

## Mobilize to vaccinate: lessons learned from social mobilization for immunization in low and middle-income countries

Mohamed F. Jalloh , Elisabeth Wilhelm, Neetu Abad, and Dimitri Prybylski

Global Immunization Division, Centers for Disease Control and Prevention, Atlanta, USA

### ABSTRACT

Creating and sustaining demand for immunization services is a global priority to ensure that vaccine-eligible populations are fully protected from vaccine-preventable diseases. Social mobilization remains a key health promotion strategy used by low- and middle-income countries (LMICs) to promote vaccination demand. In this commentary, we synthesize illustrative evidence on successful social mobilization efforts promoting the uptake of immunization services in select LMICs. The first example focuses on Sierra Leone's routine immunization program during the Universal Child Immunization initiative in the late 1980s. We then give an example of India's establishment of a social mobilization network in the early- to mid-2000s to support polio elimination in high-risk communities. Thirdly, we highlight the complexities of social mobilization in a humanitarian emergency during the 2017–2018 diphtheria outbreak among displaced Rohingyas in camps and settlements in Bangladesh. Lastly, we draw upon examples from the introduction of the human papillomavirus vaccine in several countries. We then critically examine recurring challenges faced when implementing social mobilization for immunization in LMICs and offer practical recommendations for improvement.

### ARTICLE HISTORY

Received 6 August 2019  
Accepted 20 August 2019

### KEYWORDS

Social mobilization; immunization; low- and middle-income countries; demand; community engagement; communication; behavior change; hesitancy

### Introduction

The Expanded Program on Immunization (EPI)<sup>1</sup> has had a profound impact on reducing the burden of vaccine-preventable diseases (VPDs) in low- and middle-income countries (LMICs).<sup>2,3</sup> Despite progress in increased reach to more children with life-saving vaccines, there has been a stagnation in the proportion of children under one year of age who received three doses of diphtheria-tetanus-pertussis vaccine (DTP3) in the past decade. The World Health Organization (WHO) estimated that approximately 86% of infants were vaccinated with DTP3 globally in 2018,<sup>4</sup> similar to the level of 84% coverage in 2010. DTP3 coverage remains lower in Africa (76%) and Eastern Mediterranean (82%) regions compared to all other WHO regions (87%–94%). These two regions have more than half of the nearly 20 million children globally who are either under-vaccinated or unvaccinated.<sup>4</sup>

Some caregivers delay or refuse to vaccinate their children even when immunization services are available<sup>5–8</sup> for various reasons that can be contextual (e.g. historical influences, religious and cultural beliefs), individually-driven (e.g. lack of awareness, knowledge gaps, negative vaccination experience, lack of perceived benefits), and vaccine- or vaccination-specific (e.g. adverse events following immunization, administration of multiple vaccines at a single visit, concerns about new vaccine introduction, distrust in vaccine manufacturer).<sup>9</sup> In 2019, the WHO declared vaccination delays and refusals linked to vaccine hesitancy among the top-ten global health threats.<sup>10</sup> While vaccine hesitancy undoubtedly poses a threat to maintaining optimal global vaccination coverage necessary to achieve herd immunity

against VPDs, access constraints, social inequities, and other systems-related weaknesses also pose serious challenges to both vaccination demand and uptake in many LMIC contexts.

Social mobilization is a key health promotion strategy used by LMICs to create and sustain demand for the routine immunization programs offered at the health facilities or at other sites (e.g. schools) as well as during supplemental immunization activities (SIAs). As part of VPD eradication and elimination strategies (such as for Polio and measles), SIAs may also be administered after disease outbreaks. The design and quality of implementing social mobilization for immunization vary across and within countries.

Based on a comprehensive review, Rogers et al. define social mobilization as the “effort to marshal many people to perform behaviors that impose a net cost on each individual who complies and provides negligible collective benefit unless performed by a large number of individuals.”<sup>11</sup> Definitions of social mobilization in public health also center around collective action to achieve the desired health outcome.<sup>12</sup> United Nations Children's Fund (UNICEF) defines social mobilization as “a process that engages and motivates a wide range of partners and allies at national and local levels to raise awareness of and demand for a particular development objective through dialogue.”<sup>13</sup> Taken together, we suggest that social mobilization for immunization is the collective effort by diverse stakeholders to ensure optimal vaccination uptake in a target population by generating and sustaining demand for vaccines, using community-based participatory approaches. It

should be recognized that social mobilization is only one of many strategies that can contribute to creating demand for vaccinations. Planning and implementing social mobilization for immunization may vary when done for routine immunization, SIAs, humanitarian emergencies, VPD outbreak responses, and new vaccine introductions.

