

Original Research Paper

Quality of Vaccination Programmes in the Bamenda Health District, Cameroon, Compared with the WHO Recommended Standards

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Accepted 30th August, 2020.

The Bamenda Health District has been a victim of several upsurges of vaccine-preventable diseases, which are sometimes not well reported or rather not given the well-deserved attention. This phenomenon has tended to render the vaccination programmes in the health district questionable. This was the motivation behind the research topic “Quality of Vaccination Programmes in the Bamenda Health District (BHD) Compared with the World Health Organisation (WHO) Recommended Standards”. Our main objective was to compare the quality of the vaccination programmes in the Bamenda Health District with the WHO recommended standards. A descriptive, cross-sectional, explorative, and comparative survey was carried out in which multistage random sampling was done to obtain a sample size of 414 participants. Key findings revealed an inefficient cold chain system characterised by poor Vaccine Vial Monitoring (VVM); a precarious socio-political climate compounded by insecurity; and inadequate vaccination organisation characterised by multiple flaws and lapses. It was concluded that there are massive flaws and inadequacies in the organisation of vaccination campaigns in the Bamenda Health District that need to be addressed appropriately and promptly. The vaccination programmes in the BHD are therefore substandard with regards to WHO recommended standards. We recommend the powers that be to create an enabling and safe environment for efficient and effective vaccination campaigns. Public health authorities and stakeholder should redouble their efforts to right the flaws and address the inadequacies in vaccination programmes.

Keywords: Vaccination, Standards, Guidelines, Protocols, Challenges, Herd, Immunity.

INTRODUCTION

Disease prevention and control has been a major challenge to the public health sector in Cameroon in general and in the North West Region in particular for a pretty long time. This has probably brought about the emergence and re-emergence of many diseases and epidemics in the North West Region and elsewhere in Cameroon. The North West Region is currently experiencing an upsurge of epidemics of vaccine-preventable diseases such as Poliomyelitis, Measles, and Tuberculosis. Currently, the vaccination coverage for the North West region is 68%, far from herd immunity. This is probably due to an inefficient and ineffective vaccination programme over the years.

The situation has become very challenging and aggravated by the socio-political crisis and the raging war in the Region. Many families have been displaced into the bushes and refugee camps, the adverse consequences notwithstanding. These displaced populations are at very high risk of contamination, infection, and epidemics, especially as they are

seeking refuge in forests, slumps, and overcrowded refugee camps.

With such mass displacements, disease exposure, incidence, and prevalence tend to rise significantly. Consequently, vaccination and immunisation as well as follow up by way of surveillance, monitoring, and contact tracking become even less efficient. Access to vaccination for newborns and the under-fives in such circumstances is either absent or inadequate.

We therefore require a more robust, flexible and mobile or transferrable vaccination and immunisation system that caters for the affected and vulnerable populations, and on a large scale. This requires sufficient resources, adequate capacity building of personnel, health education of the populations, and appropriate health promotion strategies that ensure vaccination programmes of conventional standards. This will go a long way to curb the upsurge of infectious diseases and improve access to health care for the most vulnerable populations.

Brief review of related literature

The World Health Organisation asserts that immunisation prevents illness, disability, and death from vaccine-preventable diseases including cervical cancer, poliomyelitis etc, and that immunisation currently averts an estimated 2 to 3 million deaths every year. Yet an estimated 21.8 million infants worldwide are still missing out on basic vaccines of whom nearly half live in India, Nigeria, and Pakistan. [1][23] The last reported cases of wild polio in India were in West Bengal and Gujarat on 13 January 2011. [1][15] On 27 March 2014, WHO declared India a Polio-free country, since no cases of wild Polio had been reported in the previous three years. [11] As of mid-2015, only Afghanistan and Pakistan still had wild Polio cases. The most recent WPV case in West Africa (excluding Nigeria) occurred in Tahoua province, Niger, with the onset of paralysis on 15 November 2012.

