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Research Article

Factors influencing the implementation of Global Polio Eradication Initiative in low- and middle-income countries: a qualitative evidence synthesis

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Background

The World Health Organization's Global Polio Eradication Initiative (GPEI) has succeeded in reducing the cases of Polio by 99%. The persistence of the remaining 1% in Pakistan, Afghanistan and Nigeria has continued to pose threats to polio-free neighbouring countries. This systematic review aims to contribute to ongoing efforts to eradicate polio by exploring factors that influence the successful implementation of the GPEI in low- and middle-income countries.

Methods

We reviewed qualitative research or mixed methods study reports published between 2012-2018 from studies conducted in low- and middle-income countries. We extracted qualitative research data using a standardised data extraction form and assessed study quality using the Critical Appraisal Skills Programme (CASP) qualitative checklist. We then conducted best-fit framework synthesis to organise, and explore patterns in, the data relating to new and existing themes. We report data on factors influencing the implementation of polio eradication efforts organised by theme.

Results

We included 11 studies published between 2012 and 2017. Most of the studies were conducted in Pakistan and Nigeria with other countries (Ethiopia, Cameroon, Angola) also represented. The ten themes included structural factors (the development of capacity, through infrastructure and training) and attitudinal factors (including cultural and religious beliefs), were particularly important given the characteristics of included low- and middle-income countries. Common factors emerged across the included studies and generally these mapped well to the underpinning "best fit" framework.

Conclusions

This qualitative evidence synthesis offers a useful expanded framework by which policymakers can explore factors specific to their geographical and population-based context although it should be recognised that individual factors relating to personal values and belief systems may moderate any community response to a polio vaccination programme.

The incidence of polio has been reduced by 99% through a concerted effort by the Global Polio Eradication Initiative (GPEI), a public-private collaboration which was instituted in 1988 for the complete eradication of this disease.[1] The current policy of GPEI is "The Polio Eradication and Endgame Strategic Plan 2013-2018".[2] However, this success is continually threatened by the presence of the remaining 1% of cases residing in developing countries, and the World Health Organisation (WHO) has suggested that one case of polio anywhere in the world is a global health risk.[1]

The Wild Polio Virus Type 1 (WPV1) is the serotype of the poliovirus that is yet to be eradicated while circulating Vaccine-Derived Poliovirus type 2 (cVDPV2) is caused by the Oral Polio Vaccine (OPV), the vaccine used for polio eradication. From 1.1.2019–10.3.2019, there were 6 WPV1 reported cases globally (2 in Afghanistan and 4 in Pakistan) and 1 cVDPV2 (Nigeria) while the total number of cases for 2018 were 33 and 105 for WPV1 and cVDPV2 respectively.[3]

Pakistan and Afghanistan are polio-endemic countries and most polio cases that have been identified in other countries have been linked to this region.[4] These two coun-

tries share the same border which led to the institution of polio border vaccination teams in 2016, a joint effort between the two countries.[5] However, illegal border movement between the two countries has been identified as an ongoing issue in attempts to prevent the spread of polio.[4] Factors contributing to the persistence of polio in these two countries are insecurity (including the killing of polio health workers by terrorists), vaccine refusal by parents, and the lack of governmental support for eradication activities.[6]

The development of cVDPV2 caused by Oral Polio Vaccine (OPV) has led to outbreaks in non-endemic areas following routine immunisation.[7] This has constituted a major setback in the eradication of polio and experts argue that even though OPV is needed for the interruption of polio transmission, it must be urgently replaced with Inactivated Polio Vaccine (IPV) for total eradication to be achieved.[8] The Polio Eradication strategic plan 2019-2023 is currently being developed.

The aim of this qualitative evidence synthesis (QES) is to contribute to the existing knowledge of polio eradication by providing current evidence on the factors (barriers and facilitators) influencing the successful implementation of GPEI in Low and Middle-Income Countries (LMIC). This will ultimately contribute to ongoing efforts to eradicate the remaining 1% of polio cases[9] as well as informing the development of a framework for the elimination of other infectious diseases.[1]

THE RELEVANCE OF QES IN INFORMING POLICY AND PRACTICE

Health systems decisions are commonly driven by evidence on the effectiveness of interventions. However, additional questions, including how stakeholders value outcomes, the acceptability and feasibility of interventions and their impact on equity, can be addressed by evidence from qualitative research.[10] An increasing number of WHO guidelines now use qualitative evidence in this way.[11] Methodological developments,[12] including robust methods for qualitative evidence synthesis,[13] have helped to facilitate the adoption of this type of evidence.

