordinator sent a letter asking all the CBV workers to conduct a micro-census for EPI. In the provinces of Sindh and Balochistan, the CBV workers will go house to house and register the immunization status of all children under 2 years old. This micro-census will be carried out every 6 months.” – Polio Programme official, federal level

Synergized activities

In the discussions, the participants gave examples of the processes or activities that can be considered as tell-tale signs of synergy. These include sharing of common trainers, one programme group attending the monthly review of the other and providing input, and sharing of data across the programmes.

“In Sindh, EPI is sitting on the review meetings for Polio [Programme]. I think it is a good opportunity for them to look at the programme indicators and the way they are traced by Polio and pick up lessons for their own programme. Currently there are 27 indicators and targets used for PEI that can be transferred to and adopted by EPI.” – Polio Programme official, Sindh

Data collection and data sharing is another visible sign of synergy seen in almost all the provinces, although the degree of efficiency is variable. It seemed from discussions that this sharing was satisfactory in Punjab, moderately good in Khyber Pakhtunkhwa, and starting to improve in Sindh and Balochistan.

“When our teams go for SIAs [supplementary immunization activities] door to door, they are collecting data on the newborns that need to be vaccinated but haven’t been vaccinated yet. They are collecting data on zero RI and they are sharing that data with the EPI of that locality.” – Polio Programme official, Punjab

The participants discussed how the micro-planning techniques of polio were integrated into the plans for RI involving Reach Every District (RED) and Reach Every Child (REC) strategy, with the support from the Polio Programme. CBV data in tier-1 districts was used for developing respective micro-plans while the same micro-planning strategy was also used for monitoring purposes.

“In Shaheen Muslim Town, Peshawar, we used the CBV data that they collected for missed children. This informed how many missed children we have in these UCs. Then CBV and all the PEI staff were assigned to work for improving routine immunization in those areas.” – Polio Programme official, Khyber Pakhtunkhwa

CBV workers are hired by the Polio Programme partners for areas where there is high and continuous transmission of poliovirus and where intensive activity is required to immunize children. These CBV workers visit each household to document children who are still not immunized and provide them with polio vaccinations. They also inquire about other immunizations and provide this data to EPI.

“They do micro-census by going door to door and we have all the data available about the vaccinations. These are areas where we had problems in accessing households, so we introduced well-trained local teams. Primarily these are women, but in Quetta, men who are trusted and respected are also working from the same communities.” – Polio Programme official, federal level

Context of two programmes

Two unequal programmes

The participants highlighted that although both programmes are working on immunization, many factors make them different from each other. Everything therefore, cannot be synergized and one has to prioritize about where to begin the process.

“To begin with, these are two unequal programmes in many respects. One is highly sophisticated and the other is very basic. One enjoys global, national and local political ownership and adequate funding while the other is just beginning to get attention. Then the target children, their ages and context are different.”
– EPI official, federal level

In areas where CBV is not working, there was noted to be a lack of attention of polio workers to RI during the polio campaigns. In addition, workers at the ground level also mentioned lack of supplies and workload as reasons for sub-optimal service delivery.

“We don’t find enough time to fulfil our regular duties and tasks due to NIDs [National Immunization Days] and repeated polio activities and it is affecting our routine work – we cannot routinely cover our children. Besides, we do have vaccines but syringes, immunization cards and stationery are usually deficient.”
– Vaccinator

Enablers

Also discussed was why synergy is happening where it is happening. In discussions, the participants mentioned the role of leadership, its clarity and actions about synergy, along with the various trickle down effects.

“Like Punjab, the KP [Khyber Pakhtunkhwa] programme manager also thinks out of the box. He holds weekly meetings with EOC coordinator every Friday from 3:00 onwards and they try to synergize how to strengthen EPI, how many field staff do we have in these districts who engage in the measles mop up and also they engage polio work force in awareness creation.” – Programme official, federal level

Certain administrative decisions have facilitated the process of synergy. These include having a joint office for staff from both programmes, all staff (from province and district levels) attending a mandatory meeting every week to discuss both polio and EPI issues, and sharing of data or capacity-building activities.

“EOC is made available to all the service staff. EPI, PEI and all the relevant staff are working under one roof. UNICEF staff, WHO staff, Bill and Melinda Gates, COMNet, then all the social mobilization people, EPI, everybody is working here under one roof. The same concept trickles down to districts.” – Programme official, Punjab

Barriers

Participants belonging to both programmes mentioned gaps in delivery of immunization services to children. A Polio Programme participant talked about inadequate RI despite the information about unimmunized children collected and provided by CBV workers.

“At times you find families complaining that the rural health centre staff sent them back saying that it is not the RI day today. We have shared this feedback actively with EPI. You know only identifying missed children with the expectation that vaccinator will vaccinate – does not happen if a person does not work.”
– Polio Programme official

Perceptions and behaviour related immunization from within communities was one of the most recurring themes in the discussions. Participants, both in individual interviews and FGDs, frequently mentioned the negative perceptions in communities towards immunization. The participants also noted that community members expected that all vaccinations would be delivered to their doorstep. CBV workers and other vaccinators face refusals due to people having poor awareness about vaccinations, including misconceptions regarding polio, and not knowing the importance of timeliness for immunization.

“The health-seeking behaviours are poor in our country. In India, for example, when polio teams used to visit the households, families would bring their kids along themselves. It was the same in Behaar, which is a Muslim community area. But here is an opposite trend in our country; people hide their children in the houses when our polio teams visit the houses.” – Programme official, federal level.

Individual and organizational attitudes and management systems were also mentioned as a challenge in synergizing the two programs.

“In our province, the EPI-Polio synergy is optimal at the senior manager level, but at the department level, there is no concept of synergy. Sometimes, EPI and Polio Programme staff belonging to the same partner organization do not like to sit with each other. Even we received complaints that our EPI technicians did not let partners’ supervisory staff check their ILRV in the office.” – EPI official, Khyber Pakhtunkhwa

Future directions

During the discussions, the participants also talked about steps for improving synergy and ultimately the immunization outcomes. Those having a perspective regarding the overall socio-political situation shared a deeper analysis of the situation and hoped for a stronger health delivery system in the country.

“They [the government] should ensure simple things. For example, vaccinators should be available at all union councils, with proper vaccine storage and logistics. You cannot turn people away saying that today is not the RI day. These mothers have 7–8 kids each, and do not have the time to visit every day; they must be entertained.” – Programme official, federal level

The participants discussed that accountability should not only result in penalizing of poor performance; but also should include incentives and rewards to improve performance, which is the ultimate objective. Moreover, inadequate human resources usually underlie the apparent sub-optimal performance, and it is the responsibility of the system to address this inadequacy before holding staff accountable for their weak performance.

“A new concept named Accountability Performance Management Framework (APMF) was introduced last year. It outlines how a complaint will be managed against any of the immunization staff – both government and private. And this is not based only on punishment; it has rewards too.” – Polio Programme official, Punjab

That the EPI needs to enhance its capacity and strengthen systems was mentioned by participants from both EPI and the Polio Programme, especially from the field workers. Inadequacy of vaccinators, their ongoing training and promotion, and supplies etc. were mentioned during this part of the discussion.

“While macro issues, like procurement, logistics of vaccines and storage etc. have been majorly revamped the infrastructure at the grass root level needs focus. For example, ensuring you have vaccinators available everywhere and health facilities are all well staffed and running, with logistics available for vaccines to be stored and delivered to every child.” – EPI official, federal level

In the early part of discussions, participants repeatedly highlighted the varied understanding of synergy within and between the two programmes, and the resultant confusion and implementation gaps. They also shared their opinion about ways that can help address this confusion and resultant gaps.

“Although we are talking about it but we have not yet designed any framework on how we are going to do it. Have we given a thought that if we are engaging CBVs for RI, how would that happen? Like what would happen when polio campaigns end? There is no security that CBVs will be available then. Clearly we need policy directions and methods to implement them.” – Official from a partner organization

Discussion

This study explored the understanding and implementation of synergy between EPI and the Polio Programme in Pakistan. This synergy is important, as the country needs to adopt its strategy upon approaching its goal of polio eradication. Findings showed that the two programmes are mindful of the importance of synergy, and are trying to implement this according to their best understanding of the concept. Two models of synergy are currently operative: one outlined by NEAP for priority districts and the other, which is being implemented in all districts of the Punjab Province. Sharing of data by the Polio Programme for RI micro-plans and gradual involvement of the Polio Programme's CBVs into RI are examples of this synergy. However, a gap currently exists in terms of understanding and interpreting the policy, resulting in uncertainties about synergy as well as polio legacy in the future.

Inclusion of IPV into RI is an important step towards mainstreaming polio and ensuring legacy. Pakistan incorporated IPV into the immunization schedule in 2015, whereby the dose is given along with DPT3 at 14 weeks of age [25]. While this introduction is a landmark in itself, it also brings some challenges. For example, global vaccine shortages can limit a country's capability to access IPV in a timely manner [26]. Moreover, new vaccines may mean either more injections during a given visit, or more visits. Multiple injections to a child on one visit could lead to objections from parents, while increasing the number of visits may lead to increased dropout rates [27]. The communication challenges from the perspective of the health system are also important, necessitating good counselling skills of health professionals to explain new doses [28]. While the challenges are significant, there was no mention of mitigation strategies from any of the partners during the study discussions.

Leveraging knowledge is an important part of the endgame strategy and it was found that sharing of surveillance data and knowledge of micro-plans by the Polio Programme was a valuable contribution. Dealing with community misperceptions about vaccines and the behaviour of vaccine hesitancy has been a huge learning experience from polio vaccination campaigns [9, 29]. Communication experiences of polio campaigns from elsewhere show that clear data alone may not be sufficient for dealing with misperceptions; people need to change their attitudes from within, and for this change to work, effective client-provider communication through frontline workers is key [30]. More recently, the Polio Programme communication in Pakistan adopted a strategic approach of using local channels more than mass media, with frontline workers playing a pivotal role [11, 31]. Such lessons are important; however, clear thinking about incorporating these lessons into future communications is required.

Transitioning assets and resources is another important pillar, and data for indicators are available for this. According to the WHO, 50 per cent of polio staff should spend time on RI activities for moving towards legacy. While in the rest of the world, about 47 per cent of this time is being spent on RI activities, the staff in Pakistan spend only 18 per cent of their time on this [32]. Another indicator is transferring of polio human resources to other immunization and public health interventions. In Nigeria, for example, Centers for Disease Control and Prevention will transition more than 180 National Stop Transmission of Polio (N-STOP) officers to measles surveillance, routine vaccination coverage, and outbreak investigation and response in high-risk areas [16]. Such transition plans need to be in place while developing synergy, but these plans were not mentioned in interviews or discussions in this study.

The introduction of CBV workers is seen as a game-changer for polio eradication in Pakistan. Deployed in priority districts where polio reservoirs persisted these CBV workers carried out door-to-door visits to conduct a micro-census. Their involvement not only helped in reaching the unreached children for polio vaccines, they also provided information about children not receiving other vaccines. Similar initiatives are also reported from India and Nigeria for addressing the pockets of populations acting as a reservoirs for polio [33, 34]. Evaluation of CBV in 11 priority districts in Pakistan where polio is surviving reports that basic immunization is still weak, which can hinder reaching and sustaining poliovirus eradication [35]. This evaluation was underway during the study, with both programmes eagerly awaiting the findings, which will help improve synergy and ultimately legacy.

