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The effectiveness of the vaccine monitoring and follow up of community health workers on the uptake vaccine measles vaccine coverage among children under 5 years: A quasi-experimental study led in Goma and Karisimbi health zone in Goma city North Kivu, Democratic Republic of Congo

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ABSTRACT: Nowadays, public health interventions remain the driving force in promoting population health, especially in developing countries where communicable diseases still present a very worrying frequency. Despite the establishment of structured outreach teams, follow-up and monitoring are essential activities to ensure correction and catalyze effective delivery of immunization services. During this study, we conducted regular monitoring of AVM vaccination and motivated community health workers on sensitization, rumor management, and minimizing resistance to AVM vaccination in order to improve the AVM coverage rate and increase measles case reporting.

Methods: A Quasi-Experimental Study and action research, led in the Karisimbi as an experimental Zone and Goma Health zone as a control Zone. Supervision of Community Health Workers was done by the team consisting of researchers at the health areas and the district-level health staff conducted supportive supervision of community health workers. During these supervisory visits, the team ensured knowledge of signal definitions and checked that community health workers correctly identified the measles cases, and the unvaccinated children and managed messages correctly. A structured interview was conducted for data collection and Focus Group Discussions (FGDs) were organized in the health areas for qualitative data to collect the opinions of community health workers on non-participation in measles social mobilization activities. A questionnaire grid and a focused discussion guide were used as data collection tools. The data collection was done in Kobo collection while the analysis and processing were SPSS 18 software. To estimate the degree of significance between the effectiveness of community health workers' training and the AVM vaccine administration, the study used the Odds Ratio test at a Confidence interval of 5%.

Findings: The frequency of cases increased progressively over the months following the different techniques used for intervention. More than 4346 CHILDREN cases were vaccinated in routine activities and 4346 unvaccinated children at the VAR were recovered and 152 measles cases were identified. Resistance and rumors were circumvented by using model lessons from the presidents of the community relays through vaccination of relatives.

Conclusion: The results showed that monitoring and follow-up had an important influence on the motivation of workers.

KEYWORDS: anti-vaccine measles, vaccination, community health workers, monitoring and fellow up, training.

1. INTRODUCTION

The first effective measles vaccine was tested between 1954 -1963 (Force & Eradicat, 2016) et the establishment of routine national immunization programs for 6 antigens in 1974 (Kagoné et al., 2018; WHO, 1993). Despite these implementations, measles is still one of the most contagious and devastating vaccine-preventable diseases among children under 5 years of age, especially in low- and middle-income countries (Doctors Without Borders, 2019; WHO, 2017) According to Patel et al, the use of MCV has saved a large number of children worldwide. He estimates that measles vaccine would have prevented 23 million deaths of children under 5 years of age Between 2010-2018 and the same period, global MCV1 coverage increased from 72% to 86%; reported annual measles incidence decreased by 66%, with the number of cases falling from 145 to 49 per 1 million

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population; and the estimated number of measles deaths fell by 73%. However, when compared with 2016, the number of measles cases worldwide in 2018 increased to 167% (Patel et al., 2020).

Nevertheless, many children are still unvaccinated against measles worldwide.

Between 2010 and 2019, MCV1 coverage remained at a stable level of 84-85% globally, but with regional variations: In 2019, it was 69% in the African Region and 96% in the European Region. Coverage with MCV2 increased from 42% to 71%, and when all countries are included (including those where MCV2 has not yet been introduced), coverage ranged from 33% in the African Region to 91% in the European and Western Pacific Regions (Chard et al., 2020).

According to the CDC and WHO, In 2020, more than 22 million infants did not receive their first dose of measles vaccine, three million more than in 2019; this represents the largest increase in two decades and creates conditions for dangerous outbreaks to occur. Compared to the previous year, reported measles cases dropped by more than 80 percent in 2020 (Dixon MG, Ferrari M, Antoni S, 2020). That said, measles surveillance has also deteriorated, with laboratories receiving the lowest number of samples for testing in more than a decade.

Regarding the WHO global weekly report on measles, the most important factor remains the low vaccination coverage recorded in most countries around the world, which in most cases is estimated at less than the 95% recommended to reach an immune threshold capable of stopping the spread of the virus in the child population (Perry et al., 2020).

In low-income countries, because the measles immunization schedule is set at 9 months, most mothers of children easily forget to bring their children because they do not know when the deadline is. Because mobilization is very low and reserved only for supplemental immunization campaigns, many households fail to bring their children in at just 9 months. (EPI-DRC, 2015).

The commitment of stakeholders and the involvement of community health workers remain assets in the effectiveness of public health interventions such as immunization and the surveillance of diseases like measles.

Thus, several studies implemented within the framework of social mobilization and surveillance of vaccine-preventable diseases have always suggested the training and capacity-building component as an important axis in the success of the expanded program on immunization. (WHO- Unicef, 2013).

Thus, it is an operational component of immunization services and a supporting element of the health system. Thus, Capacity building of staff and health workers in the health system at the local level (WHO-AFRO, 2015) contributes greatly to the improvement of the health status of the population since the knowledge they acquire allows them to raise awareness about behavior change and disease risk (Banerjee *et al*, 2018).

Indeed, in the process of prevention and control of recurrent infectious diseases, health workers at the local level must obtain from health officers the strengthening of their knowledge, attitudes and practices so that they are able to perform correctly the tasks of disease surveillance and vaccine monitoring (Lehmann et al, 2007; Matovu et al., 2013; O'Donovan et al., 2018).

Improving the routine immunization system in the health system is one of the objectives of the global plan for vaccine activities. In low- and middle-income countries, this should be done by building the capacity of health care providers at the local level (WHO, 2013a, 2019).

The training of trainers should therefore identify the training needs of local health workers on the social mobilization, the immunization schedule, the identification of children not reached by the immunization vaccine program (Arogundade *et al*., 2019), (Decorby-Watson *et al*., 2018; Naal *et al.*, 2020; Ward *et al*., 2019a; WHO, 2013d).

For this to happen, collaboration between the community, health system officers and all stakeholders must be effective in order to assess the actual training needs and identify the tasks that should be performed after the training (Musoke *et al*., 2016), (Liang *et al*., 2019).

The vaccine-preventable disease surveillance program provides that, these resources are immunization providers at the health center level and volunteer health workers in local communities. Community volunteers could be mobilized in relation to active surveillance of cases in outbreak investigations and in some response activities, such as vaccine campaigns (Banerjee *et al*, 2018).