METHODS

A research protocol (Appendix S1 in **Online Supplementary Document**) was produced prior to initiation of the study to allow a transparent replicable procedure[14] The SPICE criteria (Setting, Perspective, Interest, phenomenon of, Comparison, Evaluation) were used to define the review question and studies qualified for inclusion only if they met the criteria specified by the SPICE mnemonic[15] (see Appendix S2 in the **Online Supplementary Document**). In addition, only qualitative studies or mixed methods studies that reported qualitative findings published between 2012 and 2018 were considered eligible. The year 2012 was used because polio cases significantly reduced by this year owing to the concerted efforts of the leadership of the endemic countries which led to the commencement of the current strategic plan in 2013.[2] Unpublished papers were also considered provided they reported qualitative findings to minimise publication bias.[16]

Searching electronic databases for qualitative studies can be challenging as subject indexing for qualitative papers is poorly developed in some databases.[17] As a result, the "pearl growing" strategy was used by identifying a key article on polio eradication from a preliminary database search and using relevant terms to "grow" a list of candidate MeSH headings and free text terms.[18] However, terms like "barriers" and "facilitators" were not used as search terms, given that they could be implicit in many relevant abstracts, and therefore greatly increase the number of articles retrieved, without an accompanying increase in accuracy.[19]

A comprehensive search of the following electronic databases was undertaken to retrieve published papers on GPEI in developing countries: MEDLINE via OVIDSP, CINAHL via EBSCO, EMBASE via OVIDSP, Web of Knowledge, ASSIA via ProQuest, ProQuest Dissertation and Thesis: UK & Ireland. An additional search was conducted via MedNar database, GPEI website and Google to identify grey literature. The search was conducted in May 2017 with an update search performed in January 2019 for papers published in 2018. The full electronic strategy for Ovid Medline is presented as an Appendix (Appendix S3 in the **Online Supplementary Document**).

The citations of all included studies were also searched using Google Scholar and their reference lists were also reviewed to identify relevant papers that may have been missed due to indexing or searching inadequacies arising from the database search.[18]

Two groups of research authors in polio eradication were contacted for additional studies; the Polio Research Committee under the Global Polio Eradication Initiative organisation[20] and eHealth Africa research team[21] as it was acknowledged that they may be able to provide relevant articles that an exhaustive search would not identify.[22]

Study selection was undertaken by two independent researchers. The retrieved articles were assessed by reading the titles, abstracts and, for candidate articles, the full text successively reviewed against the inclusion and exclusion criteria.[23] All articles requiring full-text review were exported to Mendeley reference manager.

Data extraction was performed simultaneously with quality assessment of the studies using an Excel spreadsheet. These processes were undertaken by three different reviewers and a final consensus agreed. Data items extracted included the setting (country), descriptive study characteristics (study aims, study design, data collection, analysis, ethical approval) and study findings.

The research team considered the findings from the results section of included papers given that other sections of the papers would typically draw on these same findings.[24] Verbatim quotes and authors' interpretations, singly or together, were taken as data and documented in italic and bold font respectively. These respectively captured the in-depth experience of the participants in addition to the researchers' context and perspective.[14]

The included papers were quality assessed using the Critical Appraisal Skills Programme (CASP) qualitative checklist tool.[25] This tool is commonly used to assess the

quality of qualitative research studies.[14] None of the papers were excluded due to a high risk of bias.

DATA SYNTHESIS

The findings were synthesised using "best fit" framework synthesis.[15] A framework of polio eradication in Pakistan developed by Mushtaq *et al.*[26] was identified from the literature and agreed as the "best fit" for the synthesis as it employed a qualitative design to explore the perspective of health workers and managers on the factors influencing polio eradication in the region.