While federal and provincial managers were upbeat about synergy, the district- and community-level staff told a different story. Those from EPI complained that polio workers do not think RI is their responsibility, while polio staff argued that children referred by them were not vaccinated by EPI staff. Different interpretations of objectives, operational details and implementation models of synergy being followed across the country could be the main reasons for this disharmony. In the absence of clear guidelines, while some believe that synergy is to improve RI, others think that synergy is to achieve and maintain polio-free status.

This is the first study that reports the synergized work between EPI and the Polio Programme in Pakistan. Views of staff from all operational levels were explored to develop a clearer picture. Owing to a shortage of time and resources, another level could not be added, i.e., beneficiaries, who could have helped deepen the analysis. The study could benefit from a mixed method design by looking at the process and outcome indicators of strategies of synergy in addition to its qualitative exploration. This could not be done as the two programmes were in the phase of developing an understanding of the concept and instituting its operationalization. Future research could adopt this design and examine the situation to develop even better triangulation.

Conclusion and recommendations

Immunization stakeholders in Pakistan understand the importance of synergies between the Polio Programme and RI, and the operationalization of these synergies is underway. However, this operationalization depends on varied notions of synergy held at different levels from the national level, through the provincial and district levels to the community level. A gap currently exists in terms of policy direction and implementation guidelines, and NHSRC can take the lead in bridging this gap. Many robust interventions have been instituted by the Polio Programme that can be adopted by EPI, for which willingness exists on both sides. However, EPI needs to enhance its capacity to absorb these interventions and improve service delivery by using them. Given the context in which the Polio Programme has gained more political ownership, visibility and clout than the immunization programme, the guidance and clarity from higher-level policy is crucial for the two programmes to improve synergy, embrace the polio legacy and move to a sustained polio-free status for the country.

References

- 1 World Health Organization, *Statement of the Eighteenth IHR Emergency Committee Regarding the International Spread of Poliovirus*, 2018, <<http://www.who.int/news-room/detail/15-08-2018-statement-of-the-eighteenth-ihf-emergency-committee-regarding-the-international-spread-of-poliovirus>>.
- 2 Global Polio Eradication Initiative, *History of Polio*, 2018, <<http://polioeradication.org/polio-today/history-of-polio>>.
- 3 World Health Organization, *10 Facts on Polio Eradication*, 2017, <<http://www.who.int/features/factfiles/polio/en>>.
- 4 Patel, Manish and Stephen Cochi, 'Addressing the Challenges and Opportunities of the Polio Endgame: Lessons for the future', *The Journal of Infectious Diseases*, 2017, vol. 216, issue suppl 1, pp. 1–8, <<http://dx.doi.org/10.1093/infdis/jix117>>.
- 5 World Health Organization, *Polio Eradication and Endgame Strategic Plan 2013-2018*, Geneva, 2013.
- 6 Rutter, Paul D., et al., 'Transition Planning for After Polio Eradication', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 287–292, <<http://dx.doi.org/10.1093/infdis/jix026>>.
- 7 National Institute of Population Studies, *Pakistan Demographic and Health Survey 2017-2018*, indicators report, 2018.
- 8 Thompson, Kimberly M. and Radboud J. Duintjer Tebbens, 'Lessons from the Polio Endgame: Overcoming the failure to vaccinate and the role of subpopulations in maintaining transmission', *The Journal of Infectious Diseases*, vol. 216, issue supply 1, 2017, pp. 176–182, <<http://dx.doi.org/10.1093/infdis/jix108>>.
- 9 Hussain, Shoaib Fahad, et al., 'Eradicating Polio in Pakistan: An analysis of the challenges and solutions to this security and health issue', *Globalization and Health*, vol. 12, issue 63, 2016, pp. 1–9, <<http://dx.doi.org/10.1186/s12992-016-0195-3>>.
- 10 Riaz, Haris and Anis Rehman, 'Polio Vaccination Workers Gunned Down in Pakistan', *The Lancet Infectious Diseases*, vol. 13, issue 2, 2013, p. 120, <[http://dx.doi.org/10.1016/S1473-3099\(12\)70344-4](http://dx.doi.org/10.1016/S1473-3099(12)70344-4)>.
- 11 Government of Pakistan, *National Emergency Action Plan for Polio Eradication 2015-2016*, Ministry of National Health Services, 2016.
- 12 Global Polio Eradication Initiative, *Polio Cases in Pakistan*, 2018, <http://www.endpolio.com.pk/polioin-pakistan/polio-cases-in-provinces>.
- 13 Abimbola, Seye, Asmat Ullah Malik and Ghulam Farooq Mansoor, 'The Final Push for Polio Eradication: Addressing the challenge of violence in Afghanistan, Pakistan, and Nigeria', *PLOS Medicine*, vol. 10, issue 10, 2013, pp. 1-4, <<http://dx.doi.org/10.1371/journal.pmed.1001529>>.
- 14 Closser, Svea, et al., 'The Impact of Polio Eradication on Routine Immunization and Primary Health Care: A mixed-methods study', *The Journal of Infectious Diseases*, vol. 210, issue suppl 1, 2014, pp. 504–513, <<http://dx.doi.org/10.1093/infdis/jit232>>.
- 15 Hopkins, Donald R., 'Disease Eradication', *The New England Journal of Medicine*, vol. 368, 2013, pp. 54–63, <<http://dx.doi.org/10.1056/NEJMra1200391>>.
- 16 Michael, Charles A., et al., 'Polio Legacy in Action: Using the polio eradication infrastructure for measles elimination in Nigeria — The national stop transmission of polio program', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 373–379, <<http://dx.doi.org/10.1093/infdis/jix014>>.
- 17 Loevinsohn, Benjamin, et al., 'Impact of Targeted Programs on Health Systems: A case study of the Polio Eradication Initiative', *American Journal of Public Health*, vol. 92, issue 1, 2002 pp. 19–23.
- 18 Van den Ent, Maya M.V.X., et al., 'Experiences and Lessons From Polio Eradication Applied to Immunization in 10 Focus Countries of the Polio Endgame Strategic Plan', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, <<http://dx.doi.org/10.1093/infdis/jix047>>.
- 19 Abdelwahab, Jalaa, et al., 'Strengthening the Partnership Between Routine Immunization and the Global Polio Eradication Initiative to Achieve Eradication and Assure Sustainability', *The Journal of Infectious Diseases*, vol. 210, issue suppl 1, 2014, pp. 498–503, <<http://dx.doi.org/10.1093/infdis/jiu041>>.
- 20 Handler, Arden, Michele Issel and Bernard Turnock, 'A Conceptual Framework to Measure Performance of the Public Health System', *American Journal of Public Health*, vol. 91, issue 8, 2001, 1235–1239.

- 21 Cresswell, John W., *Qualitative Inquiry and Research Design: Choosing among five approaches*, 3rd edition, Los Angeles: SAGE Publications, 2013.
- 22 Suri, Harsh, 'Purposeful Sampling in Qualitative Research Synthesis', *Qualitative Research Journal*, vol. 11, issue 2, 2011, p. 11.
- 23 Patton, Michael Quinn, *Qualitative Research and Evaluation Methods*, 3rd edition, Los Angeles: SAGE Publications, 2001.
- 24 Miles, Matthew B., et al., *Qualitative Data Analysis: An expanded sourcebook*, 2nd edition, Los Angeles, SAGE Publications, 1994.
- 25 World Health Organization Regional Office for the Eastern Mediterranean, *Pakistan: Second endemic country to introduce IPV into routine immunization schedule*, 2015, pp. 3–5, <<http://www.emro.who.int/pdf/pak/pakistan-infocus/introduces-ipv-in-routine-immunization.pdf?ua=1>>.
- 26 Zipursky, Simona, et al., 'Lessons Learned from Managing the Planning and Implementation of Inactivated Polio Vaccine Introduction in Support of the Polio Endgame' *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 15–23, <<http://dx.doi.org/10.1093/infdis/jix185>>.
- 27 Hasman, Andreas, Hendrikus C.J. Raaijmakers and Douglas J. Noble, 'Inactivated Polio Vaccine Launch in Nepal: A public health milestone', *The Lancet*, vol. 2, issue 11, 2014, pp. 627–628, <[http://dx.doi.org/10.1016/S2214-109X\(14\)70324-9](http://dx.doi.org/10.1016/S2214-109X(14)70324-9)>.
- 28 Wallace, Aaron S., et al., 'Experiences with Provider and Parental Attitudes and Practices Regarding the Administration of Multiple Injections During Infant Vaccination Visits: Lessons for vaccine introduction', *Vaccine*, vol. 32, issue 41, 2014, pages 5301–5310, <<http://dx.doi.org/10.1016/j.vaccine.2014.07.076>>.
- 29 Obregón, Rafael, et al., 'Achieving Polio Eradication: A review of health communication evidence and lessons learned in India and Pakistan', *World Health Organization Bulletin*, issue 87, 2009, pp. 624–630, <<http://dx.doi.org/10.2471/BLT.08.060863>>.
- 30 Guirguis, Sherine, et al., 'Placing Human Behavior at the Center of the Fight to Eradicate Polio: Lessons learned and their application to other life-saving interventions', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 331–336, <<http://dx.doi.org/10.1093/infdis/jiw546>>.
- 31 Shaikh, Babar Tasneem, et al., 'Health System Barriers and Levers in Implementation of the Expanded Program on Immunization (EPI) in Pakistan: An evidence informed situation analysis', *Public Health Reviews*, vol. 39, issue 1, 2018, pp. 1–10.
- 32 van den Ent, Maya M.V.X., et al., 'Contribution of Global Polio Eradication Initiative – Funded personnel to the strengthening of routine immunization programs in the 10 focus countries of the polio eradication and endgame strategic plan', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 244–249, <<http://dx.doi.org/10.1093/infdis/jiw567>>.
- 33 Deutsch, Nicole, et al., 'Legacy of Polio – Use of India's social mobilization network for strengthening of the universal immunization program in India', *The Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 260–266, <<http://dx.doi.org/10.1093/infdis/jix068>>.
- 34 Ongwae, Kennedy M., et al., 'Use of Dedicated Mobile Teams and Polio Volunteer Community Mobilizers to Increase Access to Zero-Dose Oral Poliovirus Vaccine and Routine Childhood Immunizations in Settlements at High Risk for Polio Transmission in Northern Nigeria', *Journal of Infectious Diseases*, vol. 216, issue suppl 1, 2017, pp. 267–272, <<http://dx.doi.org/10.1093/infdis/jiw520>>.
- 35 Government of Pakistan, *National Emergency Action Plan for Polio Eradication 2018–2019*, Islamabad, 2018.
- 36 El-Jardali, Fadi, et al., 'Use of Health Systems Evidence by Policymakers in Eastern Mediterranean Countries: Views, practices, and contextual influences', *BMC Health Services Research*, vol. 12, 2012, pp. 1–16, <<http://dx.doi.org/10.1186/1472-6963-12-200>>.
- 37 Walt, Gill and Lucy Gilson, 'Reforming the Health Sector in Developing Countries: The central role of policy analysis', *Health Policy and Planning*, vol. 9, issue 4, 1994, pp. 353–370.
- 38 Buse, Kent, et al., *How Can the Analysis of Power and Process in Policy-Making Improve Health Outcomes? Moving the agenda forward*, Overseas Development Institute, London, 2007, <<https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/478.pdf>>.
- 39 Haq, Zaeem, et al., 'Dynamics of Evidence-Informed Health Policy Making in Pakistan', *Health Policy and Planning*, vol. 32, issue 10, 2017, pp. 1449–1456, <<http://dx.doi.org/10.1093/heapol/czx128>>.