In special occasions, the community volunteers must be trained to report cases with specific signs and symptoms suspected of avian influenza3 and vaccine preventable disease such as acute flaccid paralysis (AFP), measles and neonatal tetanus (NNT) (JICA Amrids Project, 2014).

A study conducted in Nigeria showed that the community level, CHEWs are an important healthcare worker cadre providing basic health services such as immunization and antenatal care especially in the context of filling human resource void in all country (Arogundade *et al.*, 2019).

This study showed that, Health workers (HWs) was providing routine immunization (RI) correctly after learning and services has played a crucial role in influencing vaccine uptake, a key determinant of improved immunization coverage.

Over the years, Training Needs Assessments (TNAs) have not been routinely utilized in Nigeria to determine the unmet needs of health workers offering immunization services and what approaches should be adopted to meet their training needs (WHO, 2013b), (Ward *et al*., 2019a), (David *et al*., 2020), (Mutabaruka *et al*., 2010).

The report of an experiment conducted in 2019 in the Philippines by the Philippine Red Cross proved that volunteers and other local partners can help to provide a good immunization service in the community after training (International Federation of Red Cross and Red Crescent Societies, 2020).

This study showed that, after training, volunteers were able to validate secondary data, identify epidemic areas and critical cases in the community, and ensure accompanied referral to the nearest health facility. This allowed for the rapid reporting and management of critical cases and thus reduced mortality. (International Federation of Red Cross and Red Crescent Societies, 2020).

Concerning a study published in Uganda in 2018, entitled: "Building health workforce capacity for planning and monitoring through the Strengthening Technical Assistance for routine immunization training (START) approach in Uganda (Ward *et al*., 2019b) has shown that:

The Strengthening Technical Assistance for Routine Immunization Training (START) approach aimed to utilize practical training methods to build capacity of district and health center staff to implement routine immunization (RI) planning and monitoring activities, as well as build supportive supervision skills of district staff.

Similar Studies conducted by the Red Cross in Indonesia, Kenya, Sierra Leone and Uganda, have shown that in preparing to respond to epidemics, volunteers need to be empowered to recognize health risk more quickly and report epidemic alerts, to take rapid action to control the disease (Byrne & Nichol, 2020).

Studies conducted in many low- and middle-income countries around the world have, at many levels, has shown the relationship between volunteer involvements in strengthening the health system through social mobilization (Lehmann et al, 2007), (UNICEF, 2016).

Experiences of international red cross federations and other authors around the world show that volunteers and other health workers at the grassroots level were able to provide quality services in immunization and disease surveillance programs, but after training in the practices and tasks necessary to perform them (Internation Federation of Red Cross and Red Crescent Societies, 2020).

Active and participatory methods must be used in favor of the Relays in order to facilitate the transfer of knowledge and develop their competence in the performance of daily tasks. (Naal & Mendelsohn, 2019).

However, a follow-up and supervision of the activities carried out by the volunteers remains a primordial task for the staff of the health officers to readjust each time and correct the possible errors (Biellik & Orenstein, 2018; Chesoli et al., 2018; Clara, Ndiaye, et al., 2020), The meetings provided with health facilities and health officers with opportunities not only to re-cap the knowledge on the simplified community case definitions but also to discuss challenges faced in the implementing the activities and come up with possible way-forward (JICA Amrids Project, 2014).

Nevertheless, we observe that most of our community relays in our health areas are not trained on the problems they are called upon to solve in the community and limit themselves to apparent activities.

Thus, their capacity to raise awareness and solve problems at the local level seems insufficient, involving little participation in disease surveillance and monitoring of immunization activities.

In the DRC, mobilization on vaccination is a support element for routine vaccination and supplementary vaccination activities. The Ministry of Health and partners such as SANRU and ALIMA-DRC had created structured CACs with the aim not only of strengthening the involvement of volunteers but also of extending their influence to the ends of the villages with a view to total coverage of the areas. health through awareness.

In the health zones of the city of Goma in North Kivu, two health zones, Goma and Karisimbi, have created CACs with the aim of mobilizing the populations in the fight against diseases with epidemic potential, in particular Ebola, Covid -19 and involvement in vertical programs. More than 4,500 Community Relays have been set up in different health areas.

During an evaluation by FGD, on their involvement in activities to fight against measles and other vaccine-preventable diseases, showed that out of 1,240 Community Relays set up in the CACs, less than 10% are available and effective in the activities of the health areas, more than the majority have ignored the vaccination schedule and the definition of VMA in favor of vertical and lucrative programs.

Almost all of the community health workers noted as factors in question the lack of regular follow-up, monitoring and supervision of activities by health service supervisors. Thus, we have together identified the training needs on measles surveillance from the promotion of AVM vaccination and the notification of measles cases and the training of trainers in the CACs in turn due to bi-weekly sensitization on the reminder of the VAR vaccination schedule, measles case definition and measles case reference.

2. MATERIALS AND METHODS

A Quasi-Experimental Study and action research, led in the Karisimbi as an experimental Zone and Goma Health zone as a control Zone. This Quasi-experimental study used mixed-method both qualitative and quantitative data collection methods. This study was conducted between December 2022 and March 2022, in Karisimbi and Goma health District in Goma town, North Kivu of DRC. These two health zones were in the urban area.

The study used non-probability and purposive sampling for community health workers to address questions on social mobilization for measles vaccine uptake and case notification.

The sample size was estimated at 50 community health workers from the expert health zone (Karisimbi) who have been trained on social mobilization and monitored monthly. A three-day training course was organized for community health workers to brief them on the immunization calendar, case definition, different mobilization techniques, household awareness of the activities of the national immunization program, as well as the procedures for entering households. The following variables were monitored: - Awareness through available statistical data, - Validation of reported data, compliance, adaptation and conformation of strategies, - Management of rumors, and resistance of households against the AVM vaccine

Interviewing and FGD techniques were used during monitor and follow-preached research activities and measles case identification.

A structured interview was conduct for data collection and Focus Group Discussions (FGDs) were organized in the health areas for qualitative data to collect the opinions of community health workers on non-participation in measles social mobilization activities. A questionnaire grid and a focused discussion guide were used as data collection tools. A structured interview technique and a survey questionnaire were used during this study to collect data.

During this monitoring, we used posters to define measles cases in order to differentiate it from scabies, chickenpox and other non-measles skin rashes.

