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Successful polio supplementary immunisation activities in a security compromised zone – Experiences from the Southwest region of Cameroon

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ABSTRACT

Background: Supplementary immunisation activities (SIAs) play a central role in polio eradication efforts. Armed conflicts resulting in insecurity negatively affect SIAs. In the Southwest region of Cameroon, armed conflicts persisted in 2018. We present our experiences of conducting a polio SIA in an insecure region.

Methods: The SIA took place from the 2nd to 4th of March 2018 and targeted 307,920 children aged 0–59 months. Bivalent polio vaccine was used. Before the SIA, extensive planning was done under the leadership of a Central Technical Group. Planning included security assessment, advocacy and social mobilisation.

Results: Only 4 of the 18 health districts (HDs) of the Southwest region were considered safe. Regardless, vaccination teams worked in all HDs. The SIA achieved a coverage of 89.9%. Town criers and social mobilisers were the main sources of information about the SIA. Most (76%) children were vaccinated using the door to door strategy. There was no case of vaccine refusal.

Conclusion: Community members were very receptive of the SIA and this may be due to the communication that was adopted. Strong dedication by vaccination teams, community members' understanding and acceptance of polio SIAs are all key factors to the eradication of polio in conflict zones.

1. Introduction

Since the resolution of the World Health Assembly to eradicate polio and the launch of the Global Polio Eradication Initiative (GPEI) in 1988, efforts have been intensified to eradicate polio. The GPEI identified four main pillars to achieve eradication: strengthening routine immunisation; epidemiological surveillance; targeted "mop-up" campaigns and supplementary immunisation activities (SIAs) [1]. For the epidemiological surveillance, each country's ability to detect polio is defined by its capacity to detect at least one case of acute flaccid paralysis (AFP) per 100,000 children below 15 years [1]. In addition to AFP surveillance, each country should conduct environmental surveillance: the testing of sewage and other environmental samples for poliovirus [1]. All AFP and environmental samples are tested for wild poliovirus (WPV). The surveillance also needs to detect rare instances where mutation of the attenuated virus contained in the oral polio vaccine (OPV) occurs resulting to a vaccine derived poliovirus (cVDPV). The occurrence of the cVPDPV is commonly reported in under immunised populations [1]. Transmission of both viruses is prevented through vaccination of all children with OPV.

Therefore, high quality SIAs (SIAs with vaccination coverage > 90% in the target population) play a central role in the polio eradication efforts. Suboptimal SIAs (vaccination coverage < 90%)

Abbreviations: AFP, Acute flaccid paralysis; bOPV, Bivalent oral polio vaccine; cVDPV, Circulating vaccine derived poliovirus; CTG-EPI, Central Technical Group-Expanded Programme on Immunisation; DRC, Democratic Republic of Congo; GPEI, Global Polio Eradication Initiative; HA, Health area; HD, Health district; IDP, Internally displaced population; LQAS, Lot quality assurance sampling; NID, National immunisation day; RCC, Regional Coordination Committee; RTG-EPI, Regional Technical Group-Expanded Programme on Immunisation; SIA, Supplementary immunisation activities; UNICEF, Unite Nation Children's Fund; WHO, World Health Organisation; WPV, Wild poliovirus.

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are considered a major setback to achieving the goal of polio eradication [2]. There are several factors that may result to suboptimal SIAs. These include poor communication, inadequate resource mobilization, mistrust in the health care system among others [2]. Most of the factors contributing to low quality SIAs are context specific. However, and regardless of the context, lack of adequate security to both the vaccinators and those seeking to be vaccinated can be a big obstacle to conducting a successful SIA.

Insecurity leads to suboptimal SIAs. Suboptimal polio SIAs result in low immunity levels within the community thus making them susceptible to polio outbreaks and exportation of the virus to neighbouring regions [3,4]. Countries like Afghanistan, Pakistan and Nigeria remain endemic to polio partly because armed conflicts have compromised immunisation activities [5–7].

