



## Preventive Mass Vaccination Campaign Against Meningococcal Meningitis in Refugee Camps of Cameroon During the COVID-19 Pandemic: Vaccination Coverage, Challenges, Best Practices and Lessons Learned

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**Abstract:** Refugees represent the perfect breeding grounds for infectious diseases as they might transport germs as easily as their belongings. Also, Cameroon is part of the meningitis belt which makes it prone to the emergence of a meningitis epidemic. This study describes challenges and lessons learnt from a preventive mass vaccination campaign against meningococcal meningitis in refugee camps of Cameroon during the COVID-19 pandemic. It was a cross-sectional study conducted from July to September 2020. Two rounds of a preventive mass vaccination campaign against meningococcal A, C, Y, W was planned and conducted from 20th-31st July in the Far-North within the first round from the 18th-31st August 2020 in the East region and the Adamawa within the second round. The target was 191652 people aged 2 years and above including pregnant women. Following adequate advocacy and social mobilization, people targeted received an intramuscular injection of 0.5 mL of Menactra™. Data and immunization information were filled on vaccination cards. In Cameroon having strategies to cover insecure areas, organizing vaccination posts following social distancing standards and ensuring better planning of inputs before the vaccination beginning may be key to improving higher vaccination coverage in refugee camps in the context of COVID-19 pandemic response.

## INTRODUCTION

Refugees are categorized by their constant mass movements away from emergency settings to settle at more secure zones where they usually gather themselves into refugee camps<sup>[1]</sup>. Usually settling in developing countries (nine out of ten)<sup>[2]</sup>, poverty, hunger and poor living conditions as promiscuity, lack of hygiene and sanitation may heighten the risk of infections transmission among this population as refugees transport germs as easily as their belongings, therefore, making them the perfect breeding grounds for infectious diseases.

At mid-2021, globally, according to the United Nations High Commissioner for refugees, (UNHCR) approximately 79.5 million people (1% of the world population) are uprooted from their homes among which 26.3 million are refugees<sup>[3]</sup>. More than half of this refugee population is people aged <18 years old<sup>[4]</sup>. In Africa, the horn of Africa is more affected by this refugee phenomenon followed by West Africa and Central Africa<sup>[5]</sup>.

Cameroon is located in Central and West Africa bordering the Bight of Biafra, between Equatorial Guinea and Nigeria<sup>[6]</sup>. Since, 2013, it has seen its territory invaded by refugees coming from neighboring countries mainly from Nigeria, Chad and Central Africa Republic (CAR). They are mainly taken care of by the Government and international organizations as UNHCR, World Health Organization (WHO), United Funds for Children (UNICEF) and doctors without borders. Information from UNHCR on the 31st May 2021 showed that, Cameroon had welcomed a gradually increasing population of 443918 refugees from 10 countries. They mainly flee from the CAR living in refugee camps of the East and Adamawa regions followed by Nigeria and Chad in the Far-North<sup>[7]</sup>. Cameroon welcomes the highest number of Central Africans refugees<sup>[8]</sup>. The majority of them fled their home because of political instability and social crisis in their homelands.

Following massive displacements, there is usually a breakdown in access to adequate health services or default in completion of immunization schedule<sup>[9]</sup>. Vaccines preventable diseases most prevalent among refugees include measles, poliomyelitis and depending on the geographical location meningococcal meningitis, yellow fever, Hepatitis A and cholera<sup>[9, 10]</sup>.

Meningococcal meningitis is a major health problem in the African meningitis belt where large epidemics occur every 5-12 years with attack rates reaching 1000 cases per 100000 population<sup>[11]</sup>. Cameroon is one of the 26 countries of the African meningitis belt stretching from Senegal in West Africa to Ethiopia in the East<sup>[12, 13]</sup>. Furthermore, despite poor data surveillance and reporting, according to the Cameroon department of disease control and epidemics, 2020 statistics showed, we had 1128 cases with 35 deaths making a case fatality rate of 3.1%.

The risk of a meningitis epidemic is increased among refugee populations as they easily carry infectious diseases like meningitis with their belongings. Before 2010, Meningococcus A was incriminated in severe epidemics but due to the progressive introduction of the group A meningococcal conjugate vaccine so-called MenAfriVac<sup>TM</sup> in Africa<sup>[14-20]</sup>, epidemics due to Meningococcus A has fallen giving rise to epidemics due to other serogroups as Neisseria Meningitidis W and C<sup>[21]</sup>.