Supervision of Community Health Workers was done by the team consisting of researchers at the health areas and the district-level health staff conducted supportive supervision of community health workers. During these supervisory visits, the team ensured knowledge of signal definitions and checked that community health workers correctly identified the measles cases, the unvaccinated children and managed messages correctly.

The data collection was done in Kobo collection while the analysis and processing were SPSS 18 software. To estimate the degree of significance between the effectiveness of community health workers' training and the AVM vaccine administration, the study used the Odds Ratio test at the Confidence interval of 0,05.

3. FINDINGS

3.1. FOLLOW-UP AND MONITORING OF COMMUNITY HEALTH WORKER'S TEAMS

Indeed, supervision is a key management function and a process of evaluation and continuous improvement. It can be done through self-assessment, interactions with peers or supervisors through remote communication, evaluation meetings, as well as physical visits by a supervisor. Health workers can use analytical supervision tools to monitor their performance on an ongoing basis (World Health Organization, 2017).

According to each district's reach approach, this was a formative supervision that helped staff improve their performance during this engagement process. this study emphasized the use of supervisory visits as an opportunity to improve the knowledge and skills of community health workers (World Health Organization, 2017).

This supervision was aimed more at monitoring performance against objectives and the use of tools and work methods, the veracity of the data obtained for decision-making, and it was regular, together with the staff, to ensure that new tasks were implemented appropriately (Cutts *et al.*, 2021), (Clara, Dao, *et al.*, 2020).

To carry out the follow-up and monitoring of the CHWs, we started from the structure of the health areas and the community animation cells. We therefore conducted a cross-sectional walk that allowed us to identify the number of Community Animation Cells and community health workers per health area. In total, more than 60 visits were made. To be effective, the FGDs were organized once a month in each health area (World Health Organization, 2017).

3.2. RAISING AWARENESS THROUGH AVAILABLE STATISTICAL DATA

During this activity, we opted for the "Open Data Awareness and Consumption model" (Amugongo et al., 2015). The number of unvaccinated children against measles was very high in the majority of the health areas, so this frequency was regularly exposed in the discussion groups organized in the health areas with the community health workers and the staff of the central office of the health area in order to show the importance of the problem, thus reinforcing the relevance of social mobilization in the promotion of vaccination against measles.

Thus, the health areas that had never reported went from 20 children recovered per week to 100 per week, the number of sensitizers went from 3 to half of the total in the health areas. This pushed the number of children recovered from 61 children recovered per year to an average of 500 children per month, for a total of 4,346 children for a period of 4 months, plus 145 children with measles identified for a period of 4 months.

Routine VAR immunization has seen its frequency increased to more than 6,000 children, a difference of more than 3,341 children. This activity has motivated the community health workers to work in transparency and veracity with the BCZ staff and the head nurses of the health centers who did not believe in such data.

VALIDATION OF REPORTED DATA AND COMPLIANCE DATA

Data validation was organized once a month. To carry out the follow-up and monitoring of the CHWs, the research started from the structure of the health areas and the community animation cells (C.A.C.). In order to be effective, the FGDs were organized once a month in each health area around the definition of measles cases and to remind them about the MVA target.

Many community relays confused measles with pruriginous scabies, bullous exema, chicken pox and other forms of scabies. Others recorded children over 5 years and under 9 months. To validate the data, a comparison of cases was made, out of 350 cases identified, only 140 were suspected of measles, 150 were pruritic scabies locally called "SHISHKARA", 30 cases of chickenpox, 30 others of rashes difficult to identify.

Table 1. Identification of the frequency of measles-like diseases

No	Affection identified	Effectif	Notification	Blood collection	IGM+
1.	Measles	145	45	20	5
2.	chickenpox	30	-	-	-
3.	Scabies	155	-	-	-
4.	Other	20			
5.	Number of measles deaths	0	0	0	0
6.	Complicated measles	0	0	0	0
	Total	350			

This table shows that half of the cases reported by health workers were not measles cases but similar conditions.

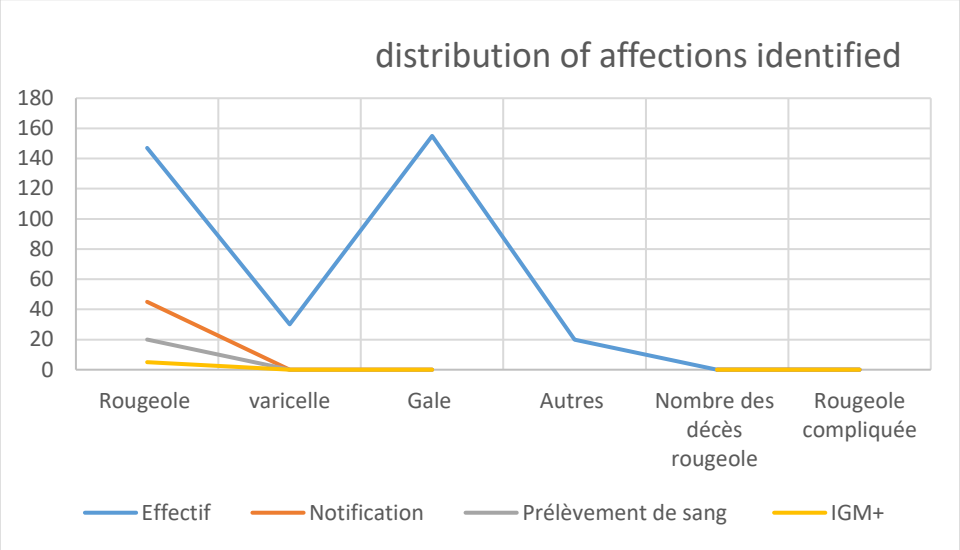

Fig. 1. Identification of the frequency of measles-like diseases

This figure shows the frequency of measles cases validated during monitoring and follow-up of community relays.