According to the WHO, improving our understanding of why some regions have been successful and others have not will help with both global eradication of Poliomyelitis and the development of more efficient and effective vaccination strategies for other pathogens. [26] Given these dynamic properties, attention ought to be given to intervention strategies that complement childhood vaccination. [26][19]

Problem statement

Immunisation is widely known to be one of the most successful and cost-effective health interventions. It prevents between 2 and 3 million deaths every year and now protects children not only against diseases for which vaccines have been available for many years, such as diphtheria, tetanus, polio, and measles, but also against diseases such as pneumonia and rotavirus diarrhoea, 2 of the biggest killers of children under 5 years of age. Meanwhile, despite improvements in global vaccine coverage during the past decade, there continue to be regional and local disparities resulting from:

- Limited resources;
- Competing health priorities;
- Poor management of vaccination and immunisation systems; and
- Inadequate monitoring and supervision.

Currently, there has been a decline in the vaccination coverage in the Bamenda Health District from 77% in 2017 to 75% in 2018 and a decline from 78% to 62% coverage for the whole North West Region. Therefore, one can rightly say there is no herd immunity acquired. The lapses and challenges in the Bamenda Health District therefore need to be addressed and improved upon, in order to ensure efficient and effective vaccination and immunisation campaigns.

It was in the light of the ongoing situation that we perceived the need to investigate the quality of vaccination programmes in the Bamenda Health District (BHD) as compared to WHO recommended standards so as to build an efficient and effective vaccination programme for the BHD.

Objective of the study

The general objective was to investigate the quality of vaccination and immunisation programmes in the Bamenda Health District (BHD) as compared to WHO recommended standards.

METHODOLOGY

Research design: The research design was a descriptive, cross-sectional, explorative and comparative one.

Random Sampling: Sample size (n) = 414 Respondents.

This was determined by the Fisher et al formula:

$$n = \frac{Z^2 P(1-P)}{d^2} \quad (\text{Fisher et al 1998})$$

Where:

- n = the desired sample size where the study population is equal to or greater than 10,000.
- Z = Standard normal deviate corresponding to 95% level of confidence (CI = 1.96).
- p = Estimated prevalence of characteristic of interest (unsound practices) = 0.5 (Since that of the Bamenda Health District is not known).
- d = Level of precision (set at $\pm 5\%$).

Research Instruments

Consisted of An observation checklist, A Semi-Structured Questionnaire, A Key Informant Questionnaire, and A Focus Group Discussion Guide.

KEY FINDINGS

Immunisation Data

Completion of routine childhood immunisation could not be ascertained in the majority of the study participants, 235 (61%) due to a lack of supporting documents. Only 95 (25%) of the respondents ascertained that they completed routine childhood immunisation while 54 (14%) reported that they had not completed the immunisation coverage.

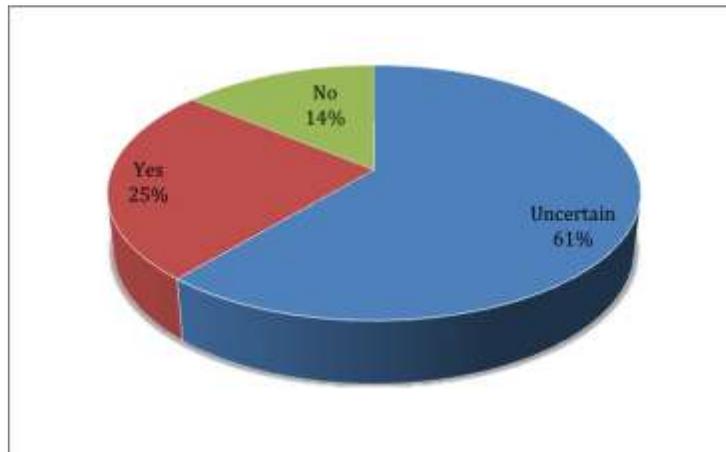
Tuberculosis (BCG vaccine/scar) had a 100% complete vaccination according to 384 participants. (But there is an upsurge of Tuberculosis in the region, though. Maybe opportunistic due to other factors like HIV/AIDS). Meningococcal Meningitis had 372 (97%) while Rubella (German measles) and yellow fever each had 369 (96%) of the participants having completed vaccination. None of the participants had Hepatitis A or Ebola vaccination.

