



***RETROSPECTIVE MORTALITY SURVEY IN THE MSF CATCHMENT AREA IN
FIZI HEALTH ZONE, SOUTH KIVU, DEMOCRATIC REPUBLIC OF CONGO***

MAY 2014

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Study design: Retrospective mortality survey

Study period: 3 months

Study site: Randomly selected villages within Fizi Health Zone, South Kivu, DRC

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List of Abbreviations

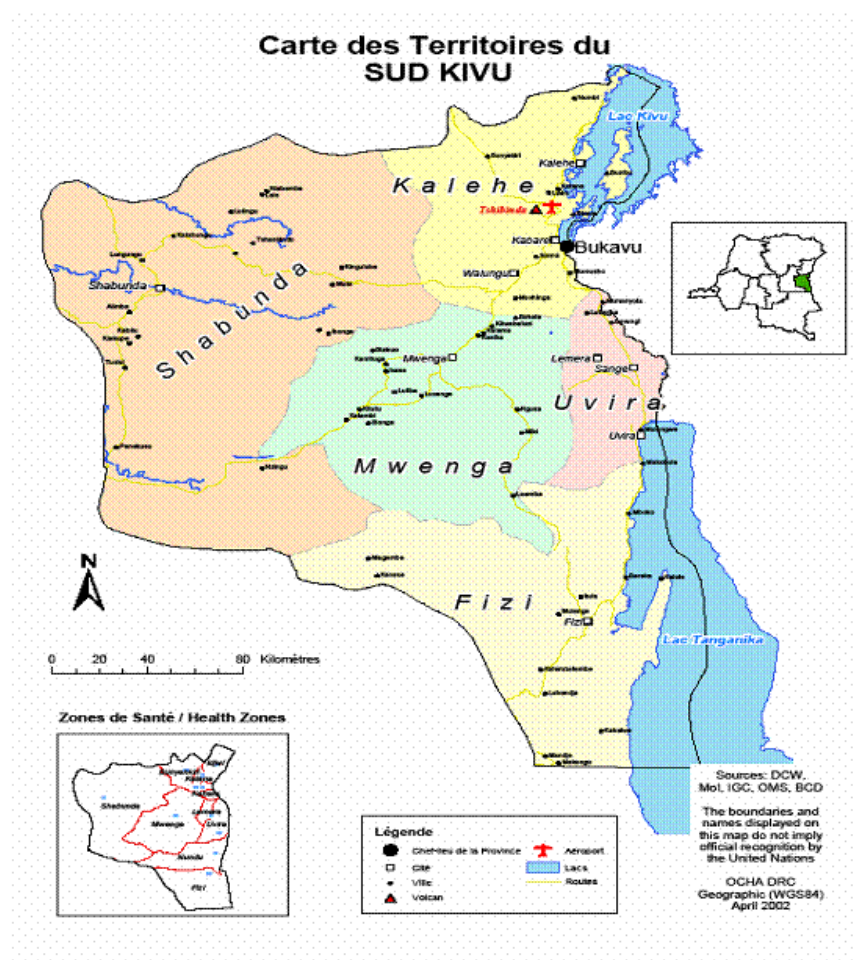
95% CI	95% confidence interval
CHW/Reco	Community Health Workers
CMR	Crude Mortality Rate
CTC	Cholera Treatment Centre
DRC	Democratic Republic of Congo
IDP	Internally displaced person
IMC	International Medical Core
MoH	Ministry of Health
MSF	Médecins sans Frontières
MSF-OCA	Médecins sans Frontières – Operational Centre Amsterdam
NFI	Non-food item
NGO	Non-Governmental Organisation
U5MR	Under 5 mortality rate (mortality rate in children under 5 years of age)
WHO	World Health Organization
Person days	Per person per day (/population x days in recall period)

Introduction

1 Context

Since its independence in 1960, the Democratic Republic of the Congo (DRC) has continued to face a series of internal political and armed struggles. According to the World Health Organisation (WHO) life expectancy at birth is 49 years, and the under-five mortality rate (U5MR) is 168 deaths per 1000 live births. Between 2000 and 2010, the main causes of death in children under five years were malaria (21%), acute lower respiratory infections (18%), and diarrhoeal disease (13% of deaths) (World Health Organisation¹).