According to The Centers for Diseases Control (CDC), dry and dusty conditions during the dry season between December to June; immunological susceptibility of the population; travel and large populations displacements and crowded living conditions represent conditions creating a favorable environment for the development of a meningitis epidemic<sup>[11]</sup>.

Also, due to the socio-political and economic instability in their countries of origin, there might be a decrease in immunization rate among refugees<sup>[22]</sup>. This is why refugees represent the perfect breeding grounds for the development of infectious vaccine-preventable diseases such as meningitis.

Moreover, after every 5-10 years, immunity against meningitis decreases, it is therefore necessary to boost the immunity of populations particularly the areas crossed by the meningitis belt.

Mass preventive vaccination campaigns with a meningococcal A conjugate vaccine represents the fourth pillar of the currently recommended meningitis epidemic control strategy. The World Health Organization (WHO) frameworks for decision-making on vaccination in acute humanitarian emergencies and on the Organization of a mass vaccination campaign in the Context of COVID-19 classify Cameroon refugees as potential benefactors of preventive mass vaccination against meningococcal meningitis.

It is in this line that the Cameroon Ministry of Public Health drawing from the WHO 2030 roadmap has organized a preventive vaccination campaign against A, C, W and Y meningitis in his refugee camps found in the Far-North, the Adamawa and the East regions.

This study describes challenges, best practices and lessons learned from the preventive mass vaccination campaign against meningococcal meningitis in refugee camps of the Far-North, the Adamawa and the East Regions.

## MATERIALS AND METHODS

**Study setting and target population:** This was a cross-sectional descriptive study. It was conducted in Cameroon refugee camps found in the Far-North (Minawao) from the 26th to the 30 July; Adamawa (Borgop and Ngam) and East regions (Lolo, Mbile, Ngarissingo, Gado Gadzere, Timangolo) of Cameroon from the 18th to the 31th August 2020.

The campaign was introduced first in the Far-North then carried out in other regions in different timeframes because we wanted to apply lessons learned from the first round to other regions as this campaign was conducted during the COVID-19 outbreak.

The target population was people aged above 2 years of age living in refugee camps of the Far-North, Adamawa and East regions of Cameroon averaging 191652 people for the administration of Menactra™.

**Campaign planning and coordination:** At the central level, coordination was insured by the Cameroon Ministry of Public Health. The Regional delegate for Public Health was responsible of coordinating and properly implementing the campaign. At the health area level, the health district chief and his teams were responsible of implementing the campaign. The technical and financial partners (ICG, WHO) were present at each level of the coordination pyramid. The following were activities carried out before the campaign:

- Preparation meetings at the central level/ Development of the implementation plan
- Reception and provision of vaccines/inputs to vaccination sites
- Briefing of the regional supervisors, Health district chief and Chief Health Bureau
- Training of technical staff involved in the campaign
- COVID-19 screening of all actors involved in the campaign
- Provision of Personal Protective Equipments (PPEs) for vaccinators

Following these activities, the campaign effectively kicked-off and was characterized by launching of the campaign, social mobilization; installation of the fixed and temporary fixed posts, daily data compilation and monitoring, daily evaluation and campaign monitoring associated to notification and investigation of AEFI.

At the end of the Campaign, restitution and overall campaign evaluation were carried out associated to AEFI surveillance during 42 days. Technical and financial partners (WHO, UNICEF, AHA and UNHCR) participated in all coordinating and technical activities. The role of coordinating teams was to put in place vaccination campaign preparatory meetings, implementation and post campaign activities.

**Training of health workers and volunteers:** Regional and districts coordinating teams were briefed on the implementation of the campaign as well as on the reinforcement of COVID-19 prevention strategies during the campaign. Following their briefing, they had face to face training sessions in small size pools of <50 participants with vaccinators and social mobilizers. The

training topics included the role of each team members, standard ethical guidelines on vaccine service delivery, safe handling of vaccines, early and prompt recognition and management of AEFI and the use of monitoring tools. There were two training documents proposed by the central level to allow these sessions to be carried out; namely the training guide for vaccinators and the supervisors training guide.

**Advocacy, communication and social mobilization:** The technical and financial leadership at the central level provided guidelines on the implementation of campaign according to the prescribed COVID-19 prevention measures put in place by the WHO and the Cameroon Ministry of Public Health. Each mobilizer carried out communication activities before the campaign for behavior change (adequate ventilation of homes) in each neighborhood and locals of refugee camps. Journalists and health animators were effectively involved in the training of media professionals at the district and regional level. In addition, the central level developed posters in both national languages that were placed at vaccination sites before and throughout the campaign.