The table 1: provides results for the knowledge of vaccine by respondents. To this end, all but the last variable concerning the satisfaction of respondents on the skills acquired were significant at the 5% (P-value < 0.05) threshold. Respondents confirm: sound knowledge of vaccines for them, sound knowledge of vaccines for children, sound knowledge of how vaccines work, good training on vaccine delivery but they are not satisfied with the skills acquired, (P-value > 0.05).

Focus Group Discussion

All participants 10 (100%) agree that the following challenges/lapses make the vaccination/immunisation programmes not the best:

- Inefficient cold chain system characterised by poor VVM monitoring, poor fridge repairs and maintenance, and lack of appropriate contingency plans.



* Uncertain due to lack of supporting documents

Fig. 1: Vaccination Coverage Among Adults (n = 384)

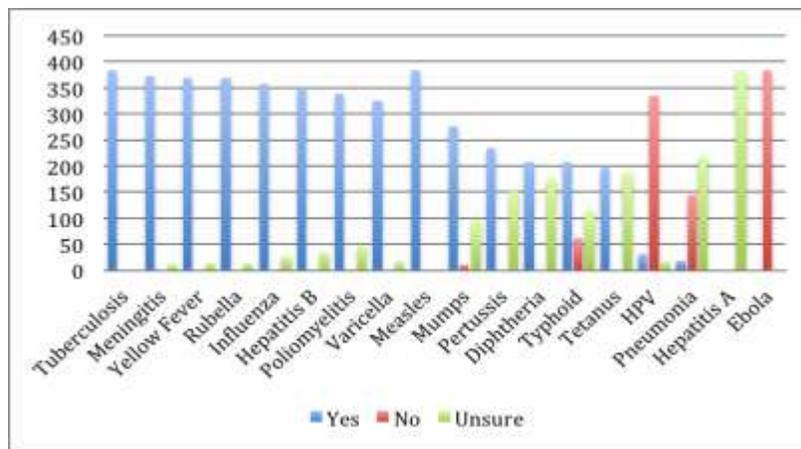


Fig. 2: Completion of Vaccination for Various Diseases: (n = 384)

Table 1: Confirmation Test of Significance on Knowledge about Vaccines

Variables	Yes	No	T- stat	P-value	DF
Sound Knowledge of vaccines for self (n=188)	120	68	3.9359	0.0001	187
Sound knowledge of vaccines for children (n = 300)	204	96	6.6723	0.000	299
Sound knowledge of how vaccines work (n = 384)	215	169	2.3124	0.0213	382
Sound training on vaccine administration? (n = 188)	111	77	2.4451	0.0154	186
Satisfied with the skills acquired? (n = 188)	98	90	0.5824	0.5610	187

*CI = 1.96 - 95% and Significance Level = 5% (P-value < 0.05); Software: Stata.

Table 2: Challenges / lapses encountered: (n = 10)

What are the challenges / lapses that make the vaccination programme not the best?	
Response	Number (%)
Inefficient cold chain system characterised by poor VVM monitoring, etc.	10 (100%)
Poor organisation (weak supervision, lack of itinerary maps, non-systematic revisit of missed homes.	10 (100%)
Insufficient financial, human, and material resources.	10 (100%)
Weak involvement of related sectors, i.e. poor intersectorial collaboration.	10 (100%)
Weak routine Immunisation activities.	9 (90%)
The surveillance & monitoring system is weak.	8 (80%)
Lack of effective advocacy and communication plans.	7 (70%)
Micro-plans are not effectively being used for the campaigns.	7 (70%)

- Poor organisation (weak supervision, lack of itinerary maps, non-systematic revisit of missed homes).
- Insufficient financial, human, and material resources.
- Weak involvement of related sectors, i.e. poor intersectoral collaboration.

Nine (90%) of the participants agreed that weak routine immunisation activities make the vaccination/immunisation not the best. Seven (70%) of the study participants said:

- Lack of effective advocacy and communication plans.

Aspects to be improved upon by the FGD

All FGD participants 10(100%) suggested that:

- The socio-political and security situation must be improved otherwise it will be pretty difficult to obtain effective vaccination performance given that many health facilities are closing down due to insecurity.
- Improving the staff situation in health facilities is very necessary. More vaccinating personnel should be trained and deployed on the field.
- More finances should be allocated for routine EPI activities.
- NID supervisors should extend their activities from proxy to hard-to-reach areas.

