

MINISTRY OF HEALTH

Polio Social Diagnostics in Response to Environmental Isolation of Polio virus type 2 in Mwanza City

April 2025

Executive summary

This report presents findings from a social and behaviour change (SBC) investigation carried out in response to the detection of vaccine-derived poliovirus type 2 in Mwanza City, Tanzania. The study was led by the Ministry of Health with support from UNICEF, Tanzania Inter-faith Partnership (TIP), and Muhimbili University of Health and Allied Sciences (MUHAS). It aimed to explore the social, cultural, and behavioural factors contributing to missed polio vaccinations among children. A mixed-methods approach was used, combining qualitative interviews with key stakeholders and quantitative household surveys across two urban districts (Nyamagana and Ilemela).

The findings show that most caregivers are aware of vaccination campaigns and trust health workers, particularly medical staff and community health workers. However, gaps in knowledge about polio and the purpose of multiple vaccine doses persist, along with some lingering myths and misinformation. Environmental factors such as poor sanitation, open drainage, and inadequate handwashing facilities increase the risk of virus transmission. Additionally, mobile populations, informal food vendors, and schoolchildren were identified as vulnerable groups. Local leaders and religious figures were found to be supportive but underutilized in mobilization and addressing hesitancy.

While the polio vaccination campaigns are generally well received, the study highlights the need for stronger community engagement, improved communication strategies, integration of water and sanitation interventions, and greater support for frontline workers. These findings offer valuable guidance to strengthen the Ministry of Health's polio response and contribute to broader immunization and disease prevention efforts.

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Abbreviations

| AFP | Acute Flaccid Paralysis |
|-------|--|
| cVDPV | circulating vaccine-derived polio virus |
| DHPCo | District Health Promotion Coordinator |
| DIVO | District Immunization and Vaccine Officers |
| DMO | District Medical Officer |
| МоН | Ministry of Health |
| MUHAS | Muhimbili University of Health and Allied Sciences |
| OPV | Oral Polio Vaccine |
| RAs | Research Assistants |
| RCCE | Risk Communication and Community Engagement |
| TIP | Tanzania Inter-faith Partnership |
| WASH | Water, Sanitation, and Hygiene |

Acknowledgement

We extend our sincere gratitude to all individuals and institutions who contributed to the successful completion of this investigation. We are especially thankful to the community members, caregivers, health workers, and local leaders in Nyamagana and Ilemela districts who participated in the study and openly shared their experiences and insights.

We acknowledge the invaluable support provided by UNICEF, which made this work possible through financial and technical assistance. We are also grateful to the Tanzania Inter-faith Partnership (TIP) and the Muhimbili University of Health and Allied Sciences (MUHAS) for their active role in conceptulizing the study, coordinating and overseeing the fieldwork and report writing.

Special thanks go to the Ministry of Health for its leadership and strategic direction, as well as to all regional and district health authorities for their collaboration throughout the investigation. The dedication and commitment of the research assistants, data collectors, and supervisors are highly appreciated. Their efforts ensured the timely and high-quality delivery of this important work.

CHAPTER ONE

INTRODUCTION

1.1 Background

Poliomyelitis (polio) is a highly infectious viral disease caused by the polio virus. It primarily affects children under five years of age and can lead to permanent paralysis or death. The virus is transmitted through the fecal-oral route, often in areas with poor sanitation.

Global efforts to immunize children with the oral polio vaccine (OPV) have reduced wild polio virus cases by 99.9% since 1988. OPV is a very safe vaccine but, because it contains live weakened viruses, it can on rare occasions mutate into circulating vaccine-derived polio virus (cVDPV). The circulating polio virus type 2 is normally detected during routine surveillance of environmental samples. Environmental surveillance involves testing sewage or wastewater samples for polio viruses. This surveillance is essential, especially in areas where acute flaccid paralysis (AFP) cases are low or absent. The detection of type 2 virus in environmental samples usually indicates ongoing virus circulation, gaps in immunization coverage, and potential risk of outbreaks that requires prompt action.

Following detection of polio virus type 2 in one of the wastewater samples collected from Makongoro area in Mwanza in recent days, the Ministry of Health in collaboration with UNICEF, Tanzania Inter-faith Partnership (TIP), and Muhimbili University of Health and Allied Sciences (MUHAS) conducted a social diagnostic study to understand social, behavioural, and cultural factors that contributed to missed children for polio vaccination.

1.2 Methodology

The special investigation tool titled "Methodology for Special Investigation Tool to identify reasons for missed children" was adopted in carrying out this study. The standard tool was customized to suit Tanzania context. The customized tools were translated into Kiswahili for easy administration during data collection. Qualitative data was collected through an in-depth interview (IDI) with respondents. The respondents at the district level included the District Medical Officer (DMO), District limmunization and vaccination Officer) (DIVO) and District Health Promotion Coordinator (DHPCo) whereas at the ward level (sub-district) the respondents included the ward executive officer (WEO), influential persons and religious leaders. The in-depth discussion with DMO focused on general knowledge about circulating poliovirus (cVDPV), vaccination coverage, micro-plan and missed children, planning and logistics for vaccination campaigns, team capacity and training of vaccination workers, funding and financial support, future strategies for polio eradication. Likewise, the in-depth discussion with RIVO focused on the same guide in addition to environmental surveillance and response to poliovirus detection in the DHPCo focused cultural barriers environment. The interview with and misinformation, risk communication and community engagement (RCCE) and multisectoral collaboration and response efforts.

The quantitative data for the household survey were collected using Kobo-collect software that was installed in smart phones. Some of the data collected from heads of households include health beliefs and health care seeking behaviours, perspectives on polio and other vaccination campaign, knowledge and attitude about polio and OPV, and water, sanitation, and hygiene (WASH) practices.

1.4 Data analysis

Quantitative data were analyzed using SPSS software, focusing on descriptive statistics to summarize key trends and patterns related to demographics, vaccination coverage, health-seeking behavior, trusted information sources, and WASH practices. Frequencies, percentages, and cross-tabulations were used to highlight variations across the two study districts.

