



Toward Health System Recovery in the Aftermath of Ebola Outbreak in Guinea: New Approaches for Improved Knowledge of Target Populations at the Community Level

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Abstract

Background: Before the COVID-19 pandemic, Guinea has been the epicenter of the huge West Africa Ebola outbreak (2014–2016), that impact heavily the health system. Demographic information is one of the most basic data sources for health systems and services delivery, and yet can be very difficult to obtain with any accuracy. The objectives were to contribute among other to: (i) a determination of the catchment area (health coverage area and responsibility) of the Kirikilan health facility (PCM); (ii) geocoded mapping to find out exactly where these populations per sector of Kirikilan neighborhood lives; (iii) an approach for regular and systematic annual demographic follow up of target populations. **Methods:** The study was a 3-year community-based survey with annual follow up of the population within the quartier of Kirikilan in Dubreka Prefecture in Guinea. It was an exhaustive enumeration of the population, sector by sector of the quartier, then there was no sampling size neither estimation. **Results:** In October 2017 as a baseline of the study, the enumeration showed the total population was 8824 persons, 936 compounds, 1435 households, and the breakdown by sub quartier (sector) has been performed. It's showed the interest of the mapping of the target populations with geo-referenced localization. The annual follow up by demographic enumerus showed a dramatic increase of the size of the population, including strong migration of the evicted population due to urbanization purpose in some districts of Conakry, the capital. **Conclusion:** The study showed the importance of the enumeration and follow up of the target populations, but also of the setting up community data based to improve the district health information system (DHIS 2) in Guinea. The approach has a best practice could be an importunity to improve data sharing, mapping, health quality access, and affordability for a sustainable health toward universal health coverage.

Keywords

community health, target populations, health system, mapping, demographic information, censure, women of childbearing age, children under 5, enumeration of the population

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Introduction

Guinea was the epicenter of the last Ebola viral epidemic in West Africa. It's has been unprecedented in its magnitude as well as the socio-economic impact. As of 17 February 2016, Guinea has notified to WHO 3804 cases including 2536 deaths,¹ and 211 affected health workers. Guinea is still facing the challenge of post-Ebola recovery.²

Over the last decades, one of the challenges facing health systems strengthening was the inability to determine accurately the target populations for service delivery. Target populations are virtually always obtained by estimation or extrapolation, by using population census records and adjusting for population growth rates during the intervening years.

The objectives were to provide: (i) a determination of the catchment area of the health facility (PCM) with the various stakeholders; (ii) geocoded mapping to find out exactly where these populations per sector of Kirikilan neighborhood lives; (iii) an approach for regular and systematic annual demographic follow up of target populations.

Methods

The study was undertaken in the last quarter of 2017 as an operational survey with annual follow up of the population by community health workers within the neighborhood or Quartier of Kirikilan in Dubreka Prefecture.³

The inclusion criteria concerned all household residents in the Kirikilan Quartier at the time of the study. The criteria for non-inclusion included persons from households in the neighborhood who did not agree to participate in this study or who were absent at the time of the survey.

With the support of the National Institute of statistics (INS) on ad'hoc basis, a total of 16 investigators were recruited and trained, and divided into 2 teams of 6 investigators deployed in the field, in addition to a supervisor and a project team lead.

The following year, by November 2018, a team of 10 community workers for the 5 sectors (called Relais Communautaire—RECO) of the Quartier has been trained and involved on regular basis to the demographic follow up of the Kirikilan Quartier.

The community engagement started by the information of the elders, administrative, and religious leaders in the Quartier. Since this study was an operational survey in the framework of the District health management team (DPS) action plan, no written consent form signed neither any incentives were offered for participation on a voluntary basis.

After developing the study protocol, three (3) questionnaires were created in ODK Collect. The questionnaires were downloaded on tablets by the investigators.

Data collection was performed over 10 days. To ensure the viability and reliability of the information collected, quality controls were performed at all stages of the survey by the supervisor and the team lead. The data manager downloaded all the data onto dedicated database on the FOSAD computers.

The required analyses and queries were performed using formats like Excels (Microsoft Office 2016 as of 22 septembre 2015) and Statistical Package for the Social Sciences (SPSS Version 22). We used the chi-square test to compare the male population and women overall in the quartier. Since the study was an exhaustive enumeration of the population by sector of the quartier, there was no sampling size neither estimation.