Framework synthesis was used rather than thematic synthesis because it represents an efficient method of generating themes deductively and then, in a subsequent stage, inductively.[24] Additionally, "best fit" framework synthesis produces findings that facilitate application by policymakers, a major objective of this review.[15]

REPORTING

This systematic review is reported using the ENTREQ statement guidelines to enhance transparency in reporting QES.[27]

RESULTS

STUDY SELECTION

A search in all the databases retrieved a total of 154 studies; 111 articles remained after the duplicates were removed and 13 articles were selected for full assessment after screening the titles and abstracts. Two articles were excluded after full-text assessment and the references, including the reasons for exclusion, are documented in Appendix S4 of the **Online Supplementary Document**. Citation search of the included papers yielded two additional published papers. Figure 1 below shows a Prisma flow diagram[28] demonstrating how the 11 studies were selected.

CHARACTERISTICS OF INCLUDED STUDIES

The characteristics of each study are documented in Table 1. All studies[29–39] were published between 2012 and 2017. Four studies were conducted in Nigeria,[36–39] three in Pakistan,[32–34] two in Ethiopia[29,31] and one each in Angola[35] and Cameroon.[30]

Three studies[29,31,32] explored multiple perspectives of health workers, community and religious leaders as well as stakeholders. Six studies had caregivers including parents as participants[30,34–37,39] while 2 studies had health workers as participants.[33,39] Stakeholders such as policymakers, programme managers, social mobilization officers/health educators and representatives were the target audience of one study.[38]

Three of the included studies[29,33,36] used focus group discussions (FGDs) while four[34,35,37,38] used In-depth interviews (IDIs). The remaining four studies[30–32,39] used both FGDs and IDIs. Participant observation was conducted in two studies.[30,39]

QUALITY ASSESSMENT

The quality of all eleven studies was assessed using the CASP checklist (See Appendix S5 in the **Online Supplementary Document**). Three studies were assessed as high quality[30,38,39] five as medium quality[29,31–33,37] and three as low quality.[34–36] None of the studies satisfactorily addressed the issue regarding the impact of the researcher on the individual study outcomes. This could be as a result of non-documentation or because it was not considered during the study.

FRAMEWORK FOR SYNTHESIS

The "best fit" framework of themes by Mushtaq *et al.*,[26] used for this review are presented alongside the themes which emerged in this study in Table 2. The study findings, mapped according to the derived themes, are documented as italics and bold for participants' quotations (italics) and authors' interpretations (bold) (Appendix S6 in **Online Supplementary Document**).

SYNTHESIS OF RESULTS

Table 3 provides a summary of the representation of main themes by the individual studies and this section gives the synthesis of the main themes as well as sub-themes.

PROGRAM RESOURCES AND LOGISTICS

CONDITION OF COLD CHAIN IN ALL ASPECTS

Two studies[31,34] reported the lack of cold chain equipment. For instance, refrigerators were either non-functioning or unavailable.

Oku *et al*.[38] also describe logistic constraints:

> "... because our solar system is bad, we collect the vaccines on the day we want to use it and this causes a delay in the early commencement of the clinic." (Health worker, Bauchi, urban site p.8)

SKILLS AND AUTHORITY IN RESOURCE ALLOCATION AND HUMAN RESOURCE MANAGEMENT

Resources for vaccination – such as funding and vaccine supply - were not distributed appropriately for the immunisation program[31,38] - "*the main reason for vaccine shortages was said to be failure of the region/zone to properly allocate and distribute vaccine according to the population size*".[31]

ADVOCACY AND COMMUNICATION RESOURCES

Awareness creation was key to the uptake of polio immunisation but was poorly implemented due to insufficient resources being allocated for campaigns. This led to a complete absence of information or parents feeling under time pressures to vaccinate their children.[30]

Opportunities to disseminate messages about vaccination might include TV programmes[32] or at the mosque after prayers.[39]