For the qualitative component, all interviews were transcribed verbatim and analyzed thematically. This involved identifying recurring themes, patterns, and insights related to community beliefs, social norms, risk perceptions, and structural barriers influencing polio vaccination. The thematic analysis allowed for a deeper understanding of the contextual and cultural factors that quantitative data alone could not capture.

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CHAPTER TWO

RESULTS

Part I: Quantitative Results

2.1 Social demographic information

For the household survey, the study involved 508 participants from two Municipal councils: Nyamagana and Ilemela. As indicated in Table 2.1, the majority of respondents (52%) resided in Ilemela Municipal Council, while 48% were from Nyamagana Municipal Council. The average age of respondents was 31 years, reflecting a relatively young adult population. Gender distribution was higher in female accounting for 97%. Household ownership was split evenly as well, with half of the households owned by a family member and the other half rented or provided by others.

In terms of educational background, most respondents (53.7%) had completed primary education. A significant portion (33.9%) had secondary education, while a small minority had either tertiary education (6.7%) or no formal education at all (5.7%). The occupational profile showed that 37.4% of participants were farmers, followed closely by traders (33.9%). Formal employment was reported by only 6.7% of the participants.. Most respondents identified as biological mothers of the child (92.2%), indicating that mothers were the primary caregivers, while fathers represented a mere 2.7%, and other caregivers made up 5.1%.

| Variable | Frequency (n) | Percent (%) |
|---|---------------|-------------|
| Age Mean Age 31 | | |
| Council | | |
| Nyamagana Municipal Council | 244 | 48 |
| llemela Municipal Council | 264 | 52 |
| Household ownership | | |
| Owned (by a household member or family) | 254 | 50 |
| Rented or Provided by Others | 254 | 50 |
| Gender | | |

| | Table 2.1: Soc | cio demographic | information | of study | participants | (N=508) |
|--|----------------|-----------------|-------------|----------|--------------|---------|
|--|----------------|-----------------|-------------|----------|--------------|---------|

| Male | 14 | 3 |
|---------------------------|-----|------|
| Female | 494 | 97 |
| Education level | | |
| No formal education | 29 | 5.7 |
| Primary education | 273 | 53.7 |
| Secondary education | 172 | 33.9 |
| Tertiary education | 34 | 6.7 |
| Occupation | | |
| Farmer | 190 | 37.4 |
| Trader | 172 | 33.9 |
| Formal employment | 34 | 6.7 |
| Unemployed | 90 | 17.7 |
| Others | 22 | 4.3 |
| Relationship to the child | | |
| Biological mother | 471 | 92.2 |
| Father | 14 | 2.7 |
| Others | 23 | 5.1 |

2.2 Coverage of polio vaccination

The polio vaccination coverage was impressively high, with 98.6% of children having received OPV doses. Majority of children 391 out of 508 (77.0%) received all four recommended doses of OPV (Figure 2.1). A smaller proportion of children received fewer doses, with 84 children (16.5%) receiving three doses, 23 children (4.5%) receiving two doses, and 9 children (1.8%) receiving only one dose. Notably, just one child (0.2%) had not received any dose of the vaccine. These findings highlight the effectiveness of polio vaccination efforts within the community, demonstrating widespread adherence to the vaccine delivery mechanisms are functioning effectively, as very few children were under-vaccinated or missed vaccination.



Figure 2.1: Number of OPV doses received by children

2.3. Trusted sources of information about vaccination

The most reliable and frequent sources of information about child vaccination were health professionals and community health workers (CHWs) (Table 2.2). Specifically, 351 respondents indicated they "always" received information from healthcare workers staff, and 306 from CHWs. This shows a high level of trust in the formal health system.

| | Table 2.2: | Information | about | vour (| child's | vaccination |
|--|------------|-------------|-------|--------|---------|-------------|
|--|------------|-------------|-------|--------|---------|-------------|

| Source | Always | Never | Rarely | Sometimes |
|-----------------------------------|--------|-------|--------|-----------|
| Medical doctors, nurses or other | 351 | 6 | 48 | 65 |
| health staff? | | | | |
| Community health workers | 306 | 3 | 24 | 37 |
| (CHWs)? | | | | |
| Tv, radio, or newspaper? | 32 | 34 | 86 | 56 |
| Social networks? | 26 | 78 | 50 | 37 |
| Relative or neighbour? | 25 | 19 | 101 | 52 |
| Accredited drug dispensing | 12 | 52 | 50 | 38 |
| outlet (ADDO) dispenser? | | | | |
| Community's traditional | 7 | 40 | 77 | 27 |
| leaders/elders? | | | | |
| Imams, pastors, or religious | 4 | 35 | 81 | 57 |
| leaders? | | | | |
| Spiritual healers, or herbalists? | 0 | 144 | 0 | 3 |

Media sources (TV, radio, newspapers) and social networks also had limited influence, with most respondents indicating they "rarely" or "sometimes" received vaccination information from them. Figure 2.2 likely complements this table by

visually illustrating the trusted sources of vaccination information, highlighting health personnel at the top and traditional/religious figures at the bottom.



Figure 2.2: Trusted sources of Information's

2.3 Health seeking behavior and government's efforts to polio vaccination

Table 2.4 outlines the caregivers' behaviors when seeking health services. Nearly all respondents (99.8%) indicated that they sought services from medical professionals such as doctors or nurses. Only one person (0.2%) reported going to a pharmacist instead. Regarding access to health facilities, most respondents (74.2%) reported walking less than 30 minutes to reach a health facility, while 24.6% reported a travel time of 1–2 hours. Very few had to travel more than 2 hours, indicating relatively good geographical access to healthcare.

| Variable | Frequency (%) | Percent (%) |
|----------------------------------|---------------|-------------|
| Place of services | | |
| Medical doctors, nurse, or other | 507 | 99.8 |
| health care professionals | | |
| Pharmacist | 1 | 0.2 |
| Walking time to HF | | |
| Less than 30 minutes | 377 | 74.2 |
| 1-2 hrs | 125 | 24.6 |
| 3-4hrs | 1 | 0.2 |
| 5hrs and above | 1 | 0.2 |
| l don't know | 4 | 0.8 |

