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. The current policy of GPEI is “The Polio Eradication and Endgame Strategic Plan 2013-2018”. 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. 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. Pakistan and Afghanistan are polio-endemic countries and most polio cases that have been identified in other countries have been linked to this region. These two countries share the same border which led to the institution of
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REPORTING

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

RESULTS

STUDY SELECTION

A search in all the databases retrieved a total of 154 studies; 111 articles remained after the duplicates were removed and 15 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 demonstrating how the 11 studies were selected.

CHARACTERISTICS OF INCLUDED STUDIES

The characteristics of each study are documented in Table 1. All studies were published between 2012 and 2017. Four studies were conducted in Nigeria, three in Pakistan, two in Ethiopia, and one each in Angola and Cameroon.

Figure 1

PRISMA flow diagram.
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. | Bauchi and Cross | Caregivers (n=84), health workers (n=14), | Health workers, community leaders and caregivers | Mixed | Observations (n = 40), IDIs |
| Identifier (Year) | Context | Participants | Target population | Ethnicity | Method |
|------------------|---------|--------------|--------------------|-----------|--------|
| (39)             | River State of Nigeria | Traditional leader (n=1), Religious leader (n=1) | | ethnicity | (n = 14) and FGDs (FGDs) (n = 12) |

IDI – indepth interview, FGD – focus group discussion
Three studies explored multiple perspectives of health workers, community and religious leaders as well as stakeholders. Six studies had caregivers including parents as participants, while 2 studies had health workers as participants. Stakeholders such as policymakers, programme managers, social mobilization officers/health educators and representatives were the target audience of one study.

Three of the included studies used focus group discussions (FGDs) while four used In-depth interviews (IDIs). The remaining four studies used both FGDs and IDIs. Participant observation was conducted in two studies.

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, five as medium quality, and three as low quality. 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. 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).
| Theme                                           | Pre-existing framework of themes                                                                 | 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/interventions                                             |
| 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:                                                               | Administrative issues including:                                                               |
|                                                 | - Method of performance evaluation                                                              | - 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                                                                            | - Issues around access (availability of staff; waiting times etc)                              |
|                                                 | - Birth records at health facilities                                                             | - Impact of positive/negative attitudes of healthcare staff                                      |
|                                                 | - Partnership of different preventive programs                                                   | - Reporting and monitoring systems                                                              |
|                                                 | Reporting and monitoring systems                                                                |                                                                                                |
| Monitoring, evaluation and feedback             | Use of local data                                                                               | Decentralization of the health system                                                          |
| Insecurity in high-risk polio areas             | Decentralization of the health system                                                          | Safety issues in regions where polio exists                                                     |
| Vaccine acceptability by caregivers             | Nil                                                                                             | Perception of sterility induced by polio vaccine                                               |
| Competing belief systems                        | Nil                                                                                             | Influence of Religion                                                                          |
| Influence of community stakeholders             | Nil                                                                                             | Influence of Frequent visits                                                                   |
| The nature of the disease                       | Nil                                                                                             | Effectiveness of vaccination                                                                  |
| Cross-border polio surveillance                 | Nil                                                                                             | Influence of vaccine side effects                                                              |
|                                                 |                                                                                                 | Eg. Islamic beliefs and traditional medicines                                                   |
|                                                 |                                                                                                 | Community leaders as determinants of community vaccination                                     |
|                                                 |                                                                                                 | The understanding of polio as an influence                                                      |
|                                                 |                                                                                                 | Factors that determine polio spread between neighbouring countries                            |
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.
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               | Y                        | Y              | Y              |
| Technical aspects                               |                     | Y                   | Y                  |                    | Y                   |                     |                        | Y               |                          |                 |                 |
| Program operation, management and organization  | Y                   | Y                   | Y                  | Y                  | Y                   |                     |                        | Y               | Y                        | Y              | Y              |
| Monitoring, evaluation and feedback             |                     | Y                   |                    |                    |                     | Y                   |                        | Y               |                          |                 |                 |
| Insecurity in high-risk polio areas             |                     |                     |                    |                    |                     |                     |                        | Y               |                          |                 |                 |
| Vaccine acceptability by caregivers             | Y                   | Y                   | Y                  | Y                  | Y                   | Y                   | Y                      | Y               | Y                        | Y              | Y              |
| Competing belief systems                        |                     |                     |                    |                    |                     | Y                   |                        |                 |                          |                 |                 |
| Influence of community stakeholders             |                     |                     |                    |                    | Y                   |                     |                        |                 |                          |                 |                 |
| Perception of the nature of the disease         | Y                   | Y                   | Y                  | Y                  | Y                   |                     |                        | Y               |                          | Y              |                 |
| Cross-border polio surveillance                 | Y                   |                     |                    |                    |                     |                     |                        |                 |                          |                 |                 |
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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." 33

"There are different reasons for refusal but the main one is Ulmah (religious leader having the authority to give Fatwa) 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). 38

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). 39

"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). 33

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). 33

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). 38

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). 38

Awareness raising and community engagement help to improve vaccine uptake in resistant areas, particularly when traditional and religious leaders are involved in the mobilisation. 59

COMPETING BELIEF SYSTEMS

Two studies 37, 30 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. 30

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...". 39 On the other hand, health workers were attacked as a way of expressing displeasure with the government for lack of social amenities. 30

These stakeholders can also play a positive role in raising awareness. Religious leaders serve as the main source of information on health matters: "ineducated 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. 34

CROSS-BORDER POLIO SURVEILLANCE

Illegal border movements were identified as a reason for the persistence of polio. 34 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...". 34

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 5) 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 over-
all 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 limita-
tions in journal article word limits.

All qualitative studies that explored factors affecting im-
plementation of polio programmes were derived from African and Asian LMIC
countries. However, some countries such as Syria and Afghanistan were not represented in the study sample al-
though 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 stud-
ies, 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 be-
tween 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 un-
earth additional grey literature studies. Unpublished evalu-
ations could conceivably offer data that is substantively dif-
ferent from the other eligible studies.

The principal investigator was supported in this synthe-
sis 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 con-
cerns 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" con-
sultations and the issues which constituted two of the more researched geograph-
ic 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 with-
in 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 erad-
ication programmes with a robust supporting infrastruc-
ture, including well-trained staff, before it is possible to
challenge local and more generic attitudinal factors. In ad-
dition, approaches should also seek to identify particular
parochial concerns, perhaps using an underpinning con-
ceptual 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 sys-
tems. More qualitative research is needed to shape a re-
sponse that accommodates a wide range of individual re-
sponses and thus improve the extent of coverage of polio
eradication programmes.

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