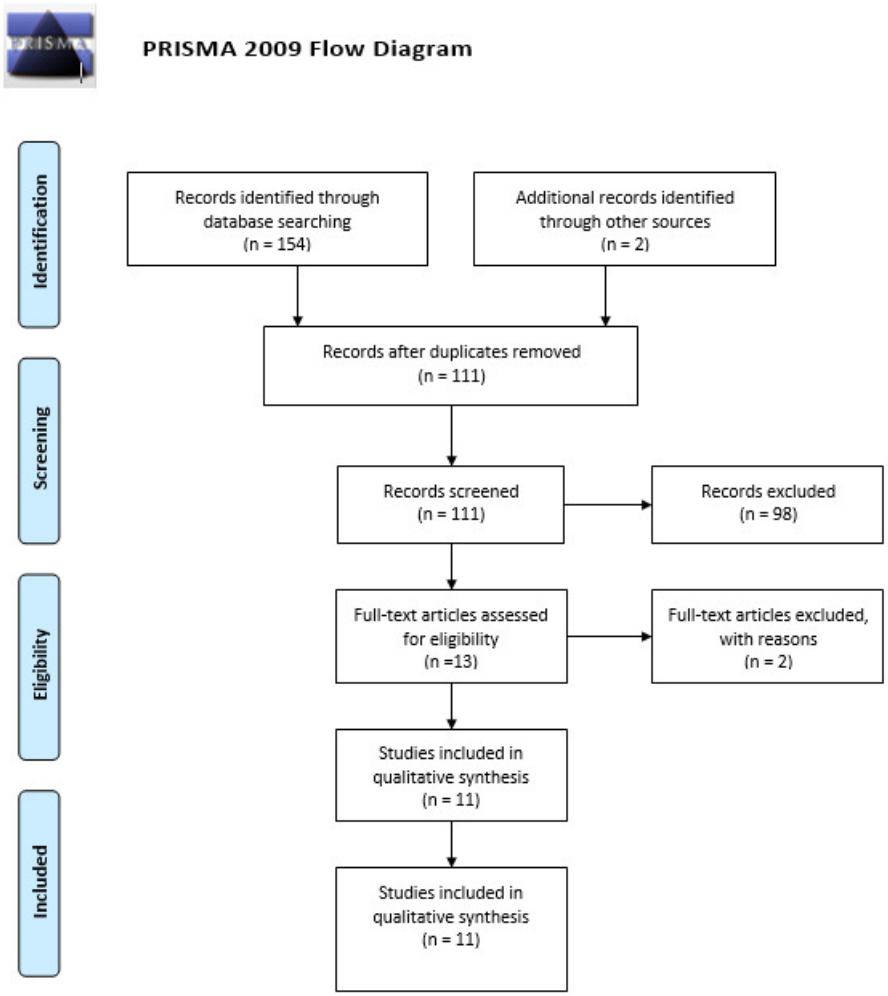

Figure 1. PRISMA flow diagram.

TECHNICAL ASPECTS

Training is necessary for appropriate detection and reporting of polio cases.[31] The staff lacked skills to effectively carry out eradication activities with lack of training as a contributory factor.

> "...health workers had poor communication and negotiation skills and were not able to communicate the purpose of their visit well, especially when they visited resistant households...".[38]

PROGRAM OPERATION AND MANAGEMENT

HEALTH SERVICE INFRASTRUCTURE

Health worker shortages, particularly in rural areas, have impacted negatively on the vaccination program. Oku *et al.*[38] reported that staff shortages can be addressed by recruiting community volunteers as well as by using traditional and religious leaders for community mobilisation.

POLITICAL INFLUENCES AND FACTORS

The government has failed to take ownership of the program because of overdependence on development partners. When there is ownership, there is active involvement in vaccination activities.[38]

FACTORS IN VACCINATION AREAS AND FIELD PROGRAM

Several factors in vaccination areas have caused problems including language barrier between vaccinators and the community[34] and delays in funds disbursement.[38] FDG respondents suggest that the best way to ensure that missing children get vaccinated is to revisit houses where children had missed the vaccination.[36]

IMMUNISATION CARDS

Vaccine administration was denied to children if parents forgot to bring immunisation cards. If there were not enough children to justify opening a vial of vaccine, "*they sent parents away and told them to come back on the next clinic day.*".[30]