In this commentary, we synthesize illustrative evidence on successful social mobilization efforts promoting the uptake of immunization services in select LMIC settings. We then critically examine recurring challenges faced when implementing social mobilization. Finally, we offer practical recommendations to improve social mobilization for immunization in LMICs.

## Examples of social mobilization strategies and lessons learned

We describe the following examples to illustrate lessons learned: 1) Sierra Leone's use of social mobilization to drastically increase routine immunization coverage during the Universal Child Immunization (UCI) initiative in the 1980s; 2) India's establishment of a social mobilization network to support polio elimination in high-risk communities; 3) the complexities of social mobilization in a humanitarian emergency during the 2017–2018 diphtheria outbreak among displaced Rohingyas in camps and settlements in Bangladesh; and 4) examples of human papillomavirus (HPV) vaccine introductions targeting pre-adolescent and adolescent girls in several countries.

### Sierra Leone's universal child immunization initiative experience

In 1977, the World Health Assembly adopted the UCI initiative that called for all countries to vaccinate every child against tuberculosis, polio, diphtheria, pertussis, tetanus, and measles by 1990.<sup>14,15</sup> Just four years away from the UCI target date, coverage of the six antigens was abysmally low at 6% in Sierra Leone.<sup>16</sup> Lagging behind other African countries and the rest of the world, there was enormous pressure on the country to improve the situation. The government's response – with technical and financial support from UNICEF and partners – was to ramp up social mobilization in all 14 districts, down to the chiefdom and community levels. The intensified social mobilization efforts contributed to increasing coverage of the six antigens to 75% by 1990, which further led to decreased mortality rate of children under the age of five years.<sup>16,17</sup> So how did social mobilization contribute to the UCI success in Sierra Leone?

Prior to social mobilization efforts, interventions that had focused solely on vaccination service delivery failed to achieve UCI targets in 1986. To inform effective interventions, a national survey was conducted to assess the public's knowledge, attitudes, and practices related to immunization.<sup>14</sup> Results from the survey informed the design and implementation of a large-scale social mobilization intervention that galvanized diverse community stakeholders to support routine immunization. Religious leader engagement was a central pillar of the social mobilization strategy, including the formation of faith-based action groups that comprised Islamic and

Christian leaders. Imams and pastors used relevant verses from the Qur'an and Bible to promote childhood immunization messages to community members in mosques, churches, and other community venues. The government and UNICEF also engaged traditional chiefs extensively to organize community-level immunization promotion events and vaccination outreach services. Partnerships with the media were further leveraged in promoting vaccination. Unfortunately, progress made in the country's immunization program was derailed by a devastating civil conflict in subsequent years (1991 to 2002), with DTP3 coverage dropping below 50% in 1999 at the peak of the conflict.<sup>18</sup> From 2014 to 2015, the country was again challenged by a large outbreak of Ebola Virus Disease<sup>19</sup> that took an adverse toll on primary health care services, resulting in decreased uptake of childhood immunization services.<sup>20</sup> Community action groups formed during UCI were revitalized and repurposed to mount a nationwide social mobilization campaign to promote Ebola-protective behaviors across all 14 districts.<sup>21</sup>

At the end of the Ebola outbreak, the mobilization platforms used for the response were then adapted and extended to support social mobilization efforts for routine immunization and supplementary campaigns. For instance, the platform has since been used to support several polio and measles SIAs, the introduction of measles-rubella vaccine, and the promotion of routine childhood immunization.<sup>22</sup> Long-term sustainability of this platform to support routine immunization programs may be derailed without the appropriate funding, planning, and integration into health systems beyond outbreak response and campaigns. Funds for social mobilization may be more readily available during outbreak response compared to routine immunization promotion efforts.

### India's social mobilization network for Polio

In India, the Social Mobilization Network (SMNet) was established – in 2002 in Uttar Pradesh and 2005 in Bihar – to support polio elimination with emphasis on areas that were considered high risk for polio transmission and had demonstrated frequent refusal of vaccination.<sup>23</sup> SMNet trained and engaged more than 6,000 social mobilizers of whom 90% were women. Mobilization strategies were grounded in evidence-based communication and microplanning and comprised the use of mass media, print materials, house-to-house dialogs, peer-support groups and the training and mobilization of community influencers, including traditional and religious leaders.<sup>24</sup>

Monitoring data suggested that exposure to social mobilization messages and the quality of social mobilization implemented through SMNet were associated with enhanced SIA outcomes.<sup>25</sup> Beyond polio, one study revealed that a mother's exposure to SMNet's intervention was associated with an increased likelihood of her child receiving at least one dose of DTP in the routine immunization schedule. SMNet's social mobilization strategies were continuously refined, using insights from various social behavioral assessments.<sup>26</sup>

While successful in contributing to polio elimination, the SMNet platform in India has faced a myriad of challenges in transitioning over to largely supporting the achievement of

routine immunization outcomes across India, particularly in the southern states where the SMNet platform was not as well-developed. Leveraging social mobilization networks that were originally established by polio eradication initiatives to improve the uptake of routine immunizations offered in health facilities has been difficult. This is a common global challenge for many countries, particularly for those who once had robust polio eradication structures.