To map the Kirikilan Quartier, we used the following steps: (i) defined the borders of the Quartier; (ii) delineated and digitized the border of the sectors; (iii) updated the different streets; and (iv) identified and geo-referenced all the basic socio-economic infrastructures of the district (see Map 1).

The geocodes were taken by three (3) GPS Map 76 Garmin by the mapping staff going along the border verified and consolidated by the chiefs of the Sector and Quartier to avoid any controversy.

The mapping of Kirikilan Quartier took place over 4 days using five (5) consultants from the National Institute of Statistics (INS). The software used for analyzing data and creating the thematic maps was softwares for mapping « ArcGIS 10.2™» with valid license, as well as QGIS software 3.12 and Google Earth/Map (free public softwares).

Findings

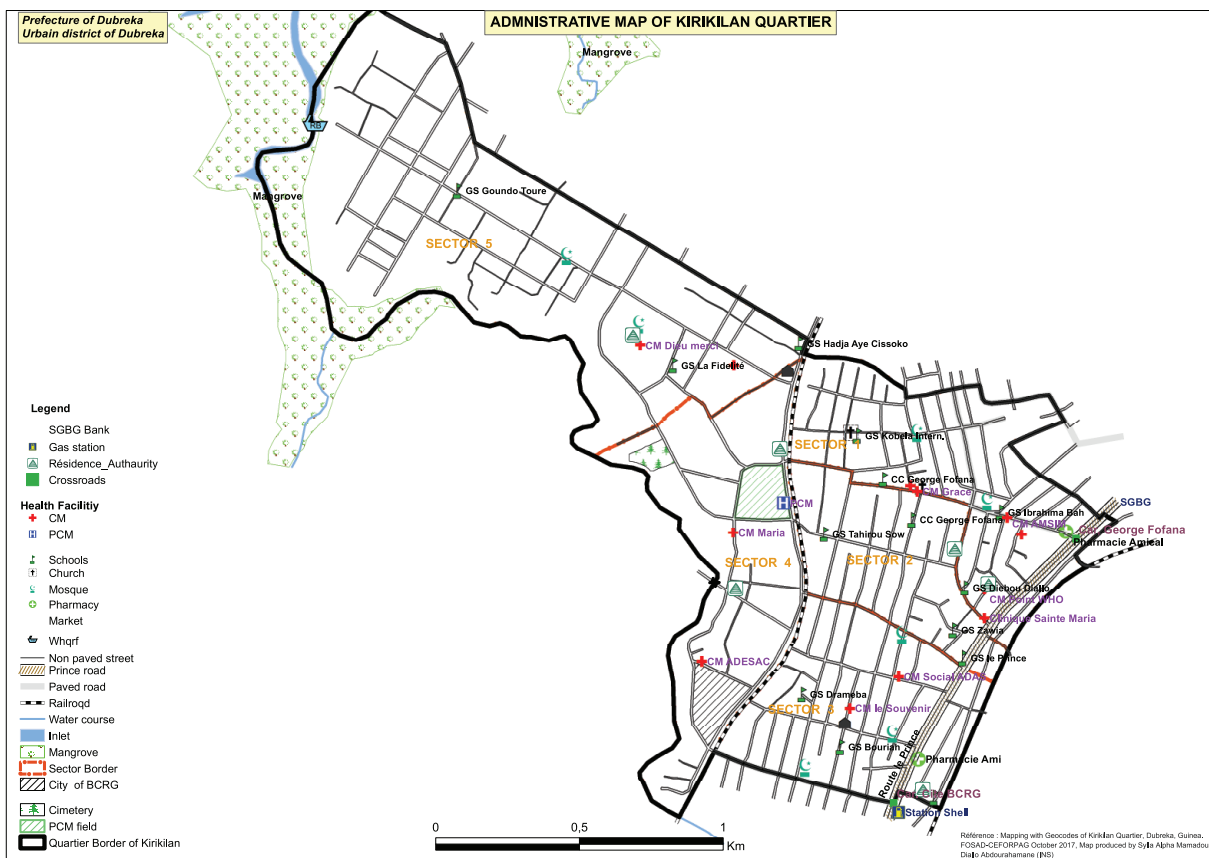
This survey was initiated as part of a project to provide updated and reliable demographic information to inform, and improve, community-based health at the local level.