Regarding to satisfaction level to the government's efforts to polio vaccination, majority of respondents, 93.9%, reported being very satisfied, which reflects a strong positive perception of the campaign's organization, delivery, and overall impact. A smaller proportion, 4.1%, indicated that they were somewhat satisfied, suggesting that while their experience was generally favorable, there may have been minor concerns or areas for improvement. Only 2% of respondents reported feeling neutral, and notably, there were no responses indicating dissatisfaction. These results demonstrate a high level of community approval and acceptance of the vaccination services, which is crucial for the continued success of public health initiatives such as immunization programs. (See Figure 2.3)



Figure 2.3: Satisfaction level to the government's efforts to polio vaccination

2.4 Caregiver Perspectives on Polio and other vaccination Campaign

Table 2.5 explores community perceptions of the polio vaccination campaign. Awareness was high, with 79.5% of respondents stating they were aware of the most recent polio campaign. Most preferred taking their child to the nearest health facility for vaccination (98.2%), showing trust in formal institutions. Only a small percentage preferred vaccination at home or elsewhere. Additionally, respondents overwhelmingly affirmed that vaccinators were appropriate in age (99.7%), appearance (98.7%), and knowledge (99.7%). This indicates that the vaccination teams were well received by the community and perceived as professional.

| Fable 2.5: Perception of communit | members on the Polic | vaccination and campaign |
|-----------------------------------|----------------------|--------------------------|
|-----------------------------------|----------------------|--------------------------|

| Variable | Frequency (n) | Percent (%) |
|-----------------------------------|---------------|-------------|
| Awareness of last polio campaign | | |
| Yes | 404 | 79.5 |
| No | 104 | 20.5 |
| Preferred place for your child to | | |
| receive Polio vaccination | | |
| Nearest health facility | 499 | 98.2 |
| My house | 8 | 1.6 |
| Other (specify) | 1 | 0.2 |
| Appropriate age vaccinators that | | |
| visited | | |
| Yes | 382 | 99.7 |
| No | 1 | 0.3 |
| Appearance vaccinators | | |
| Appropriate | 378 | 98.7 |
| Somewhat inappropriate | 2 | 0.5 |
| I don't remember | 2 | 0.5 |
| Inappropriate | 1 | 0.3 |
| Vaccinators were well informed | | |
| Yes | 382 | 99.7 |
| No | 1 | 0.3 |

In Table 2.6, half of the respondents (50.2%) believed that polio is caused by a lack of vaccination, while 17.1% correctly identified a virus as the cause. Alarmingly, 31.3% admitted they did not know the cause of polio, suggesting a gap in health education. Regarding concern, 61.4% were not concerned at all that their child could contract polio, possibly due to confidence in the vaccine. About 21.3% were "very concerned," and the rest were unsure or somewhat concerned.

Regarding vaccine effectiveness, 93.5% of respondents believed the polio vaccine is "very effective." However, a small number of harboured fears about its safety, citing causes like fever (60%) or distrust due to its origin (26.7% said it comes from the West). When asked about the need for multiple doses, 62.6% understood that it was necessary, although 18.1% were unsure. Moreover 92.7% had not heard about the detection of poliovirus in wastewater, and 44.1% never discussed polio prevention. This suggests that while awareness of campaigns is high, deeper public engagement and communication about polio risks may be limited.

| Variable | Frequency (n) | Percent (%) |
|--|---------------|-------------|
| Causes of polio | | |
| Lack of vaccination | 255 | 50.2 |
| l don't know | 159 | 31.3 |
| Virus | 87 | 17.1 |
| Others | 7 | 1.4 |
| Concerned that your child can contract | | |
| polio | | |
| No, not concerned at all | 312 | 61.4 |
| Yes, very concerned | 108 | 21.3 |
| Not sure | 46 | 9.1 |
| Yes, somewhat concerned | 42 | 8.3 |
| Effectiveness of polio vaccine | | |
| Very effective | 475 | 93.5 |
| Not sure | 18 | 3.5 |
| Somewhat effective | 15 | 3 |
| Perceived unsafe of polio vaccine | | |
| Causes Fever | 9 | 60 |
| Comes From USA / Western | | |
| Countries | 4 | 26.7 |
| Too Many Doses Are Unsafe | 1 | 6.7 |
| Others | 1 | 6.7 |
| Needs multiple doses | | |
| Yes | 318 | 62.6 |
| No | 98 | 19.3 |
| not sure don't know | 92 | 18.1 |
| Heard about the recent detection of | | |
| poliovirus in wastewater | | |
| No | 471 | 92.7 |
| Yes | 37 | 7.3 |
| Frequently discussion about polio | | |
| prevention | | |
| Never | 224 | 44.1 |
| Rarely | 168 | 33.1 |
| Often | 74 | 14.6 |
| Sometimes | 42 | 8.3 |
| | | |

Table 2.6: Awareness of community members on the Polio vaccination

There was overwhelming support for polio campaigns across all social groups. For instance, 80.3% reported that traditional or religious leaders were "very supportive," while 93.5% said members of their own household strongly supported the campaigns. Similarly, 87.4% noted strong support from community members.

Resistance or opposition to the campaigns was virtually non-existent, indicating a highly favourable environment for vaccination efforts (See Table 2.7)

| Question | No, They Are Against Polio Campaigns / Opv | Not Sure | Somewhat Supportive | Yes, Very Supportive |
|----------------------------------|---|-----------|------------------------|-------------------------|
| Traditional/religious leaders | 2 (0.4%) | 41 (8.1%) | 57 (11.2%) | 408 (80.3%) |
| People in household | 0 (0.0%) | 8 (1.6%) | 25 (4.9%) | 475 (93.5%) |
| People in the community | 1 (0.2%) | 36 (7.1%) | 27 (5.3%) | 444 (87.4%) |

Table 2.7: Support of polio campaigns / Polio vaccination by different groups

2.5 WASH services and practices

Table 2.8 outlines household WASH practices. Most respondents (89.6%) had access to piped water, with small portions relying on rainwater (5.5%), unprotected wells (3.1%), or protected wells (1.8%). Water treatment was common, with 78.5% treating their water by boiling (47.4%) and chlorination (22.4%) being the most common methods.