### **Rohingya humanitarian emergency in Bangladesh**

The 2017–2018 diphtheria outbreak in camps and settlements for displaced Rohingyas in Bangladesh<sup>27</sup> highlights some of the complexities in conducting social mobilization for immunization in a humanitarian emergency setting among a population with previously low or unknown vaccination history. In November 2017, suspected cases of diphtheria were detected among children in camps and settlements in Cox's Bazar district. By January 2018, there were over 4,000 suspected cases and 30 deaths.<sup>28,29</sup> Several rounds of vaccination campaigns were conducted as part of the outbreak response efforts. The first campaign round of the diphtheria-containing vaccine reached approximately 80% of the targeted children population based on administrative coverage data.<sup>30</sup> Shortfalls of the target coverage of 95% during the first round were partly attributed to sub-optimal social mobilization. Community mobilizers were used primarily on the days of the campaign to disseminate reminders by megaphones and help identify eligible children to be brought to the fixed vaccination sites. Following the first campaign round, the U.S. Centers for Disease Control and Prevention supported the UNICEF and partners to conduct a rapid behavioral assessment that uncovered various barriers to campaign participation, including religious concerns about vaccines and vaccination, safety concerns, such as worrying about receiving multiple vaccines at once, and perceived lack of sensitivity to gender norms during vaccination (e.g. the lack of female vaccinators to vaccinate girls).<sup>31</sup>

Results from the assessment were used by outbreak response partners to guide the revamping of social mobilization efforts in subsequent vaccination campaigns in the camps. For instance, radio messages were revised to address vaccination concerns. Trusted leaders including religious leaders and appointed camp leaders were identified and engaged to promote vaccination in their community. Model Mothers were respected women elders previously trained by UNICEF to operate Community-based Information Centers in the camps, and they were trained to answer questions about vaccination concerns to promote vaccinations. Given religious and cultural norms prohibiting adolescent girls from interacting with men outside of their families, additional efforts were made to increase the number of female vaccinators. Improvements in social mobilization during subsequent campaign rounds may have contributed to higher diphtheria vaccination coverage (>90% for both the second and third campaign rounds compared to 80% in round one based on administrative data).<sup>30</sup>

### **Introductions of the human papillomavirus vaccine**

The HPV vaccine that targets adolescent girls has been successfully introduced in diverse LMIC settings, using various strategies that contributed to high uptake and completion of the three-dose series. Systematic reviews of lessons-learned from numerous evaluations of the HPV vaccine introductions in LMICs identified positive messages, focusing on the prevention of cervical cancer as the dominant reason for pursuing vaccination among both caregivers and girls.<sup>32,33</sup> Caregivers often had concerns about HPV vaccine safety and potential effects on the future fertility of their daughters. These concerns should be addressed proactively in social mobilization leading up to the HPV vaccine introduction.<sup>32</sup> Initiating social mobilization early, developing ongoing interactive communication campaigns with parents and guardians that addressed emerging rumors early were more effective than non-interactive communication campaigns.<sup>33</sup> Additional factors identified for successful social mobilization were endorsement and support from national governments and having prepared crisis communication plans with clearly defined messages and roles for rapid response when needed.<sup>32</sup>

One study used household surveys to examine the effect of communication strategies on the HPV vaccine uptake among eligible girls in select demonstration project sites in Uganda and Vietnam.<sup>34</sup> Caregiver exposure to community influencers was associated with high HPV vaccine uptake rather than exposure to traditional information channels (e.g. posters, radio programs, and television programs). Best results were achieved when caregivers spoke with a wide range of social influencers before vaccination, including trained personnel (health care workers and particularly teachers) in addition to family, community or religious leaders. The need to use comprehensive communication strategies that pay specific attention to key social influencers, as opposed to traditional educational materials and activities, was corroborated in a qualitative study in Vietnam<sup>35</sup> and have also been found in high-income settings.<sup>32</sup> In Tanzania, results of a case-control study revealed that most caregivers and girls who initially did not accept the HPV vaccination, indicated that they would have accepted it if they had been given another chance to do so. This finding highlights the need for social mobilization efforts to make it clear that there are future opportunities to receive the HPV vaccine for those who initially declined.<sup>36</sup> Mobilizing 'credible influencers' should start early to allow caregivers time to consult sources who are well-informed to guide their decision-making.<sup>33</sup> Credible influencers included health-workers, teachers, community or religious leaders, and influential family members, members of royalty, wives of elected leaders, political leaders, and entertainers.