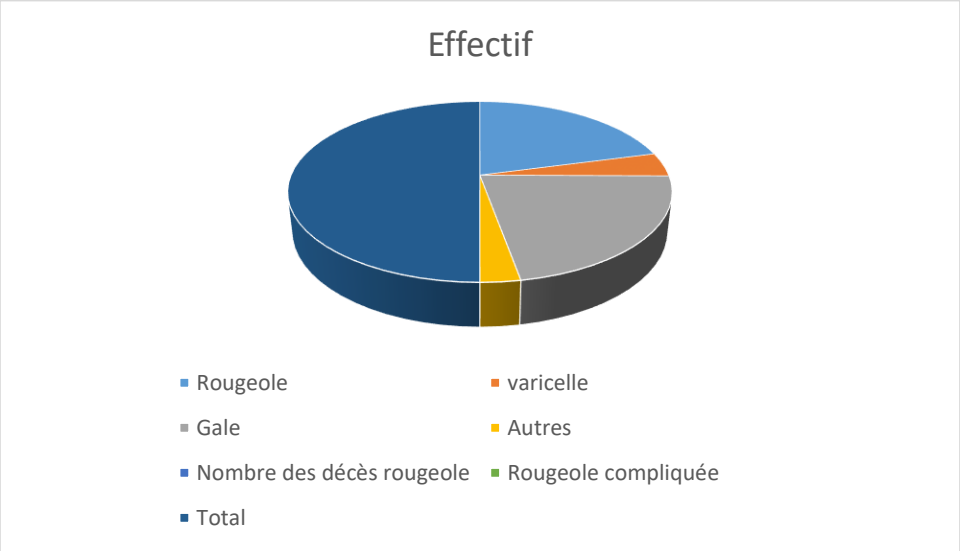

Fig. 2. Identification of the frequency of measles-like diseases

Fig. 3. Typical measles forms

NUMBER OF CHWS BY KNOWLEDGE OF CASE DEFINITION

During FGD, for the five FGD teams, i.e. 60, only 10 nurses gave the measles case definition against 50 CHWs who did not know the measles case definition.

Table 2. Knowledge of measles case definition by health care workers

		Cas Définitions				
		Fever	**Types of rashes**	**Catarrhea oculo nasale**	**Physical asthenia**	**Less than 15 year old**
	Catégories	**N=50**	**N=50**	**N=50**	**N=50**	**N=50**
1	Community relays	25	25	25	25	25
	%	50%	50%	50%	50%	50%
	Catégories	**N=10**	**N=10**	**N=10**	**N=10**	**N=10**
2	Nurses	10	10	10	10	10
	%	100%	100%	100%	100%	%

This table shows that the majority of Relais do not remember the definition of measles cases. 50% of 50 CHWs know two major signs of measles

3.3. ADAPTATION AND CONFORMATION OF STRATEGIES

In the first few months, many community health workers used spot home visits and immunization day. During the monitoring, participants suggested using megaphones every evening and early morning as well as door-to-door visits every evening and morning and contacting mothers at the workplace, message in local churches. This approach showed that the data increased progressively in the different health areas and HEALTH ANIMATION CELL (CAC) for the variables for recovery of unreached children through AVM activities, routine AVM vaccination, and case notification.