Table 1. Characteristics of included studies

Identifier (Year)	Context	Participants	Target population	Ethnicity	Method
Abraham et al.[29]	Semi pastoralist and pastoralist areas of Ethiopia	Health workers, community and religious members, women of reproductive age (Focus Group Discussions (FGDs) - Each 6 to 8 individuals)	Health workers, community and religious members, women of reproductive age	Mixed ethnicity	Focus group discussion (FGDs)
Ames et al.[30]	Central and North West Regions of Cameroon	Immunization program manager(n=8), Health workers(n=8), Community members (n=6), Parents (56)	Immunization program managers, health workers, community members, Parents	Mixed ethnicity	Semi-structured interview (n=78), Participant observation and informal conversations (n=8)
Bisrat et al.,[31]	Border districts (woredas) of Ethiopia	Community volunteers, health workers, community and religious leaders' (In-depth interviews (IDIs) (n=33), 6 FGDs each with 6-8 individuals)	Community volunteers, health workers, community and religious leaders	Mixed ethnicity	In-depth Interviews (IDIs) (n=33), Focus group discussion (n=36 to 48)
Habib et al.[32]	Pishin, Bajaur and Karachi districts of Pakistan	Women. Community stakeholders, male decision-makers, polio program staff, religious leaders, healthcare providers, political leaders, stakeholders (n=477)	Decision-makers at the household level, influencers at the community level, political and religious leaders, health workers, polio program staff and government stakeholders.	Not documented	FGDSs (n=112), IDIs (n=365)
Khan and Sahibzada[33]	Kohat and Hangoo, and Bannu and Peshawar districts of Pakistan	Health workers (n=44)	Health workers	Not documented	FGDs (n=44)
Khowaja et al.[34]	Karachi district of Pakistan	Parents that refused vaccination for their children (n=30)	Parents that refused vaccination for their children	Pashtuns	IDIs (n=30)
Macama et al.[35]	Luanda province of Angola	Families and health staff (n=Not documented	Families of cases and health staff	Ambundu, the Ovimbundu and the Bakongo	IDI
Michael et al.[36]	Katsina, Nigeria	Caregivers (36 FGDs of 8-12 members each)	Caregivers of missed children	Hausa/ Fulani	36 FGD of 8-12 members each
Murele et al[37]	Sokoto, Nigeria	Caregivers (n=72)	Caregivers	Fulani	IDIs
Oku et al.[38]	Bauchi and Cross River State of Nigeria	Stakeholders (n=15)	Stakeholders	Mixed ethnicity	IDI (n= 15)
Oku et al.[39]	Bauchi and Cross River State of Nigeria	Caregivers (n=84), health workers (n=14), Traditional leader (n=1), Religious leader (n=1)	Health workers, community leaders and caregivers	Mixed ethnicity	Observations (n = 40), IDIs (n = 14) and FGDs (FGDs) (n = 12)

IDI – indepth interview, FGD – focus group discussion

Table 2. Best-fit framework of themes and themes which emerged from the review

Theme	Pre-existing framework of themes Sub-Themes/Description	Emerged themes from the review
Program resources and logistics	Condition of cold chain in all aspects	Condition of cold chain in all aspects
	Skills and authority in resource allocation and human resource management	Skills and authority in resource allocation and human resource management
	Advocacy and communication resources/interventions	Advocacy and communication resources
Technical aspects	Skills and training among staff at all levels in all aspects of the program	Skills and training among staff at all levels in all aspects of the program
	Availability of public health professionals and state of health service structure	Availability of public health professionals and state of health service structure
Program operation, management and organization	Administrative issues including:	
	-Method of performance evaluation	Administrative issues including:
	-Political Influences and factors	-Political Influences and factors
	-Factors in vaccination areas and the field program	-Factors in vaccination areas and the field program
	-Immunization cards	-Immunization cards
	-Birth records at health facilities	-Issues around access (availability of staff; waiting times etc)
	-Partnership of different preventive programs	-Impact of positive/negative attitudes of healthcare staff
Monitoring, evaluation and feedback	Reporting and monitoring systems	-Reporting and monitoring systems
	Use of local data	
	Decentralization of the health system	Decentralization of the health system
Insecurity in high-risk polio areas	Nil	Safety issues in regions where polio exists
Vaccine acceptability by caregivers	Nil	Perception of sterility induced by polio vaccine
		Literacy status of caregivers
		Influence of Religion
		Influence of Frequent visits
		Effectiveness of vaccination
		Influence of vaccine side effects
Competing belief systems	Nil	Eg, Islamic beliefs and traditional medicines
Influence of community stakeholders	Nil	Community leaders as determinants of community vaccination
The nature of the disease	Nil	The understanding of polio as an influence
Cross-border polio surveillance	Nil	Factors that determine polio spread between neighbouring countries

