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Programmatic evaluation of a school-based typhoid vaccination campaign: findings of qualitative research

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ABSTRACT

Background: Globally, typhoid fever is a vaccine preventable infectious disease with significant morbidity and mortality. Apart from expanded program on immunization center, other alternative and accessible venues were needed for this vaccine like schools. The purpose of this study was to identify the factors influencing acceptance and rejection of participation in school-based typhoid vaccination program in target communities in Karachi.

Methods: A qualitative study was conducted, 46 in-depth interviews were conducted with parents, teachers and administrators in the schools where the typhoid vaccine was provided. NVivo was utilized for data coding and themes were derived along with WHO's analytical framework, vaccine hesitancy, that is, confidence, convenience and complacency, in responses to the vaccination.

Results: Participants described confidence as a key factor that largely rooted their perceptions and attitudes related to the vaccination program. Stakeholders showed their concerns about affordability, safety and effectiveness and convenience of the vaccine's delivery to the students. Satisfied participants from the school-based program showed lack of trust in quality of vaccine and vaccination procedures.

Conclusions: Our findings indicate the importance of providing adequate information on vaccination through multiple communication channels, sustained social mobilization programs including community engagement. Addressing concerns through dialogic interactions were crucial for motivation and acceptance of the vaccination program.

Keywords: School, Typhoid vaccine, Vaccination campaign

INTRODUCTION

Typhoid fever, a disease caused by the bacterium, *Salmonella enterica* serotype typhi (*S. typhi*), continues to be a serious public health problem in many developing countries. Humans are the only source of the *S. typhi* infection as it spreads by fecal-oral route through contaminated food and water. Typhoid is characterized by persistent fever, abdominal pain, malaise and often causes prolonged illness. In about 10-15% cases it leads to

serious complications such as hypotensive shock, gut perforation and gastrointestinal hemorrhage. Preventive measures include improvement in water and sanitation systems as well as in general living conditions yet requiring a large investment and are far off goals in typhoid endemic countries.

Globally, typhoid fever is an important cause of morbidity and mortality, with an estimated 12-33 million cases leading to 216,000-600,000 deaths yearly; with

Asia presenting 75% of this global burden.²⁻⁵ The annual incidence of typhoid in Pakistan was estimated as >100/100,000 population.⁶ The bulk of this burden is borne by preschool and school-aged children.^{7,8} A randomized, cluster surveillance of typhoid fever in 41,845 children 2-15 years old in inpatient and outpatient settings of Karachi found an incidence of 451.7/100,000 child years of *S. typhi*. Approximately 95% of culture-proven typhoid cases were recognized in children 2-12 years of age.⁹

Along with its high incidence, rapidly rising rates of antibiotic resistant strains of *S. typhi* have posed a significant health impact, increasing its treatment cost and case fatality from 1-4% to pre-antibiotic era rates of 10-20%. ^{10,11} Fortunately, prevention against typhoid can also be achieved through vaccination. A 3-dose oral liveattenuated Ty21a vaccine and the parentally administered, single-dose Vi polysaccharide (Vi) vaccine have been found to be 64-72% effective for at least 17 months and 55% protective for at least three years. ^{5,11-13} The one-dose nature of the Vi vaccine supports better coverage rates, at a reduced cost of administration. Since, these vaccines are recommended only for children older than 2 years, it cannot be incorporated into the routine expanded program on immunization program.

Literature revealed that school-based vaccination programs were an effective form of delivery for the introduction and coverage of new vaccines in a mass vaccination campaign for this population. Vaccine administration activities supported by community-based communication and social mobilization strategies that engage educational institutions, healthcare providers and parents, have remained an effective way of involving and motivating parents to make knowledgeable decisions about their children's participation in a vaccination program. ¹⁶⁻¹⁹

The Aga Khan University (AKU) conducted a schoolbased typhoid vaccine program in schools of two towns of Karachi in 2010 to 2011. The project targeted schoolenrolled children (grade 1-10) either in the formal educational institutes or in religious schools. The vaccination team selected 683 schools from Gulshan and 971 from Jamshed town. With a refusal rate of 27% and 14% respectively, 38,419 (38.6%) students from 435 schools of Gulshan and 78,246 (59.6%) from 815 schools of Jamshed town got vaccinated. Most of the vaccinated schools were private, with 33% to 68% coverage, highest being in madrasahs.²⁰ Critical in its implementation was the social mobilization strategies including, interactive health education sessions with children, teachers and parents. Posters, brochures, and banners were placed in schools, clinics and nearby residential areas.²¹ The strategy was based on a review of the findings from a formative evaluation study.²² The aim of the present study was to evaluate the feasibility of school-based vaccine program and to identify factors that influenced participation.