**Logistics:** Vaccines were already available in the country by the beginning of the campaign and their availability was not affected by COVID-19. The plans for the distribution of vaccines and other inputs from the Region to health districts were drawn up and the distribution was carried out by the regional logistics team.

COVID-19 inputs (Face masks, hands sanitizers, overcoats and visors) were also provided by the central level.

**Data collection:** Vaccine coverage data were collected during the campaign from the campaign tally sheets and 42 days after representing the surveillance time for AEFI. Proportions were calculated from the absolute number of people vaccinated according to different age groups.  $p < 0.05$  was considered significant.

## RESULTS

**Quality of the preparation and of the implementation of the campaign:** Globally, the quality of the preparation and of the implementation of the vaccination campaign against meningococcal meningitis was satisfactory in all the refugee camps of Cameroon. We observed a better preparation and implementation plan in the Far-North region which comprises only one refugee camp. This vaccination campaign in the refugee camps cost 61 004 026 million XAF.

**Vaccination coverage:** Globally there is a significant difference between vaccination rates of people below 19

Table 1: Administrative vaccination coverage of the preventive mass campaign against meningococcal meningitis in the Far-North; Adamawa and East regions refugee camps, 2020 Cameroon

Regions	Health district	Health area	Refugee camp	Target population	No. of people vaccinated	Coverage (%)	19 years (%)	>19 years (%)	p-values
Far North	Mokolo	Minawao	Minawao	57613	61227	106.3	167.4	133.7	0.044
Adamawa	Djohong	Djohong	Borgop	12159	8000	65.79	109.5	42.2	0.007
			Ngam	6693	2878	43.0	68.25	27.7	0.07
East	Garoua-Boulai	Gado-Gadzere	Gado-Gadzere	49950	55586	111.3	118.05	134.5	0.00001
	Kette	Timangolo	Timangolo	14236	16030	112.6	119.25	131.8	0.00001
	Ndelele		Lolo Mbile	46000	45986	99.97	100.1	110.2	0.00001
	Yokadouma	Ngarisingo	Ngarisingo	1945	1945	100	99.3	101.8	0.00001
Total				188596	191652	101.62	111.69	97.41	0.004

and people above 19 years of age. This tendency does not vary across health districts or health areas. As people grow older in age, there is a global tendency of decrease vaccination interest. This is due to the fact that vaccination is generally perceived (even among refugees) as a children issue, no matter the disease concerned. People bring their children to get a vaccine shot but they themselves don't feel the need to get the vaccine (Table 1).

**Adverse Events Following Immunization (AEFI):** During the campaign, among 191652 people vaccinated, we recorded 8 cases of adverse events following Immunization thus making a AEFI prevalence of 0.00004%. The reporting period lasted 42 days. Six cases from the Borgop refugee camp in the Djohong Health district and 2 cases from the Minawao Refugee camp in the Far North Region. All of them were minor cases which were handled free of charge. No case of vaccine preventable disease was recorded during the campaign.

## DISCUSSION

The objectives of this study were to describe vaccination coverage, challenges best practices and lessons learned from a vaccination campaign against meningitis in Cameroon refugee camps. We had a global vaccination coverage of 101.62% which is much more higher than what had been obtained in other settings all over the world<sup>[23, 24]</sup>. This high vaccination rate is secondary to the containment of the population in the refugee camp. It was easy to catch them as a group in their refugee camp.

Concerning AEFI, there was a low rate of AEFI reporting, might be because of inadequate recognition of AEFI or due to inefficient association with the vaccination campaign. However, all AEFI cases were minor issues as observed elsewhere<sup>[25]</sup> during a vaccination campaign against Meningitis C in two French administrative areas.

**Challenges:** The challenges faced during this preventive mass vaccination campaign against meningococcal meningitis in Cameroonian refugee camps included the following:

Carrying out this vaccination campaign during COVID-19 outbreak made some people to state that it was COVID-19 vaccine that was being administered. We overcame this challenge through thorough communication and the involvement of refugee camps leaders; religious and traditional leaders who are much more listened to by the population.

Non-compliance with social distancing measures due to crowds during vaccination sessions; vaccination staffs were protected with provided personal protective equipments.

The replacement of positive COVID-19 vaccination staff by less experienced new staff. Low capacity of the cold chain and the frequent electricity shutdowns disrupted the smooth ongoing of the campaign as vaccines had to be stored far from the vaccination sites; this delayed vaccine arrival on site and prolonged vaccination schedule for 3 more days.