Demographics of the Study Area

Despite some reticence at the beginning of the study, after additional information was provided, all the identified participants agreed to be included. The enumeration of the total population in the study area of Kirikilan Quartier in October 2017, was 8824 persons. The breakdown by sub quartier (sector) shows that sectors 1 and 3 was the most populated, considering population movements and internal migrations (see Table 1).

Only 87 participants out of 8824 were absent during the survey (1%). The male population was slightly greater than women overall in the quartier, though this difference was not statistically significant ($\text{Chi}^2 P = .061$) (see Table 2).

The age pyramid is typical of a young population, including target populations of women of childbearing age and young children (Figure 1).



Map I. Distribution of the Kirikilan district population by sector.

Table I. Population by Sector, by Compound, and household in the Kirikilan Quartier (October 2017).

	Compound	Household	Inhabitant	% of population
Sector 1	297	424	2264	25.7
Sector 2	170	272	1846	20.9
Sector 3	246	349	2459	27.9
Sector 4	150	195	1654	18.7
Sector 5	73	195	601	6.8
Total	936	1435	8824	100.0

Table 2. Population by Sector and Sex in the Kirikilan District (October 2017).

	Male		Female		Total number
	Number	%	Number	%	
Sector 1	1132	50.0	1132	50.0	2264
Sector 2	948	51.4	898	48.6	1846
Sector 3	1265	51.4	1194	48.6	2459
Sector 4	843	51.0	811	49.0	1654
Sector 5	312	51.9	289	48.1	601
Total	4500	51.0	4324	49.0	8824

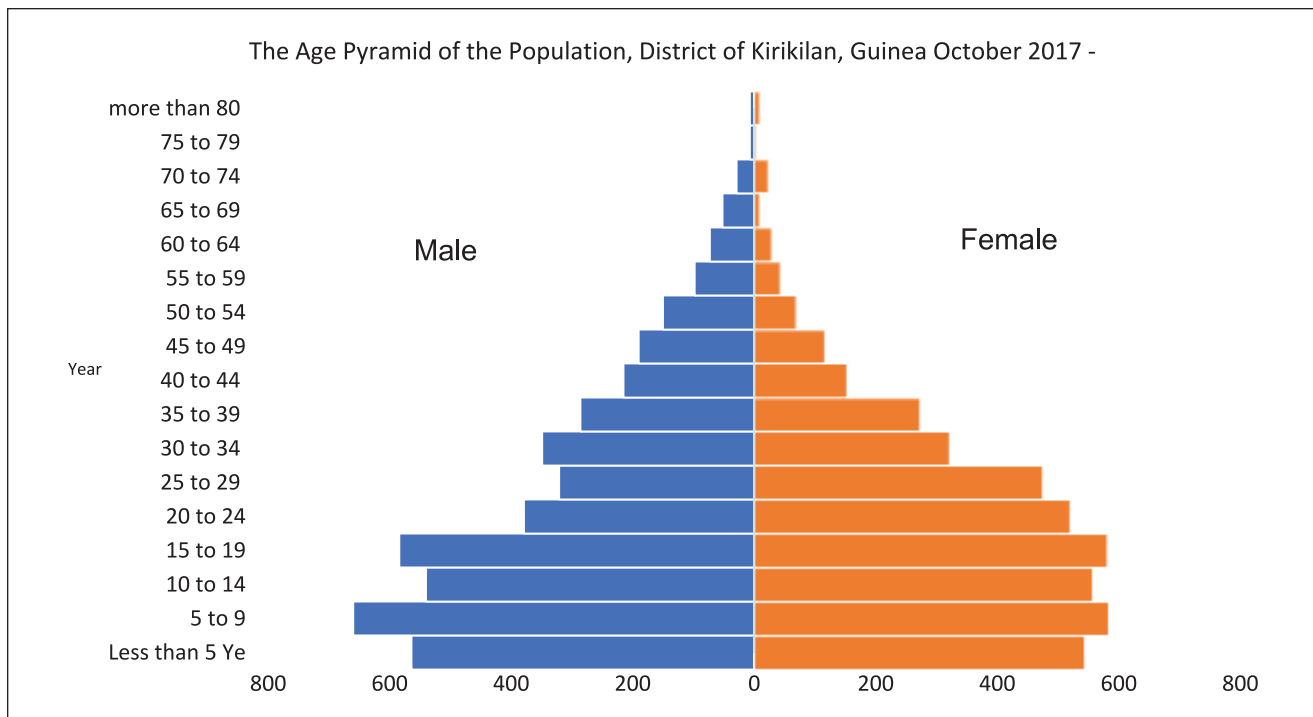


Figure 1. The age pyramid of the population (October 2017).