### **Recurring challenges in social mobilization for immunization**

As in other public health programming, social mobilization for immunization should be guided by a clear, data-driven strategy that is centrally positioned within the broader program.<sup>37</sup> However, this often does not occur. In our experience, some of the underlying reasons behind the poor implementation of social

mobilization for immunization in LMICs include failures to sufficiently integrate social behavioral science expertise into the immunization workforce, inadequate funding for social mobilization, poor planning, and weak evaluation systems for social mobilization. These underlying reasons are further described below. In addition, we summarize recurring challenges faced in social mobilization for immunization in four specific settings (routine childhood immunization, SIAs, humanitarian emergencies and outbreaks, and introducing, piloting, or testing of new vaccines) and provide illustrative mitigation strategies in Table 1.

### Failures to integrate social science expertise into the immunization workforce

Many immunization programs may not have dedicated staff to lead the planning and implementation of promotion including social mobilization activities to create demand. In most cases, staff from health promotion units within ministries of health may be assigned to support SIA social mobilization activities on an ad-hoc basis. Staffing and human resource considerations should be prioritized to ensure that the appropriate mix of personnel with diverse skills and

expertise in social behavioral sciences are involved in mobilizing communities and stakeholders from national, and down to the community levels. During various social mobilization efforts for immunization, there is often an over-reliance on print materials and poorly trained community mobilizers who use simple awareness-raising approaches such as one-way messaging via megaphones. While some of these strategies may be necessary to raise basic awareness of immunization services, they are fundamentally inadequate to foster resilient vaccination demand whereby communities have ownership of immunization services.

### Inadequate funding

In our view, the lack of consistent, adequate funding to design, implement, and evaluate social mobilization for immunization is another underlying reason for suboptimal mobilization. Appropriate financing to support high-quality social mobilization is vital for improving vaccination uptake in LMICs. Limited evidence exists on the resources needed to support effective social mobilization for routine immunization or SIAs. Many of the budgets that cover social mobilization are allotted for polio and measles SIAs. The

**Table 1.** Summary of major threats to social mobilization for immunization and mitigation strategies across four contexts.

Major Threats <sup>&amp;</sup>	Mitigation Strategies <sup>&amp;</sup>
	Routine childhood immunization
<ul style="list-style-type: none"> <li>● Lack of or outdated demand strategy at national and sub-national levels</li> <li>● One-off social mobilization (SM) activities and poor planning</li> <li>● Outdated or no micro-plans for SM, leading to suboptimal outreach, especially in hard-to-reach areas or for transient populations</li> <li>● Outdated or no monitoring and evaluation framework</li> <li>● Inadequate or no specific budget for routine demand promotion and SM</li> </ul>	<ul style="list-style-type: none"> <li>● Develop/update demand strategy that articulates the role of SM<sup>40</sup></li> <li>● At a minimum, implement Reaching Every District guidelines for SM, micro-planning and recurring engagements with the community stakeholders.<sup>41</sup></li> <li>● Develop/update national and district-level monitoring and evaluation plans for SM.</li> <li>● Determine and allocate an appropriate budget for social mobilization based on a clear action plan linked to an overall demand strategy.</li> </ul>
	Supplementary immunization activities
<ul style="list-style-type: none"> <li>● Communities may end up having “campaign fatigue” and see limited personal or public benefit in repeated campaigns<sup>42</sup></li> <li>● People may not understand the differences between doses received during campaigns and routine immunization</li> <li>● SIAs vaccinate many people at once, increasing the likelihood of serious adverse events occurrence following immunization (AEFIs), especially in clusters, causing vaccine safety concerns in the community<sup>43</sup></li> </ul>	<ul style="list-style-type: none"> <li>● Sustain mobilization of a wide coalition of stakeholders to prioritize high coverage among target population during the campaign and help achieve targets as well as preventing outbreaks<sup>44</sup></li> <li>● SIA messages during social mobilization should articulate to caregivers the need to continue with the regularly scheduled doses in the routine schedule</li> <li>● Ensure vaccine safety is addressed in social mobilization events, and that caregivers know how to report AEFIs</li> </ul>
	Humanitarian emergencies and outbreak settings
<ul style="list-style-type: none"> <li>● Unknown or incomplete immunization history of the affected population</li> <li>● Population may not have been socialized to vaccination benefits</li> <li>● Context can deprioritize immunization over more pressing health, security, and livelihood concerns</li> </ul>	<ul style="list-style-type: none"> <li>● Use existing community leadership structures to build confidence and trust in vaccines among<sup>45</sup></li> <li>● Use social mobilization and immunization activities adapted for difficult contexts (e.g. health days for multiple health services or entering the community on days of tranquility)<sup>46</sup></li> <li>● Conduct social mobilization and immunization at gathering points (e.g. places of worship, food distribution centers, and recreational events)</li> </ul>
	Introducing, piloting, or testing of new vaccines
<ul style="list-style-type: none"> <li>● Low perceived risk of the disease prevented by the vaccine or prevention benefits not resonating<sup>47, 48</sup></li> <li>● Safety concerns of a new vaccine, especially unlicensed vaccines</li> <li>● The new vaccine may be partially effective</li> <li>● The new vaccine may only be available for sub-populations and/or targets an age group not currently served by the immunization program<sup>49</sup></li> <li>● Challenges with inter-ministerial collaborations when introducing a new vaccine, requiring involvement of multiple government ministries.</li> </ul>	<ul style="list-style-type: none"> <li>● Develop, test, and refine SM messages to articulate the benefits of the new vaccine and health risks if left unvaccinated</li> <li>● Use qualitative approaches to get a deeper understanding of the safety or efficacy concerns and identify appropriate messages and trusted messengers to communicate the safety profile of the vaccine, using plain language<sup>37, 50</sup></li> <li>● Prevent misinformation by clarifying who is eligible and who is not and why to address misinformation<sup>50</sup></li> <li>● Consider policy updates required to successfully target social mobilization at new locations (e.g. schools) and with new populations (e.g. adolescents).</li> </ul>