Figure 1: Map of South Kivu province showing the location of Fizi Administrative Zone. Fizi Health zone is considerably smaller, consisting of the most Eastern parts of the administrative zone. Source: Foundation D. Mugangu, Pour un Futur Sustainable dans un Congo Démocratique (FONDAMU)



The territory of Fizi has been a hotbed of violence for many decades and the region remains unstable. The protracted nature of the conflict is fed by the presence of many armed groups in the territory:

FARDC, MONUSCO, FRF, MM Yakatumba, FNL, and FDLR (the last three often working in coalition with each other). On March 28th 2013, the Security Council adopted resolution 2098 to create an “intervention brigade”. At the time of writing the ‘intervention brigade’ has begun operations in North Kivu, but how this will affect the context in South Kivu is uncertain. Though sustained displacement is uncommon in South Kivu, there are frequent temporary displacements in response to clashes between FARDC and rebel groups as well as ethnic clashes. Displacement is mainly seen around Sebele and in the Moyen Plateau north of Fizi.

Due to the lack of integrated surveillance in South Kivu, a clear picture of the main morbidities and causes for mortality are unclear. However, data suggests that the highest levels of morbidity and mortality are from malaria, malnutrition and diarrhoeal diseases. Vaccination coverage rates are low, and outbreaks from vaccine preventable diseases, particularly measles, are common. Cholera is known to be endemic, with cases reported on an annual basis from across the health zone.

Over the years, a number of retrospective mortality surveys have been carried in South Kivu (though not specifically in Fizi health zone). Unfortunately, only a handful of these surveys and their results are available in the public domain and they were conducted at very different times during the conflict in eastern DRC. In 2004, the International Rescue Committee (IRC), conducted nationwide retrospective mortality surveys in DRC and determined that the CMR was 2.1 deaths/10,000/day, with mortality rates being higher in eastern provinces than elsewhere². In May 2009, Action Contre la Faim (ACF) conducted a nutritional and mortality survey in children under five years in the health zone of Kalonge (Sout Kivu, north of Fizi) and determined that the CMR and U5MR were under emergency thresholds at 0.44 and 1.26 deaths per 10,000 persons per day respectively³.

1.1 MSF-OCA in South Kivu, DRC

MSF has been present in Baraka since 2003, and has been providing free integrated health care to the general population in collaboration with the Bureau Centrale de Zone de Sante (BCZS) de Fizi since 2005 (see Figure 1). At present, the project in South Kivu provides a large number of services: primary healthcare, secondary healthcare, reproductive healthcare, care for malnutrition, integrated sexual and gender based violence (SGBV) care, cholera, HIV, TB and MDR-TB services. These are delivered by the presence of MSF-OCA in Baraka Hospital, Baraka Health Center (HC), Baraka Cholera Treatment Center (CTC), Katanga Health Center, Sebele Health Center and Sebele Cholera Treatment Center. MSF-OCA is the only health actor working in the health zone that provides free medical care.

Figure 2: Number of admissions, total and top three morbidities for all ages, Baraka Project, South Kivu, 2013-14.