Children Under 1 Year

Children under 12 months of age were identified into 2 categories (under 6 and 6-11 months), based on operational distinctions for immunization, growth monitoring, and other child development programs planned for the 5 sectors in the Quartier (see Table 3).

In October 2017 enumerus, a total of 145 children under 12 months were identified to be followed across the 5 sectors of Kirikilan Quartier for the immunization program as well as nutrition and growth monitoring. Which number was not so huge for the follow up of the community health workers per year.

Women of Childbearing Age

Women of childbearing age were classified into 2 categories for follow-up operational reasons: (i) 12 to 14 years old to assess and monitor reproductive health activities that are increasingly early; (ii) 15 to 49 years of age represented by women of childbearing age proper (see Table 4).

Out of 8824 inhabitants, 2442 peoples surveyed are really women of childbearing age (87.8%). A total of 2782 women targets for reproductive age (12-49 years) will be followed in the 5 sectors of the Kirikilan Quartier.

Composition of the household: In the Octobre 2017 enumerus, there were a total of 1671 heads of households in the

5 sectors and 1505 wives or co-wives, while the total number of sons or daughters of the head of household were 4044 in the 5 sectors.

Marital status of the head of household. Of the 6032 people surveyed, 2634 were single (43.7%); 3222 were married (53.4%); 126 were widowed, 43 divorced (0.7%), and 7 common-law/cohabiting (0.1%).

Type of employment of the head of the household. Of the 7453 people surveyed, 5287 were independent workers (70.9%), followed by workers giving support to their family 1017 (13.6%).

Religion of the population. The majority of people are: (i) Muslim religion 7758 out of 8824 (87.9%), (ii) Christian religion 1010/8824 (11.4%), other religion 6/8824 (0.1%), no religion 50/8824 (0.6%).

Marital status of the head of household. Of the 6032 people surveyed, 2634 were single (43.7%); 3222 were married (53.4%); 126 were widowed, 43 divorced (0.7%), and 7 common-law/cohabiting (0.1%).

Education level of head of household. Of out the total people surveyed 8 179; 2992 had no level of education (36.6%) while 279 had a preschool level (3.4%); primary level 2291

Table 3. Number of Children (Less Than 1 Year Old) to be Followed in the Kirikilan Quartier (October 2017).

Children under 12 months	Age group	Male		Female		Total number
		Number	%	Number	%	
Sector 1	Less than 6 months	16	51.6	15	48.4	31
	6-11 months	12	75.0	4	25.0	16
	S/Total	28	59.6	19	40.4	47
Sector 2	Less than 6 months	7	46.7	8	53.3	15
	6-11 months	11	68.8	5	31.3	16
	S/Total	18	58.1	13	41.9	31
Sector 3	Less than 6 months	13	52.0	12	48.0	25
	6-11 months	4	50.0	4	50.0	8
	S/Total	17	51.5	16	48.0	33
Sector 4	Less than 6 months	8	53.3	7	46.7	15
	6-11 months	4	57.1	3	42.9	7
	S/Total	12	54.5	10	45.5	22
Sector 5	Less than 6 months	5	83.3	1	16.7	6
	6-11 months	4	66.7	2	33.3	6
	S/Total	9	75.0	3	25.0	12
Total	Less than 6 months	49	53.3	43	46.7	92
	6-11 months	35	66.0	18	34.0	53
	Total	84	57.9	61	42.1	145