The Boko Haram insurgency has been prevailing since 2010 in the northern regions of Nigeria with encroachments into Cameroon. As a result, SIAs in Nigeria were interrupted due to health staff being assaulted and the constant movement of people disrupted routine immunisation [6,8]. Many health facilities closed down as health workers fled for safety [9]. Consequently, in 2016, a polio outbreak was declared in the Nigerian Boko Haram controlled territory. Security assessments in 2017 revealed that only 30% of the area was fully accessible to polio eradication program staff [10].

Similarly, the Taliban insurgency had a negative effect on Pakistan and Afghanistan's polio eradication efforts. From 2006, intensified armed conflict was associated with an increased number of polio cases reported in Pakistan [11]. The use of SIAs for intelligence gathering, negative vaccination propaganda, vaccination bans and the targeted attacks on vaccinators during SIAs left many children unvaccinated in both countries [12,13]. The constant movement of people across the border also favoured the spread of the virus among the poorly immunised communities.

Ongoing civil wars have also posed a threat to polio eradication efforts in non-polio endemic countries (countries that have stopped indigenous wild poliovirus (WPV) circulation for at least one year) like Somalia and the Democratic Republic of Congo (DRC). In 2012, Somalia had the largest cohort of unvaccinated children in the world because of armed conflicts [14]. Somalia was therefore a fertile ground for the WPV outbreak in 2013. Response polio SIAs (SIAs carried out within 14 days of an outbreak declaration as opposed to regular SIAs also known as national immunisation days (NIDs) which are regularly scheduled) were hampered by vaccination bans put in place by non-government factions in several districts [15]. Due to armed conflicts, the DRC is one of the last countries in Africa to implement national immunisation days (NIDs). After implementation, there have been reports of disruption of the SIAs in certain regions, harassment of vaccinators and uncovered zones due to open hostilities [16,17]. Amid conflict, Somalia and DRC have been able to contain outbreaks and remain polio free for several years. However, in July 2018, circulating vaccine-derived poliovirus (cVDPV) outbreaks were declared in DRC [18,19]. Nonetheless, research on the strategies to achieve high quality SIAs in security compromised areas is missing.

Polio eradication efforts in Cameroon have been suboptimal prior to the Boko Haram insurgency in the Far North region. The country has reported several outbreaks of polio from 2000 to 2014 [20]. The last case of WPV was detected in 2014 in the East region of the country [21]. Though no case has been detected since then, undetected circulation cannot be ruled out due to suboptimal surveillance of acute flaccid paralysis (AFP) as well as environmental surveillance. Moreover, and presently, Cameroon is still at high risk of importing the polio virus from Nigeria with which it shares a long porous border from its Northern to Western regions. Routine immunisation in Cameroon has not been optimal as indicated by a coverage rate of 84% for the third dose of polio in 2017 [22]. Multiple polio SIAs have been carried out nationwide and in high risk regions over the past years in order to stop transmission of the virus and boost immunity of the population.

In addition to the Boko Haram insurgency in the northern region, Cameroon faces a new threat in its Northwest and Southwest regions. What began as civil disobedience by lawyers and teachers two years ago locally termed the 'Anglophone crisis' blossomed into an armed conflict by January 2018. The ongoing crisis is characterized by violence, burning of villages and schools, destruction and looting of health facilities to name a few. Subsequently, communities from affected areas fled into the forest, neighbouring villages or across the border into Nigeria. The armed conflict resulted to unforeseen interruption in providing health services to community members in the affected areas. For example, some health facilities were completely shut down and this halted the provision of routine immunisation activities.

It is in this context that the 2018 national polio SIA coupled with the Mother and Child Health Action Week were carried out in the Southwest region of Cameroon. We present our experiences and report that dedication of health staff and the population's understanding and acceptance of polio SIAs are key to the eradication of polio in conflict zones. In comparison to the 2017 polio SIA that was carried out in the same region before the armed conflict, we were successful in conducting a high quality polio SIA in a security compromised region of Cameroon.