However, 15.9% still did not treat their water. Only 40% had designated handwashing stations in their homes, and while 18.9% reported "always" washing hands with soap, the rest either did so often, sometimes, or rarely. A small minority (1.2%) never practiced handwashing with soap. Toilet access was nearly universal (99.2%), with 92.5% using flush toilets. Most households (95.5%) had regular waste disposal systems. Despite these strong WASH indicators, 8.9% of children were reported to regularly play in areas with open sewage or standing wastewater, and 5.5% of households had open drainage nearby, presenting potential public health risks.

Table 2.8: WASH services in household

| Variable | Frequency (%) | Percent (%) |
|--------------|---------------|-------------|
| Water source | | |
| Piped water | 455 | 89.6 |

| Rainwater or surface water (river, Tube | 28 | 5.5 |
|--|-----|-------|
| well or bore hole lake etc.) | | |
| Unprotected dug well or tank spring | 16 | 3.1 |
| Protected dug well or spring | 9 | 1.8 |
| Treating drinking water before consumption | | |
| Yes | 399 | 78.5% |
| No | 109 | 21.5% |
| Water treatment methods | | |
| Boiling | 241 | 47.4 |
| Chlorination | 114 | 22.4 |
| No treatment | 81 | 15.9 |
| Filtration | 62 | 12.2 |
| Others | 10 | 2 |
| Household with designated handwashing | | |
| station | | |
| Yes | 203 | 40.0 |
| No | 305 | 60.0 |
| Household practice handwashing with soap | | |
| Often | 218 | 42.9 |
| Rarely | 135 | 26.6 |
| Always | 96 | 18.9 |
| Sometimes | 53 | 10.4 |
| Never | 6 | 1.2 |
| House with functional toilet | | |
| Yes | 504 | 99.2 |
| No | 4 | 0.8 |
| Type of toilet facility | | |
| Flush toilet (flush to piped sewer system, | 470 | 92.5 |
| septic tank, or pit latrine) | | |
| All other types of toilets | 38 | 7.5 |
| Regular waste disposal system | | |
| Yes | 485 | 95.5 |
| No | 23 | 4.5 |
| Children regularly play in areas with open | | |
| sewage or standing wastewater | | |
| Yes | 45 | 8.9 |
| No | 463 | 91.1 |
| Open drainage systems nearby house | | |
| Yes | 28 | 5.5 |
| No | 480 | 94.5 |

Part II: Qualitative Results

This section presents qualitative findings from key informant interview with respondents from district and sub-district levels (ward). Some of the issues reported here include understanding of the respondents about the situation of polio in Mwanza, causes and risk factors for polio, vulnerable groups, interventions to prevent the polio virus outbreak in the community, causes of missed children, capacity of health workforce, and roles of local leaders including religious and influential people in the fight against diseases including polio.

Current Situation on Polio Virus

When asked about the current status of the Polio Virus situation in their context, the majority of participants confirmed that there are no reported or suspected cases of polio among children. However, the environmental surveillance has detected the presence of vaccine-derived poliovirus in the wastewater system. The virus was initially detected in November of the previous year and was again identified in February, indicating intermittent presence in the environment.

"In my district, Nyamagana, we have not identified any suspected or confirmed cases of poliovirus infection in children. However, environmental surveillance detected the presence of the poliovirus in contaminated water within the sewage system" (KII 2, DIVO, Nyamagana)

Causes and risk factors for Polio Virus

Respondents from this study mentioned various causes and risk factors that perpetuate the spread of the poliovirus in the community. The most mentioned cause was poor sanitation. Respondents expressed their concerns about challenges in adhering to proper environmental sanitation. It was reported that hygiene practices and the improper disposal of waste contribute to the persistence of diseases such as polio. A significant factor in this issue is the lack of access to proper sanitation facilities, such as toilets, and the contamination of water resources due to poorly constructed wells and improper waste management. In many areas, people continue

to dispose of waste carelessly, underestimating the potential risks, especially when it comes to the feces of children. One of the respondent mentioned;

"Environmental sanitation is compromised due to factors such as the lack of proper toilets, poorly dug wells, and the use of contaminated water resources. These issues contribute to the continued presence of polio. Additionally, the casual handling of waste, for example, when people say that a child's feces are harmless and dispose of them recklessly, leads to the spread of infections. Feces remain a source of disease, and as long as this practice continues, we will continue to face outbreaks in our surrounding areas" (KII4, DHPco, Nyamagana).

Another respondents attributed the environmental presence of the virus to the movement of people, especially from regions where the type two oral polio vaccine (OPV) is still in use. In Mwanza, the routine immunization does not include the type two OPV, which is the type known to be shed and appear in environmental samples. Large gatherings such as the Syria Exhibition at Goldcrest and interactions at Kirumba fish market may increase the risk of transmission.

" First of all, as you know, Mwanza is a city with a high level of interaction among people from different areas. The virus detected is vaccine-derived, meaning it originated from the oral polio vaccine. It is a vaccine strain that was shed. Someone who received the vaccine and then shed the virus, which was subsequently detected in the environment. The vaccines responsible are type two strains, but here in Mwanza, we do not administer the type two oral polio vaccine. We provide bOPV, which contains type one and type three strains, as well as IPV, which is an injectable vaccine and does not enter the digestive system. So, based on my understanding, I strongly believe that the presence of people from various regions — for instance, Congolese who come to buy fish at Kirumba market, and the Syria Exhibition held every November at Gold Crest, which brings people from different countries — could be the source of the virus being introduced in Mwanza and thus in the environment." (KII2, DIVO, Nyamagana). In addition, Mwanza is a hub of fish market that attracts people from other countries notably Uganda, Kenya and Rwanda, who are potential for spreading the virus, if it is circulating in their country.

One of the respondents mentioned the complex and varied beliefs that still exist within the community regarding the causes and treatment of polio virus diseases. While some cultural narratives may view illnesses such as polio as spiritual or cultural consequences, attributing outbreaks to broken taboos or traditional interpretations, others, particularly religious leaders and informed community members, recognize polio as a biomedical condition requiring professional medical intervention.