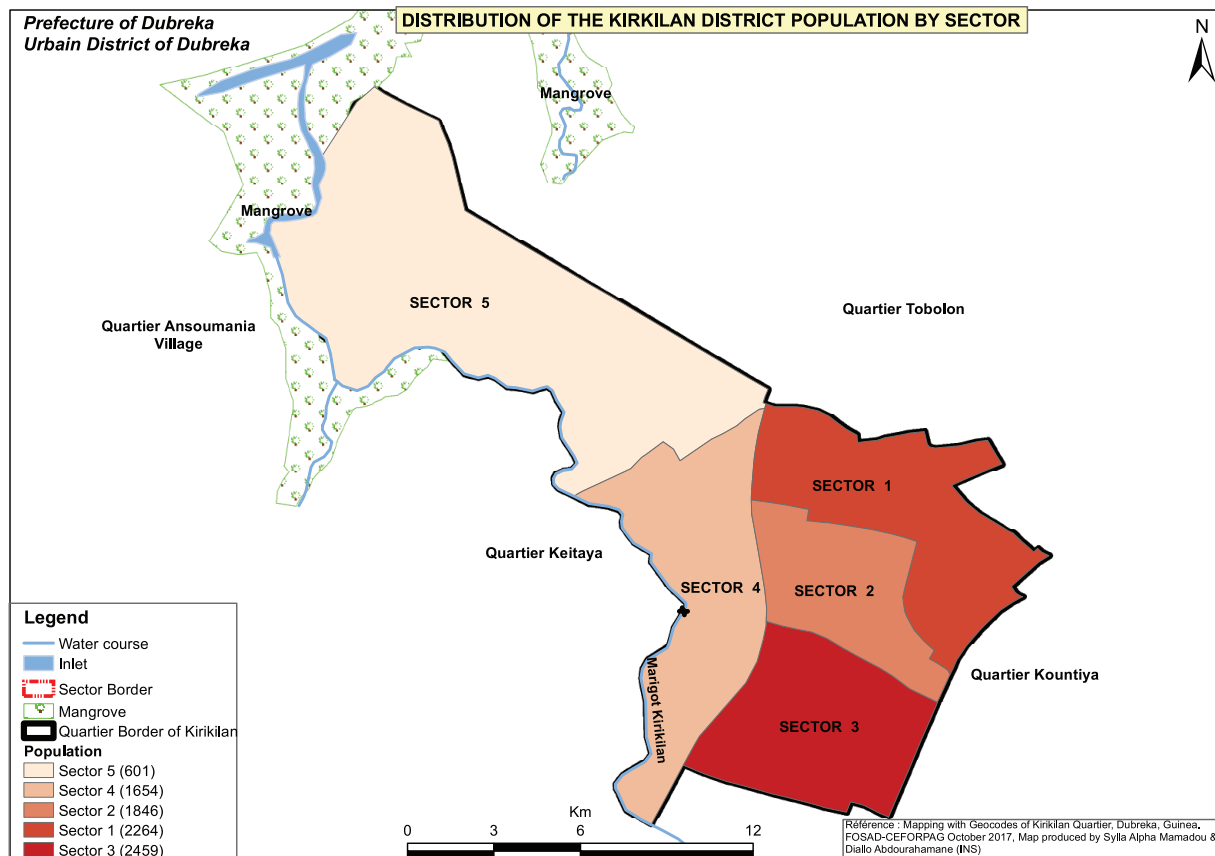
Table 4. Number of Women of Child Bearing Age by Sector to be Followed in the Kirikilan Quartier (October 2017).

Women of child-bearing age	Age group (years)	Number	%
Sector 1	12-14	89	12.5
	15-49	623	87.5
	S/Total	712	100.0
Sector 2	12-14	61	10.6
	15-49	516	89.4
	S/Total	577	100.0
Sector 3	12-14	111	14.2
	15-49	669	85.8
	S/Total	780	100.0
Sector 4	12-14	60	11.8
	15-49	448	88.2
	S/Total	508	100.0
Sector 5	12-14	19	9.3
	15-49	186	90.7
	S/Total	205	100.0
Total	12-14	340	12.2
	15-49	2442	87.8
	Total	2782	100.0

(28%). Among the reasons for not attending the school, there are 1343 out of 2893 (46.4%) for absence of a school or distance from a school. Of the 6032 respondents, 2149 could not read or write any language including French, English, or Arabic (35.6%); 211 could read and write in a national language only (3.5%).

Mapping and Geo-Referencing

Follow up demographic enunerus (2017-2019). The follow up study started on October 2017 as a baseline, it's was plan to carry out on semestry based follow up, but for a financial limitation, the process was made annually (see Map 2).



Map 2. Administrative map of Kirikilan quartier.

After the support of the Guinea national institute of statistics (INS), the 10 social mobilizers (RECO) were fidelized to implement the MOH community health strategy.

For the 2 first years (2017 and 2018) the entire population including the target groups were considered. At the third year, only the target populations were considered. The reason was to show at the local leaders that the aim was not an official censure but an enumerus of target population.