Nine (90%) of the participants thought that rumours should be dispelled and managed adequately by the authorities concerned with vaccination and 8 (80%) thought that Immunisation programme coordinators should step up sensitisation and awareness by tackling practical problems concerning vaccination.

Responses from Key Respondents

Responses from key respondents revealed the following facts:

- Insufficient mobilisation of resources, both local and otherwise.
- Poor organisation (weak supervision, weak trans-border activities, lack of itinerary maps, non-systematic revisit of homes).
- Obsolete and non-functional cold chain equipment in some health facilities.
- Poor implementation of Reach Every Child (REC) approach.
- Lack of robust bottom-up micro-plans for the campaigns.
- Lack of effective advocacy and communication plans resulting in weak intersectoral collaboration.

Proposed Solutions by Key Respondents: (N = 20)

All the study participants proposed the following for vaccination improvement:

- The security situation should be alleviated for vaccination programs to be improved.
- Improving the staff situation in health facilities
- Ensure the availability, and functioning of cold chain equipment

- Misconceptions and rumors should be dispelled and managed adequately by all stakeholders involved in vaccination and immunisation programmes.
- Step up advocacy and enhance information, education, and communication for behavioral change with a focus on health promotion and disease prevention.

Eighteen (90%) proposed adequate financing routine EPI activities while 16 (80%) proposed financing the elaboration of RED micro plans to REA at the beginning of each year by reaching health units and health areas.

Observation Check List

An observation checklist was used to practically observe the vaccination procedure as carried out by the actors in 26 randomly selected vaccination teams. During the observation, it was discovered that 5 of the teams could not be physically located. They were finally regarded as either fake and non-existent teams, or pseudo-teams and therefore inadequate. Table 5 summarises the results.

Synthesis of Vaccination Improvement Proposals: (n = 414)

1. The security situation should be alleviated for vaccination programs to be improved.
2. Improving the staff situation in health facilities is mandatory.
3. The availability and functioning of cold chain equipment should be ensured.
4. Misconceptions and rumors should be dispelled and managed adequately by health authorities and all stakeholders involved in vaccination and immunisation programmes.
5. Stakeholders should step up advocacy and enhance information, education, and communication for behavioral change with a focus on health promotion and disease prevention.
6. Eighteen (90%) proposed adequate financing of routine EPI activities while 16 (80%) proposed financing the elaboration of Reach Every District (RED) micro plans to Reach Every Area (REA) at the beginning of each year.

DISCUSSION

Introduction

Everyone knows that vaccination and immunisation are some of the most cost-effective health interventions to halt the spread of childhood diseases and improve child health even though there is a significant disparity in childhood vaccination and immunisation coverage. According to Leslie Roberts (Dec. 30, 2019) the “endgame” in the decades-long campaign to eradicate Polio suffered major setbacks in 2019. While the effort lost ground in Afghanistan and Pakistan, which recorded 116 cases of wild Polio—four times the number in 2018, an especially alarming situation developed in Africa.

Table 3: Major Problems Encountered during vaccination campaign (n = 20)

Major Problems	Frequency / %
Lack of micro effective planning at implementing levels	20 (100%)
Inefficient cold chain system characterised by poor VVM monitoring, poor fridge repairs and maintenance, and lack of an appropriate contingency plan	20 (100%)
Lack of effective advocacy and communication plans.	20 (100%)
Poor organisation (weak supervision, lack of itinerary maps, non-systematic revisit of homes etc)	18 (90%)
Weak surveillance, monitoring, etc.	17 (85%)
Lack of robust bottom-up micro-plans for the campaigns.	16 (80%)
Weak involvement of related sectors.	15 (75%)

Table 4: Proposed Solutions for vaccination improvement

Proposed Solutions	Number / %
1. The security situation should be alleviated for vaccination programs to be improved.	20 (100%)
3. Improving the staff situation in health facilities	20 (100%)
4. Ensure the availability, and functioning of cold chain equipment	20 (100%)
6. Misconceptions and rumors should be dispelled and managed adequately by all stakeholders involved in vaccination and immunisation programmes.	20 (100%)
7. Step up advocacy and enhance information, education and communication for behavioral change with focus on health promotion and disease prevention.	20 (100%)
2. Adequate financing routine EPI activities	18 (90%)
5. Financing the elaboration of RED micro plans to REA at the beginning of each year by vaccinating health units and health areas	16 (80%)