Table 3. Summary of themes across individual studies

Themes	Khowaja et al.[35]	Abraham et al.[36]	Bisrat et al.[37]	Macama et al.[38]	Michael et al.[29]	Murele et al.[30]	Khan and Sahibzada[34]	Ames et al[39]	Habib et al. (2017)[33]	Oku et al.[31]	Oku et al.[32]
Program resources and logistics	Y	Y	Y			Y		Y	Y	Y	Y
Technical aspects			Y	Y						Y	
Program operation, management and organization	Y	Y	Y	Y	Y			Y	Y	Y	Y
Monitoring, evaluation and feedback			Y							Y	
Insecurity in high-risk polio areas							Y				
Vaccine acceptability by caregivers	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y
Competing belief systems						Y					Y
Influence of community stakeholders			Y			Y			Y	Y	
Perception of the nature of the disease		Y	Y	Y	Y	Y		Y	Y		
Cross-border polio surveillance		Y	Y								

ACCESSIBILITY FACTORS

These relate to the unavailability of children at the clinic, or at home when a health professional visits.[36] Health workers face challenges in travelling to hard-to-reach places:

> "I trekked a very long distance with vaccines on my head because there were no roads to the community. I have even walked through a forest all alone...I had to cross a deep... fast-flowing river..." (Health worker, Cross River, rural site.).[39]

ATTITUDE OF HEALTH WORKERS

Attitudes of health workers may impact upon the willingness to attend vaccination clinics:

> "However, a few caregivers described the impolite behaviour of health workers towards women with low levels of education, teenage mothers and mothers who arrived late or forgot their vaccination cards.".[39]

While this may not necessarily result in non-attendance it can certainly impact upon receptivity to the accompanying information being provided:

> "If you don't dress well and are not so educated some of the nurses treat you badly... This attitude usually leaves a lasting impression on the minds of the mother and she may miss vital information on vaccination..." (Caregiver, Bauchi, rural site.).[39]

MONITORING, EVALUATION AND FEEDBACK

REPORTING AND MONITORING SYSTEMS

A lack of monitoring and supervision at the local level may affect the overall performance of the program.[38] For example, *"the problem was said to be graver during rainy season when reporting was totally interrupted..."*.[31]

DECENTRALIZATION OF THE HEALTH SYSTEM

One study found that "*the local government usually depended on the State Ministry of Health to supervise and monitor the health workers at the lower levels, but this rarely happened*".[38]

INSECURITY IN HIGH-RISK AREAS

Health workers affirmed that: "*Due to the recent terrorist attacks we sometimes have to look over our shoulders to check if someone is following us*".[33]

Health workers suggested that house to house visiting should be stopped and restricted to the health centres because of insecurity (Khan and Sahibzada 2016). Though this is problematic as people from rural areas may not be willing to go to health centres for immunisation.[37]

VACCINE ACCEPTABILITY BY CAREGIVERS

FREQUENT VISITS BY HEALTH WORKERS

A common view among health workers was that, "*revisits create suspicion in the minds of parents, and that is why some believe it's an American campaign*".[33]

VACCINATION AS A CAUSE OF STERILITY

Some parents perceive that the "*polio vaccine is prepared in the West and sent here. It is then given to our children in order to destroy their ability to reproduce in the future.*".[34]

"There are different reasons for refusal but the main one is Ulmah (religious leader having the authority to give Fatwah) prohibition of polio drops because they think it causes infertility".[32]

LITERACY STATUS

Illiteracy is one reason why parents refuse to accept the vaccine as "*a low education level makes people think negatively...*" (Health worker).[33]

RELIGIOUS INFLUENCE

Religion is an important factor.