"Certain customs make people believe that polio is the result of specific actions or taboos... There are different levels of understanding." (KII, Religious leader, Nyamagana)

Despite this diversity in belief systems, the respondent, speaking from a religious standpoint, expressed trust in the health system and affirmed that professional healthcare providers are the rightful actors to manage such diseases. He added that;

"We, as religious people, believe it is a disease that needs to be treated by doctors who are experts in that area." (KII, Religious Leader, Nyamagana)

Another participant added that;

"No, because in our faith, we believe that when God allows a disease to happen, He also provides a cure. So when a person becomes sick, they should be helped by receiving treatment. Therefore, in our religion, there is no doubt or conflict about vaccination" (KII, Religious Leader, Shigunga)

The most vulnerable groups in the community

The main groups identified as high risk are cross-border traders, particularly those from Congo, informal food vendors (mama ntilie) and school children. Food vendors operate in unhygienic environment that increase the likelihood of contamination and transmission of the virus through food and water.

"I strongly believe that it is these traders, especially the Congolese ones, who are contributing significantly. These are high-risk groups because even the environment at the fish market is not clean. There are many food vendors (mama ntilie), and as we know, our food vendors' hygiene standards often require supervision. This makes it easy for someone to get infected by consuming contaminated food, as polio is a virus that is contracted orally. If you consume food or water that is contaminated, it is very easy to get infected. Therefore, these groups of food vendors could be a source of the virus spread due to their poor hygiene practices." (KII2, DIVO, Nyamagana)

On the other hand, school children are used to play everywhere including near waste water drains where they can be in contact with feacal matter. If they do not practice appropriate hygiene they may endup where wastewater

Interventions to prevent the polio virus outbreak in the community

To mitigate the risks, the district ensures all children are vaccinated. Outreach programs target hard-to-reach areas and mobile populations, such as businesswomen who may not attend clinics due to their schedules. Health workers visit these areas monthly.

"The first effort we focus on is ensuring that all children are vaccinated. We make sure to reach every child with various forms of education. Our staff conducts outreach programs to ensure that even hard-to-reach areas, those that are not easily accessible by health centers or clinics, are reached every month. They also conduct regular exercises to locate children who may have missed vaccination, as some of these mothers, especially traders, wake up in the morning focused on their business and are unable to wait for their child to receive vaccination, prioritizing making money over the child's vaccination. Therefore, we also ensure that we reach them." (KII2, DIVO, Nyamagana)

Another respondent mentioned that door-to-door immunization campaigns are conducted as deliberate efforts to ensure all children are being reached and receive polio vaccines. The most successful strategy has been the REC (Reach Every Child) approach, involving planning and assigning specific areas to each of the 60 vaccination centers. Using this approach was reported to be highly successful in reaching targeted children. The Key informant said;

"Because vaccination campaigns, especially during campaign periods, are conducted door-to-door, with many teams involved, no child is left behind." (KII2, DIVO, Nyamagana)

He further added that;

"The strategy that has been successful now is called REC, which stands for Reach Every Child. We reach every child by implementing the MKOBA (a mobile outreach strategy). I have 60 vaccination service centers, and we called them together, sat down with them, and developed a strategy where each one was assigned specific neighborhoods to reach. So, the strategy to reach every child has been successful." (KII2, DIVO, Nyamagana)

Additionally, community education is emphasized to raise awareness of the importance of vaccination. One of the respondents mentioned;

"Our strategies involve ensuring that all children under the age of 5 are vaccinated. We use routine vaccination at our health facilities, but we also conduct outreach services to reach those in the community, ensuring that we cover children who have missed their vaccinations or received only one or two doses, allowing them to complete their immunizations. Additionally, we continue to provide education to the community to raise awareness about the importance of vaccination, ensuring that all children are vaccinated on time so that they can remain safe within the community" (KII3, DIVO, Ilemela)

Another respondent mentioned the council conducting the routine monthly water sampling, where water samples are collected from various locations and sent to a laboratory in Dar es Salaam for microbial testing and analysis. This exercise is conducted in collaboration with MWAWASA (Mwanza Water Supply and Sanitation Authority), and a designated health worker is responsible for ensuring the timely collection and submission of the samples. In addition to water testing, the Mwanza City Council works closely with the environmental department to carry out regular inspections and address health risks associated with water sources. This includes monitoring and closure of shallow wells in the community, particularly in areas with high risks of contamination. The participant mentioned;

"A major initiative we have in the Mwanza City Council is the monthly water sampling exercise, where samples are collected and sent to the laboratory in Dar es Salaam for analysis. We collaborate with MWAWASA for this process, where a health worker is responsible for sending the samples to Dar es Salaam. In addition to this, we work closely with the environmental department for inspections and various activities, including the closing of wells that may pose risks in surrounding communities" (KII4, DHPco, Nyamagana)

Moreover, during the discussion, the respondent emphasized two critical areas for strengthening routine immunization and disease prevention efforts, especially among children under five: continued government investment in community health education and vaccination services, and greater recognition and support for Community Health Workers (CHWs). The respondents called for better financial support for CHWs, highlighting their tireless efforts in tracking children, following up with families, and supporting health education within the community. One of the respondents mentioned;

"CHWs should be given increased compensation because they do a very important job" (KII5, WEO, Nyamagana)

Tracking Missed Children

A special periodic exercise called "Periodic Intensification of Routine Immunization" is conducted to track and vaccinate children who missed immunization. Community Health Workers (CHWs) go door-to-door checking vaccination cards and filling out forms for follow-up. Phone numbers of parents are also recorded to facilitate tracking of partially immunized children.

Planning and Coordination of Campaigns

Immunization campaigns are planned in coordination with the PHC (Primary Health Care) committee, chaired by the District Commissioner. Engagement with local leaders and CHWs ensures community awareness and cooperation. Health workers are assigned specific areas in collaboration with CHWs, with clear strategies to handle resistance. In severe cases, parents refusing vaccination may face legal consequences.