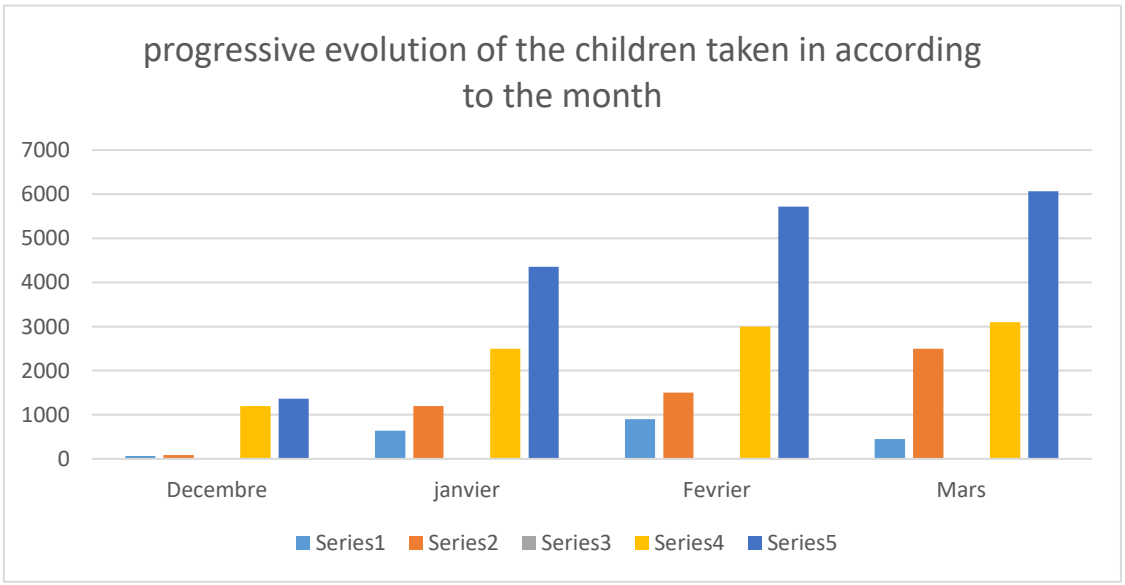

Fig. 4. Progressive evolution of the children taken in according to the month

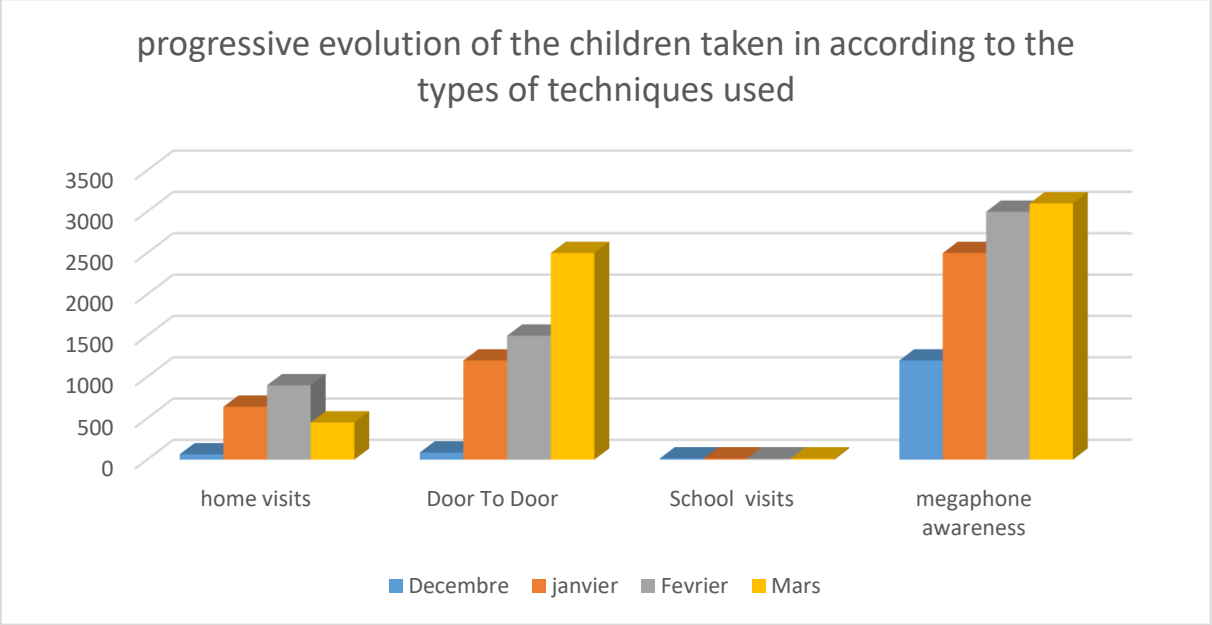

Fig. 5. Progressive evolution of the children taken in according to the types of techniques used

Figures 5 and 5 show the progression in the number of children brought in according to the adaptation of the techniques and during the months of intervention

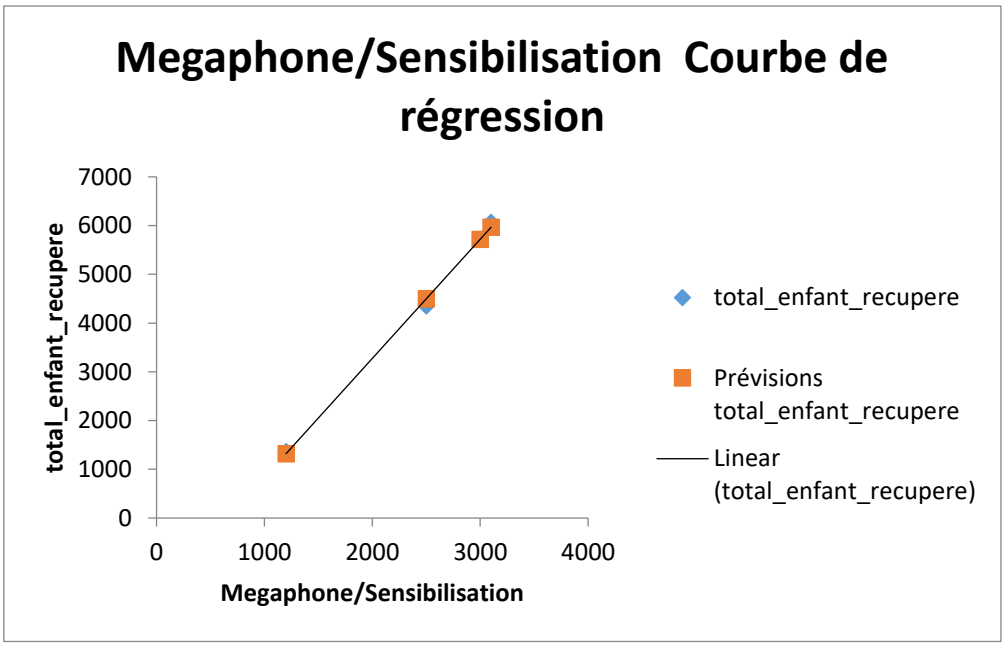

Fig. 6. Results of megaphone technique

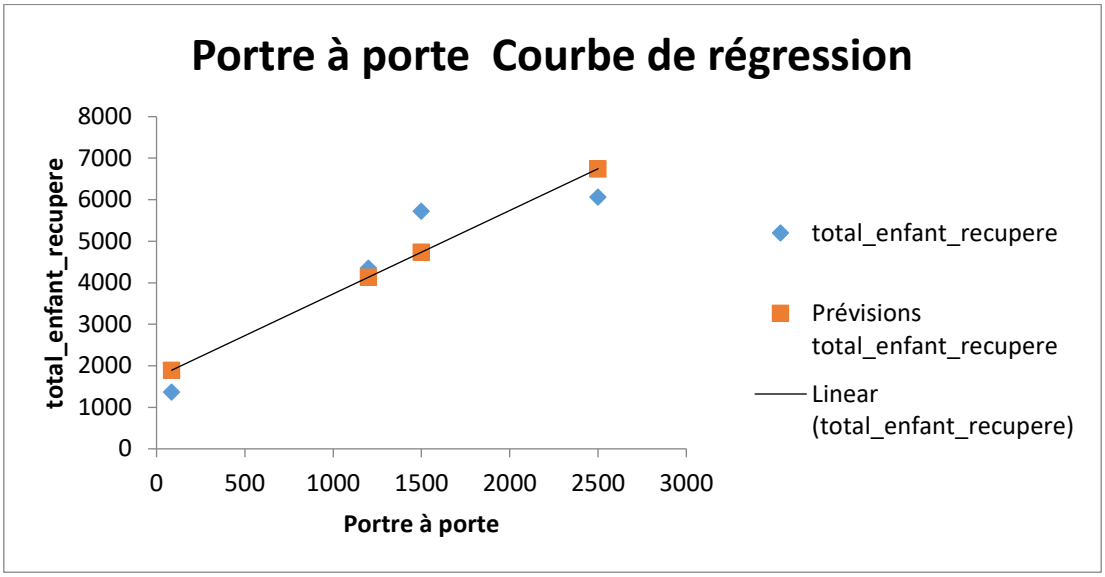

Fig. 7. Results of the door-to-door technique

The two figures above show the effectiveness of door-to-door and megaphone techniques.

MANAGEMENT OF RUMOR AND MANAGEMENT OF HOUSEHOLD RESISTANCE TO VAM VACCINE

Monitoring has allowed us community health workers to successfully manage rumors and various resistances. According to the declarations of one of the presidents of the health areas, the mothers refuse declare this: “Any CHWs who will bring my child to the VAR vaccination, I will send him witch threats preventing him from any mobility of the limbs” To circumvent this resistance, we have preached by concrete examples, community health workers say: "We brought our children and the children of friends and relatives to the vaccination so that the communities accepted that the vaccine is not toxic to children” during the different Focus Group Discussions, the presidents.