2. Implementation of the SIA

2.1. Setting and target population

The Southwest region is one of the two English-speaking regions of Cameroon as the rest of the country's regions are French-speaking. To the west and south, the region borders Nigeria and the Atlantic Ocean respectively and to the north it borders the other English-speaking region. Two French-speaking regions border the region to the east. The Southwest region has a total population of 1,817,667 inhabitants according to estimates provided by the Ministry of Health (MOH) in 2018. Many of its communities are rural based and are involved in farming and fishing as the major economic activities. Prior to the recent armed conflicts, the region was relatively peaceful.

The Southwest region is made up of 18 health districts (HD) with 105 health areas. All the HD are accessible year-round by land except for the Bakassi HD where some communities are only accessible by sea. For the 2018 polio SIA, all children 0–59 months were eligible for vaccination. Based upon the number of children vaccinated per health district in the June 2017 SIA, the MOH estimated a target population of 307,920 children for the March 2018 SIA.

2.2. Campaign organisation

The polio SIA was organised and coordinated by the Central Technical Group for the Expanded Programme on Immunisation (CTG-EPI). The CTG-EPI is the national body in charge of the EPI in Cameroon. The CTG-EPI worked very closely with the Southwest regional coordination committee (RCC). The RCC was comprised of the EPI regional technical group (RTG-EPI), regional administrative authorities and WHO technical staff. The RCC was given the mandate of co-ordinating the SIA in the region by the CTG-EPI.

The RCC ensured all the 18 HD had updated the microplans which showed itineraries of the vaccination teams and the vaccine needs of each of the 105 health areas. The state of cold chains and space to store vaccines at district and health area levels were also assessed by the RCC prior SIA implementation. Additional checks prior SIA implementation included: availability of vaccine

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distribution plans, ice packs, vaccine carriers and contingency plans for the cold chains.

Resources and funds for the 2018 polio SIA were provided by the Cameroonian MOH, WHO and UNICEF. The UNICEF specifically gave sponsorship to carry out communication activities. Training of supervisors, vaccinators and social mobilisers was carried out using a cascade approach. Staff of the RTG-EPI trained the district teams (district medical officers, chief nurses and district focal points for communication) who then trained the health area (HA) teams (chief medical officers of the HA and HA focal points for communication). The HA teams then trained the vaccinators and social mobilisers. Training topics included; rationale for the SIA, organisational methods to achieve a high quality SIA, data management and finance. Importantly, training on the management and strategies to ensure safety of the vaccination teams was provided. Regarding security assessments, district and HA teams were tasked with evaluating their security level as the situation remained fluid. Only four (22.2%) out of the 18 HD were considered safe based on reports from the district teams (Fig. 1). Unsafe districts were characterised by open conflict and sporadic fighting and displacement of the population. The safe HDs were Limbe, Muyuka, Tiko and Buea.

2.3. Vaccine procurement, storage and transport

Biopolio® B1/3, which is a bivalent oral polio vaccine (bOPV) containing attenuated poliovirus strain types 1 and 3 was used for the SIA. The vaccine is manufactured by Bharet Biotech