"The strategies we plan to ensure we achieve success start with coordination. We call it collaboration. We always meet with the District Primary Health Care (PHC), whose chairperson is the district commissioner, and this meeting includes various members, even chairpersons. Once these people have received the information, it's very easy to pass it down to the citizens. You have already done the promotion before the exercise begins. We also invite community health workers and chairpersons, where we sit with them, explain the strategies, and give them education on the importance of the exercise so that we get their cooperation. After that, we sit with our healthcare providers, provide them with strategies, and assign them neighborhoods to work with community health workers (CHWs) in reaching children door to door. If there is resistance, you know it's inevitable; there are always some who are stubborn. But the leadership at the local level is important, which is why we have a chairperson there. If they continue to resist, the district commissioner is informed. Therefore, if a child refuses the vaccine without a valid reason, the parents are held accountable. With these strategies and extensive practice, we usually succeed with more than a hundred percent effectiveness." (KII2, DIVO, Nyamagana)

Data Sources and Planning

Baseline data for campaign planning are derived from platforms such as VIMS and DHIS2. These systems provide coverage statistics and performance indicators for each health facility.

"The baseline for vaccination first involves examining vaccination data on a platform called VIMZ, where all vaccination information is recorded. This provides coverage

data and other relevant details. If a health facility is underperforming, we can also monitor it using DHIS2. By accessing VIMZ, you can review the facilities to identify which ones are not effectively reaching their children. Thus, the baseline data is derived from VIMZ." (KII2, DIVO, Nyamagana)

Partner Support

The district collaborates with partners to conduct outreach, supervision, and logistics. The Nyamagana DIVO had this to say:

"Honestly, it's mainly the government, but sometimes WHO supports us, especially during the polio campaigns. UNICEF also supports us, and so does GAVI. Currently, there is an organization called GAVI that supports us greatly with outreach funding." (KII2, DIVO, Nyamagana)

"There is a shortage when you reflect on how things were in the past. In the past, there was enough funding to plan large teams that could reach every corner. In Mwanza, the terrain is mountainous, so if you set up a station in one place, you will get only a few people. However, when you go house-to-house, it becomes more effective, and you reach many more children. This requires a large team and funding. Sometimes, the funds provided do not match the scope of the work. You might find funds allocated for three days of work, but the actual work is being done over seven days." (KII2, DIVO, Nyamagana)

"I think more funding is needed for outreach. You know, if we do outreach properly, we won't need to do the second part. We won't have to search for children who missed their vaccination because we will have reached all of them." (KII2, DIVO, Nyamagana)

"It is a challenge because, as I mentioned, the budget is limited. In some areas, they need to pay for transportation and also extra hours to ensure they can complete the work. For instance, you may need to go three times, but with a limited budget, payment might only cover one day. This becomes a challenge, and it can also be demoralizing" (KII3, DIVO, Ilemela)

Capacity building of healthcare providers in immunization

From the findings in this study, regular capacity building of primary healthcare facility service providers to ensure that health service delivery remains effective and responsive to emerging needs. According to one of the respondents, it was revealed that regular quarterly meetings with health center staff are held to review progress, discuss challenges, and strengthen service delivery mechanisms. These meetings serve as an important platform for orientation and mentorship, especially for newly recruited staff. Orientation sessions are conducted both at the health facilities and during these quarterly meetings to ensure that all providers are well-versed in the necessary protocols and practices. One of the respondents mentioned;

"We hold meetings every quarter, where we gather with the health center staff to discuss various issues. If there are new staff members, we conduct orientations and mentorship at the centers. During these meetings, we also provide further orientation. For example, in the last quarter, we invited everyone, provided orientation, and also conducted a data review. So, as you can see, this process is carried out frequently" (KII3, DIVO, llemela

Conversely, other respondents highlighted the need for more training, especially in private health facilities. Nyamagana has 20 public and 40 private facilities. While public facilities perform well, private ones often underperform due to staff turnover а lack of internal training dissemination. and "There is a very high need for training, especially in these local government authorities and cities, particularly for private facilities, because they have many private centers. For example, in Nyamagana, I have 20 government facilities but 40 private ones. My 20 government facilities perform well, but if the 40 private ones are not performing well, I will not succeed even once because the private ones outnumber the government facilities. Therefore, a lot of effort must go into those. Here, our government staff are doing well, the issue lies with the private facilities because today you can train someone, but in two days they leave. And also, people over there sometimes lack a certain level of cooperation, meaning if you train one person, they won't go and teach their colleague." (KII2, DIVO, Nyamagana)

Surveillance system and reporting mechanisms

When discussing the monitoring of environmental factors and the response to polio virus outbreaks, it's important to explore the systems in place for tracking and detecting the presence of the virus. One of the key systems currently implemented is the active case search strategy. This involves systematically visiting all government health facilities to identify any children who may have shown symptoms indicative of polio, even if they were not initially reported or properly assessed. Health workers perform these checks to ensure that no potential cases are overlooked.

In addition to facility-based surveillance, significant efforts have been made to extend this monitoring into the community. Health workers at the community level have been educated to recognize the signs of polio in children. These health workers are trained to be vigilant in the community, particularly because some children may not visit health centers, even if they are exhibiting symptoms. This outreach is crucial in ensuring that no child goes unnoticed.

"In Nyamagana, the definition of 'hard to reach' is that we have mountains, and the strategy we have developed to reach these areas is through providing outreach services, specifically using the MKOBA (mobile outreach) approach. We go to these areas with local community leaders, such as the area chairpersons. This is done every month." (KII2, DIVO, Nyamagana)

It should be noted that community surveillance is often supported by SBC/Social Mobilization as disease surveillance requires different technical expertise which is led by WHO for polio. There is also an ongoing effort to address misconceptions within some communities. Some parents, guided by traditional beliefs, may choose to take children who suddenly show signs of paralysis to traditional healers instead of health centers. To combat this, education has been provided to traditional healers, especially those who run clinics or offer treatments at home. The message conveyed is that when a child presents with symptoms such as sudden paralysis, it is important to seek medical help rather than delay or provide treatment outside of the formal healthcare system. Health workers have reassured healers, explaining that their goal is not to undermine their practices but to work together to ensure the child receives

the appropriate care to prevent further harm. Through these efforts, a comprehensive approach to monitoring and response is being implemented to better detect and prevent polio outbreaks in the community.