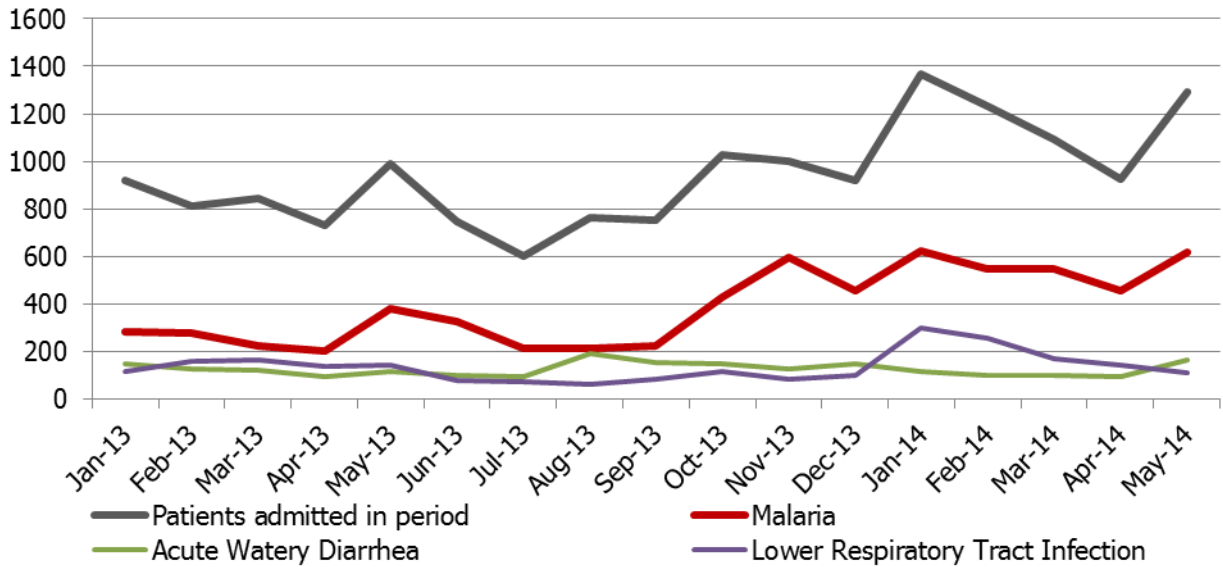
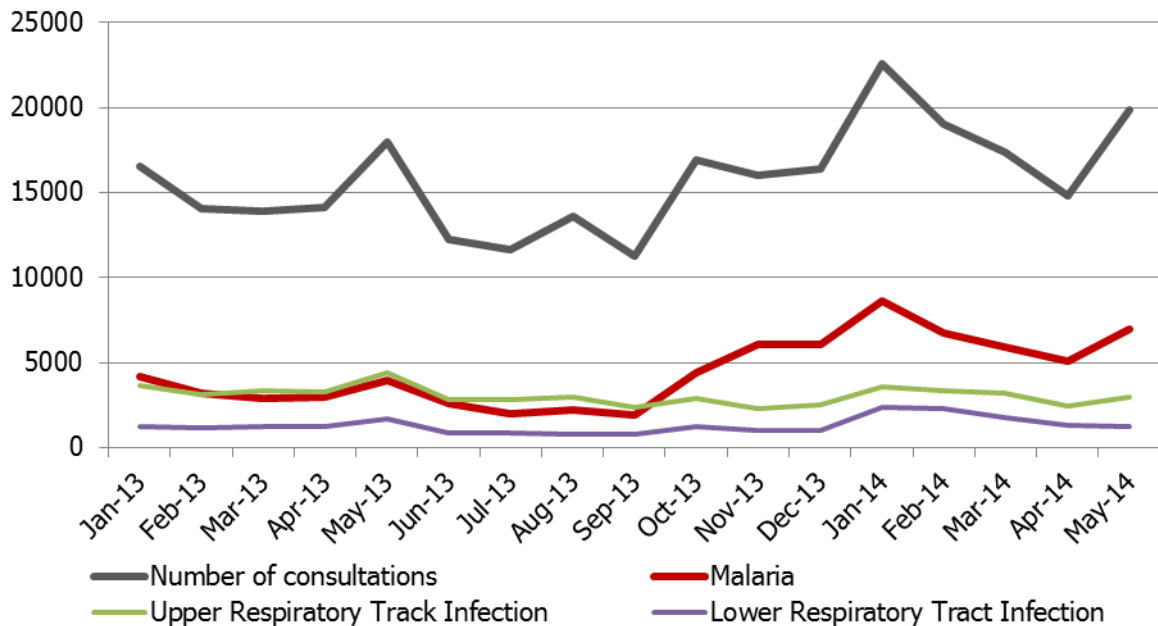


Figure 3: Number of consultations for total OPD and top three for all ages, Baraka Project, South Kivu, 2013-14.



In 2013, the Baraka project saw 72,659 and 101,959 consultations in the outpatient department (OPD) in children under 5 years and persons over 5 years of age respectively. Inpatient department (IPD) admissions were 7,246 and 2,872 in those same respective age groups during the year. The most important morbidities in the OPD consultations are shown Figure 2 and Figure 3 with confirmed malaria, acute watery diarrhea, acute upper respiratory infection and parasitic infections common between the two age groups.