<sup>&</sup> Threats and mitigation strategies may be overlapping across the four contexts. For example, while adverse events following immunization also pose a threat to routine immunization, such threats are more pronounced during SIAs.



example from the UCI experience in Sierra Leone was quite unusual in that the budget for social mobilization was always at least 10% of the national EPI budget and even went as high as 25% in some years.<sup>14</sup> In India, social mobilization constituted approximately 7% of the total immunization expenditure in 2012.<sup>38</sup> Among the few studies that examined successful HPV vaccine introduction project costs, social mobilization expenditures were substantial and accounted for a large proportion of the overall start-up costs – ranging from one-half in Uganda, two-thirds in Peru and three-quarters in Vietnam.<sup>32</sup> Despite the collective evidence of the potential return-on-investment that adequately funded and well-planned social mobilization can yield, it is still common for immunization programs to lack a dedicated budget line for social mobilization, except during SIAs and outbreak responses.

### Poor planning

Many social mobilization efforts in immunization lack the necessary planning needed for successful implementation; and if plans are available, they are usually not integrated into the broader EPI planning processes. A behavior change communication and demand generation strategy should be developed and refined over time based on available research, observations and experiences from past efforts, and sufficient community input to develop content and approaches that are specific to local contexts and relevant and accessible to community members. Equally important, an operational plan that spells out all logistical components of the social mobilization strategy must be developed in close collaboration with the larger EPI team.

### Weak monitoring and evaluation systems

Finally, even though an outcome evaluation for social mobilization is costly and complex,<sup>39</sup> leveraging existing assessments (e.g. vaccination coverage surveys) and EPI program data should be considered to measure the contributions of social mobilization. At a minimum, a process evaluation of social mobilization efforts should be conducted to identify implementation bottlenecks. Rapid qualitative assessments can be powerful tools to quickly generate a deeper understanding of the behavioral and social drivers of vaccine demand and uptake, which may contribute to planning more successful social mobilization strategies.

### Looking to the future

Social mobilization approaches that use data-driven messages and engagement approaches, trusted messengers, and preferred channels of receiving information and promoting action within the population should be prioritized in creating resilient vaccination demand in LMICs. Trusted people from local communities should be engaged in promoting vaccination using existing structures where people worship, learn, and play in their communities. Such engagements should be done on an ongoing and participatory basis to foster community ownership of the immunization services. Moreover, when

adjusting to increased urbanization occurring in LMICs, immunization programs need to adapt novel mobilization strategies that are responsive to these demographic changes.