Developing a three-dimensional narrative to counter polio vaccine refusal in Charsadda

Key messages

- Vaccine refusal is common in various parts of Pakistan. Charsadda District has the highest rate of vaccine refusal in Khyber Pakhtunkhwa Province
- Complex combinations of religious, cultural and ethnic beliefs, and perception about vaccines contribute to vaccine refusals in Charsadda District
- An active role of the media, involvement of religious and ethnic leaders, and appropriate social mobilization strategies are needed to tackle vaccine refusals
- Active engagement of community health workers with the support of private sector organizations may reduce refusals and improve coverage

What is the problem?

Caregivers refusing of the polio vaccine for their children is persistent in many areas of Pakistan. In every polio campaign, more than 2,000 vaccine refusals are reported in Khyber Pakhtunkhwa's Charsadda District, and the district has the highest polio refusal rate in the province.

Caregivers who refuse the polio vaccine are also likely to refuse other vaccines and less likely to demand other immunization services. It is well known that several factors can contribute to vaccine refusal, such as religious and cultural beliefs, misconceptions, ethnical predisposition and fear of adverse events.

Some refusals are very dominant/strong and have the potential to influence the opinions of others. Therefore, it is important to understand the factors driving caregiver refusals in order to develop cohesive strategies to tackle them.

How was the research done?

A qualitative exploratory study was conducted including a total of 44 semi-structured interviews. Twenty-three in-depth interviews were conducted with members of households refusing polio vaccination. At least one of these interviews took place in each of Charsadda's 21 union councils

(sub-districts), which are labelled 'high risk' for polio. In addition, 15 frontline polio workers were interviewed, including union council polio officers, communication officers and religious support persons. Another six interviews were conducted with the Khyber Pakhtunkhwa EPI leadership and other high-level policy makers. Qualitative content analysis was done to analyse and present the data.

What solutions were identified in the study?

A Media engagement can counter vaccine refusals

Many communities in Charsadda still consider vaccines to be harmful to children. In some areas, immunization is considered a Jewish conspiracy. Communities believe that vaccination campaigns have oblique motives. Rumours and misleading information are often spread through the traditional media by religious leaders. A well-informed, active and more responsible media can play a vital role in addressing vaccine refusals.

B More knowledgeable health workers diminish persistent mistrust

Lack of vaccine-related knowledge reduces vaccine demand in the community. Fear of side effects, beliefs that vaccines cause infertility, doubts about the quality of vaccines and lack of health worker capacity to address concerns are important factors in refusals. Improving health worker knowledge and interpersonal communication skills can help close the knowledge gap.

C Barriers related to ethnicity are important

People residing in the Pashtun area in Charsadda have their own ethnic identity that often shapes their care-seeking behaviour. Ethnic mistrust towards vaccines is particularly widespread in these communities. Refusals can be effectively countered through active support from ethnic political leaders and appropriate social mobilization strategies.

Recommended actions

- 1** Increase religious leaders' support for the immunization programme through active involvement in immunization and health workshops and seminars. The aim should be to address religious and cultural dimensions of vaccine refusal.
- 2** To address the cultural dimension of vaccine refusals, involvement of social and traditional media is needed. Dissemination of vaccine-related information, success stories and the consequences of not receiving vaccines should be delivered in a simple way to make people in the community people receptive to vaccines and immunization.
- 3** Investments should be made in training and support for vaccinators to improve knowledge of vaccines and immunization, and build capacity for interpersonal communication. Involvement of the private sector in social mobilization activities can also strengthen the government's response to vaccine refusals.

For more information please contact:

Sheraz Ahmad Khan, (S.A.Khan-6@sms.ed.ac.uk); Muhammad Ashfaq, (ashfaq301@gmail.com); Ayaz Ayub, (ayub111@hotmail.com)

Developing a three-dimensional narrative to counter polio vaccine refusal in Charsadda

Sheraz Ahmad Khan,¹ Muhammad Ashfaq,² and Ayaz Ayub³

¹ Department of Health, Government of Khyber Pakhtunkhwa

² Pakistan Institute of Medical Sciences (PIMS)

³ Institute of Public Health, Khyber Medical University, Peshawar

Introduction

Polio eradication is a public health challenge. With a sharp rise in polio cases in 2014, Pakistan's situation was declared as "public health emergency of international concern" by the International Health Regulations and Emergency Committees of WHO. Pakistan was labelled as a threat to international polio eradication efforts [1]. Success of the Global Polio Eradication Initiative (GPEI) depends on Pakistan's ability to overcome religious, social, economic and political barriers to polio vaccination [2].

These challenges are more pronounced in the Pashtun Belt of Pakistan [2, 3]. To understand the ethnic, cultural and religious roots of vaccine refusals, a detailed qualitative inquiry was conducted in Charsadda. Charsadda, a populous district, is a strong hub of Pashtun nationalist politics and religious ideologies [4, 5]. Charsadda has ongoing Expanded Programme on Immunization (EPI) and Polio Eradication Initiative (PEI) activities with persistent refusals. Twenty-one union councils (UCs) in Charsadda are high-risk. In the Pashtun Belt, more than 2,000 vaccine refusals are reported every National Immunization Day.

Since health is a product of social determinants, this study looked at polio vaccine refusals from a social dimension [4, 5]. This research examined the cultural, religious and ethnic underpinnings of vaccine refusals. The knowledge generated by current research is a multi-dimensional understanding of vaccine refusals. Also, gaps were identified in current trust-building measures; hence recommendations are made to improve the EPI/PEI outreach component. The findings enabled EPI and PEI to achieve implementation success through moulding a community trust-building narrative, according to the community's own perspective.

Methods

Interpretivist paradigm, case-study methodology and in-depth interviews were used as data collection tools. Other issues explored included any unaddressed religious notions, cultural stereotypes and ethnical predisposition leading to persistent polio vaccine refusals in Charsadda District. In-depth interviews were conducted with community members, and PEI staff. At the community level, residents of district Charsadda who had refused polio vaccines to their children were interviewed. Among the PEI staff, there were two subgroups: frontline PEI worker and top management of PEI.

Fifteen front line polio workers, including five union council polio officers, five union council communication officers and five religious support persons, were interviewed. Four interviews were conducted with upper tier of PEI leadership, including the provincial team leader for PEI at WHO, provincial team leader for UNICEF and deputy director EPI Khyber Pakhtunkhwa. Two interviews were conducted with well-versed, educated persons

affected by polio in childhood. Fifteen interviews with male respondents and eight interviews with female respondents were conducted at the community level. In total, 43 in-depth interviews were conducted, after which theoretical saturation of data was achieved.

As well as the 43 in-depth interviews, content analysis was carried out on:

- scripts for propaganda videos circulating on social media,
- scripts for critical TV shows,
- Fatwah book compiled by the PEI,
- National Emergency Action Plan (NEAP) 2017-2018, and
- EPI frequently asked questions (FAQs)

Data collection and analysis

All interviews were conducted in Pashtu. Interviews were audio recorded with prior permission of interviewees. Consent from community members was verbal, as they were not comfortable with giving written consent due to fear of administrative action; while from the staff, all consents were written. Interviews were written in verbatim. The Pashtu scripts were translated into English and then back translated. Efforts were made to keep the data anonymous and secure.

Thematic analysis of data was done concurrently with data collection. Data analysis was done using the Atliis.ti software. Initially, open coding was done. This was followed by categorizing the codes and placing them under appropriate thematic areas.

Findings

The study findings are assembled under five major themes:

- 1 Reasons behind vaccine refusals,
- 2 Ethnicity and vaccine refusals,
- 3 Role of religious considerations and vaccine refusal,
- 4 Cultural considerations and vaccine refusals, and
- 5 Ideal steps to enhance vaccination uptake.

Reasons behind vaccine refusals

Many people adhere to the old belief that polio vaccination is a 'grand conspiracy'. One of our respondents said:

"Many people believe that the polio vaccination campaign is a conspiracy of Jews. In MC-4 area, there was a person named XXX. He was a case of chronic refusal and was jailed because of his refusal, but still he didn't agree to vaccinate his children."

With the ongoing terror and counter-terror activities, terrorist groups such as Tehreek-e-Taliban-Pakistan are spreading the venom of conspiracy theories via social media. Content on social media can be very dangerous, as it spreads exponentially. There is a trust deficit at the community level. One female respondents said:

"Why should we trust our government which never brings us requirements of our living like sugar and flour (staple food) and which is unable to employ us, yet they have endless resolve and resources for the polio vaccination campaign. What so special about it?"

In other instances, the trust deficit arises from questioning the credibility of vaccinators,

“The rumours and hearsay are spread that the team members are just filling the bottles from water only for the sake of daily remunerations.”

Many in the community have fears of adverse effects of vaccination. It is difficult for some community members to understand the basic concept of vaccination. The extensive disinformation material on social media targets vital figures and augments fears.

Fear of infertility was among the leading causes for vaccine refusals. One of our respondents on this account said:

“My husband is very against it. He is worried for elimination of our future generation, everybody does. We all want our children to have kids.”

Another respondent interpreted the misinformation differently, saying that:

“...it causes in-fertility in women... Also, it causes the birth of more female children compared to male babies...”

Ethnicity and vaccine refusals

The Pashtun ethnic group considers itself at centre of national and international conspiracies. They believe that their love for the land, affiliation with religion and their braveness are unacceptable to both ‘the insiders’ and ‘the outsiders’. This concept is crystallized in a quote by a respondent:

“Pashtuns face numerous challenges everywhere all the time across the globe due to some facts. First, they are brave, second, they accept challenges, third, they never let down their turbans with reference to honour. So, we think polio is a source or tool for devastating Pashtuns entirely in our minds all the time.”

When asked if ethnic ideology shapes community’s behaviour, one respondent replied:

“Yes, Pashtuns feel discriminated and they are suspicious of state’s mass investment and mobilization behind the polio campaign...they are reluctant.”

Another respondent mentioned the administrative action is further stoking hatred. He said:

“Sometimes the government imposes sanction 144 due to polio. Government knows that Pashtuns will not allow them to give their children such objectionable and ineffective drops. Now they are using police, but how can they force us, these are our children and we will decide what is best for them.”

A grave concern was raised in a social media video that downplayed the significance of the polio virus and anti-polio campaign. Many in this ethnic group, however, are amendable to change if approached positively.

Role of religious considerations and vaccine refusal

The PEI uses the term ‘religious refusal,’ which is misleading. People in the clergy resisted vaccination for political reasons, not for religious reasons. Regarding this, one of our participants said:

“Islam does not forbid us from polio vaccination but the imam does...for the same reason that it is being manufactured by America and it may be a conspiracy. All our men have the same concept.”

Those with greater attachment to religious circles have deep hatred for foreign influence. One family labelled as religious refusal, when asked about their cause for refusal, said that:

“When America is killing our officers and our elders, how should we presume that what they are sending for our children is safe and harmless? It’s a conspiracy plot to make our generations shameless and vulgar.”