METHODS

Study design

We conducted qualitative study to explore and identify multiple, interdependent factors that influenced decisions related to participation in the school-based typhoid vaccination program.

Sampling strategy and procedure

Between September to December 2012, 46 in-depth interviews were conducted. A list of those public and private schools and Madrasahs located in Karachi was designed, where typhoid vaccination was conducted. From this, a computer-generated random list of schools was achieved. Private schools were divided into two categories: low fee school (LFS) where monthly fees >300 and <500 rupees and high fee where fees was >500 rupees. Participants in the study included parents, teachers and head teachers (HT) who were identified from the selected schools. Private health care providers (HCPs) were chosen from the catchment areas of these schools. Thus, the selection of participants created an ethnographic sample of categorically representative respondents of the community involved in the typhoid vaccination.

Sample size

Participant schools

Total 40 interviews were conducted involving 16 parents (4 from each public school, madrasahs, LFS and high fee school (HFS) private schools). Likewise, 2 teachers and 2 HT were interviewed from each of the four school categories.

Non-participant schools

Total 6 interviews were done including. 2 parents (1 from LFS and HFS) while 2 teachers and 2 HT were interviewed from each of the two school categories.

Analysis

The NVivo 10 qualitative software was used for data analysis, which involved data coding, segmenting, sorting the coded data and generating grounded themes that emerged inductively from the analysis.^{23,24} To ensure that the analysis was systematic and verifiable, we revised validated interview guides derived from our earlier work.^{22,25,26} Audio taped interviews were transcribed and then translated from Urdu to English. By utilizing a comparative coding process, a dictionary was created and the data was coded in a series of iterative steps. The data were organized and analyzed according to key components of vaccine hesitancy framework that were grounded in the context-specific findings of the study to understand the factors that influenced attitudes and

behavior regarding acceptance and refusal to support participation in the vaccination. This process led to the generation of a set of main, grounded themes in relation to the data that were redundant across categories of respondents and saturated the thematic analysis of the content of the participants' transcripts.²⁷

RESULTS

Socio demographic characteristics

The mean ages of the participants were in range of 28.4-49.4 years. The parents had a wide range of educational levels from illiterate to masters. Whereas the minimum level of education for teachers was matric (Table 1).

Vaccine acceptors

Vaccine confidence and vaccination program's convenience among parents

Majority of the parents were aware of typhoid being a serious disease.

"Typhoid is a continuous fever of >5 days along with vomiting and weakness. It does not settle without proper treatment" said a low fee school, mother.

Findings revealed that social mobilization efforts were critical in providing information hence influencing the acceptance of the vaccination program among parents and school staff. These activities involved regular parent-teacher discussions and opportunities to discuss certain apprehensions about the vaccine such as vaccine's expiry date, side effects and use of disposable syringes. The brochures and consent forms which were sent to homes via students had information about typhoid fever, Vi vaccine and the vaccination team. According to many parents, these brochures were helpful in deciding whether they should sign the consent.

"The brochures were good as everything was mentioned in it and all our family members could read it and it had enough information" said a low fee government school, mother.

Another influential category affecting parents' participation was convenience of the program. School was declared as a good platform for vaccination because the vaccine was readily available and accessible to many children at one time. This allowed them to be able to get vaccinated in a short period of time, since they were already present in school.

"First, many children got the benefit of vaccine. They all got it at one time, you did not have to approach the children individually and in school it was easily done" said a low fee government school, mother. Another major issue for most parents was the cost of the vaccine which was free or at a nominal charge in this program. Free vaccine was necessary for many parents to be able to have their children vaccinated, which they could not have afforded otherwise.

"Cost was important as a common person can't afford to pay a lot of money for vaccines. We have many other expenses, too" said a government school, father.

For majority of parents, knowledge about typhoid fever and availability of a vaccine against it was a new information. Most of them had never accessed vaccines at clinics or hospitals for their children. Becoming aware of this vaccine, having it for free and immediate access to the program at the school encouraged the parents to participate in it.

"The good aspects of the vaccination program were that it was conducted in school so many children got the vaccine at one time. Parents were informed about the vaccination through brochures. And it was given for free" said a low fee school, mother.

The organization of the school-based vaccination not only met the challenges for families belonging to lower socio-economic status but its accessibility also assured parents that it is beneficial for their children and hence heightened their confidence and trust in the program.

"This was given at low cost and we trust the school so it definitely helped in making the decision" said a high fee school, mother.

Vaccine confidence and vaccination program's convenience among teachers

Confidence in the vaccination program was fostered among teachers and HT through several informative interactions with the vaccination team, social mobilization activities and material that was given to them regarding the vaccination program.