> "There is a video tape being circulated by one Muslim teacher discouraging people against vaccination... and resulted in our vaccination teams ... to be attacked because of the tape" (Local mobilizer).[38]
> "I was allowing my children to receive polio vaccine until last year, when I learnt that the material used is un-Islamic (haraam)... if we are given proof that this material is not haraam, then we will allow our children for polio vaccine" (Parent).[34]

EFFECTIVENESS OF VACCINATION

Doubts were raised about the effectiveness of vaccines. "*It is of no good, because one of my friends has polio even though he was vaccinated against it.*" (Parent).[34]

SIDE EFFECTS OF VACCINATION

Concerns about vaccine side effects were given as reasons for rejecting the vaccine. "*some diseases are seasonal, such as cold cough and flu, but parents just associate it with the polio vaccination because they know that their kids have taken the vaccination recently*" (Health worker).[33]

Where health workers were indigenous to the community this could help to address vaccine resistance. "*We are residents of this area. People know us and that is why they cooperate with us*" (Health worker).[33]

Awareness raising and community engagement help to improve vaccine uptake in resistant areas, particularly when traditional and religious leaders are involved in the mobilisation.[38]

COMPETING BELIEF SYSTEMS

Two studies[37,39] reported competing belief systems which impact on decision-making processes regarding vaccination.

> "... qur'anic verses are recited to invoke divine protection against all diseases... After the recitation, the words are written on a slate, washed and the water given to the child. This is a very serious and effective immunization against diseases...".[37]
> "*the health workers and government people who told us that OPV is very effective against this disease that affects the legs*" (respondent),.... "*because I have not seen any quote in the Holy Quran that say immunization is good*" (IDI, female refusal, urban).[37]

Community engagement has been identified as an important tool for resolving competing beliefs.[39]

INFLUENCE OF COMMUNITY STAKEHOLDERS

Community stakeholders can impact on immunisation activities in various ways. "*...community members demand money from health workers in exchange for immunization services...*".[38] On the other hand, health workers were attacked as a way of expressing displeasure with the government for lack of social amenities.[39]

These stakeholders can also play a positive role in raising awareness. Religious leaders serve as the main source of information on health matters: "*uneducated people go to Molvis (religious leaders) and they believe whatever the moulvi (religious leader) says*".[32]

THE NATURE OF THE DISEASE

Various ideas of the nature of the disease were presented, including that it has a supernatural cause and that it can be transmitted from one person to another.[31]

CROSS-BORDER POLIO SURVEILLANCE

Illegal border movements were identified as a reason for the persistence of polio.[31] Bisrat *et al*. suggest that immunisation cards should be used at the borders to check for unvaccinated children and also comment on "importance of having regular cross-border consultative meetings with neighbouring countries...".[31]

DISCUSSION

This qualitative evidence synthesis suggests that many structural factors impact upon the capacity of LMICs to deliver effective polio eradication programmes. In many cases, structural factors must be addressed before context-sensitive barriers relating to attitudes can be successfully tackled. Training acts as a cross-cutting theme that not only impacts upon delivery of the programme but also on the ability of health workers to tackle attitudinal factors.

Competing belief and value systems that are founded on Islamic principles influenced how populations viewed the vaccine and its administration. Not all studies addressed how polio was perceived (Table 3) but this appeared to reflect the focus of the research question rather than an absence of data *per se*.

The review has also found that wider political issues such as security and cross-border surveillance influenced the context within which programmes are being delivered. Thus, the provision of accurate and complete information becomes even more important but more difficult to achieve. Several of the above findings may also be applicable to other low- and middle-income countries where polio vaccination programmes are being run; however, this review captures only those areas where research and data collection initiatives were being undertaken and subsequently published.

STRENGTHS AND LIMITATIONS OF THE EVIDENCE BASE

Overall, included studies were of variable quality. Main limitations were insufficient detail of how the sample was identified and, particularly, the extent to which the sample was likely to be representative of the prevalent attitudes within the population. This is not an uncommon finding within syntheses of qualitative research where representativeness is not commonly considered an important characteristic and yet decision-makers require some confidence that they have elicited the widespread views of the target population with prevalent views being accurately recorded and represented.