Table 3. Influence of appointment follow-up on measles vaccination

Healty zone				measles vaccination		Total	Khi2 value	Ddl	P-value	OR	IC à 95 %	
				No	Yes						Lower	Sup
Goma	Follow-up for MVA 9-month appointments	No	Frequency	49	10	59	77,301	1	0,00	16,677	7,945	35,005
			%	83,1%	16,9%	100,0%						
		Yes	Frequency	57	194	251						
			%	22,7%	77,3%	100,0%						
	Total		Frequency	106	204	310						
			%	34,2%	65,8%	100,0%						
karisimbi	Follow-up for MVA 9-month appointments	No	Frequency	42	12	54	35,912	1	0,00	6,919	3,463	13,821
			%	77,8%	22,2%	100,0%						
		Yes	Frequency	86	170	256						
			%	33,6%	66,4%	100,0%						
	Total		Frequency	128	182	310						
			%	41,3%	58,7%	100,0%						
Total	Follow-up for MVA 9-month appointments	No	Frequency	91	22	113	107,673	1	0,00	10,529	6,359	17,433
			%	80,5%	19,5%	100,0%						
		Yes	Frequency	143	364	507						
			%	28,2%	71,8%	100,0%						
	Total		Frequency	234	386	620						
			%	37,7%	62,3%	100,0%						

In both areas, follow-up appointments have a significant influence on measles vaccination.

Table 4. Monitoring of immunization activities

Health Zones				Did_he_have_a_sign_of_measles		Total	Khi2 value	Ddl	p-value	OR	IC à 95 %	
				No	Yes						Lower	Higher
Goma	Was the child followed up for the AVM vaccination?	No	Frequency	28	31	59	28,095	1	0,00	0,21	0,12	0,39
			%	47,50%	52,50%	100,00%						
		Yes	Frequency	203	48	251						
			%	80,90%	19,10%	100,00%						
	Total		Frequency	231	79	310						
			%	74,50%	25,50%	100,00%						
Karisimbi	Was the child followed up for the AVM vaccination??	No	Frequency	29	25	54	2,372	1	0,12	0,63	0,35	1,14
			%	53,70%	46,30%	100,00%						
		Yes	Frequency	166	90	256						
			%	64,80%	35,20%	100,00%						
	Total		Frequency	195	115	310						
			%	62,90%	37,10%	100,00%						
Total	Was the child followed up for the AVM vaccination?	No	Frequency	57	56	113	21,448	1	0,00	0,38	0,25	0,58
			%	50,40%	49,60%	100,00%						
		Yes	Frequency	369	138	507						
			%	72,80%	27,20%	100,00%						
	Total		Frequency	426	194	620						
			%	68,70%	31,30%	100,00%						

The table below shows that follow-up vaccination has a significant impact on the risk of getting measles in the Goma zone but not in the Karisimbi zone. Vaccination follow-up reduces the risk of getting measles in the Goma zone by 79%.

Table 5. Effectiveness of monitoring and supervision

Health Zones				Competence development after monitoring and supervision		Total	Khi-2 Value	DDL	P-value	OR	IC 95 %	
				No	Yes						Lower	High
Control	Do you receive supervision and follow-up to build your social mobilization capacity?	No	Frequency	1	0	1	0,75	1	0,386	2,00	0,500	7,997
			%	100,0%	0,0%	100,0%						
		Yes	Frequency	1	1	2						
			%	50,0%	50,0%	100,0%						
	Total		Frequency	2	1	3						
			%	66,7%	33,3%	100,0%						
Experimental	Do you receive supervision and follow-up to build your social mobilization capacity?	No	Frequency	4	1	5	11,733	1	0,001	0,20	0,035	1,154
			%	80,0%	20,0%	100,0%						
		Yes	Frequency	0	11	11						
			%	0,0%	100,0%	100,0%						
	Total		Frequency	4	12	16						
			%	25,0%	75,0%	100,0%						
Total	Do you receive supervision and follow-up to build your social mobilization capacity?	NO	Frequency	5	1	6	10,871	1	0,001	60,00	3,104	1159,783
			%	83,3%	16,7%	100,0%						
		YES	Frequency	1	12	13						
			%	7,7%	92,3%	100,0%						
	Total		Frequency	6	13	19						
			%	31,6%	68,4%	100,0%						

In the Karisimbi health zone, having supervision and follow-up significantly influences skill development. In Karisimbi, the chance of developing skills decreases by 80% if one has not benefited from supervision and follow-up.

For the Goma health zone, unlike Karisimbi, having supervision and follow-up does not significantly influence skill development (the P-value is greater than the 5% threshold and the CI contains 1).

4. DISCUSSION

Training community health workers in the promotion of measles vaccination is critical. Nevertheless, it is more fruitful when it is accompanied by follow-up, monitoring and supervision sessions of the various tasks. The supervision process is therefore a formative activity of the CHWs allowing to redirect the work, to correct the errors and to motivate. The results of Table No1 show that over the months, the number of children only increased from 2055 to 17507, however only 4346 were vaccinated. These findings support those of Reaching Every District, which (World Health Organization, 2017) found that supervision corrects gaps in service delivery and increases performance. They join those of Clara et al, on Community-Based Surveillance in Cote d'Ivoire, according to which the involvement of volunteers made it possible to obtain a speed in the reference but after a capacity building of the volunteers. According to Catts et al, follow-up and supervision-training helps to arouse the interest of community health, and a sustainability of vaccination surveillance activities even when the incidence of measles is low after a long period. Forgetting or abandoning this strategy leads to a rebound in the disease and a resurgence of epidemic outbreaks. (Cutts et al., 2021) Regarding the validation of the data, several cases brought by the CHWs were rejected, resembling other rash diseases or skin rashes other than measles. Out of 350 cases, only 152 cases were retained and 45 were notified. This was thanks to sessions replacing briefings on case definitions and the VAR vaccination schedule. All children over 5 years old were withdrawn from our reference for vaccination since the program does not support them. these results agree with Clara et al, whom during a surveillance study they rejected after validation many of the cases with non-measles rashes but already confirmed by CHWs (Clara, Ndiaye, et al., 2020). According to the WHO in its publication on the basis of immunization, supervision and monitoring sessions validate the data (Murray Trostle et al, n.d.) All children over 5 years old were withdrawn from our reference for vaccination since the program does not support them. these results agree with Clara et al, that during a surveillance study they rejected after validation many of the cases presenting non-measles rashes but already confirmed by