2 Background and Justification

The Baraka project has taken on a 'stable' format in recent years, considering the almost 10 year presence in the health zone. We presently lack an in depth understanding what the existing health needs of the population of the health zone are, particularly in those communities that do not have easy access to the hospital in Baraka or MSF supported health centers. Conducting a retrospective mortality survey throughout the health zone is to be the first step to gain a deeper understanding and evidence of the ongoing health problems that affect morbidity and mortality in the wider community. This information will feed into the strategic and operational thinking for future medical activities of OCA in this part of DRC. Additionally, the planned expansion of the Community Health Worker (CHW) project will provide additional insight into the above mentioned issues. Using both sources of information it is intended to adapt and re-focus MSF-OCA's medical activities, where needed to continue to be relevant and of added value in this part of DRC.

3 Objectives

3.1 Primary Objectives

To estimate the crude mortality rate for the total population (host and IDP) and for children under five years of age in the health zone of Fizi, South Kivu, DRC, in order to understand the current health status of the population in this catchment area.

3.2 Secondary Objectives

- To determine the prevalence of self-reported morbidities in the two weeks preceding the survey in household members;
- To determine the frequency and reasons for displacement;
- To assess access to health care;
- To determine the main causes of deaths during the recall period;
- To measure the incidence and types of direct violence experienced by the civilian population;
- To evaluate household ownership of basic non-food items;

Study Design

Retrospective mortality survey using a two-stage cluster sampling methodology as an adaptation of the standardized method recommended by the World Health Organization (WHO) .

4 Sampling Frame

4.1 Study Area and Period

The study was conducted in the catchment area of the health zone of Fizi in South Kivu. Population estimates for 2013 from the Ministry of Health indicate that the cumulative population of this health zone is of estimates per village of the zone place the total population at 311,295 persons.

4.2 Study Population

The study population includes all people living in the villages which are situated in Fizi health zone. This catchment area is where MSF-OCA monitors the humanitarian and the epidemiological situation.

4.3 Inclusion and Exclusion Criteria

A person was included in the study if s/he satisfied all of the following criteria:

- Living in the randomly selected household

and

- Informed consent was been given by the head of the household

A person was excluded from the study if s/he satisfies one of the following criteria:

- Refusal to participate in the study

or

- Inability to locate the potential participant after attempts to trace him/her

or

- No parent or guardian above the age of 18 available to respond for household

A copy of the informed consent form was given to the heads of household if desired and another copy was held by the study team.

4.4 Definitions

4.4.1 Household

A household was defined as a group of people who were under the responsibility of one person or head of household, regularly sleeping under the same roof and eating together. The whole household was included, no matter the age of the household member or the relation with the other members.

4.4.2 Head of household

The head of household was defined as follows: Adult household member (18 years or more), who could give accurate information on all demographic and mortality issues in his/her household (could describe with reasonable accuracy the events that occurred during the recall period), and had lived in the household the entire recall period, and present at the time of the survey.

A household was excluded from the study if none of the household members fulfil all criteria of the above mentioned definition.

4.4.3 Permanent member of the household

A permanent member of the household was defined as a person who was part of the household according to the household definition and was present at the moment of the study or slept in the house the previous evening.

4.4.4 Other Definitions

For the purpose of this survey the following definitions were adhered to:

- Displaced person: a person that was not living in their place of permanent residence against their own wishes.
- Returned person: a person who lived in their place of permanent residence, but who was previously living as a displaced person elsewhere during the period of interest.
- Permanent person: a person living in his place of permanent residence.
- Disappeared person: a person who is no longer present in the household (whether displaced or permanent) for who the destination or status (alive/dead) is unknown.
- Absent person: a person who is not present in the household (whether displaced or permanent) but who is known to be alive.

4.5 Recall Period for Mortality

For this survey the start of the main recall period was Christmas of 2013. A secondary recall date was linked to questions of occurrence of disease in the members of the household. This recall period was 14 days (two weeks) prior to the date of the survey visit. Together with the field team an events calendar was generated for the chosen recall period in order to determine most accurately the dates of the occurred deaths.

4.6 Sample Size and Sampling methods

4.6.1 Sample Size

The sample size was calculated using ENA for SMART software (<http://www.nutrisurvey.de/ena/ena.html>). The criteria listed in Table 1: Criteria for the calculation of the sample size, Fizi health zone, South Kivu, DRC, 2014 were taken into consideration for the calculation of the sample size.

A total of 6190 persons were required to be sampled. With an average household size of 5.5 persons, we aimed to visit 50 clusters of 25 households for a total of 1250 households. As this part of DRC is very heterogeneous, we chose to increase the design effect of the sample size calculation to 4 to account for this factor.