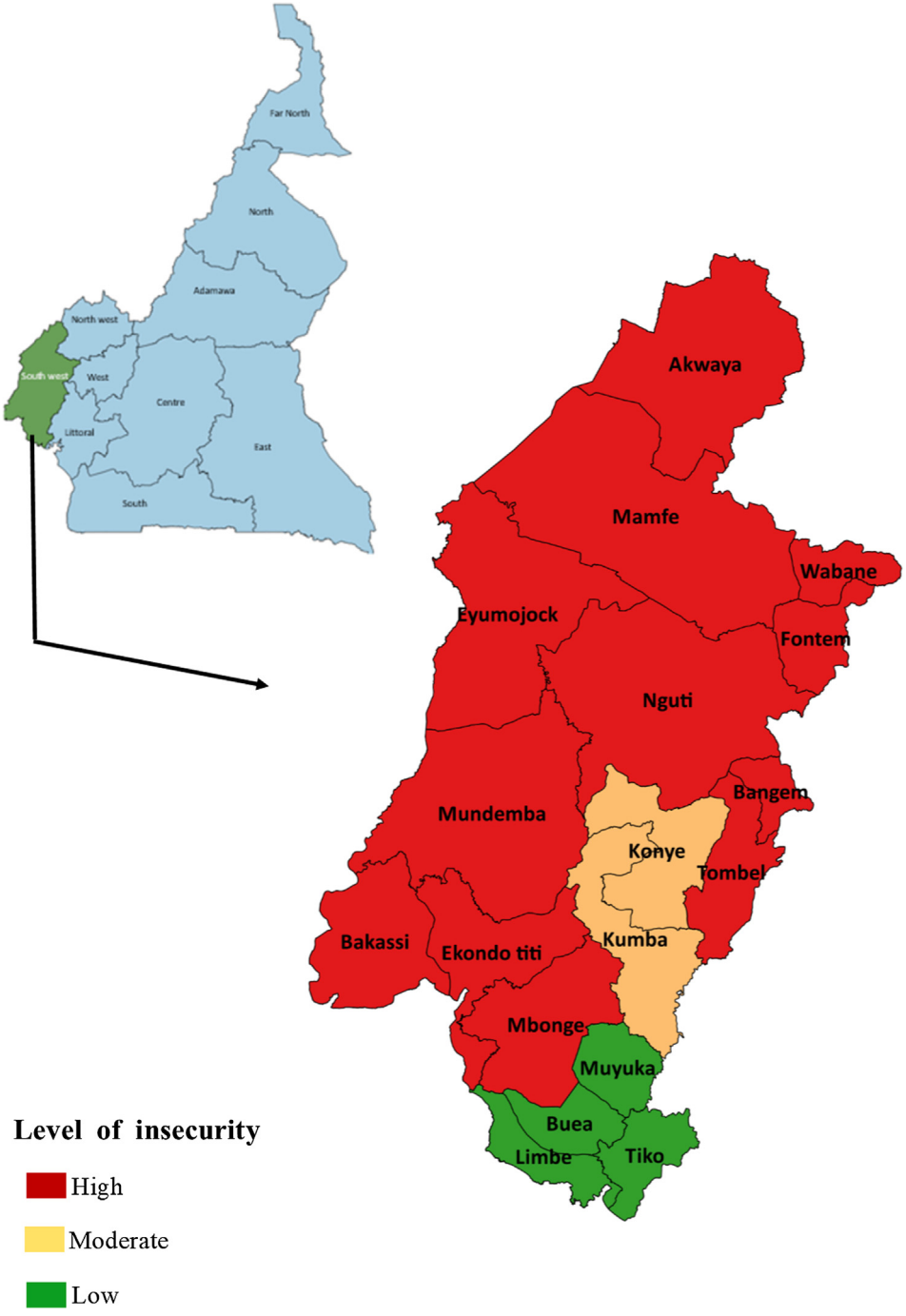

Fig. 1. Health districts with different levels of insecurity in the Southwest region of Cameroon in March 2018.

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International. Each vaccine vial contained twenty doses of OPV. Based on the estimated number of children in the Southwest region, a total of 355,000 vaccine doses were transported in a refrigerated truck and delivered to the regional cold chain. The vaccine delivery process was completed two weeks before the start of the SIA. A regional vaccine distribution plan was used to ensure the vaccines were allocated and transported in cold boxes to all HDs and then, to HAs. The transportation of the vaccines to HA was done four days before start of the SIA. On the field the vaccines were stored in gas, electric or solar fridges (depending on the type at the health facility) till the children were vaccinated.

Other materials like communication flyers, aprons for communicators, indelible markers, Vitamin A and Mebendazole were also distributed to the health districts upon collection of vaccines. Each HD was given a soft and hard copy of data entry tools for multiplication at their districts.

2.4. Community mobilisation

Advocacy and social mobilisation teams carried out several activities to ensure the communities were aware of the SIA implementation. The activities included: closed meetings with the administrative authorities, traditional and opinion leaders; briefing of media houses; radio and television interviews; dissemination of messages in churches, mosques and door to door sensitisation. The community members were sensitised on the importance of getting their children vaccinated, the type of vaccine to be administered and the vaccination dates. Though vaccine hesitancy in the Southwest region is low (based on reports from previous SIAs), the mobilisers emphasized to the communities that the health sector was not involved with the socio-political crisis. The emphasis was done to prevent the community members from viewing vaccinators as a security threat as this would negatively affect the SIA. Door to door sensitisation began two days before the vaccination. The advocacy and social mobilisation team successfully reiterated the key messages about the SIA, counted the number of children eligible for vaccination in each household and marked the houses.