"This program was conducted to protect the children from typhoid. The staff also distributed pamphlets and put banners in classes and gave permission letters to the children" said a madrasah, teacher.

The vaccination team presented a proposal to the HT through a number of consultations on the nature of vaccine and the vaccination procedures and also provided them information material. Teachers were given orientation about the implementation of the program and their roles in it. Teachers played a key part in the social mobilization, helped in organizing the event, conducted sessions with parents and discussed their concerns.

"We distributed pamphlets and permission letters class wise for younger children and told them to show it to their parents" said a low fee school, head teacher.

"I managed the time and setting of the whole process of vaccination. We also had pasted posters in our school since parents were asking us for complete information" said a high fee school, head teacher.

The collaboration between the school staff and the vaccination team strengthened the staff's understanding and trust in the program. The teachers were impressed by the efforts of the team as they took proper care of the students and kept them under observation after the vaccination and by the presence of a physician during vaccine administration. This professional competence and intentions of the vaccination team influenced the confidence of teachers.

"The vaccination team was very cooperative, well trained and well-educated. They were vaccinating the children with very much love and care" said a high fee school, head teacher.

Teachers who were in support of this program largely agreed that an important aspect was its arrangement in schools. They also appreciated its accessibility for all students with the cost of the vaccine being nominal or free.

"This vaccine was given free which was also good for poor people who can't afford to pay" said a low fee school, teacher.

The teachers also found that the brochure was informative and that its language was understandable. They pointed out that sending brochures with consent form assisted the parents to make informed decisions about the vaccination.

"We distributed the letters to the children in higher classes and attached the forms to the diaries of the younger children" said a high fee school, teacher.

The teachers also had various discussions with parents to reassure them about the program. This range of involvement of the HT and teachers created a good impression.

"Overall, the program was designed well. It was a great help to poor children's health. We should also do whatever we can do for needy people, so this kind of program should be conducted in the future" said a low fee school, HT.

Vaccine refusals

Parent's complacency and refusal to accept participation in the vaccination

These parents expressed a degree of uncertainty about the risk of the vaccination, which for them outweighed its potential benefits. They thought that the information in the brochure, although clear and informative to an extent, was limited and inadequate on important points, so that

they were unable to confidently accept their children's participation in the program.

"It was in easy language and it was written that typhoid is a lethal disease and vaccine is necessary, but important details were not given such as information about vaccine quality, expiry date and overall management of the program" said a low fee school, mother.

Majority of parents complained that they were not able get answers to their questions and concerns. They were uncertain about the proper administration of the vaccine, had concerns over negative rumors and wondered about their association with this program, thus voiced a general concern about the safety and integrity of the program.

"We were not sure about the quality of the vaccine and whether the team will use separate syringes for each student. As we daily hear in news, after taking an injection some people got some other disease or virus. So, we were very scared. And in our country, we can't trust that anybody has the right intention" said a high fee school, mother.

Parents also questioned if it was possible for the school to provide a proper hygienic environment for the vaccination.

"It should be conducted in hospitals only as hospitals are better than schools because of proper setting and arrangement of storage for vaccines" said a high fee school, mother.

Teachers' complacency and refusal to accept to participation in the vaccination

Certain schools refused to participate in the campaign because of their fear of parent's resistance to it and subsequent displeasure with the school.

"Team members came here but we refused to participate because we know that the parents will not agree since we already had a bad experience like this in polio campaign. Parents argued a lot with us" said a high fee school, HT.

Some administrators were not confident that the program was safe and would not have any adverse events. They did not want to take responsibility for possible risks from the vaccination and asked the parents for their permission for participation in the vaccination. They generally felt that a clinical setting would be more appropriate for the vaccination.

"I was not at all comfortable as in my opinion, school should not be involved in such campaigns. It is not a good platform for vaccination" said a HT, low fee school.

Along with questions about the safety of vaccine, there were also reservations about the convenience of having the program in their schools. While a number of these HT

thought that it was a good idea to vaccinate students against typhoid fever but this program would present a number of inconveniences for them and for their staff.

"Although a school could be a good platform for it, but here we have a small space and we will have to spare time for it, and will have to arrange a saturday for this and spare my staff and place" said a HT, low fee school.

Table 1: Socio demographic characteristics.