The demographic enumerus has shown that beyond a natural population growth, there has been a strong migration of the evicted population due to urbanization purpose in some urban districts of Conakry, the capital. These populations had no choice rather than going to the updown, suburbs of Conakry or neighboring prefectures such as Dubreka and Coyah where rents are more affordable. A strong increase of all target group of population were noticed including women of child bearing, pregnancy women and under 5 children (see Table 5).

Discussion

The challenge after the unprecedented Ebola huge outbreak in Guinea is, how to revitalize the weak health system in a

sub urban area with a poor population, by insuring better access, in particular affordability to health services in term of equity.

The study showed the possibility to assess population health needs as a situation analysis basis, by using new technologies, good involvement of local authorities, in particular the way to implement MOH community health policy at local level.

Enumeration of the Population and Census

The census counts and the population estimates play key and complementary roles as official sources of informations on population.⁴⁻⁶ In this approach, there was no intention to challenge official censure data and the process has been designed with the fully awareness and involvement of the local leaders.

Interest to Follow Up the Target Populations

Data information system with collection from good tools is an opportunity to generate strong data for information and decision-making at community level. The mapping with

Table 5. Demographic Follow Up by Enumerous of the Kirikilan Quartier (2017-2019).

Quartier/ Neighborhood	Population*		Woman of child bearing			Pregnancy woman			Under 5 children		
	October 2017	November 2018	October 2017	November 2018	December 2019	October 2017	November 2018	December 2019	October 2017	November 2018	December 2019
Secteur 1	2264	267	623	869	1460	16	21	55	282	494	670
Secteur 2	1846	2224	516	586	1007	20	16	48	246	311	378
Secteur 3	2459	2850	669	1052	1678	0	20	28	328	504	829
Secteur 4	1654	1190	448	487	899	11	18	27	195	217	313
Secteur 5	601	1214	186	617	813	1	26	22	61	504	377
Total	8824	9645	2442	3611	5857	48	101	180	1112	2030	2567

*There was no enumerous for the entire population, just to show at the local leaders that the aim was not an official censure but an enumerous of target population.

professional software (ArcGIS) and more popular and freer one (QGIS, Google Earth, and Map) are a strong toll to locate and see clearly and exactly where the target populations are. It's will be the way to develop an efficiency collaboration with social mobilizer workers in evidence based and concrete delegation of task.

Our study showed the Interest of the mapping with geo-referenced localization. For the first time in Guinea, we can be able to have the shape files below of the sub district level «Sous Prefecture». Now we have shipe files by Quartier of the District as well as by Sector for the Kirikilan Quartier. Even if it's for only 1 Quartier, we think it's will be easy and affordable to scale up the process of mapping to the Prefecture hopefully to the entire country.

How to Move Toward Universal Health Coverage (UHC)

Some authors think that efficeince of the implementation of Bamako Initiative was more privileged and the equity considerations has been neglected.⁷ In Guinea perspective, we are strongly convinced that the Bamako Initiative was a very good sustainable intervention to implement the primary health program with the community engagement. Recently, the health system and various programs has been well funded with enormous amount of million of USD annually while the basic health indicators are so low, like EPI vaccine coverage, around 25%.⁸

Bijleveld et al⁹ Showed the country perspectives on integrated approaches to maternal and child health: beyond the need for alignment and coordination, the country perspective should include new and pragmatic way to improve the beneficiary's health and well being, considering emergency infectious diseases context.

How to Ensure Equity for Marginalized Populations, Difficult to Access, and Poor

Guinea has started using successfully a comprehensive District Health Information Software (DHIS 2).¹⁰ Inequalities

in health persist worldwide and one of the starting points for remedial action is collecting data that reveal patterns of inequality. Current discussions about the best ways of monitoring health inequalities emphasize disaggregating data by variables such as socioeconomic status, geographical area, or sex.

Limitation of the Study

Household health surveys have certaines limitations. In many low- and middle-income countries they tend to cover only a narrow set of topics, such as reproductive, maternal, newborn, and child health.

This study is at early stage. There are some limitations in particular the limited data from the pilot stage to scaling up process.

Conclusion

The study carried out a model of determination of the targeted population to be served, focusing on the mothers and children as well as on the socio-economic determinants of health. It showed the importance of the enumeration and follow up of the population on the field. It also enabled the administrative and health authorities in the difficult-to-access area to understand, on a demographic factual basis and equity, the rapid increase in target populations and the need to increase healthcare provisions accordingly.

The approach contributed to implement the MOH community health policy at community level, by improving data sharing, health quality access, and affordability which will improve the DHIS2 national system.


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