Addressing this cohort [clergy] would be more cost effective, as was stated:

“It is better to persuade one religious scholar rather than trying to persuade hundreds in a locality. Religious scholars will persuade people for feeding the vaccines. Definitely, masses will accept the maulvi’s instructions willingly.”

Maulvis have a following, and can set off a ripple effect using extreme religious beliefs. This intentionally can cause refusal. One respondent said:

“Religion is being used as a tool to influence for politics, for example, with regards to vaccine refusals, who knows if religious sentiment has been stirred by anti-state elements?...Might be! It looks like that.”

Cultural considerations and vaccine refusals

Our respondents believed that the vaccination drive did not conform to the patriarchal, conservative Pashtun culture. They believed that these vaccines cause vulgarity.

One respondent said:

“These vaccines are affecting our culture, making our children more vulgar and disrespectful to their elders. They also see it as a plot to control our population growth.”

Similarly, keeping in view the patriarchal structure of the society, there is a natural preference for male children meaning that this cultural preference plays into vaccine refusals. One respondent said:

“These drops affect [decrease] the fertility ratio of male gender, whereas, it increases female gender ratio. The drops alter the genetic matter [sperm and ova]. Then, the element of modernism and increase of obscenity [vulgarity] are among the major effects of these vaccinations. Therefore, we keep away our children from polio vaccinations.”

The majority of women in rural areas are virtually impossible to reach, causing an information barrier. In Pashtun culture, informal institutions like Hujra and Jirgah have great influence. When asked about the role for Hujra in addressing the issue of vaccine refusals, one respondent said:

“Hujra is the place of finding solutions to the problems... If the polio teams come to Hujras to converse with the male family heads, it will surely bring benefit.”

Conventional Hujras are being replaced by the firebrand digital Hujras. Now the state has resorted to mandatory or forceful vaccination. However, force is not acceptable in this culture and with this ethnic group. One frontline polio worker labelled use of force as detrimental. He said:

“I would advise against the involvement of administrative authorities in vaccination...vaccinators have police or mayor with them. This stringent attitude towards people will surely increase their disapproval.”

The administrative action is further stoking hatred against polio vaccination, said one respondent:

“Using force or police against the families who refuse vaccination is leading towards the genesis of more and more doubts and hatred for our polio teams. It creates a very hostile work environment for us in subsequent campaigns.”

Ideal steps to enhance vaccination uptake

First, the programme needs to address the community’s belief in medical myths, by providing accurate information to dispel medical misconceptions. The community needs to have a means of increasing knowledge to eliminate unmet information needs. When asked what could be done to increase vaccination uptake, one front line worker said:

“Our Government is lagging behind in the awareness part. Why doesn’t the government make it compulsory on all television stations to have PEI and EPI related awareness messages?”

Another issue that came up in interviews was expired polio vaccine vials. Referring to media reports of expired vials, one educated respondent said:

“I will not accept exposing my children to such expired material [vaccines]. It is also shameful for our health institutions to allow use of such things for mass campaigns ...I will never feed my children such drops.”

Government entities have to uphold their reputation and rebut vehement propaganda spread against them.

A current wave of disinformation by militants is discrediting the Global Guarantors such as WHO. Excerpts from a propaganda video aired by Tehrek-i-Taliban Pakistan, which has been in circulation for many years say that:

“In 1972 the World Health Organization published a report requesting that a virus which destroys our immunity T-cells should be on experimental bases incorporated in the vaccines... Immediately following this experiment, incidence of AIDS was widely reported in Africa, Americas and other countries.”

These institutions will have to protect and preserve their reputation and neutral stature through proper counter-measures. The study sheds light on the community’s preference for better service packaging and addressing their overall unmet medical needs. One of our respondents asked:

“Why doesn’t the government care if a person is dying due to other diseases but concerned about polio?”

Vaccination does not seem a relevant problem to people when they have unmet basic medical and nutritional needs. A frontline worker said:

“We don’t have anything concrete to offer...we do guide them regarding access to primary healthcare or district hospitals. But, when they visit those places and get the inhumane treatment, their gazes for us are extremely furious on our next visit...”

Lack of engagement and information was a repeated theme and it should be addressed. Information flow need not only be quantitative enhancement but also in content and quantity. A community member said:

“Once the campaign starts, we come to know [from banners] that polio vaccination has started. So, the current campaigns material tells us about the dates only, on which vaccination will be done.”

A frontline worker believed the action [vaccination] is not coupled with properly packaged information. He said:

“We first launch an initiative and the awareness part of it follows later on. This awareness becomes a damage control only, i.e., going for awareness when there is an inertia and stalemate.”

About the content of information rolled about, a frontline worker said:

“I suggest and emphasize the government should spread more information regarding polio vaccines’ composition and ingredients.”

Information should be in a way to build the concept of the importance of vaccination in the community.

Discussion

The study’s findings conform with previous studies that found that vaccination campaigns are thought of as espionage activities [6-10]. As a result of this belief, militant groups are carrying out active propaganda to discredit vaccination campaigns [11]. A few pockets in the community have developed a strong disliking for vaccines. Similar refusals were reported from Muslim minority group in Utar Pradesh, where they doubted the government intentions behind vaccination [12]. In addition to refusals, others are hesitant about vaccines. These are the parents who have had their children immunized but who still have questions [13].

Reaching the hesitant parents before they turn to refusals is promising.[5]. Finding and reaching out to hesitant parents would need smart approaches, including collection of social and behavioural data. So far, the data-driven communication campaign by PEI has focused on community-level aggregate-data and generic outreach [14]. We found that refusals and hesitance are due to contentious issues like sterility, vulgarity, early puberty, *haram* composition of vaccines and using vaccination campaigns as mapping activities for picking drone strikes. The content of PEI material is silent on these points. The public health paradigm has shifted from a community perspective to an individual one, and the individual demand needs personalized interaction [15].

The Pashtun ethnic group makes up 8 per cent of Pakistan’s population, but reported 77 per cent of polio cases in 2011. It could be attributed to the rising trends in vaccine refusals that followed the insurgency and counter-insurgency in Pashtun belt [16]. Also, the drone strikes and fake vaccination campaign to catch Osama bin Laden proved detrimental to global efforts for polio eradication [6]. However, instead of trying to establish a credible image and creating active demand for vaccines, the Government started to arrest parents for refusing vaccination. This step is highly controversial [17]. On the other hand, some have commended these arrests, seeing them as testament to the government’s resolve [18]. However, our findings suggest that use of force is counter productive and further maligns this ethnic group.

Charsadda District has seen violence against polio vaccinators [19]. Administrative actions can add fuel to the fire. As suggested, rather than a forceful paternalistic approach, a counter narrative for vaccine refusals should be adopted [17]. There is still an incentive for PEI to create active demand as a goal. Passive acceptance is low yield in the long term [20]. While passive acceptance is higher in populations with low education [21], findings show that highly qualified parents are refusing vaccination now.

Pashtun ethnicity, culture and vaccine refusals

Due to protracted ideological and armed conflict in the region, the Pashtun ethnic group has suffered hugely. This scenario led to an ethnic mistrust and created a public-versus-state confrontation [22]. Given this hostile backdrop, zealous efforts by the state for polio vaccination made the population wary of the state's intentions behind it [16]. These negative feelings were originally more severe in the tribal belt and trickled out to rest of Pakistan after the military action ensued against militants. The merger of the Federally Administered Tribal Areas (FATA) with Khyber Pakhtunkhwa presents a possibility to build an accessible and responsive health system. The PEI and EPI should not miss this opportunity to integrate its services to this ungoverned territory [23, 24].

The informal Hujra and Jirgah institutions have played a vital role in Pashtun society [22]. These institutions were strong in opposing conspiracy theories and misinformation. Evidence suggests that in the case of vaccinations, people prefer to trust their family, friends and colleagues who are not experts on vaccines and go along with their opinion. Such consensus of opinions used to be in the Hujras, uniting people in negative views of vaccination [25, 26].

Our findings suggest that these institutions have almost collapsed and are being replaced with social media, where malicious messages are spreading at exponential rate. The birth of the Digital Hujra is threatening the lives of vaccinators, the credibility of GPEI stakeholders and the success of PEI. These social media platforms are effectively used by a terrorist organization to incite the refusal of polio vaccination. This troubling issue requires immediate response. Situations like this can further proliferate conspiracy and sociological theories [27, 28, 29].

Religion and vaccine refusals

Findings suggest that the 'religious refusals' are rather 'pseudo-religious refusals'. A refusal from a cleric based on his political beliefs and not on religious evidence should not be called 'religious refusal'. It is political manoeuvring for a clergyman trying to have a bigger say in public discourse.

Religion has a deep influence on lives of Pashtuns. There is widespread illiteracy in the area, and *maulvis* are held in high esteem. So much so that they can undermine the credibility of the government. However, for large-scale interventions, it is the credibility of institutions that matters [25, 26]. At times, the credibility of the messengers (those who are implementing an intervention) matters more than the message itself [30]. With limited government involvement and more foreign influence, the intervention leads to more sociological (conspiracy) theories [30]. Therefore, the institutions and programmes involved with polio eradication need to promote a positive image and strengthen their credibility in the communities.

Moreover, there are communities with other needs that need to be met and they use polio vaccination as a bargaining chip [31, 32]. The legality of the community members' refusals is debatable but the reality of their needs is undeniable. By fulfilling their basic needs, greater demand for vaccination can be created [20]. Good results are possible with better service packaging and information sharing [23, 33]. These refusals based on government performance fall under the theme of 'political refusals'. Politics in this context is the set of activities associated with governance of a country or area, and includes debates between the parties. Through constant, positive engagement, establishing trust and legitimacy, which are the cornerstone for large scale interventions, can be achieved [20, 34].

The prevalence rate of polio in Pakistan has reduced drastically. When a disease becomes rare, active demand for vaccination can drop [20]. Ultimately, the population becomes sceptical as to why the government is insisting on continuing with such programmes when the goal seems to have already been accomplished and becomes fearful of vaccine overload [13]. With decreasing cases, the momentum for polio eradication (no cases) should have been kept alive. To motivate through positive reinforcement, PEI needs to share with communities the previous polio counts and ask them for their support to go the last mile to eradication.

Conclusion

From the findings, the conclusion is that vaccine refusals have been persistent over time, but the reasons for this refusal needs to be clarified. What previously was accepted as ‘religious refusal’ is becoming more violent and driven by elements of anti-state sentiments. Refusals rooted in ethnic deprivation are becoming more resistant, invoking administrative actions, which will further deepen an “us versus them” feeling. A cultural role also has played a part in refusals. The demise of cultural institutions like Jirga and Hujra has created a vacuum, which is being filled by social media and its fear mongers. Social media is proving to be damaging to PEI.

The existing nomenclature for classifying polio refusals is misleading, as it is shifting the onus of system failures to communities and rendering officials over-protected. Walking the last mile of the PEI roadmap is tough, and requires determination. Though mainstream awareness and advocacy are needed, addressing social media messaging and negative online influences will be vital. Some of the current administrative actions against refusal families that include the arbitrary and incoherent use of force may be short-term solutions and may be ineffective and counterproductive in the long run.