Characteristics	HT (N=10) (%)	Class teacher (N=10) (%)	Parents (N=18) (%)	HCP (N=8) (%)
Gender				
Male	3 (30)	-	5 (27.8)	5 (62.5)
Female	7 (70)	10 (100)	13 (72.2)	3 (37.5)
Age (mean, SD)	38.3 (11.4)	28.4 (8.1)	36.4 (5.3)	49.4 (9.6)
Education	•			
Illiterate	-	-	4 (22.2)	-
Middle	-	-	2 (11.1)	-
Matric	1 (10)	-	2 (11.1)	-
Intermediate	-	3 (30)	6 (33.3)	-
Graduate and above	9 (0.9)	7 (0.7)	4 (0.2)	8 (100)

Health care providers: mixed views on the vaccination

The HCPs stated that they were not well informed about the vaccination program and had little direct contact with it. Very few physicians were willing to fully accept and support it. Few had heard about it from their patients, while some had received pamphlets and consent forms from their children's schools. They also noticed posters and banners about the program yet felt that these forms of information were inadequate to make a judgment about its safety and effectiveness.

"I got to know that vaccination for typhoid is being conducted in school when parents came to me to confirm about the vaccine and whether they should vaccinate their children. But no one from the team directly approached me" said a physician, Gulshan town.

Some said that they were satisfied with the program because they felt it was properly conducted, at a reasonable cost and would protect many children from typhoid fever, though they could just assume that it would be performed properly, since parents did not come to them with complaints about the program.

"Yes, although I was not involved in the program, but I am personally satisfied with it as it could improve the health of children and they can get the vaccine without any cost, which will save them from future expenditures" said a physician, Jamshed town.

There was, thus, a consensus among the physicians that typhoid is a major problem among school-aged children and a need for increased awareness about it. They appreciated the effort of school base program because many parents were not aware of its preventive measures.

"In my opinion, they were comfortable in getting their children vaccinated from school because they didn't face

any problems, parents trust schools when they allow such programs" said a physician, Jamshed township.

Some HCPs did not recommend their patients to allow their children to get the vaccine from their schools as they were unsure about the quality of the vaccine and lacked adequate information about the vaccination program.

"I was not sure about the quality of the vaccine, its storage and whether proper information was given to the parents, so I told them I will not refer them to take it" said a Physician, Gulshan township.

All the HCPs were in favor of a typhoid vaccination program being conducted in future, though in a proper way. Most of them suggested that it should be conducted by the government and funding agencies and would be better if it involved staff and settings of clinics and hospitals.

"I think it should be done at the PMDC level and they should involve primary care district clinics. The government and NGOs should conduct these programs. Other organizations like USAID and WHO should also be approached as they do in polio campaign" said a (physician, Gulshan township).

The program missed an opportunity of meaningfully and adequately involving the HCPs, who were influential and knowledgeable community members. This resulted in majority of the HCPs lacking confidence in the program and being unable to support participation in it.

DISCUSSION

Pakistan has some of the highest rates of endemic typhoid in the world and there is the emergence of resistant strains of *S. typhi* in the country. 9.28 Moreover, school-aged children were most susceptible to infection and suffering

from typhoid. The practical expediency of having a school-based vaccination presented an efficient way to reach the maximum number of children.¹⁷

Given many interrelated determinants of vaccine hesitancy, a critical finding of this study was that communication and social mobilization served as the cornerstones of vaccine confidence and acceptance. It also showed that lacking relevant and necessary information diminished stakeholders confidence in the program and their acceptance of it. Overall, this study demonstrated the essential importance and synergy of an intensive, community-based social mobilization and communication strategy that needed to reach and involved a wide range of socioeconomic, health care and institutional respondents and address key issues in their decisions regarding the vaccination.

Majority of respondents appreciated the school-based program as many children got vaccine at a time, trustworthy place, free of cost or in affordable price. Similar findings were observed in other studies.^{29,30}

Immunization has significant health benefits, particularly for children, however, studies showed that people, particularly in developing countries, did not vaccinate their children.³¹ As observed during the interviews, participants remained unconvinced about the safety and effectiveness of the vaccine and vaccination process and refused to vaccinate or ignored the recommendation of HCPs and program staff. Despite of it, hesitation to vaccinate remained one of the most important factors to determine the course of eradication program.³²

Limitations and strengths

A small sample of respondents was approached, so generalizability of the findings can be affected; however, interviews were stopped as soon as the point of saturation was achieved. The qualitative approach and structured analysis were critically important in identifying the issues and barriers that were most prominent and influential for stakeholders decision making regarding the school-based vaccination. The systematic triangulation of data in terms of responses from diverse stakeholders and the practical and conceptual framework of WHO's vaccination hesitancy components provided findings that were comparable and corroborated in relation to the issues of both, who accepted and who rejected the vaccination.

CONCLUSION

The findings of the study were gathered from representatives of diverse setting of low and high fee schools and religious schools, and physicians. The results show the importance of multi-component, community-based intensive and interactive communication and social mobilization efforts in the development of vaccine confidence and acceptance and the capacity to access and participate in the vaccination program. Moreover, school

as a platform for vaccination was accepted and appreciated by the participants.

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