2.5. Vaccination days

Vaccination took place from the 2nd to the 4th of March 2018. One thousand and forty vaccination teams each comprising of a vaccinator, recorder (data capturer) and social mobiliser were deployed across the region. Vaccination activities were carried out from 7am to 4 pm daily. Vaccination teams immunised children at fixed posts and door to door in the community. The vaccinators administered two drops of bOPV alongside vitamin A capsules and Mebendazole. At the same time, the recorders marked the left fifth finger of each vaccinated child with an indelible marker and tallied the vaccine doses.

The mobilisers complemented the work of the vaccinators and recorders by marking of houses as proof that targeted children in the marked house had been vaccinated. Guardians of the vaccinated children were advised to take their children to the nearest health facility in case of any adverse event following immunisation (AEFI). The possible AEFIs were explained to the guardians by the mobilisers. Vaccination teams were followed by a team of supervisors who confirmed the targeted children were correctly vaccinated, houses were properly marked and the supply of vaccines was not interrupted. At the end of each vaccination day, review meetings were held at all levels to discuss the experiences and challenges faced during the day. During the meetings, the teams discussed and agreed on the measures to be taken to overcome the challenges experienced. Vaccination data was forwarded daily by the vaccination teams through the district team to the regional data management team for compilation, analysis, dissemination and archiving.

The WHO independently monitored the SIA. The monitoring entailed in-house visits of 60 households; and interviewing of 20 parents randomly met with children on the streets. The monitors assessed house markings, children's finger markings and parent's awareness of the campaign and poor geographic coverage areas. The monitors participated in district daily review meetings and areas with reported missed children were revisited the next day for vaccination.

2.6. LQAS survey

Post-SIA coverage evaluation was implemented using a LQAS methodology. Six health areas were randomly chosen per district and then, one village was randomly sampled from each health area by balloting. In the selected village, random number tables were used to select an enumeration area (EA). A bottle was then spun at the centre of the selected EA to choose the first house to be sampled. The second house on the right was systematically sampled until the 10 households were identified. The questionnaire was administered to a child less than five years old in the selected household. Hence, a total of 60 children were surveyed per district. Coverage was determined by the number of missed children among the 60 surveyed. Vaccination coverage was classified as; good (>90%) if $\leq$3 children were missed; average (80–90%) if 4–8 children were missed; poor (<80%) if $\geq$9 children were missed.

3. Results

3.1. Social mobilisation

All the 18 HDs participated in the SIA. Door to door sensitisation began two days before vaccination and a total of 1,292 social mobilisers were deployed across the region. These mobilisers visited 421,116 households and sensitised 1,160,423 people.

3.2. Vaccination coverage

The administrative vaccination coverage for the polio SIA in March 2018 was 89.9% compared to 91.2% in June 2017 SIA (Table 1). In 2018, Fontem HD had the highest coverage of 103.5% while Mundemba HD had the lowest with 53.4%. In 2018, vaccination coverage above 100% in some HDs was likely due to the influx of internally displaced populations (IDPs) in addition to the possibility of underestimation of the denominator. In contrast, vaccination coverage above 100% in some HDs during the 2017 polio SIA was attributable to underestimation of the denominator.

Majority (76%) of the children in the 2018 polio SIA were vaccinated using the door to door strategy while the rest were vaccinated in schools, churches/mosques, health facilities, markets, stations and toll gates (24%). Overall, there was no AEFI case reported during the SIA.

3.3. Independent monitoring

Only 17 HDs were monitored and surveyed. The Bakassi HD was excluded due to poor accessibility and insecurity. A team of 20 members independently monitored the SIA. The monitors visited 4625 houses of which 97% were correctly marked. Among 4614 eligible children physically inspected for finger marking both in and out of house, 109 (2.3%) were unmarked. The main reason given for non-vaccination was absence from the house during the visits by the vaccination team (52%). Impressively, there was no incident

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Table 1
Vaccination coverage for the 2018 and 2017 Polio SIAs in the Southwest region.