Table 1: Criteria for the calculation of the sample size, Fizi health zone, South Kivu, DRC, 2014

Criteria	
<i>Expected mortality of 10 000/day</i>	0.9
<i>Precision of 10 000/day</i>	0.4
<i>Design effect</i>	4
<i>Recall period in days</i>	130
<i>Non-response rate</i>	10%
<i>Nr. population to be sampled</i>	6190
<i>Average household size</i>	5.5
<i>Number of households to be surveyed (assuming average household size of five persons)</i>	1250
<i>Number of clusters</i>	50
<i>Number of households per cluster</i>	25

4.6.2 Sampling

A two-stage cluster sampling methodology was chosen as an adaptation of the standardized method recommended by the WHO.

The survey will address Fizi health zone. This survey attempted to obtain a representative sample of 50 clusters in the health zone. Therefore cluster allocation was done by systematic sampling with probability of allocation proportional to the respective population size of each village (probability proportional to size). Table 2 shows the 50 villages in Fizi health zone that were randomly selected as clusters for this survey.

In the second stage, the standard WHO/EPI methodology was used to select the allocated households within a cluster: Accordingly, a pen was thrown on the ground in the central point of the cluster (as indicated by the village chef), and a line will be drawn in its direction towards the edge of the cluster. Households along this line were counted, and one of these was selected using a random number table as the first to be interviewed in the cluster.

The next household following in order of physical proximity will then be interviewed until the desired cluster of all allocated households will be completed.

Physical proximity was defined as the household whose front door is closest to the front door of the household that was just interviewed.

Table 2: Villages, population estimates and cluster allocation for Fizi health zone retrospective mortality survey.

Aire de Santé (Préciser le Nom)	VILLAGE (Préciser le Nom)	Population Actualisé	Cumulative population	Cluster
AS1: Baraka	MWEMEZI II	3561	7029	1
AS1: Baraka	MWEMEZI III	2905	9935	2
AS1: Baraka	AEBAZ II	4050	17612	3
AS1: Baraka	MATATA	5973	25183	4
AS1: Baraka	KIBONJWA	5685	32424	5
AS2: Bibogobogo	BIKIRIKIRI I	868	34884	6
AS3: Buma	BUMA KIREWA	2227	41892	7
AS3: Buma	KILUMU	309	46535	8
AS3: Buma	BUYENZI	361	52619	9
AS4: Bwala	KADEGU	1124	59308	10
AS5: DINE	KALONGWE	1521	60829	11
AS6: FIZI	CENTRE COMMERCIAL	1628	71595	12
AS6: FIZI	AV KALEMBELEMBE	1120	77261	13
AS6: FIZI	AV SOUS HOPITAL II	1028	83231	14
AS6: FIZI	AV KITONGO	1394	89939	15
AS7: Kafulo	ALENGA	711	95660	16
AS8: Kalunja	KALUNJA I	1340	102628	17
AS9: Kananda	KANADA II	1267	107648	18
AS10: Kandali	KIKWENA	2114	114127	19
AS11: Katanga	KATANGA III	1492	120734	20
AS11: Katanga	KATANGA VII	1350	127168	21
AS12: Katenga	MSOMBOZI	776	131901	22
AS13: Kazimia	NGUMA	734	138488	23
AS13: Kazimia	TANGANYIKA	1210	145170	24
AS13: Kazimia	MWELENDI	323	150327	25
AS15: Kikonde	LEKESHA	291	156543	26
AS16: Kilicha (Milimba I)	KALUNDU I	2005	164173	27
AS16: Kilicha (Milimba I)	KABILABILA	1363	169315	28
AS17: Lumanya	ITENDELO	611	174618	29
AS18: Malinde	MULONGWE	1959	181961	30
AS19: Mshimbakye	MWANDGA I	2084	188618	31
AS19: Mshimbakye	MWANDIGA III	2565	194187	32
AS19: Mshimbakye	MWATEMBO	1203	199417	33
AS20: Mukera	MUKERA II	6126	210790	34
AS21: Mwangaza	MAJENGO II	5877	217005	35
AS21: Mwangaza	KALINGA SUD	4433	221438	36
AS21: Mwangaza	KIBONJWA	3713	225151	37
AS21: Mwangaza	KALINGA NORD	4465	233231	38
AS21: Mwangaza	MALALA II	2730	235961	39
AS22: Mwayenga	MWAYENGA	2472	243929	40
AS22: Mwayenga	BWENGE	618	248453	41
AS23: Nemba	NEMBA II	832	254347	42
AS24: Rubana	CHANGWENA	990	261185	43
AS25: Sebele	SEBELE	6241	269707	44
AS25: Sebele	BUZIMBA	1451	273028	45
AS26: Simbi	SIMBI CENTRE	2980	281698	46
AS27: Some	KARUNGA	464	285157	47
AS29: Umoja	KALIMWEMA	247	291185	48
AS29: Umoja	KIKUNDA I	949	297156	49
AS30: Yungu	KISANU	764	303910	50