CHWs (Clara, Ndiaye, et al., 2020). have thus shown significant associations between monitoring and promotion of VAR vaccination coverage, for example during household surveys, mothers who vaccinated their children had almost all been visited several times by CHWs, i.e. X2 77.3, P=0,00,0R = 16.67. The Democratic Republic of Congo has introduced since 2003, the involvement of CHWs in its measles surveillance system, however several challenges are still observed the CHWs which in the DRC are called Community Relays, create as a community participation structure to raise awareness, mobilize and creating a link with the structures does not perform these tasks well. The lack of a monitoring, evaluation and supervision structure for these local health actors often leads to a weakness in their functioning. Several studies conducted, such as in Katanga and at the School of Public Health in Kinshasa, have shown a relationship between the dysfunction of this organ and low vaccination coverage or only the monitoring of diseases with epidemic potential such as measles. The lack of their follow-up becomes a direct or indirect cause of the resurgence of these diseases with epidemic potential. During this study, FGD participants reassured that they had turned away from VAR and Measles vaccine surveillance not only following the Ebola and COVID-19 pandemic, but also because of a lack of follow-up and supervision by local health authorities. This situation has currently led to a resurgence of measles and other preventable vaccine-preventable diseases such as poliomyelitis in the Karisimbi health zone in the DRC, after a period of silence of more than 6 months. Thus, the promotion of health cannot be effective in this part of the republic after the authorities of the Ministry of Health at the central, intermediate and local levels think of the revitalization of this body through follow-up, supervision and monitoring mechanisms.

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REFERENCES

[1] Amugongo, L. M., Muyingi, H. N., & Sieck, J. (2015). Increasing open data awareness and consumption in Namibia : A hackathon approach. *13th Culture and Computer Science - Cross Media Conference*, *July 2016*, 187–198. https://www.academia.edu/13020835/Increasing_Open_Data_Awareness_and_Consumption_in_Namibia_A_Hackathon_Approach.

[2] Arogundade, L., Akinwumi, T., Molemodile, S., Nwaononiwu, E., Ezika, J., Yau, I., & Wonodi, C. (2019). Lessons from a training needs assessment to strengthen the capacity of routine immunization service providers in Nigeria. BMC Health Services Research, 19 (1), 1–12. https://doi.org/10.1186/s12913-019-4514-2.

[3] Banerjee et al. (2018). Public health responses during measles outbreaks in elimination settings: Strategies and challenges. Human Vaccines and Immunotherapeutics, 14 (9), 2222–2238.

[4] Biellik, R. J., & Orenstein, W. A. (2018). Strengthening routine immunization through measles-rubella elimination. Vaccine, 36 (37), 5645–5650. https://doi.org/10.1016/j.vaccine.2018.07.029.

[5] Byrne, A., & Nichol, B. (2020). A community-centred approach to global health security: implementation experience of community-based surveillance (CBS) for epidemic preparedness. Global Security: Health, Science and Policy, 5 (1), 71–84. https://doi.org/10.1080/23779497.2020.1819854.

[6] Chard, A. N., Gacic-dobo, M., Sodha, S. V, Wallace, A. S., Chard, A. N., Gacic-dobo, M., & Sodha, S. V. (2020). SYSTEMATIC VACCINATION COVERAGE. In Weekly Epidemiological Record (Issue 46).

[7] Chesoli, R. N., Schuster, R. C., Okelo, S., & Omotayo, M. O. (2018). Strengthening care delivery in primary care facilities: Perspectives of facility managers on the immunization program in Kenya. International Journal of Health Policy and Management, 7 (12), 1130–1137. https://doi.org/10.15171/ijhpm.2018.83.

[8] Clara, A., Dao, A. T. P., Mounts, A. W., Bernadotte, C., Nguyen, H. T., Tran, Q. M., Tran, Q. D., Dang, T. Q., Merali, S., Balajee, S. A., & Do, T. T. (2020). Developing monitoring and evaluation tools for event-based surveillance: Experience from Vietnam. Globalization and Health, 16 (1), 1–11. https://doi.org/10.1186/s12992-020-00567-2.

[9] Clara, A., Ndiaye, S. M., Joseph, B., Nzogu, M. A., Coulibaly, D., Alroy, K. A., Gourmanon, D. C., Diarrassouba, M., Toure-Adechoubou, R., Houngbedji, K. A., Attiey, H. B., & Balajee, S. A. (2020). Community-Based Surveillance in Côte d'Ivoire. Health Security, 18 (S1), S23–S33. https://doi.org/10.1089/hs.2019.0062.

[10] Cutts, F. T., Ferrari, M. J., Krause, L. K., Tatem, A. J., & Mosser, J. F. (2021). Vaccination strategies for measles control and elimination: time to strengthen local initiatives. BMC Medicine, 19 (1), 1–8. https://doi.org/10.1186/s12916-020-01843-z.

[11] David, A. A., Mobolaji, M. S., & Segun, B. (2020). Training needs assessment and preferred approach to enhancing work performance among clinical nurses in University College Hospital (UCH), Ibadan, Oyo State, South-western Nigeria. International Journal of Nursing and Midwifery, 12 (4), 130–138. https://doi.org/10.5897/ijnm2020.0434.

[12] Decorby-Watson, K., Mensah, G., Bergeron, K., Abdi, S., Rempel, B., & Manson, H. (2018). Effectiveness of capacity building interventions relevant to public health practice: A systematic review. BMC Public Health, 18 (1), 1–15. https://doi.org/10.1186/s12889-018-5591-6.

[13] Dixon MG, Ferrari M, Antoni S, et al. (2020). Progress Toward Regional Measles Elimination — Worldwide, 2000 – 2020. MMWR Morb Mortal Wkly Rep 2021, 70 (42), 1563–1569. http://dx.doi.org/10.15585/mmwr.mm7045a1external icon.

[14] Doctors Without Borders. (2019). Management of a measles epidemic (MSF).

[15] EPI-DRC. (2015). Democratic Republic of Congo's Comprehensive EPI Pluri-Annual Plan, 2013-2015 revised.

[16] Force, T., & Eradicat, D. (2016). Weekly epidemiological record elevé épidémiologique hebdomadaire. Weekly Epidemiological Record, 6, 61–72.

[17] Internation Federation of Red Cross and Red Crescent Societies. (2020). Social Mobilization Guide for Vaccination Campaign and Routine Immunization. In International Federation of Red Cross and Red Crescent (Red Cross). https://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2020/01/1_SM-Guide-RC_version-1.pdf%0A http://pesquisa.bvsalud.org/bvsms/resource/pt/mis-20713.