Recommendations

To cover the religious dimension of polio vaccine refusals, recommendations include:

- 1 The recruitment and reporting line of religious support persons should be made transparent and their roles in helping should be enhanced.
- 2 The religious outreach by PEI shall be made more inclusive, including reaching out to Tableeghi Jamat and Ahl-e-Hadith.
- 3 Stakeholders like the PEI and EPI should put their support behind the Government of Khyber Pakhtunkhwa, which earlier proposed including all religious prayer leaders on the government’s payroll, thereby including them in formal governance structures and mainstreaming their influence.
- 4 Anti-terrorism and cyber-crime laws shall be invoked against the militant groups challenging vaccination online and using social media to promote refusal based on false religious notions.

To cover the ethnic and cultural dimensions of vaccine refusals, recommendations include:

- 1 The propaganda against vaccination on social media must be controlled.
- 2 The smooth transition of PEI Khyber Pakhtunkhwa to former de-facto/ FATA areas should be ensured.
- 3 The use of force for vaccination should be discouraged. Judicious restraint and creating active demand through the positive reinforcement of the value of vaccination should be the rule.

To address the socio-political construct of vaccine refusals, recommendations include:

- 1 The efforts of field workers must be acknowledged in the form of sufficient and swift payments for their services.
- 2 The misleading nomenclature used for classifying polio vaccine refusals should be revised.
- 3 Vaccination should be presented as part of better service packaging, similar to the newly launched health insurance programmes.

To address the existing gaps in the PEI awareness approach and to bridge the gap of information-to-action coordination, recommendations include:

- 1 Open talk to dispel the notions that polio vaccines cause infertility, cancer, HIV/AIDS and/or leads to the birth of more female babies.
- 2 Awareness-raising material should address the misconceptions about polio vaccines, which include the myths that the vaccines cause early puberty, more caesarean deliveries and obscenity within society.
- 3 The concept within communities that vaccination is “treating polio while it has not happened yet” needs correction. There should be roll-out of a comprehensive information package to help communities understand (i) the basic concept of disease prevention, (ii) vaccination and its mechanism of action, and (iii) herd immunity and its significance.
- 4 PEI and EPI would benefit from letting people know about the laws binding them to vaccinate and legal consequences if they refuse.
- 5 The PEI and EPI, along with their partners, should fully utilize social media to disseminate accurate information to the public.
- 6 The PEI and EPI should utilize social media to gauge communities’ sensitivities and to respond accordingly.

References

- 1 World Health Organization, WHO Statement on the Meeting of the International Health Regulations Emergency Committee concerning the International Spread of Wild Poliovirus, 2014, <<http://www.who.int/mediacentre/news/statements/2014/polio-20140505/en>>.
- 2 Naeem, Mohammad, et al., ‘Coverage and Causes of Missed Oral Polio Vaccine in Urban and Rural Areas of Peshawar’, *Journal of Ayub Medical College, Abbottabad*, vol. 23, issue 4, 2011, pp. 98–102.
- 3 Murakami, Hitoshi, et al., ‘Refusal of Oral Polio Vaccine in Northwestern Pakistan: A qualitative and quantitative study’, *Vaccine*, vol. 32, issue 12, 2014, pp. 1382–1387.
- 4 Khyber Pakhtunkhwa Bureau of Statistics, *Health Institutions and their Bed Strength in Khyber Pakhtunkhwa*, Peshawar, 2013.
- 5 Salathé, Michael and Sebastian Bonhoeffer, ‘The Effect of Opinion Clustering on Disease Outbreaks’, *Journal of The Royal Society Interface*, vol. 5, issue 29, 2008, pp. 1505–1508.
- 6 Kennedy, Jonathan, ‘How Drone Strikes and a Fake Vaccination Program Have Inhibited Polio Eradication in Pakistan: An analysis of national level data’, *International Journal of Health Services*, vol. 47, issue 4, 2017, pp. 807–825.

- 7 Ahmad, Syed Osama, et al., 'Pakistan: The final frontier for global polio eradication', *Journal of Epidemiology and Community Health*, vol. 70, issue 2, 2016.
- 8 Mahmood, Hina, 'Polio Elimination in Pakistan: Still a dream?', *Journal of Ayub Medical College, Abbottabad*, vol. 30, issue 2, 2018, pp. 304–307.
- 9 Callaway, Ewen, 'Public Health: Polio clings on in Pakistan', *Nature Publishing Group*, vol. 473, 2011, pp. 427–428.
- 10 Maher, Christopher, 'The Push to Eradicate Poliomyelitis in the Eastern Mediterranean Region (Editorial)', *Eastern Mediterranean Health Journal*, vol. 23, issue 9, 2017, pp. 587–588.
- 11 Sherazi, Zahir Shah, 'Polio Security Team Attacked in Charsadda; Seven Dead', *Dawn News*, 2014, <https://www.dawn.com/news/1081941>.
- 12 Jeffery, Patricia and Roger Jeffery, 'Underserved and Overdosed? Muslims and the Pulse Polio Initiative in rural north India', *Contemporary South Asia*, vol. 19, issue 2, 2011, pp. 117–135.
- 13 Casiday, Rachel, et al., 'A Survey of UK Parental Attitudes to the MMR Vaccine and Trust in Medical Authority', *Vaccine*, vol. 24, issue 2, 2006, pp. 177–184.
- 14 Obregón, Rafael, et al., 'Achieving Polio Eradication: A review of health communication evidence and lessons learned in India and Pakistan', *Bulletin of the World Health Organization*, vol. 87, issue 8, 2009, pp. 624–630.
- 15 Rosen, Rebecca and Steve Dewar, 'On Being a Doctor: Redefining medical professionalism for better patient care', *King's Fund Publications*, 2004.
- 16 Roberts, Leslie, 'Fighting Polio in Pakistan', *American Association for the Advancement of Science*, vol. 337, issue 6094, 2012, pp. 517–521.
- 17 Ahmad, Syed Osama, et al., 'Pakistan: The final frontier for global polio eradication', *Journal of Epidemiology and Community Health*, vol. 70, issue 2, 2016, pp. 109–110.
- 18 Hussain, Syed Ather, Ritesh G. Menezes and Sharath Burugina Nagaraja, 'Parents in Pakistan Arrested for Polio Vaccine Refusal: A necessary step?', *The Lancet*, vol. 385, issue 9977, 2015, p. 1509.
- 19 BBC News, 'Pakistan Killings Near Peshawar Disrupt Polio Campaign', *BBC News*, 2012, <<https://www.bbc.com/news/world-asia-20779388>>.
- 20 Nichter, Mark, 'Vaccinations in the Third World: A consideration of community demand', *Social Science & Medicine*, vol. 41, issue 5, 1995, pp. 617–632.
- 21 Hak, Eelko, et al., 'Negative Attitude of Highly Educated Parents and Health Care Workers Towards Future Vaccinations in the Dutch Childhood Vaccination Program', *Vaccine*, vol. 23, issue 24, 2005, pp. 3103–3107.
- 22 Khan, Sabina, 'Fata's Political Status, Strategic Insights; 2011 Spring', *Calhoun: The NPS Institutional Archive*, 2011.
- 23 Habib, Muhammad Atif, et al., 'Community Engagement and Integrated Health and Polio Immunisation Campaigns in Conflict-Affected Areas of Pakistan: A cluster randomised controlled trial', *The Lancet Global Health*, vol. 5, issue 6, 2017, pp. 593–603.
- 24 Safi, S., 'The Dawn of a New Era?', *The Nation*, 2018.
- 25 Pareek, Manish and Helen M. Pattison, 'The Two-Dose Measles, Mumps, and Rubella (MMR) Immunisation Schedule: Factors affecting maternal intention to vaccinate', *The British Journal of General Practice*, vol. 50, issue 461, 2000, pp. 969–671.
- 26 Yaqub, Ohid, et al., 'Attitudes to Vaccination: A critical review', *Social Science & Medicine*, vol. 112, 2014, pp. 1–11.
- 27 Blume, Stuart, 'Anti-Vaccination Movements and Their Interpretations', *Social Science & Medicine*, vol. 62, issue 3, 2006, pp. 628–642.
- 28 Hobson-West, Pru, 'Understanding Vaccination Resistance: Moving beyond risk', *Health, Risk & Society*, vol. 5, issue 3, 2003, pp. 273–283.

- 29 Calman, Kenneth C., 'Communication of Risk: Choice, consent, and trust', *The Lancet*, vol. 360, issue 9327, 2002, pp. 166–168.
- 30 Gefenaite, Giedre, et al., 'Comparatively Low Attendance during Human Papillomavirus Catch-Up Vaccination Among Teenage Girls in the Netherlands: Insights from a behavioral survey among parents', *BMC Public Health*, vol. 12, issue 1, 2012, p. 498.
- 31 Nishtar, Sania, 'Pakistan, Politics and Polio', *Bulletin of the World Health Organization*, vol. 88, 2010, pp. 159–160.
- 32 Hussain, Shoaib Fahad, et al., 'Eradicating Polio in Pakistan: An analysis of the challenges and solutions to this security and health issue', *Globalization and Health*, vol. 12, issue 1, 2016, p. 63.
- 33 Afzal, Muhammad Naveed, et al., 'An Effective and Doable Interventional Strategy to Enhance Vaccination Coverage – Are we ready to change?', *JPMA: The Journal of the Pakistan Medical Association*, vol. 67, issue 11, 2017, pp. 1719–1722.
- 34 Roalkvam, Sidsel, Desmond McNeill and Stuart Blume, *Protecting the World's Children: Immunisation policies and practices*, Oxford University Press, Oxford, 2013.



On 12 September 2017 in Punjab, Pakistan, District Health Communication Officer Bushra conducts a community awareness meeting about polio immunization for guest families in Rawalpindi District.



Children smile after being immunized against the measles in Peshawar, Pakistan.



III

LESSONS LEARNED, CONCLUSIONS AND RECOMMENDATIONS

Introduction

It is estimated that in Pakistan 66 per cent of children aged 12–23 months received all basic vaccinations, and only 51 per cent of children received all age-appropriate vaccinations [1]. This compares with a global average of about 85 per cent [2]. While evidence of the efficacy of vaccines is well established, there are still gaps in our knowledge and understanding of ways to improve implementation and scale-up of this life-saving intervention, particularly among the most deprived populations.

Implementation can be defined as the use of strategies to adopt and integrate evidence-based health interventions, and change practice patterns within specific settings [3]. There are multiple definitions of implementation research (IR) by several organizations [4-7]. UNICEF defines IR as *“[t]he integration of research methods and approaches within existing health programme implementation and policymaking cycles in order to improve service delivery and overcome bottlenecks.”* IR can provide a critical path to strengthening health systems [4, 8]. With its practical and operational focus, IR produces information needed to bridge knowledge gaps by addressing key questions concerning programme and policy implementation. Whether identified barriers relate to technical, behavioural, socio-cultural, financial, and/or health systems challenges, IR can examine them in real-world settings, identify strategies to overcome barriers and promote the uptake of research findings to maximize implementation effectiveness [4, 7, 8].

A desk review was commissioned by the Pakistan’s Ministry of National Health Services, Regulation and Coordination (MoNHSRC) to identify the key implementation challenges of EPI in Pakistan. Following the review, a stakeholder consultation workshop was organized to discuss potential IR topics and a call for research proposals was subsequently launched by HSA. Following the review of 26 submissions by an external committee consisting of independent local and global experts in IR, 10 research projects were selected for funding. Projects were chosen to provide a diverse mix of topics and geographic locations.