An influx of refugees in the Djohong Health District (Adamawa) which disrupted vaccines provisions made earlier in the campaign planning. The recruitment of nurses at the nurse's school of Bertoua (East Region) to help in the campaign because of the insufficient number of social mobilizers increased the planned costs of the campaign; this also prolonged the implementation of the campaign for 3 days and 3 were not enough trainers. Insufficient social mobilizers in some districts due to low budgeting for social mobilization

**Best practices:** Among best practices, we recorded the following:

- A good collaboration between refugee camps site managers, vaccination staff and partners
- Holding of evaluation meetings; daily between the vaccination staff and the district team lead and thrice weekly between the central vaccination team lead, the regional vaccination staff and technical and financial partners to clear and resolve problems encountered
- The systematic COVID-19 screening of all actors taking part at the vaccination campaign
- The availability of personal protective equipment's

**Lessons learned and way forward:**

- In Cameroon having special teams to cover insecure areas

- Organizing vaccination posts following social distancing standards due to COVID-19
- Ensuring better planning of inputs before the vaccination starts may be key to improving higher vaccination coverage in refugee camps
- Provide district health services with a large capacity (solar) refrigerator/freezer will prevent extra-movements from the health areas to the region thereby reducing vaccination time
- Intensify communication during vaccination campaign in the COVID-19 context to prevent misinformation among the population

**Simple summary:** Cameroon is home to many refugees fleeing from many neighboring countries mainly the Central African Republic, Nigeria and Chad. Refugees usually leave their countries because of socio-political instability and emergency situations. This is why they might be a breakage in their health standards more so, during the COVID-19 pandemic. We carried a preventive mass vaccination campaign against meningococcal meningitis in refugee camps found in the Far-North, East and Adamawa regions. We sorted to unveil vaccination coverage, challenges, best practices and lessons learned from the campaign. As results, all people living in the targeted refugee camps were vaccinated with Menactra™. It was difficult to maintain social distancing measures for the population and since, it was the very first campaign of its kind in a refugee camp in Cameroon, there was also an inappropriate planning of vaccination inputs before the vaccination beginning. The main best practice was the testing of all actors taking part at the vaccination campaign and the main lesson learned was that having new strategies to cover insecure areas will be of paramount importance in case there is need to redo this campaign.

## CONCLUSION

The preventive mass vaccination campaign against meningococcal meningitis was a success with vaccination coverage reaching >95% in some health areas. Emphasis on some governmental efforts and strategies need to be developed to address the low vaccination coverage among people older than 19 years of age. Secondly, related to the challenges linked to COVID-19, there will be need to develop case sensitive approaches to deepen sensitization before the beginning of the campaign.

**Author contribution:** Conceptualization: AA and AB; methodology, AA and AB.; software, AN; validation, all authors; formal analysis, AN.; investigation, AA; resources, AA.; data curation, AN; writing original draft preparation, AN; writing review and editing, AA and AB.; supervision, AB; project administration, AA.

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## REFERENCES

01. Yotebieng, K.A., J.L. Syvertsen and P. Awah, 2019. Is wellbeing possible when you are out of place?: Ethnographic insight into resilience among urban refugees in Yaounde, Cameroon. *J. Refugee Stud.*, 32: 197-215.
02. UNHCR., 2021. Figures at a glance. United Nations High Commissioner for Refugees, Geneva, Switzerland.
03. UNHCR., 2020. Figures at a glance. United Nations High Commissioner for Refugees, Geneva, Switzerland.
04. UNHCR, 2021. Global trends forced displacements in 2015. United Nations High Commissioner for Refugees, Geneva, Switzerland.
05. Bariagaber, A., 2016. Conflict and the Refugee Experience: Flight, Exile and Repatriation in the Horn of Africa. Routledge, London, England, UK.,.
06. Anonymous, 2021. Geography of Cameroon-Wikipedia. Wikimedia Foundation, Inc., San Francisco, California.
07. Ciglencecki, I., R. Eyema, C. Kabanda, F. Taafo, H. Mekaoui and V. Urbaniak, 2011. Konzo outbreak among refugees from central African Republic in Eastern region, Cameroon. *Food Chem. Toxicol.*, 49: 579-582.
08. Cameroun, L., 2015. [Operational environment]. Office of the United Nations High Commissioner for Human Rights, New York, USA.
09. Lam, E., A. McCarthy and M. Brennan, 2015. Vaccine-preventable diseases in humanitarian emergencies among refugee and internally-displaced populations. *Hum. Vaccines Immunotherapeutics*, 11: 2627-2636.
10. Bonn, D., 2001. Infectious diseases threaten refugees entering Pakistan. *Lancet Infect. Dis.*, Vol. 1, No. 4. 10.1016/S1473-3099(01)00102-5
11. Anonymous, 2021. Meningococcal disease in other countries. Centers for Disease Control and Prevention, Atlanta, Georgia.
12. Molesworth, A.M., M.C. Thomson, S.J. Connor, M.P. Cresswell and A.P. Morse *et al.*, 2002. Where is the meningitis belt? Defining an area at risk of epidemic meningitis in Africa. *Trans. R. Soc. Trop. Med. Hyg.*, 96: 242-249.