Table 5: Observation of vaccination teams: (n = 36) (5 teams absent)**

Item	Adequate	Inadequate
Has a Bold Marker	31	5
Possesses WHO guidelines and protocols	00	36
Has a vaccine carrier	31	5
Vaccines possess VVMs	31	5
Present NID report to the Chief of Centre's office in time	31	5
Tally immediately after vaccination on official tally sheet	25	11
Vaccine carrier contains enough ice packs containing ice blocks	24	12
Vaccinator explains vividly the meaning and indications of VVM	19	17
Composition of the team	15	21
Has contingency plan to replace melted ice blocks	11	25
Efforts made to get through to the hard-to-reach children	2	34
Has an itinerary map	0	31
Efforts made to revisit the missed homes	0	31

Table 6: Routine Vaccination Coverage – Penta 3 Vaccine for the whole North West Region

Health District	2017		2018	
	Number of Children Vaccinated	Vaccination Coverage (%)	Number of Children Vaccinated	Vaccination Coverage (%)
AKO	2 038	111%	980	71%
BAFUT	1 004	54%	660	46%
BALI	552	51%	541	62%
BAMENDA	10 181	77%	7 570	75%
BATIBO	1 962	69%	796	36%
BENAKUMA	1 755	93%	620	44%
FUNDONG	3 507	70%	2 074	56%
KUMBO EAST	4 581	96%	2 683	72%
KUMBO WEST	2 680	78%	1 917	72%
MBENGWI	1 429	80%	615	47%
NDOP	5 325	63%	3 074	48%
NDU	2 462	81%	1 290	58%
NJIKWA	690	96%	202	38%
NKAMBE	3 623	78%	2 419	70%
NWA	2 263	112%	1 398	91%
OKU	2 034	65%	1 278	54%
SANTA	2 741	85%	1 458	62%
TUBAH	1 621	72%	1 224	75%
WUM	3 583	84%	1 880	59%
REGION	54 031	78%	32 679	62%

In 12 countries, 196 children were paralysed not by the wild virus, but by a strain derived from a live vaccine that had regained its virulence and ability to spread. Fighting these flare-ups will mean difficult decisions in the coming years.

This phenomenon affected Cameroon tremendously, particularly with the poorly managed cold chain system. It was commonplace to find vaccinators carrying Polio vaccines in their bare hands from compound to compound in the process of vaccinating. This kind of practice is very dangerous because it exposes the vaccinated child to **Vaccine Derived Polio (VDP)**. In the case of other vaccines or antigens, if exposed to non-ambient temperature they would either get damaged, or become impotent or simply inactivated. An overview of the results of this study shows that the Bamenda Health District is understaffed, not well equipped, and the vaccinating personnel not well motivated especially in terms of capacity building. Furthermore, the declining performance in vaccination for the past several years in the Region in general and in the Bamenda Health District (BHD) in particular due to limited financial and human resources has been further compounded by the socio-political climate with the accompanying insecurity.

According to WHO norms and standards, vaccine and immunisation quality and safety are primordial. That's why ensuring the safety and quality of vaccines is one of the WHO's highest priorities. The WHO works closely with national authorities to ensure that global standards are developed and made readily available to assess the quality, safety, and immunogenicity of biological products including vaccines. The WHO has played a key role for over 50 years in establishing the WHO Biological Reference Materials necessary to standardise biological materials as well as developing the WHO guidelines and recommendations on the production and control of biological products and technologies. These norms and standards, based on the scientific consensus achieved through international consultations, assist WHO Member States in ensuring the quality and safety of biological medicines and related in vitro biological diagnostic tests worldwide.