To support quality implementation and building of demand promotion systems for routine immunization, programs may have to consider allocating a minimum budget threshold for social mobilization and other related demand creation activities so that these do not become an after-thought. Greater financial investments in demand creation for immunization in LMICs is critical for achieving global immunization outcomes, such as attaining at least 95% vaccination coverage of two doses of measles-containing vaccine in all countries. In turn, to demonstrate value-for-money and effectiveness in increasing vaccine uptake, more rigorous approaches and methods are needed to evaluate social mobilization efforts for immunization.

Demand promotion should be carefully linked and coordinated with the service delivery to ensure that immunization services are responsive to communities and culturally appropriate. Otherwise, efforts may lead to community frustration, which may negatively affect vaccination demand and broader health outcomes. Social mobilization for immunization is likely to succeed when it is not implemented as an after-thought but rather conceived and implemented as a centrally positioned effort with a clear, evidence-based strategy that is fully integrated within broader immunization and health systems.

### Acknowledgments

We thank various colleagues for their contributions in reviewing and providing feedback on the manuscript: Dr. Abigail Shefer, Dr. Shibani Kulkarni, Dr. David Fitter, and Dr. Michael Lynch of the Centers for Disease and Prevention in Atlanta, United States; Dr. Karen Greiner and Dr. Benjamin Hickler of UNICEF in New York, United States; and Mr. Mohammad B. Jalloh of FOCUS 1000 in Freetown, Sierra Leone.

### Disclosure of potential conflicts of interest

The authors have no interests to declare. All authors are government employees of the United States Centers for Disease Control and Prevention.

### Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the United States Centers for Disease Control and Prevention.

### ORCID

Mohamed F. Jalloh  <http://orcid.org/0000-0002-7206-8042>

### References

1. WHO. The expanded programme on immunization. 2013. [http://www.who.int/immunization/programmes\\_systems/supply\\_chain/benefits\\_of\\_immunization/en](http://www.who.int/immunization/programmes_systems/supply_chain/benefits_of_immunization/en)
2. WHO. Surveillance for vaccine preventable diseases. 2017. [http://www.who.int/immunization/monitoring\\_surveillance/burden/VPDs/en](http://www.who.int/immunization/monitoring_surveillance/burden/VPDs/en)
3. WHO. Global vaccine action plan 2011-2020. Geneva: WHO; 2013. [http://www.who.int/immunization/global\\_vaccine\\_action\\_plan/en](http://www.who.int/immunization/global_vaccine_action_plan/en).