"We have also provided education to community health workers about the signs and symptoms of polio in children, so they can identify them within the community. Sometimes, a child may be in the community but not visit a health facility. Some parents hold misconceptions that if a child is walking and suddenly becomes paralyzed, they take the child to traditional healers. We have also educated traditional healers, especially those who run home-based clinics, explaining that when they see a child with such symptoms, it is important to refer the child to medical professionals. We assure them that we are not trying to take their clients away but rather to collaborate to prevent further harm to the child." (KII2, DIVO, Nyamagana)

Another participant mentioned on limitations of the existing surveillance system;

"Yes, there were limitations because the surveillance system was not active, and the follow-up schedule was not being adhered to as required. However, we have now put strategies in place and prepared a schedule ensuring that specific health facilities are visited every week." (KII2, DIVO, Nyamagana).

Moreover, one of the local leaders shared his experience on reporting mechanisms at grassroots levels when suspected polio cases are identified in their respective context. It was revealed that community leaders play a significant role in reporting such suspected cases to the nearest health facility as the first point of contact. One of the respondents mentioned;

"Among the approaches we use in our ward, once we discover that someone or a child is facing a challenge, we report it to the health centre for the necessary procedures to follow" (KII5, WEO, Nyamagana).

The respondents, especially grassroots leaders, spoke about their role in polio virus prevention in the community. It was noted that local leaders play an active role in sensitizing pregnant women to begin and adhere to antenatal care visits early and take their children for vaccination. It was also reported that grassroots leaders often visit healthcare settings to complement healthcare providers in the provision of healthcare education to the visiting mothers or pregnant women. One of the respondents mentioned;

"As ward executive officer, I participate in various ways. When I receive instructions from the health officers, I call my committee and other experts together, and we receive training. Then we organize public meetings where health experts get a chance to explain about the outbreaks and provide relevant education on how people can protect themselves" (KII5, WEO, Nyamagana)

Moreover, the respondent also noted that deep-seated beliefs and misinformation continue to hinder full vaccine uptake. Among the persistent myths is the notion that vaccines, particularly those provided through mass campaigns or supported by international partners, are intended to reduce fertility. One of the respondents mentioned;

"People still say that these vaccines are brought by white people to stop us from having children." (KII5, WEO, Nyamagana)

Conversely, one of the respondents noted a positive shift in community perceptions toward childhood vaccination, emphasizing that past misconceptions and harmful beliefs have significantly declined. Historically, there were strong myths, such as the belief that children who received vaccines might lose their ability to bear children later in life. These fears contributed to resistance and low vaccine coverage in earlier years. He said;

"These harmful traditional beliefs no longer exist. Nowadays, I don't think there are many people misleading others. Most people now vaccinate their children. I think it was in the past when there were such misconceptions—some used to say that if children were vaccinated, they wouldn't be able to conceive or reproduce. But that was in the past. Now I see that many people are vaccinating their children without any problems. This is because people are now more aware. Community members go around making announcements, encouraging people to vaccinate their children. *(KII, Influential elder, Kirumba)*"

Community leaders including religious leaders

General understanding about polio as a disease

Respondents had different opinions about polio as a disease. What was seen as a common response is that Polio was regarded as a disease with very long history yet devastating. The diseases affected mostly children leading to paralysis. In the past before people were educated about the disease and that it was preventive through vaccination, people used to go to traditional healers once a child was identified with symptoms of paralysis. This is revealed by one respondent who narrated that ...polio was considered as acute disease and people had no enough knowledge of the disease. Tradition healers used to inform each others of the problem in the community and would provide trational herbs surrounding each family with a beieve that members of the family will remain safe...(KII, Influencial person-llemela). However, the government has made efforts to educate people on polio vaccination and now many people bring their children whenever there is a vaccination campaign. On the other hand one of the religious leader said that....in our church there is a group of people whose roles is to educate others about the health issues."during different health campaign including vaccination, we announce to our followers in the church as we believe that only medics can be able to treat diseases"... (KII pastorllemela).

Role of local leaders on community awareness about vaccination

Local leaders such street chairperson, influential and religious leaders have unique role in providing awareness and supporting health campaigns including vaccinations because they are trusted, influential figures within their communities. Religious leaders can use sermons to emphasize the importance of health and moral responsibility, linking vaccination to community well-being and religious values....here at our church we have sessions to talk about health issues including vaccination of diseases... (KII pastor-Ilemela). The trust we have built to our

followers is potential to support any government initiatives including counter vaccine hesitancy rooted in misinformation or fear among community members. With regards to street leaders, they often assist to provide information on the vaccination schedules and help in coordination. One of the ward village executive officer had this to say....during vaccination campaign you may invite people to bring their children just to find only few parents does...it is disappointing and sometimes we have to join hands with community health workers to go house to house...(KII, WEO Ilemela). The Muslim Leader (Sheikh) added by saying that ...In Islam we believe every disease has a cure... it is upon us (leaders) to sensitize people to go to health facilities to seek medical attention and in doing so we practice the religios teaching...(KII, Sheikh, Ilemela)

SYNTHESIS OF THE RESULTS AND CONTEXT

Quantitative part of the results

The study surveyed 508 caregivers from Nyamagana and Ilemela municipal councils in Mwanza, Tanzania. Participants were predominantly female (97%), with the average age being 31 years, reflecting a young, mother-centered caregiver population. The oral polio vaccine (OPV) coverage was very high, with 98.6% of children having received at least one dose. A strong majority—77% of children received all four recommended OPV doses, showing strong adherence to the immunization schedule. High vaccination rates show that vaccination campaigns are well-organized and trusted. The success may be partly due to localized healthcare access and the presence of CHWs, which are known to be effective in reaching community members. The strong reliance on formal health workers underscores the importance of investing in training and deploying medical professionals and CHWs. With high trust in health staff and near-universal OPV coverage, vaccine hesitancy appears minimal in this population. These patterns can inform future campaign by strengthening community-based strategies to maintain and expand coverage.,

Almost universal reliance (99.8%) on medical professionals (doctors, nurses) for child health services. 74.2% of caregivers reported walking less than 30 minutes to a health facility, indicating good physical access to healthcare. A large majority

(93.9%) were very satisfied with the government's polio vaccination efforts. About 80% were aware of the most recent polio campaign. However, 50.2% incorrectly believed polio is caused by lack of vaccination. Only 17.1% correctly identified it as a viral disease, and 31.3% did not know—indicating gaps in disease knowledge. Despite this, 93.5% believed the vaccine is very effective. Skepticism was limited but present: some feared side effects (e.g., fever) or mistrusted origins of the vaccine. No significant resistance or opposition to vaccination was recorded.