Furthermore, biological medicinal products, such as vaccines, blood and blood products, diagnostics, gene therapy, biotechnology products, cytokines and growth factors, and cell and tissue products rely heavily on international standardisation to ensure their quality and their equivalence across manufacturers. The activities of the WHO biological standardisation programme include the development and establishment of written guidelines, protocols and biological reference materials made readily available to all nations for implementation. In this regard, efficient and effective vaccination is achieved only when at least 95% of the target population has been effectively vaccinated and immunised, leading to herd immunity. It is worth noting that:

1. During this study, it was observed that none of the health areas visited had a copy of the WHO guidelines, protocols, and biological reference materials readily available. Activities by the actors on the field were therefore not standardised, but more or less a routine informal activity.
2. With regards to immunisation data, completion of routine childhood immunisation could not be ascertained by a majority of the study participants - 235 (61%), due to a lack of supporting documents.
3. When the non-health personnel were asked if they had had any training on how to administer vaccines, just over half of them (59%) answered in the affirmative. The remaining 41% of them had no training on how to

administer vaccines. Of the 111 who had had the training, 98 (52%) were satisfied with the skills acquired while the rest 48% were not satisfied with the knowledge and skills acquired. Here there is a huge Knowledge gap portraying insufficient capacity building of the actors on the field.

4. During the study the following observations were made:
 - Inefficient cold chain system characterised by poor VVM monitoring, poor fridge repairs and maintenance, and inadequate contingency plans confirmed by the mention of all 20 Key Respondents. In several instances vaccinators were found holding vaccines in their bare palms, moving from door to door carrying out vaccination and many vaccine carriers contained melted ice packs. It is worth noting that an inefficient cold chain system is very dangerous for a vaccination campaign. Should the vaccines not be at the required ambient temperature the vaccine may be destroyed. In the case of Polio, there will be a very high risk of spreading **Vaccine Derived Polio (VDP)**.
 - Only 11 teams out of 36 teams under study (36%) had contingency plans to replace melted ice blocks. This simply confirms the inefficiency of the cold chain system and its repercussions.
 - Furthermore, only 2 teams out of 36 teams under study (6%) made efforts to get through to the hard-to-reach children. In effect, when the hard-to-reach children are not reached for effective vaccination and immunisation this creates room for an imminent upsurge of an epidemic.
 - No team under study made efforts to revisit the missed homes, with reasons attributed to the raging war and insecurity, and no team had an itinerary map handy.

When missed homes are not revisited it renders the campaign inefficient and ineffective, giving room for a possible outbreak of the disease in question since an unknown number of the target population is left unvaccinated.

When one takes a retrospective look at the vaccination coverage rate for 2017 and 2018 for the PENTA 3 Vaccine one discovers that the vaccination coverage rate is on the decline in the BHD in particular and in the North West Region in general. In table 5 below, in 2017, Ten thousand, one hundred and eighty-one (10181) children were vaccinated giving a vaccination coverage of 77% while in 2018, Seven thousand, five hundred and seventy (7570) children were vaccinated giving a coverage rate of 75%.

Meanwhile, a quick glance at the vaccination coverage of the whole North West Region reveals a decline from Fifty-four thousand and thirty-one {(54031) 78%} children vaccinated in 2017 to Thirty-two thousand, six hundred and seventy-nine {(32679) 62%} children vaccinated in 2018. There is a very significant decline of 16%.

CONCLUSION

From the revelations discussed above, one is definitely right to say that there exist quite a number of flaws and inadequacies in the vaccination and immunisation programme in the BHD. The conclusion is that the vaccination programme in the Bamenda Health District (BHD) is substandard and consequently there is a high risk of an upsurge of morbidity

and mortality from Poliomyelitis and other vaccine-preventable diseases.

RECOMMENDATIONS

1. The security situation should be alleviated for vaccination programs to be improved.
2. Improving the staff situation and capacity building in health facilities is vital.
3. A fully functional cold chain system should be ensured and put into place.
4. Misconceptions and rumors should be dispelled and managed adequately by health authorities and all stakeholders involved in vaccination and immunisation programmes.

SUGGESTIONS FOR FURTHER RESEARCH

1. Effective Vaccination and Immunisation Coverage of the Displaced Populations in Cameroon: Serum Immuno-Antigen Level of Various Pathogens.
2. KAP study on Disease Prevention, Control and Health Promotion in B H D.

CONTRIBUTIONS

All authors read and approved the final manuscript.

COMPETING INTERESTS

There are no competing interests. The article is original and has not been submitted nor accepted elsewhere for publication.

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