4. WHO. Diphtheria tetanus toxoid and pertussis (DTP3) by region. 2018. [http://apps.who.int/immunization\\_monitoring/globalsummary/timeseries/tswucveragebcg.html](http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucveragebcg.html)
5. Dube E, Loberge C, Guay M, Bramadat P, Roy R, Bettinger J. Vaccine hesitancy: an overview. *Hum Vaccin Immunother.* 2013;9:1763–73. doi:10.4161/hv.24657.
6. Dube E, Vivion M, MacDonald NE. Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. *Expert Rev Vaccines.* 2015;14:99–117. doi:10.1586/14760584.2015.964212.
7. Eskola J, Duclos P, Schuster M, MacDonald NE. How to deal with vaccine hesitancy? *Vaccine.* 2015;33:4215–17. doi:10.1016/j.vaccine.2015.04.043.
8. Jarrett C, Wilson R, O’Leary M, Eckersberger E, Larson HJ. Strategies for addressing vaccine hesitancy - a systematic review. *Vaccine.* 2015;33:4180–90. doi:10.1016/j.vaccine.2015.04.040.
9. MacDonald NE. Vaccine hesitancy: definition, scope and determinants. *Vaccine.* 2015;33:4161–64. doi:10.1016/j.vaccine.2015.04.036.
10. WHO. Ten threats to global health in 2019. Geneva: World Health Organization;2019.
11. Rogers T, Goldstein NJ, Fox CR. Social mobilization. *Annu Rev Psychol.* 2018;69:357–81. doi:10.1146/annurev-psych-122414-033718.
12. Ofosu-Amaah S. Social mobilization for immunization and primary health care. *Asia-Pacific J Public Health.* 1989;3:200–04. doi:10.1177/101053958900300305.
13. UNICEF. Social mobilization. New York: Unicef; 2015. [https://www.unicef.org/cbsc/index\\_42347.html](https://www.unicef.org/cbsc/index_42347.html)
14. UNICEF. Building trust in immunization: partnering with religious leaders and groups. New York, NY: UNICEF; 2004. p. 23–26.
15. UNICEF. Reaching the children: universal child immunization by 1990. New York, NY: UNICEF; 1987. p. 1–10.
16. Zarocostas J. UNICEF taps religious leaders in vaccination push. *Lancet.* 2004;363:1709. doi:10.1016/S0140-6736(04)16294-6.
17. Amin R, Hill RB, Horton SA, Kamara C, Chowdhury J. Immunization coverage, infant morbidity and infant mortality in Freetown, Sierra Leone. *Soc Sci Med.* 1982;1992:851–56.
18. WHO. WHO-UNICEF estimates of DTP3 coverage; 2018.
19. Organization WH. Ebola situation reports; 2016.
20. Elston JW, Cartwright C, Ndumbi P, Wright J. The health impact of the 2014–15 Ebola outbreak. *Public Health.* 2017;143:60–70. doi:10.1016/j.puhe.2016.10.020.
21. Blevins JB, Jalloh MF, Robinson DA. Faith and global health practice in Ebola and HIV emergencies. *Am J Public Health.* 2019;109:379–84. doi:10.2105/AJPH.2018.304870.
22. FOCUS1000. New Polio Vaccine in Sierra Leone: SUNI CSP engages communities to eradicate polio; 2017.
23. Deutsch N, Singh P, Singh V, Curtis R, Siddique AR. Legacy of polio-use of india’s social mobilization network for strengthening of the universal immunization program in India. *J Infect Dis.* 2017;216:S260–s6. doi:10.1093/infdis/jix068.
24. Siddique AR, Singh P, Trivedi G. Role of Social Mobilization (Network) in polio eradication in India. *Indian Pediatr.* 2016;53: S50–s6.
25. Weiss WM, Rahman MD, Solomon R, Ward D. Determinants of performance of supplemental immunization activities for polio eradication in Uttar Pradesh, India: social mobilization activities of the Social Mobilization Network (SM Net) and Core Group Polio Project (CGPP). *BMC Infect Dis.* 2013;13:17. doi:10.1186/1471-2334-13-17.
26. Coates EA, Waisbord S, Awale J, Solomon R, Dey R. Successful polio eradication in Uttar Pradesh, India: the pivotal contribution of the Social Mobilization Network, an NGO/UNICEF collaboration. *Glob Health Sci Pract.* 2013;1:68–83. doi:10.9745/GHSP-D-12-00018.
27. WHO. Bangladesh: Rohingya refugee crisis 2017–2018; 2018.
28. WHO. Diphtheria – Cox’s Bazar in Bangladesh; 2017.
29. Medecine Sans Frontiere. Bangladesh: emergence of diphtheria worsens situation of Rohingya refugees. *Med Sans Front.* 2017. <http://www.msf.org/en/article/bangladesh-emergence-diphtheria-worsens-situation-rohingya-refugees>
30. UNICEF. Bangladesh Humanitarian Situation Report No.22 (Rohingya Influx). UNICEF; 2018.
31. Jalloh MF, Bennett SD, Alam D, Kouta P, Lourenco D, Alamgir M, Feldstein LR, Ehlman DC, Abad N, Kapil N, et al. Rapid behavioral assessment of barriers and opportunities to improve vaccination coverage among displaced Rohingyas in Bangladesh, January 2018. *Vaccine.* 2019;37:833–38. doi:10.1016/j.vaccine.2018.12.042.
32. Tsu VD, Cernuschi T, LaMontagne DS. Lessons learned from HPV vaccine delivery in low-resource settings and opportunities for HIV prevention, treatment, and care among adolescents. *J Acquir Immune Defic Syndr.* 2014;66(Suppl 2):S209–S216. doi:10.1097/QAI.000000000000175.
33. Kabakama S, KE G, Howard N, Mounier-Jack S, HE B, Griffiths UK, Feletto M, LaMontagne DS, Watson-Jones D. Social mobilisation, consent and acceptability: a review of human papillomavirus vaccination procedures in low and middle-income countries. *BMC Public Health.* 2016;16:834. doi:10.1186/s12889-016-3517-8.
34. Galagan SR, Paul P, Menezes L, LaMontagne DS. Influences on parental acceptance of HPV vaccination in demonstration projects in Uganda and Vietnam. *Vaccine.* 2013;31:3072–78. doi:10.1016/j.vaccine.2013.04.056.
35. Cover JK, Nghi NQ, LaMontagne DS, Huyen DT, Hien NT, Nga le T. Acceptance patterns and decision-making for human papillomavirus vaccination among parents in Vietnam: an in-depth qualitative study post-vaccination. *BMC Public Health.* 2012;12:629. doi:10.1186/1471-2458-12-629.
36. Watson-Jones D, Tomlin K, Remes P, Baisley K, Ponsiano R, Soteli S, de Sanjosé S, Changalucha J, Kapiga S, Hayes RJ, et al. Reasons for receiving or not receiving HPV vaccination in primary schoolgirls in Tanzania: a case control study. *PLoS One.* 2012;7:e45231. doi:10.1371/journal.pone.0045231.
37. Obregon R, Waisbord S. The complexity of social mobilization in health communication: top-down and bottom-up experiences in polio eradication. *J Health Commun.* 2010;15(Suppl 1):25–47. doi:10.1080/10810731003695367.
38. Shen AK, Fields R, McQuestion M. The future of routine immunization in the developing world: challenges and opportunities. *Glob Health Sci Pract.* 2014;2:381–94. doi:10.9745/GHSP-D-14-00137.
39. Nelson KN, Wallace AS, Sodha SV, Daniels D, Dietz V. Assessing strategies for increasing urban routine immunization coverage of childhood vaccines in low and middle-income countries: a systematic review of peer-reviewed literature. *Vaccine.* 2016;34:5495–503. doi:10.1016/j.vaccine.2016.09.038.
40. Habib MA, Soofi SB, Ali N, Hussain I, Tabassum F, Suhag Z, Anwar S, Ahmed I, Bhutta ZA. Knowledge and perceptions of polio and polio immunization in polio high-risk areas of Pakistan. *J Public Health Policy.* 2017;38:16–36. doi:10.1057/s41271-016-0056-6.
41. Pless Robert P, Bentsi-Enchill Adwoa D, Duclos P. Monitoring vaccine safety during measles mass immunization campaigns: clinical and programmatic issues. *J Infect Dis.* 2003;187:SS291–S8. doi:10.1086/368049.
42. Cochi SL, Hegg L, Kaur A, Pandak C, Jafari H. The global polio eradication initiative: progress, lessons learned, and polio legacy transition planning. *Health Aff (Millwood).* 2016;35:277–83. doi:10.1377/hlthaff.2015.1104.
43. Smout EM, Enria L, Mooney T, Lees S, Watson-Jones D, Greenwood B, Leigh B, Larson HJ. Implementing a novel community engagement system during a clinical trial of a candidate Ebola vaccine within an outbreak setting. *Int J Infect Dis.* 2016;45:191. doi:10.1016/j.ijid.2016.02.444.