Ten teams were given a timeframe of up to nine months, and a relatively small budget (approximately US\$20,000 per project) to complete their projects. Each selected project focused on specific implementation challenges and was jointly led by an EPI manager and a researcher experienced in public health research. The involvement of EPI managers was critical because they, as implementers, provided unique insights into specific EPI challenges. All teams completed the research within six to nine months and presented their results in a national-level dissemination workshop in early 2018.

The Initiative was the first of its kind in Pakistan and the aim of the exercise described in this section is to document challenges, successes and key lessons learned to inform similar future initiatives. It is also critical to learn from the strategies that were used in the projects that made up the Initiative to assess how they have contributed to immunization coverage and equity in Pakistan.

Methods

An online survey was conducted among self-selected members of the IR teams (n = 13). The survey asked open-ended questions regarding the Initiative, such as how challenges were addressed, what the successes were and what factors facilitated these successes, and what research utilization strategies and key lessons learned were. In total, 13 respondents (10 researchers, 3 EPI managers), representing 9 of the 10 IR teams participated in the survey. To complement the results of the survey and ensure participation of all teams, additional face-to-face interviews were conducted with other seven members of IR teams.

Two representatives from the UNICEF Pakistan Country Office, a representative from AHPSR, and a UNICEF-recruited consultant, who were involved in coordination of the overall project and provided technical support, were interviewed in key informant interviews (KIIs). Questions were asked about the challenges of this initiative and for recommendations for future IR initiatives. In addition, informal discussions were conducted with members of three teams and the programme director of EPI in Sindh Province. The online survey and all interviews were conducted by two authors in English.

Data from the survey, interviews and discussions were qualitative in nature. They were independently analysed by two researchers and categorized into themes relating to challenges, success stories, factors that facilitated the successes, barriers, key lessons learned and strategies to ensure utilization of IR findings into EPI policy and practice, and recommendations for future initiatives. Before the survey, informed consent was obtained from all respondents through e-mail. In addition, verbal informed consent was obtained prior to each interview.

TABLE 19
Data collection methods and research respondents

Data collection methods	Research respondents
SurveyMonkey	Researchers (n = 10) EPI managers (n = 3)
In-depth interviews	Researchers (n = 5) EPI managers (n = 2)
Key informant interviews	UNICEF staff (n = 2) UNICEF recruited local consultant (n = 1) Representative of AHPSR (n = 1)
Informal discussions	EPI director Sindh (n = 1) Members of three teams from Sindh Province (n = 7)

Results

The participants referred to both challenges and successes experienced by the research teams. The results are presented according to themes that emerged, and include these challenges and successes along with the factors that facilitated successful strategies and recommendations for future IR initiatives.

Challenges encountered by the teams

Data collection, methodology and coordination

Collection of data, identifying respondents, communication with communities and partnerships with local non-governmental organizations (NGOs) and institutions were noted as key challenges by several research teams. One team mentioned that collection of data was challenging due to the concurrent activities of lady health workers (LHWs) and lady health supervisors (LHSs) in some districts. LHWs and LHSs are usually involved in sensitizing community members on reproductive health and nutrition, facilitating birth and death registration, distributing family planning methods, immunizing children, and providing basic maternal and child health services in the community [9, 10]. In addition, LHWs and LHSs take part in any nationwide campaigns organized by the Ministry of Health. During data collection some teams reported that they had difficulties reaching LHWs and LHSs, as they were involved in polio campaigns and other activities. These

activities included concurrent rotavirus vaccine introduction training sessions as well as unexpected medical emergencies. Moreover, due to polio campaign activities, it was difficult to obtain research data from LHWs and LHSs.

Another research team mentioned that the reluctance of the community to participate in the study was a challenge. Moreover, several research teams faced difficulties while interviewing people about vaccines, as it is often considered a sensitive topic. Time constraints, and inaccessibility to certain security-compromised and hard-to-reach areas were mentioned by several teams.

In addition, members of three teams found that the duration of the project was too short. As a member of one team said:

“The topic required a mixed method design but we could do only the qualitative part due to the shortage of time, resources etc.”

Another team reported:

“We were fortunate to encounter minimum challenges. However, getting to some of the selected facilities and convincing the staff to cooperate w[ere] the two key challenges as they had to open their stock registers and that was not easy.”

There were also challenges related to the different skill levels of the research teams. Some teams were better equipped to execute the research projects, whereas other teams lacked any experience of implementation research. Most of the research teams struggled to present their research findings effectively and lacked experience with research dissemination and policy communication. In spite of this, most of the research projects were highly relevant across provinces and even beyond Pakistan, and the research teams generally produced useful findings on how to tackle implementation barriers of EPI in Pakistan.

One interviewee mentioned that, from the outset, there was a lack of clarity and coordination among different partners on the implementation of the project. In particular, there was some confusion over who held operations/management and technical support roles (e.g., shortlisting projects, financial management of grants, financial flows, managing workshops, etc.). In addition, at the end of the project, a few teams reported that it was not clear who would support the dissemination process (i.e., policy briefs, journal publications) and programme integration/follow-up.

Research utilization/translation of results into practice and policy

Although two teams shared their research findings with different policy makers, overall, research utilization was a challenge for all teams. Some teams found that they lacked capacity and skills relating to research utilization, as the process to ensure use of IR findings in EPI and policies requires both comprehensive follow-up and a considerable time commitment. No team reported that they had designated a focal person accountable for the translation of research outcomes into policy and practice.

Dissemination of findings from the project was primarily through a national-level dissemination workshop chaired by the Federal Minister for Health. However, several teams suggested that their findings should be further disseminated at different levels using appropriate strategies. As mentioned by one team member:

“The results need to be shared with the policy makers and the implementers to expect improvement in EPI. Dissemination should be held in each province and soft as well as hard copies of the recommendations should be shared with [relevant stakeholders].”

One team argued that their IR project had helped bring focus to EPI and polio synergies at both provincial and district levels, and as a result, in some areas, EPI had increased collaboration with the Polio Programme. When asked whether their IR project contributed to improving EPI, a member of an IR team responded:

“For our project, the IR initiative allowed an innovation to be tested in the existing system, which facilitated and enabled it to deliver and improve immunization and decrease dropout rates.”

Only two teams took action on their own to influence provincial- and federal-level EPI policy makers with their study recommendations. However, there was no proper follow-up with the relevant policy makers to track whether results effectively translated into decisions. Another team mentioned that translation of the evidence into practice rests with the government and partners, including UNICEF. Overall, research teams stressed the importance of sharing more refined and concrete results with specific recommendations with provincial- and district-level EPI policy makers, particularly as some of their recommendations are more applicable to provincial and district levels.

Key successes

Effective engagement of EPI managers and policy makers

Several research teams mentioned that the IR initiative in Pakistan was unique in engaging EPI programme managers from the outset of the research. As one EPI implementer commented:

“It (the implementation research initiative in Pakistan) was first of its type of research in which the implementers were engaged from the very beginning to get to know about the issues and their solutions.”

Gaining support from and bringing local-, provincial- and federal-level EPI managers and policy makers on board for implementation research was added to the success of the Pakistan IR project, and was mentioned by both implementers and researchers. This is a notable accomplishment because the country is complex in terms of different mindsets and priorities of various stakeholders.

With the support of researchers, EPI officials identified implementation bottlenecks of EPI in Pakistan and through IR they came up with strategies to address these bottlenecks. Ensuring active participation of both researchers and EPI managers was mentioned as the key strength and success of the IR initiative, particularly involvement of EPI managers in helping to provide greater access to data and build ownership of the research.

Generating comprehensive evidence within a short period

Although three of the research teams noted that it was challenging for them to complete their study within the timeframe (6-9 months), all IR teams identified potential strategies to address several important implementation bottlenecks for EPI programme. The potential scope of the research areas was broadly defined, and the research projects that were prioritized by the teams touched upon a number of different challenges. The fact that all research projects were completed within a relatively short period of time and with limited budgets was seen by the teams as a great success. Moreover, all studies were finished with clear recommendations for EPI policy and programmatic decisions. One of the members of a team mentioned that:

“Prioritization of research areas was broad-based, hence the evidence generated touched upon almost every knowledge gap faced by EPI in Pakistan.”

Timely completion of projects

All teams worked hard to complete the project within the timeframe. The teams felt that the overall process (including literature review, orientation workshop, call for proposals, finalization of study designs, conducting of research and dissemination of findings at a final workshop) was robust and ultimately successfully. All teams reported that the ongoing support they received from the local consultant, as well as guidance from the partners (i.e., the UNICEF Pakistan Country Office and AHPSR) enabled them to overcome challenges, and helped to ensure timely completion of the studies and submission of the final project reports. One team member mentioned three important aspects:

“Timely submission of a well written proposal with a practical work plan; timely implementation of activities according to the agreed timeline; and timely and successful completion of the project and submission of the project completion report.”

Facilitating factors

Strong government buy-in

The overall concept and execution of the IR initiative was fully supported by MoNHSRC, which ensured acceptance of the initiative by all stakeholders and acted as a key factor for completion of all the projects within the allocated timeframe. In addition, cooperation from both provincial and district health authorities in the research helped make the IR project successful. As mentioned by a research team:

“The overall concept and execution of this (IR) initiative coupled with the fact that MoNHSRC was fully supportive, were the key facilitating factors.”

Involvement of EPI managers in the project

EPI in Pakistan faces many hurdles ranging from service delivery, equipment, human resources and data management, to reporting and other issues. The direct involvement of EPI managers enabled the research teams to identify feasible and practical solutions and their potential for scaling-up. In addition, having EPI managers as part of the research teams made the process (including data collection) faster than usual. The EPI officials helped research teams to contact the appropriate participants to collect the most relevant data. Most of the problems regarding data collection, communication with communities and partnerships with local NGOs were dealt with pragmatically with the involvement of EPI officials. When asked about key facilitating factors in the research, one team member said:

“Firstly, ensuring that an EPI manager was part of the team. Secondly, the introductory workshop facilitated. And thirdly, ensuring the best teams were selected after a rigorous selection process.”

Effective support from different stakeholders for project development and implementation

Ten teams were selected after a competitive selection process. All proposals were assessed by an external committee of independent local and global experts engaged in IR. The proposals were reviewed according to their relevance, appropriateness of the methods, composition of research teams (i.e., EPI manager as principal investigator) and budgets. Based on these criteria the committee scored each team. The ten proposals that were ultimately selected ensured a strong mix of topics and geographical representation of the teams. Throughout the implementation of the IR, continued feedback from the local IR consultant proved useful to all teams. Being a local researcher, the consultant had a comprehensive understanding of the social and political context of Pakistan. Moreover, several teams mentioned that an orientation and protocol development workshop held by the UNICEF team at the beginning of the research had helped to streamline the concept

(i.e., process, methods) of IR and emphasize its importance. Effective administrative support from the UNICEF Pakistan Country Office and HSA, easy modalities of fund transfer and a-priori engagement of EPI leadership by UNICEF played important roles in the implementation and completion of all IR projects. Guidance and regular support from UNICEF and HSA teams were also mentioned as important drivers for moving each project forward and allowing for completion within the expected timeframe.

Strategies to ensure use and application of the findings

Clear guidance on research utilization was requested by most of the teams. Moreover, Pakistan is a decentralized country where most health decisions are made at the provincial level. For that reason, active involvement of provincial-level decision-makers and partners from the outset was critical to ensure research uptake. Although several provincial-level EPI implementers and decision-makers were involved in the IR initiative, it was lacking in terms of their active participation and involvement in research utilization.