The quality of the primary qualitative research studies was explored using the CASP checklist. This tool offers a structured and consistent approach for exploring study characteristics. No study was excluded on the basis of poor quality, each finding being thought to contribute to an overall configuration of composite findings. While most studies included contextual detail, it was challenging to build up a full picture of the salient context, primarily due to limitations in journal article word limits.

All qualitative studies that explored factors affecting implementation were derived from African and Asian LMIC countries. However, some countries such as Syria and Afghanistan were not represented in the study sample although included in the inclusion criteria. It is not known to what extent these countries have additional considerations that have not been captured by this synthesis. Furthermore, although a narrow timespan was applied for included studies, the response to vaccination programmes is very time-critical and it is unclear to what extent contextual factors, or their perceived relative importance, have changed between the dates of the first and last included studies.

STRENGTHS AND LIMITATIONS OF THE QES

This is the first synthesis of qualitative studies focusing on factors that impact upon the success of polio vaccination programmes. Searches were as extensive as the context of a student project resulting in reasonable confidence in search results. However, our wider experience from other QES for LMIC settings suggests that more detailed examination of regional databases and institutional repositories might unearth additional grey literature studies. Unpublished evaluations could conceivably offer data that is substantively different from the other eligible studies.

The principal investigator was supported in this synthesis by experienced academic researchers, reviewers and methodologists. All review processes were subjected to quality assurance including independent blind review of a sample of included studies, checking of data extraction and quality assessment for all included studies, and continual checks on author interpretation.

IMPLICATIONS FOR POLICY AND PRACTICE

The findings of this qualitative evidence synthesis may help in the formation of policies to introduce effective, feasible, acceptable and meaningful polio vaccination programmes. Notably, as anticipated by the socio-economic (ie, LMIC) context for this review, structural and infrastructure concerns figure prominently as a prerequisite to subsequent shaping of how best to deliver the services (Theme 1). Linked to this is the associated capacity-building issue of skills and training (Theme 2) together with human resource and political issues that impact on program operation and management (Theme 3). Completing the program cycle we identify issues that relate to monitoring and evaluation (Theme 4). Only after these organisational issues have been resolved can attention turn towards "on the ground" concerns such as Insecurity (Theme 5) and Cross Border Surveillance (Theme 10), as well as to the belief systems engaged by Vaccine Acceptability (Theme 6), Religious and Traditional beliefs (Theme 7), Influence of Stakeholders (Theme 8) and Perceptions of the Disease itself (Theme 9).

IMPLICATIONS FOR RESEARCH

Polio eradication programmes depend, for their success, on the engagement and synergistic action of multiple stakeholders. While several studies targeted "stakeholders" more broadly, rather than simply exploring the attitudes of parents and caregivers, it was generally unclear the extent to which these were recruited systematically to represent a wide range of positions and viewpoints. Instead many of the studies appeared to be opportunistic in their approaches to eliciting viewpoints. It was challenging to identify cross-country differences, even between Pakistan and Nigeria which constituted two of the more researched geographic settings. We anticipate that thicker detail on the study context, perhaps present in supplementary "sibling" project and programme documents, may help to increase our knowledge of contextual factors and to identify substantive contextual variation. However, the supplementary searches required to harvest additional data proved prohibitive within the context of a single student project and may be better achieved through a specific country-by-country emphasis. Similarly, we were not able to identify much in the way of conceptual thinking whereas that might prove a valuable lens on study data. Restrictions in word length may also have truncated the level of detail offered by participant quotations and accompanying author interpretation.

CONCLUSIONS

Our research shows that there is a need to equip polio eradication programmes with a robust supporting infrastructure, including well-trained staff, before it is possible to challenge local and more generic attitudinal factors. In addition, approaches should also seek to identify particular parochial concerns, perhaps using an underpinning conceptual framework to unearth particular areas of concern. Even within a relatively tightly specified sub-population, parental attitudes are heterogeneous and individual parental perspectives and preferences must be explored within the wider context of individual belief and value systems. More qualitative research is needed to shape a response that accommodates a wide range of individual responses and thus improve the extent of coverage of polio eradication programmes.

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COMPETING INTERESTS

The authors completed the Unified Competing Interest form at http://www.icmje.org/coi_disclosure.pdf (available upon request from the corresponding author), and declare no conflicts of interest.

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