44. Habib MA, Soofi S, Cousens S, Anwar S, Haque NU, Ahmed I, Ali N, Tahir R, Bhutta ZA. Community engagement and integrated health and polio immunisation campaigns in conflict-affected areas of Pakistan: a cluster randomised controlled trial. *Lancet Glob Health*. 2017;5:e593–e603. doi:10.1016/S2214-109X(17)30184-5.
45. Thompson EL, Vamos CA, Piepenbrink R, Kadono M, Vázquez-Otero C, Matthes S, Daley EM. Human papillomavirus risk perceptions and relationship status: a barrier to HPV vaccination? *Journal of Behavioral Medicine*. 2019. doi:10.1007/s10865-019-00025-4.
46. Irwin KL, Jalloh MF, Corker J, Alpha Mahmoud B, Robinson SJ, Li W, James NE, Sellu M, Jalloh MB, Diallo AA, et al. Attitudes about vaccines to prevent Ebola virus disease in Guinea at the end of a large Ebola epidemic: results of a national household survey. *Vaccine*. 2017;35:6915–23. doi:10.1016/j.vaccine.2017.06.026.
47. Berlier M, Barry R, Shadid J, Sirica C, Brunier A, Hasan H, Bouma E. Communication challenges during the development and introduction of a new meningococcal vaccine in Africa. *Clin Infect Dis*. 2015;61:SS451–S8. doi:10.1093/cid/civ493.
48. Jalloh MF, Jalloh MB, Albert A, Wolff B, Callis A, Ramakrishnan A, Cramer E, Sengeh P, Pratt SA, Conteh L, et al. Perceptions and acceptability of an experimental Ebola vaccine among health care workers, frontline staff, and the general public during the 2014–2015 Ebola outbreak in Sierra Leone. *Vaccine*. 2019;37:1495–502. doi:10.1016/j.vaccine.2019.01.046.
49. Chatterjee S, Pant M, Haldar P, Aggarwal MK, Laxminarayan R. Current costs & projected financial needs of India's Universal immunization programme. *Indian J Med Res*. 2016;143:801–08. doi:10.4103/0971-5916.192073.
50. MacQueen KM, Bhan A, Frohlich J, Holzer J, Sugarman J. Evaluating community engagement in global health research: the need for metrics. *BMC Med Ethics*. 2015;16:44. doi:10.1186/s12910-015-0033-9.