13. Diallo, A.O., H M Soeters., I. Yameogo, G. Sawadogo and F. Ake *et al.*, 2017. Bacterial meningitis epidemiology and return of *Neisseria meningitidis* serogroup a cases in Burkina Faso in the five years following MenAfriVac mass vaccination campaign. *PloS One*, Vol. 12, No.11. 10.1371/journal.pone.0187466
14. Fouda, A.A.B., 2019. Epidemiological status of bacterial meningitis disease following the introduction of the meningococcal a conjugate vaccine in the African meningitis belt. *Int. J. Immunol.*, 7: 12-22.
15. Collard, J.M., B. Issaka, M. Zaneidou, S. Hugonnet and P. Nicolas *et al.*, 2013. Epidemiological changes in meningococcal meningitis in Niger from 2008 to 2011 and the impact of vaccination. *BMC Infect. Dis.*, Vol. 13. 10.1186/1471-2334-13-576
16. Fernandez, K., C. Lingani, O.M. Aderinola, K. Goumbi and B. Bicaba *et al.*, 2019. Meningococcal meningitis outbreaks in the African meningitis belt after meningococcal serogroup a conjugate vaccine introduction, 2011-2017. *J. Infect. Dis.*, 220: S225-S232.
17. Bwaka, A., A. Bitá, C. Lingani, K. Fernandez and A. Durupt *et al.*, 2019. Status of the rollout of the meningococcal serogroup a conjugate vaccine in African meningitis belt countries in 2018. *J. Infect. Dis.*, 220: S140-S147.
18. Fouda, A.A.B., 2019. Impact of the meningococcal a conjugate vaccine introduction in the African meningitis belt, 2010-2017. *Am. J. Biomed. Life Sci.*, 7: 84-92.
19. Trotter, C.L., C. Lingani, K. Fernandez, L.V. Cooper and A. Bitá *et al.*, 2017. Impact of MenAfriVac in nine countries of the African meningitis belt, 2010-15: An analysis of surveillance data. *Lancet Infect. Dis.*, 17: 867-872.
20. Fall, A., A.F. Bitá, C. Lingani, M. Djingarey and C. Tevi-Benissan *et al.*, 2018. Elimination of epidemic meningitis in the African Region: Progress and challenges: 2010-2016. *J. Immunol. Sci.*, 1: 41-45.
21. WHO., 2015. Weekly epidemiological record meningitis control in countries of the meningitis belt, 2015. World Health Organization, Geneva, Switzerland.
22. Mipatrini, D., P. Stefanelli, S. Severoni and G. Rezza, 2017. Vaccinations in migrants and refugees: A challenge for European health systems. A systematic review of current scientific evidence. *Pathogens Global Health*, 111: 59-68.
23. Haelterman, E., M. Boelaert, C. Suetens, L. Blok, M. Henkens and M.J. Toole, 1996. Impact of a mass vaccination campaign against a meningitis epidemic in a refugee camp. *Trop. Med. Int. Health*, 1: 385-392.
24. Woods, C.W., G. Armstrong, S.O. Sackey, C. Tetteh, S. Bugri, B.A. Perkins and N.E. Rosenstein, 2000. Emergency vaccination against epidemic meningitis in Ghana: Implications for the control of meningococcal disease in West Africa. *Lancet*, 355: 30-33.
25. Laribiere, A., G. Miremont-Salame, H. Reyre, A. Abouelfath, L. Liege, N. Moore and F. Haramburu, 2005. Surveillance of adverse effects during a vaccination campaign against meningitis C. *Eur. J. Clin. Pharmacol.*, 61: 907-911.