District	2018				2017	
	Targeted children 0–59 months	Number of children vaccinated	Administrative coverage (%)	LQAS coverage (%)	Targeted children 0–59 months	Administrative coverage (%)
Akwaya	19,135	16,071	84.0	>90	19,190	99.1
Bakassi	6439	5270	81.8	–	5019	128.3
Bangem	4758	4337	91.2	>90	4754	96.5
Buea	25,572	22,725	88.9	80–90	27,741	89.4
Ekondo titi	15,212	14,326	94.2	>90	14,931	93.9
Eyumodjock	7104	4227	59.5	>90	6859	97.5
Fontem	20,313	21,025	103.5	>90	20,031	98.4
Konye	10,990	7837	71.3	80–90	10,266	105.6
Kumba	49,186	45,354	92.2	>90	49,100	92.2
Limbe	43,140	41,423	96.0	<80	43,173	63.2
Mamfe	14,867	13,781	92.7	80–90	14,875	96.9
Mbonge	15,930	11,667	73.2	<80	16,167	95.7
Mundemba	4223	2256	53.4	>90	4251	95.5
Muyuka	19,603	18,966	96.8	>90	19,591	98.7
Nguti	5455	4688	85.9	>90	5338	88.5
Tiko	25,704	23,860	92.8	>90	26,230	94.5
Tombel	11,957	10,767	90.0	>90	11,939	92.6
Wabane	8332	8256	99.1	<80	8433	98.8
South West	**307,920**	**276,836**	**89.9**		**307,888**	**91.2**

of vaccination refusal reported during the polio SIA. Of the 3217 parents interviewed, 88% were aware of the SIA before it began. The main sources of information were town criers who made announcements in the streets (38.5%), social mobilisers (32.7%) and churches/mosques (17.2%).

Frome the LQAS survey, 11 (65%) HDs were estimated to have a good vaccination coverage ($\leq$3 missed children) while three (18%) districts were recorded to have a poor coverage (>9 missed children) (Table 1).

4. Discussion

We report a successful polio SIA amid insecurity in the Southwest region of Cameroon in 2018. The insecurity was due to active fighting that resulted to internally and externally displaced populations. Additionally, the fighting caused fear among community members. A regional vaccination coverage of 89.9% compared to 91.2% achieved in the previous year when the region was secure was considered successful. Several factors could be attributed to the successful 2018 polio SIA. These factors include: political will, optimal planning and co-ordination, support from partners, widespread sensitisation and mobilisation of the members of the community before and during the SIA as well as dedication by the teams involved. When compared to the 2017 polio SIA which targeted almost the same population, we observed a decline in coverage for majority of the districts although overall coverage differed marginally. Notwithstanding, several challenges were faced during the 2018 polio SIA which were either resolved or circumvented. We share the challenges faced and lessons learnt in conducting a successful SIA in a security compromised setting.

4.1. Challenges faced and lessons learnt

Proper sensitisation of communities remains a key element in immunisation. Mistrust of health service providers by the community members is known to hamper optimal delivery of health services in several settings [23]. Misunderstanding of the objectives of immunisation and fear that vaccines might transmit diseases or be used as a weapon by the authorities during times of conflict may lead to vaccine hesitancy [24]. To prevent such mistrust from the community members, the administrative authorities involved in the planning of the SIA were not put at the forefront as is routinely done. Rather, the WHO and UNICEF were portrayed as the main organisers. This strategy permitted vaccination in certain districts where the population was suspicious of the government.