One key respondent from UNICEF mentioned the need to find upstream entry points for translation of IR findings into policy and practice. These entry points could be, for example, joint appraisals during the development of comprehensive multi-year plans (cMYPs), EPI policy reviews that are conducted by provincial and federal governments, and other meetings with ministers and high-level policy makers organized by UNICEF and other partners.

All teams reported that they require further technical as well as financial support to ensure use and application of the research findings in practice. Most teams suggested coordinated efforts by Gavi, UNICEF, WHO, AHPSR, HSA, provincial authorities and CSOs should be in place to facilitate the research uptake process. Two research teams suggested that the UNICEF Pakistan Country Office should take the lead in this change process. For example, one research team member stated:

“We believe the official clout of UNICEF [is high and therefore is critical] to ask for EPI response on our findings will set the ball rolling. We suggest that findings of all the teams should be sent to EPI/Government and they should be requested to come up with an action plan as to how they endorse and enact the knowledge base established by the IR teams.”

Four teams also suggested that peer-reviewed publications or wider dissemination of the IR findings would garner more legitimacy and ensure a greater push toward acceptance and implementation. Guidance and technical support in finalizing manuscripts for publication in journals, developing policy briefs for respective policy audiences, and organizing dissemination events (particularly at the provincial level) were suggested by several teams. In addition, four teams requested funding for additional research and scale-up of some of the innovations that were identified as promising solutions.

The teams argued that going forward, strategies for IR should involve active participation of all district-, provincial- and federal-level stakeholders and officials to coordinate efforts to tackle implementation bottlenecks. Being a decentralized country, most of the administrative and policy decisions regarding the EPI programme are made at the provincial level in Pakistan. Therefore, sharing the IR findings with respective provincial-level stakeholders and sensitizing them to uptake IR findings for improving immunization coverage is key.

Research teams also suggested that EPI policy guidelines and programmatic decisions should be drafted keeping in mind the cultural, economic, administrative and social needs of the respective provinces. Moreover, ensuring community participation and political will were mentioned as critical to ensure uptake of the IR findings and facilitate positive change.

All teams suggested that there needs to be a discrete set of actions identified, either in policy or programmatic arrangements, to enact the proposed recommendations of each IR team. Potential actions include:

- organizing roundtable discussions and policy dialogues with provincial-level policy makers to share and discuss key findings for each province;
- publishing IR findings in a peer-reviewed journal;
- using local media to highlight positive aspects of EPI and consequences of non-immunization; and
- developing a platform for EPI-related knowledge sharing between provinces.

Discussion

The survey and interviews of implementers and researchers involved in Pakistan's immunization IR showed strong collaboration in local contexts and the ability to jointly generate programme-relevant information in a short timeframe and with a limited budget.

Challenges encountered by the research teams related to internal capacity to deliver the research to a high standard (with the obvious limitations that a short timeframe and small budget introduce), coordination between partners, and the translation of research findings into practice.

Several partners were involved in overseeing and guiding the IR initiative in Pakistan. Partnerships among the local government public health institutions (i.e., HSA), AHPSR, UNICEF Pakistan Country Office and UNICEF Headquarters brought together several implementation research experts through which all teams received very good technical guidance during the initial phase of the project (i.e., during proposal development workshop). However, involvement of all partners and their continuous support throughout the project was lacking. Unclear roles and responsibilities of each partner could be a key reason for this deficiency. Recruitment of a local consultant with a clear understanding about the social and political context of Pakistan was extremely useful. However, implementation of the whole IR project could have been more robust if the feedback mechanism on draft research proposals, interview tools and research reports by all partners was provided on time in a systematic manner. Effective coordination and ensuring the involvement of every partner is often challenging, especially in settings where involvement of every partner is key [11, 12].

Government buy-in and support from the MoNHSRC were key drivers for increasing the acceptance of the whole IR initiative. Implementers' and policy makers' perspectives are rarely taken into consideration in research, although they play significant role when it comes to tackling service delivery bottlenecks. Literature shows that involvement of implementers and policy makers in the research ensures greater relevance and uptake of research findings into policy and programmatic decisions [7, 8, 13]. Moreover, stakeholders' ownership of the research is increased once they are involved in projects from the outset or lead the process [11, 13, 14].

A key objective of IR is to improve service delivery bottlenecks by applying evidence-based solutions [4, 6, 7]. It is expected that solutions generated through IR will inform policy and/or programmatic decisions. Although all teams intended to translate findings into EPI policy and practice, they did not follow explicit strategies. Effective research utilization can be complex, and often depends on the context in which the research takes place, as well as the knowledge and skills of relevant stakeholders, including researchers and policy makers [14,15]. Clear understanding of a country's

health systems and role of different policy audiences is important to ensure utilization of IR findings. In a decentralized health system such as that in Pakistan, district- and provincial-level policy makers may play a more significant role than federal-level policy makers. Regular communication with, and sensitizing of provincial level policy makers become much more important for ensuring research uptake.

Lack of knowledge and skills about research utilization among researchers and implementers was found to be a major factor that negatively influenced and delayed the process of translating IR findings into EPI policy and practices. Although implementers played a key role in completing all research projects within the timeframe, their role in contributing to the up-take of research findings into EPI policies in Pakistan was not evident. Delay in the process of translating IR finding into EPI policy and practices may also have been influenced by a lack of technical support from partner organizations (i.e., UNICEF) to the teams.

The gap between research and policy has been a long-standing concern among researchers as well as policy makers. Following the Pakistan Implementation Research for Immunization Initiative, several research teams suggested strategies for ensuring better uptake of implementation research findings into EPI policy and practices. These suggestions included sharing policy briefs and project summaries; organizing dissemination workshops or round-table discussions with policy makers at the provincial level; and publishing in journals. Among ten teams, only two teams were able to share their research findings with policy makers. However, subsequent follow-up and communications were not done properly to explore whether findings were taken into account. The presence of a dedicated support and coordination body in the country might influence the process of research utilization that was absent in Pakistan. Building researchers and programme managers capacity to address research utilization, working with strong advocates or policy champions (i.e., researchers, programme managers, members of a partner organization) and having the support of a coordination body in the country might help to ensure better uptake of IR findings into EPI policies and practices [3, 4, 13, 16]. In addition, establishing an implementation research platform within the Ministry of Health supported from other stakeholders (e.g. research institutions) would help to build IR capacity in the country as well as promoting evidence-based EPI policy and practices.

Limitations of the study

Findings of this explorative exercise reflect the experience of EPI implementers and researchers who were part of the Pakistan IR initiative. Therefore, all findings are not necessarily transferrable to other countries or other initiatives. However, the study revealed several lessons and recommendations that potentially can inform future IR initiatives in resource-poor-settings, as well as potential strategies to ensure utilization of research findings within policy and programmes.

Conclusions and recommendations for improvement

The Pakistan Implementation Research for Immunization Initiative provided useful insights into the delivery of an IR programme of projects. The initiative showed that relatively small and time-bound research projects can generate information and evidence for health systems strengthening. Programme implementers and researchers worked together with a clear focus on barriers to effective implementation. Despite some challenges, all teams reported that they were able to complete the project within the allocated time and generate comprehensive evidence with the support of EPI managers and researchers. Key factors that facilitated the successful and timely completion of

the studies included strong government buy-in, continuous technical support by a local research consultant, active engagement of EPI managers and strong partnerships with different stakeholders.

The partners that worked together to lead this initiative made specific recommendations to overcome the challenges and strengthen this type of research in the future:

- Develop additional guidance on the IR process for implementers and researchers, including guidance on proper execution, coordination and strategies to ensure utilization of research findings into policy and practices. In addition to researchers, involvement of programme managers, implementers and policy makers from the outset of an IR project is important. It is also important to involve national-, regional- and district-level stakeholders, especially in a decentralized setting such as Pakistan. A coordinated effort makes the IR process smooth, and increases acceptability and uptake of research findings.
- Clarify the roles and responsibilities of all involved stakeholders at the outset of the project, including the specific contributions of different partners at the global, regional and country levels.
- Ensure provision of ongoing technical support by a local consultant or partner with implementation research skills and knowledge of the local context to coordinate IR projects at the country level.
- Build capacity of the research teams on research utilization. Provide technical and financial support to ensure the timely dissemination and use of the findings and recommendations of the IR studies at the provincial level as well as the federal level, including through the development of an action plan and progress tracking. Establishing an IR platform within the Ministry of Health could help in this regard.
- Although this initiative showed that IR can be conducted within a limited timeframe, more time is required for projects that need an experimental design and long follow-up time.
- Continue to facilitate integrated partnerships among research teams (implementers and researchers), government counterparts and CSOs. Facilitate more frequent and greater collaboration among implementation research teams to enable knowledge sharing and learning.

References

- 1 National Institute of Population studies, Pakistan Demographic and Health Survey 2017–2018: Key indicators, Islamabad: 2018, <doi:10.2307/1973773>.
- 2 World Health Organization, 'Immunization coverage'. Fact sheet. Geneva: 2017, <www.who.int/news-room/fact-sheets/detail/immunization-coverage>.
- 3 Gonzales R, et al., 'Increasing the Translation of Evidence Into Practice, Policy, and Public Health Improvements: A Framework for Training Health Professionals in Implementation and Dissemination Science'. *Academic Medicine*, vol. 87, issue 3, 2012, pp. 271–278.
- 4 Theobald, Sally, et al., 'Implementation research: new imperatives and opportunities in global health', *Lancet*, vol. 392, issue 10160, 2018, pp. 2214–2228, <http://dx.doi.org/10.1016/S0140-6736(18)32205-0>.
- 5 Eccles, Martin P, et al., 'An implementation research agenda,' *Implementation Science*, vol. 4 issue 18, 2009, <doi:10.1186/1748-5908-4-18>.
- 6 Peters David H., et al., 'Implementation research: What it is and how to do it,' *British Journal of Sports Medicine*, vol. 48, 2014, pp. 731–736, <doi:10.1136/bmj.f6753>
- 7 Peters David H., Nhan T. Tran and Adam Taghreed, 'Implementation Research in Health: A Practical Guide', Alliance for Health Policy and Systems Research, World Health Organization, 2013, <https://www.who.int/alliance-hpsr/alliancehpsr_irguide.pdf>.

- 8 Ghaffar A. et al., 'Strengthening health systems through embedded research', *Bulletin of the World Health Organization*, vol. 95, issue 2, 2017, <doi:10.2471/BLT.16.189126>.
- 9 Mumtaz Z, et al., 'The role of social geography on Lady Health Workers' mobility and effectiveness in Pakistan', *Social Science Medicine*, 2013, pp. 48–57, <doi:10.1016/j.socscimed.2013>.
- 10 Hafeez A, et al., Lady health workers programme in Pakistan: Challenges, achievements and the way forward. *Journal of Pakistan Medical Association*, vol. 61, issue 3, 2011, <doi:10.1111/resp.12697>.
- 11 Nyström M.E., et al., 'Collaborative and partnership research for improvement of health and social services: Researcher's experiences from 20 projects', *Health Research Policy and Systems*, vol. 16, issue 46, 2018, <doi:10.1186/s12961-018-0322-0>.
- 12 Leeman Jennifer et al., 'implementation strategies: Classifying the full range of strategies used in implementation science and practice', *Implementation Science*, vol. 12, issue 125, 2017 <doi:10.1186/s13012-017-0657-x>.
- 13 Grimshaw Jeremy, M. et al., 'Knowledge translation of research findings', *Implementation Science*, vol. 7, issue 50, 2012, <doi:10.1186/1748-5908-7-50>.
- 14 Peters David, H., Abbas Bhuiya and Abdul Ghaffar, 'Engaging stakeholders in implementation research: lessons from the Future Health Systems Research Programme experience', *Health Research Policy and Systems*, vol. 15, suppl. 2, issue 104, 2017, <doi:10.1186/s12961-017-0269-6>.
- 15 Koon, Adam, D., et al., 'Embedding health policy and systems research into decision-making processes in low- and middle-income countries', *Health Research Policy and Systems*, vol. 11, issue 30, 2013, <doi:10.1186/1478-4505-11-30>.
- 16 Glasgow, Russell, E., et al., 'National institutes of health approaches to dissemination and implementation science: Current and future directions', *American Journal of Public Health*, vol. 102, issue 7, 2012, pp. 1274–81, <doi:10.2105/AJPH.2012.300755>.