With regards to Water, Sanitation, and Hygiene (WASH) practices, 89.6% of households had access to piped water, with 78.5% treating water. Only 40% had a designated handwashing station, and only 18.9% always used soap—suggesting room for improvement in hygiene practices. Toilet access (99.2%) and waste disposal (95.5%) were strong. However, 8.9% of children regularly played in areas with open sewage, posing a potential environmental risk for enteric diseases, including polio.

Areas for improvement

1) Health education gaps:

- A large proportion of caregivers misunderstand the cause of polio, or don't know it. This demands more communication and community engagement planning and implementation
- Misinformation and uncertainty about vaccine safety (e.g., "comes from the West") point to the need for more targeted health education, especially addressing misconceptions.

2) Engagement beyond awareness

- While awareness of vaccination campaigns is high, discussion around polio prevention is low—with 44.1% never discussing it.
- Communication strategies should evolve beyond announcements to encourage active dialogue and community ownership.

3) WASH integration:

 The presence of open drainage, untreated water, and poor handwashing practices in some homes poses a risk for disease transmission. This need intervention from Mwanza Urban Water Supply and Sanitation Authorities Polio campaigns could be paired with WASH initiatives to reduce broader health vulnerabilities and reinforce the benefits of immunization. There is thus a need to mainstream WASH issues in vaccination campaigns.

4) Policy and programmatic implications

- Scale up CHW efforts: Community health workers are already trusted expanding their role in health education could close the knowledge gap. This needs immediate attention to make the best use of CHWs trust and its expansion for better vaccination coverage
- Leverage supportive community structures: With near-universal support from leaders and households, mobilizing these groups in peer education and local campaigns could be impactful.
- Integrate WASH with immunization: Especially in urban-poor or peri-urban areas, a more holistic public health approach could reduce environmental exposure risks

Qualitative part of the results

While no clinical cases of polio have been reported among children in Mwanza, some respondents confirmed that environmental surveillance has intermittently detected the presence of vaccine-derived poliovirus in wastewater systems, indicating silent transmission risks. Following this, respondents widely attributed the environmental presence and potential spread of poliovirus to poor sanitation practices, improper waste disposal, and unsafe water sources. The use of contaminated wells and misconceptions surrounding child feces emerged as key contributors. Additionally, the movement of people—particularly traders from areas still using type two oral polio vaccine (OPV)—was cited as a likely factor for introducing vaccine-derived virus strains into the local environment.

Cultural beliefs also play a role in how polio is understood within communities. While some view the disease through spiritual or traditional lenses, religious leaders interviewed affirmed trust in medical interventions and actively promote vaccination.

Cross-border traders (notably from the Democratic Republic of Congo) and informal food vendors (Mama Ntilie) were identified as high-risk groups due to inadequate

hygiene in their work environments. These populations are considered both vulnerable to and potential transmitters of poliovirus, especially in crowded marketplaces like Kirumba and during international gatherings.

Local health authorities employ a variety of vaccination strategies, including:

- Routine and outreach immunization services targeting hard-to-reach populations
- Door-to-door campaigns during national immunization drives
- The REC (Reach Every Child) strategy, operationalized through coordinated efforts at 60 health centers
- Regular community health education on the importance of vaccination

In addition to immunization, environmental interventions are conducted in collaboration with MWAWASA and municipal health departments, including monthly water sampling, shallow well closures, and inspections to mitigate waterborne disease risks.

The CHWs are instrumental in tracking missed children, conducting home visits, checking immunization cards, and maintaining follow-up contact with families. Respondents advocated for increased financial and logistical support to sustain their crucial work, emphasizing that under-resourcing demoralizes staff and limits outreach effectiveness.

Campaigns are planned through collaborative platforms led by the PHC committee under the district commissioner's leadership. Community leaders and CHWs are involved in grassroots mobilization and resistance management. Digital platforms like VIMS and DHIS2 are utilized for campaign targeting, data analysis, and identifying underperforming facilities.

While partners such as UNICEF, WHO, and GAVI provide support especially for outreach and logistics funding constraints remain a significant challenge. Respondents noted mismatches between allocated resources and the scale of work required, particularly in geographically challenging areas. Inadequate funding for transportation, allowances, and overtime hampers the ability to conduct thorough and sustained immunization efforts.

Despite all this, misconceptions like vaccines causing infertility are still heard in some communities. However, some respondents reported significant improvement in vaccine acceptance and awareness.

Recommendations

Based on the social and behavioural data analysis, the following are recommended actions that SBC / Socioal Mobilisation should consider to include in the planning and implementation of future polio campaign

- Training and deployment of community health workers (CHWs) for household outreach activities. There is a need to train and equip CHWs to conduct door to door mobilization, provide accurate polio information, and track missed children. The training should include interpersonal communication, identification of unvaccinated children, and addressing vaccine hesitancy at the household level
- 2) Orientation and engagement of private healthcare workers. This is critical intervention because there are so many people who rely on private facilities. This will ensure consistent messaging, referral to campaign services, and countering misinformation in community-level interactions
- 3) Strenghthen community engagement and local leader involvement. The focus is to mobilize and train community leaders, religious figures, and influential local stakeholders to promote polio vaccination. Local leaders are one of the trusted people and thus can help to address vaccine hesitancy or misinformation in the community
- 4) Household-level interpersonal communication (IPC). This will involve deploying trained social mobilizers to conduct door-to-door sensitization, answer questions, and counter myths. This will ensure parents and caregivers understand the importance of polio vaccination and where/when to access it
- 5) Mass media and local media campaigns. In this platform dissemination of culturally tailored messages via radio, community loudspeakers, and mobile

vans will be done to raise broad awareness and reinforce key campaign messages