Challenges were encountered during proximity mobilisation. Due to fear of reprisals, some communities refused marking of the houses. However, the community members allowed their children to be counted and subsequently vaccinated. We observed that the community members understood the importance of the polio SIA. In instances where the houses were not marked, internal monitoring was difficult. As a result, internal monitoring was not fully possible. Another challenge was the absence of IDP camps/settlements which rendered vaccination of the displaced children difficult. The IDPs were dispersed and sought refuge in nearby bushes. To reach the displaced, additional mobilisers were recruited from among the IDPs. This was possible as some IDPs occasionally returned home to gather supplies. In the Kombone and Kotto Barombi health areas of Mbonge HD, the additional mobilisers were tasked with assembling children for vaccination at cocoa ovens which were closer to the villages. The assembly of the children facilitated access by the vaccination team. The importance of recruiting community mobilisers was well recognised during the 2018 SIA.

Regular security assessments by professionals are suggested as one of the strategies to ensure the safety of health workers in conflict zones during SIAs [7]. Unfortunately, in our situation, there was no communication between security forces and the health workers. Consequently, each HD team was tasked with assessing the security of their district using local knowledge and eye witness reports. In addition, due to the causes of the conflict, it was considered safer for vaccination teams to move without security forces. This approach to security assessment may have contributed to the fact that some vaccinators were either threatened or beaten and even kidnapped as they carried out their duties. Such acts have been decried by international bodies but little is being done to ameliorate the situation [25].

In the Fontem HD, district team members responsible for coordinating and supervising the SIA as well as data management fled the district a few days before the start of the SIA after death threats from a warring faction. Consequently, the regional supervisor for the district had to take over these roles to ensure that vaccination took place despite the insecurity.

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Door to door and school-based vaccination were the main strategies prescribed for this SIA. Due to the unpredictable nature of fighting and movement of people out of their communities, other strategies had to be tested as the vaccination progressed. Usually, schools are targeted first in order to vaccinate a large number of children before door to door vaccination. However, as a result of the crisis, schools in several communities shut down causing several teams to modify their itineraries to door to door on the vaccination day. In areas where the population had not fled but there was active fighting, the hit and run strategy was used or vaccination was postponed until when calm returned.

In the Wone and Ibemi health areas of the Konye HD, confrontations between the warring parties began on the eve of the vaccination leading to suspension of vaccination activities as health workers and the population fled for safety. During this period, vaccination went on regularly in the other health areas of the district. Vaccination teams in the Wone and Ibemi health areas were only able to vaccinate the children one month later when calm returned. Similar vaccination strategies have been used in countries with armed conflicts like Sudan, Angola and the Democratic Republic of Congo [16]. In other settings cease-fires have been brokered with the warring parties to allow immunisation of children [16].

Negotiating secure physical access to conflict areas to facilitate immunization activities was a successful strategy used during a multidecade armed struggle in Colombia [7] Another successful strategy used to ensure immunization against polio is successful was negotiation of formal cease fire between the governments of El Salvador, Guatemala and Honduras with the rebels between 1985 and 1991 [26]. A special themed manuscript on eradicating polio in countries experiencing armed conflicts was published by WHO in 2000 in recognition of the threats posed by the conflicts towards polio eradication [27] Almost 20 years later, armed conflicts remain a threat to global polio eradication efforts. Therefore, experiences on best practices to use to obtain high quality polio SIAs in conflict areas must be shared timeously as one of the strategies to mitigate polio outbreaks.

Though the LQAS survey was carried out in 17 health districts, only communities that were relatively safe were surveyed. Hence, communities which were most likely to have missed children as a result of insecurity were not surveyed. This explains the discrepancy between administrative coverage and LQAS coverage in districts like Eyumojock and Mundemba. Hence, the LQAS survey was not able to portray the true coverage of the SIA.

5. Conclusion

We conclude that high quality SIAs are possible in compromised security zones if there is rigorous planning and commitments from the authorities and health workers with the support from partners. To achieve polio eradication, SIAs will have to be conducted in all areas including security compromised settings. Dissemination of the experiences and lessons learnt in conducting a successful SIA in security compromised settings is therefore a very important component of the polio eradication campaign.

Declaration of interest

None.

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Authors contributions

EH conceived and designed the study. EH, DN and GK acquired the data and wrote the first draft with supervision from BK. All authors reviewed the various drafts of the manuscript. All authors reviewed and approved the final manuscript.

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