[18] International Federation of Red Cross and Red Crescent Societies. (2020). Operations Update Philippines: Re-emergence of Vaccine Preventable Diseases – Measles outbreak. 4, 1–16. https://reliefweb.int/sites/reliefweb.int/files/resources/MDRPH03212m_measles.pdf.

[19] JICA Amrids Project. (2014). Lessons learned from the community surveillance activities. December.

[20] Kagoné, M., Yé, M., Nébié, E., Sié, A., Müller, O., & Beiersmann, C. (2018). Community perception regarding childhood vaccinations and its implications for effectiveness: A qualitative study in rural Burkina Faso. BMC Public Health, 18 (1), 1–10. https://doi.org/10.1186/s12889-018-5244-9.

[21] Lehmann et al. (2007). Community Health Workers: What do we Know About Them? The State of Evidence on Programmes, Activities, Costs and Impact on Health Outcomes of Using Community Health Workers (WHO (ed.); University, Issue January).

[22] Liang, S., Deng, H., Liu, S., Wang, G., Li, L., Wang, M., Pu, J., Xing, W., Luo, X., Ehiri, J., Xiang, Y., & Li, Y. (2019). Competency building for lay health workers is an intangible force driving basic public health services in Southwest China. BMC Health Services Research, 19 (1), 1–13. https://doi.org/10.1186/s12913-019-4433-2.

[23] Matovu, J. K. B., Wanyenze, R. K., Mawemuko, S., Okui, O., Bazeyo, W., & Serwadda, D. (2013). Strengthening health workforce capacity through work-based training. BMC International Health and Human Rights, 13 (1), 1–13. https://doi.org/10.1186/1472-698X-13-8.

[24] Murray Trostle et al. (n.d.). Immunization Essentials; A Practical Field Guide. (Murray Trostle et al (ed.); USAID). Kristina Engstrom Graphic.

[25] Musoke, D., Gibson, L., Mukama, T., Khalil, Y., & Ssempebwa, J. C. (2016). Nottingham Trent University and Makerere University School of Public Health partnership: Experiences of co-learning and supporting the healthcare system in Uganda. Globalization and Health, 12 (1), 1–8. https://doi.org/10.1186/s12992-016-0148-x.

[26] Mutabaruka, E., Dochez, C., Nshimirimana, D., & Meheus, A. (2010). Evaluation of mid-level management training in immunisation in the African region. In East African journal of public health (Vol. 7, Issue 1, pp. 37–43). https://doi.org/10.4314/eajph.v7i1.64674.

[27] Naal, H., El Koussa, M., El Hamouch, M., Hneiny, L., & Saleh, S. (2020). Evaluation of global health capacity building initiatives in low-and middle-income countries: A systematic review. Journal of Global Health, 10 (2), 020412. https://doi.org/10.7189/jogh.10.020412.

[28] Naal, H., & Mendelsohn, R. (2019). Evaluating the Long-Term Impact of a Capacity Building Program for Displaced Community Health Workers in Fragile Settings in Lebanon on Women ' s Health. Research, 5, 1–26.

[29] O'Donovan, J., O'Donovan, C., Kuhn, I., Sachs, S. E., & Winters, N. (2018). Ongoing training of community health workers in low-income and middle-income countries: A systematic scoping review of the literature. BMJ Open, 8 (4). https://doi.org/10.1136/bmjopen-2017-021467.

[30] Patel, M. K., Goodson, J. L., & Alexander, J. P. (2020). Progress towards regional measles elimination – worldwide, 2000–2019 – Progrès accomplis dans le monde en vue de l'élimination régionale de la rougeole, 2000-2019. Weekly Epidemiological Record = Relevé Épidémiologique Hebdomadaire, 95 (46), 564–572.

[31] Perry, R. T., Murray, J. S., Gacic-dobo, M., & Dabbagh, A. (2020). Progress towards regional measles elimination – worldwide, 2000–2019 – Progrès accomplis dans le monde en vue de l'élimination régionale de la rougeole, 2000-2019. Weekly Epidemiological Record = Relevé Épidémiologique Hebdomadaire, 95 (46), 564–572.

[32] UNICEF. (2016). The UNICEF Health Systems Strengthening Approach. In New York (Health Sec). https://www.unicef.org/media/60296/file.

[33] Ward, K., Stewart, S., Wardle, M., Sodha, S. V., Tanifum, P., Ayebazibwe, N., Mayanja, R., Luzze, H., Ehlman, D. C., Conklin, L., Abbruzzese, M., & Sandhu, H. S. (2019a). Building health workforce capacity for planning and monitoring through the Strengthening Technical Assistance for routine immunization training (START) approach in Uganda. Vaccine, 37 (21), 2821–2830. https://doi.org/10.1016/j.vaccine.2019.04.015.

[34] Ward, K., Stewart, S., Wardle, M., Sodha, S. V, Tanifum, P., Ayebazibwe, N., Mayanja, R., Luzze, H., Ehlman, D. C., Conklin, L., Abbruzzese, M., & Sandhu, H. S. (2019b). Building health workforce capacity for planning and monitoring through the Strengthening Technical Assistance for routine immunization training (START) approach in Uganda. Vaccine, 37 (21), 2821–2830. https://doi.org/10.1016/j.vaccine.2019.04.015.

[35] WHO- Unicef. (2013). Problem-solving approach to managing immunization services (WHO (ed.); WHO-Africa).

[36] WHO-AFRO. (2015). Integrated Diseases Surveillance and Response in the African Region Community-based Surveillance (CBS) Training Manual (WHO). https://www.afro.who.int/sites/default/files/2017-06/community-based-surveillance_idsr_training-manual.pdf.

[37] WHO. (1993). The immunological basis of vaccination (WHO).

[38] WHO. (2013a). Global Vaccine Action Plan. In Vaccine (Vol. 31). https://doi.org/10.1016/j.vaccine.2013.02.015.

[39] WHO. (2013b). Universal Truth: No Health Without a Workforce. In Global Health Force Alliance (WHO).

[40] WHO. (2017). Measles vaccines: WHO position paper–April 2017. Weekly Epidemiological Record= Relevé Épidémiologique Hebdomadaire, 92 (17), 205–227.

[41] WHO. (2019). Global Vaccine Action Plan. In WHO Regional Office (Vol. 31, Issue September). https://doi.org/10.1016/j.vaccine.2013.02.015.

[42] World Health Organization. (2017). Reaching Every District (Red). In Regional Office for Africa.