Annexes

A Implementation research projects: Topics, locations and research teams

Thematic area	Research topic	Study sites/ districts	Province	Research teams
Community and demand	Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District	Sukkur	Sindh	Zafar Fatmi Siraj Ahmed Ambreen Sahito
	Addressing community barriers to immunization in Rajanpur District	Rajanpur	Punjab	Muhammad Younas N Rehan Kanwal Qayyum
	Addressing EPI vaccination demand through mHealth in Quetta City, Balochistan: A feasibility study	Quetta	Balochistan	Ejaz Ahmad Khan Muhammad Ishaque Panezai Baber Shahid Subhana Akbar
	Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts in Pakistan	Sargodha and Khushab	Punjab	Tariq Saleem Masood Sarwar Awan Muhammad Nauman Malik
Immunization supply chain and performance management systems	Immunization supply chain and management performance system	Ghotki and Sukkur	Sindh	Agha Muhammad Ashfaq Arshad Altaf Anees Siddiqui Tanzeb Ali
	E-Vaccs: Qualitative assessment of the barriers and enablers in implementation using Consolidated Framework for Implementation Research	4 districts: Lahore, Dera Ghazi Khan, Gujrat, Rawalpindi	Punjab	Munir Ahmed Shehneela Mazhar Eefa Tabbasum Saad Akbar Ahmed Razzaq
Human resources and service delivery	Exploring opportunities for strengthening supportive supervision: A case study of EPI services in Sindh	Hyderabad and Thatta	Sindh	Dure Samin Akram Yasmeen Suleman Lubna Baig SanaTanzil
	Understanding accountability for human resources in EPI, Balochistan: Perspective from the government officials at the provincial and district levels	Pishin, Harnai, Jhal Magsi, Killa Abdullah, Killa Saifullah	Balochistan	Aftab Kakar Zaeema Naveed Abid Saeed
Building on the polio experience	Examining the mechanisms and effectiveness of multi-tiered, EPI-polio synergy		In 4 provinces	Zaeem Ul-Haq Shamsa Rizwan Arshad Chandio Faisal Iqbal Saad Karim
	Developing three-dimensional narrative to counter polio vaccine refusal in Charsadda	Charsadda	Khyber Pakhtunkhwa	Sheraz Ahmad Muhammad Ashfaq Ayaz Ayub

B Project objectives, key findings and recommendations

Involvement of community health workers to improve immunization coverage in hard-to-reach areas of Sukkur District

Objectives	To explore feasibility of involvement of traditional birth attendants (TBAs) and determine the improvement in EPI vaccination coverage in hard-to-reach areas in rural Sindh
Key findings and recommendations	<ul style="list-style-type: none">• A TBA-based referral system can improve immunization coverage and completion of vaccination in rural areas with the provision of minimal incentives.• TBAs are acceptable to communities/parents and the formal health system.• A programme should be established to engage and train TBAs to refer children for timely immunization.• In parallel with a TBA-based referral system, vaccinators should expand outreach in hard-to-reach areas, particularly for families for whom travelling long distances to fixed centres is prohibitive. TBAs can then arrange for eligible children to gather in a set area on the planned day for vaccination.• Consideration should be given to providing a monetary incentive to TBAs, for example per child enrolled or vaccines given following enrolment.

Addressing community barriers to immunization in Rajanpur District

Objectives	To explore strategies for social mobilization in Rajanpur District for improving immunization coverage
Key findings and recommendations	<ul style="list-style-type: none">• Trained LHWs and vaccinators should be reallocated to hard-to-reach and underserved areas.• Community health workers and vaccinators should be given additional training in social mobilization. Monitoring should focus on social mobilization activities.• Systems for monitoring and supportive supervision of LHWs and vaccinators should be strengthened.• A system for registration of births in the community by LHWs and vaccinators should be established.

Addressing EPI vaccination demand through mhealth in Quetta City, Balochistan: A feasibility study

Objectives	To explore the use of artificial intelligence (AI) through the mHealth initiative for addressing demand and increase in vaccination coverage in Quetta, Balochistan
Key findings and recommendations	<ul style="list-style-type: none">• An AI-based mHealth initiative has the potential to improve coverage and equity by raising awareness and tackling vaccine-related hesitancy. The technology should be scaled up in Balochistan and potentially, subsequently, across Pakistan.• AI-based mHealth is a robust intervention, which is well accepted by parents, and is feasible to implement. It should be implemented at a broader scale, lessons learnt should be documented, and improvement and modification of the approach should be made accordingly.

Social mobilization campaign to tackle immunization hesitancy in Sargodha and Khushab districts in Pakistan

Objectives	To identify the causes of immunization hesitancy and assess the existing Social Mobilization Campaign (SMC) in terms of acceptability, appropriateness and fidelity
Key findings and recommendations	<ul style="list-style-type: none"> • Fear of fever and needles, lack of awareness, and religious and cultural beliefs are key reasons for vaccine hesitancy and refusal. • A structured monitoring system should be put in place to ensure that vaccinators properly counsel parents and mothers about potential adverse effects of immunization. • Communication committees at the district and divisional level should be established or reactivated. These committees should regularly monitor social and community mobilization activities, and provide feedback to EPI officials. • Availability and use of media, public service messages, brochures, pamphlets and descriptive-cum-pictorial materials should be ensured to enable LHWs to disseminate vaccinate-related information and encourage retention of the vaccination card. • Education sessions should be organized with conservative and illiterate segments of the population. • Training needs assessment of staff involved in social mobilization should be conducted.

Immunization supply chain and management performance system

Objectives	To assess effectiveness, barriers and enablers of the Visibility and Analytics Network (VAN) approach in improving the supply and availability of stocks by comparing the situation in intervention and non-intervention districts
Key findings and recommendations	<ul style="list-style-type: none"> • The introduction of a dedicated quality improvement team is an effective way to address capacity issues at the local level related to data analysis and decision-making about inventories and data entry into the Vaccine Logistic Management Information System. • The VAN should be rolled out in all districts of Sindh and options for introduction across Pakistan should be identified.

E-vaccs: Qualitative assessment of the barriers and enablers in implementation using consolidated framework for implementation research

Objectives	To investigate different barriers and enablers for the implementation of E-Vaccs in Pakistan
Key findings and recommendations	<ul style="list-style-type: none"> • Implementation of E-Vaccs, an android-based performance management system, can be strengthened by having an active mobile network, training for newly hired vaccinators, a unique identification for every child, facility-based E-Vaccs devices to ensure digitization of data and inclusion of the option of work status of the vaccinator. • E-Vaccs should be used in every health facility in Punjab. This will allow the government to gather data required for effective planning of vaccine delivery, including creating target lists for vaccinators and capturing information on children who dropped out of vaccination delivery. • E-Vaccs dashboards should be changed to meet the requirements vaccinators and planners. This work would ideally be guided by exploratory research to ascertain these needs. • Additional features should be added to the E-Vaccs application to improve acceptability and uptake among frontline workers. • Periodic training should be organized for vaccinators and supervisors to build capacity in the use of E-Vaccs and similar technology.

Exploring opportunities for strengthening supportive supervision: A case study of EPI services in Sindh

Objectives	To assess the supportive supervision system for routine immunization services in Sindh and to document barriers and facilitators for improved supportive supervision systems
Key findings and recommendations	<ul style="list-style-type: none"> • The training module for EPI supervisors should be updated and translated into local languages. • Training should include modules on interpersonal communication skills and regular technical refresher training for supervisors. • Guidance for supervisory visits in the field should be developed and checklists should be updated and field tested. • An improved incentive structure for supervisors should be introduced and carefully monitored. • There should be adequate provision of logistics, particularly transportation, for supervisory visits.

Understanding accountability for human resources in EPI, Balochistan: Perspective from the government officials at the provincial and district levels

Objectives	To determine perspectives of health officials on human resource accountability challenges that hinder immunization services at various levels of government; and to identify governance strategies for management of inefficiency, lack of motivation and absenteeism
Key findings and recommendations	<p>Effective strategies to increase and strengthen human resource accountability in Balochistan include:</p> <ul style="list-style-type: none"> • Adapt the National EPI Policy tailored to the provincial context and intensify implementation. Include description of rules, regulations or procedures governing the workforce. • Develop clear job descriptions and terms of reference, specifying responsibilities and objectives, for all EPI staff. • Review current incentive structures and institute changes as required. • Review current allocation of vaccinators and reallocate to fill gaps. Increase recruitment of new vaccinators and other EPI staff as required.

Examining the mechanisms and effectiveness of multi-tiered, EPI-polio synergy

Objectives	To examine current status of EPI-polio synergy including the barriers and facilitators, along with documenting its community-level implementation and perceived effectiveness in Pakistan
Key findings and recommendations	<ul style="list-style-type: none"> • It is important to ensure clarity on the concept of synergy particularly among the polio and EPI officials at the district and provincial levels. • Operational guidelines for synergy and clarity on the guidance from higher policy makers from both polio and EPI are crucial. The national ministry should take the lead and bridge the gaps in terms of policy direction and implementation of the synergy guidelines. • Polio and EPI leadership should develop clear action points of synergy and facilitate the administrative process to make activities happen at national, provincial and district levels. • A central oversight mechanism and consensus document/framework can enhance EPI-polio synergies around micro-planning, monitoring and surveillance for zero-dose children.

Developing three-dimensional narrative to counter polio vaccine refusal In Charsadda

Objectives	To explore the root causes of community mistrust in polio vaccination in district Charsadda and explore the gaps in current community trust building measures with regard to polio eradication
Key findings and recommendations	<ul style="list-style-type: none"> • Increase religious leaders' support for the immunization programme through active involvement in immunization and health workshops and seminars. The aim should be to address religious and cultural dimension of vaccine refusal. • Address the cultural dimension of vaccine refusals with the involvement of social, traditional media and cellular networks. Dissemination of vaccine related information, success stories and consequences of not receiving vaccines should be delivered in a simple way to make people in the community receptive to vaccines and immunization. • Investments should be made in training and support for vaccinators to improve knowledge of vaccines and immunization, and build capacity for interpersonal communication. Involvement of the private sector in social mobilization activities can strengthen the government's response to vaccine refusals.



A girl in Karachi during the October 2018 national measles immunization campaign across Pakistan.

Implementation Research and Delivery Science (IRDS) Unit
Health Section
UNICEF
3 United Nations Plaza
New York, NY 10017