If all households of a selected cluster were included in the study before completing the required number of households, the cluster was continued by selecting the (geographically) closest village. The standard WHO/EPI methodology was again used in the closest village to select the first household in the village.

If for unforeseen reasons a selected cluster could not be visited, it was replaced by selecting the (geographically) closest village. This occurred once, where a village was deserted because of a suspected case of sorcery. The village of Eden was chosen to replace Buyenzi.

4.7 Data Collection

Selected clusters according to the sampling (see chapter Table 2) were informed before the survey teams visited through an official letter to the head of the village.

The heads of the villages were also visited the day of the survey and the purpose of the study was explained and an information sheet in Kiswahili was given before conducting interviews in their villages. Furthermore it was clearly explained to the heads of the villages, that they were allowed to decline the participation of their village without any consequences or penalty. In this case it was replaced by selecting the (geographically) closest village.

In the randomly households, the purpose of the survey was explained to the head of the household in a language he or she was familiar with and written consent obtained to conduct the interviews.

The household interviews used the questionnaires found in the annex.

The questionnaire was translated into French and Swahili, verified by numerous people in Swahili and then back-translated from Swahili into French and again verified to ensure consistency of the questions. In Fizi health zone there are also many people who speak Kinyarwanda and Kibembe. The survey ensured that all teams were familiar with the questions in other languages in order to ensure the most appropriate form of questioning per household.

The questionnaire was pilot tested with a convenience sample of households in easy access from the MSF-OCA office in Baraka in neighbourhoods that were not targeted for the survey to ensure consistency of language and flow of the questionnaire. No changes were made to the survey questionnaire after this time.

4.8 Implementation of the study in the field

Eight teams of two interviewers were used to collect the data, comprised of seven (7) women and nine (9) men. Generally one cluster was surveyed by two teams of interviewers. Teams were rotated regularly. Four supervisors, two expatriates and two nationals, were employed throughout the survey. teams of two interviewers. We had a total of seven teams. Half of the team members were female.

Two days training was given to all interviewers to familiarise them with presenting MSF and its principles, the background of the study, the questionnaires, the information sheet and the informed consent form. The training was given in French and Kiswahili by the principal investigator and the national staff supervisor. It consisted of an intensive review of the questionnaires and the information sheet including role-plays. As the interviews were held in Kiswahili or the local language of the village, the principal investigator reviewed all key terms during the training such that all interviewers understood what they referred to and how to translate them into other languages if required. This process standardised the

wording of questions posed to each households for the interviews. The vast majority of interviews were conducted in Kiswahili.

The 3-days training were finished with a fourth day of pilot study in a place, which was outside of the study area. The pilot study allowed for the testing and possible final adaptation of the questionnaires, informed consent, and evaluation of the interviewer understanding to field conditions.

4.9 Data Entry and Analysis

Data was entered into EpiData by the field epidemiologist supervising the survey. Data analysis was done using ENA for SMART, EpiData, Excel and STATA 12 (StataCorp, College Station, TX, USA) where necessary.

5 Ethical Issues

The survey was conducted in accordance with the World Health Assembly of 1975 concerning ethical aspects in human tests, and with the Helsinki declaration. The study was approved by the MSF Ethics Review Board on 28 May 2014 and the Ministry of Health of DRC provided approval on the 7th of April, 2014 for the conducting of the survey.

Written consent was requested from all heads of household before initiating the questionnaire. A written consent form can be found in Annex 1. All households were allowed to refuse participation in the survey without any negative consequences to them.

All data collected remained anonymous from the moment of collection up to data entry.

A summary of the survey outcomes will be produced at the project level and shared with relevant stakeholders as well as village heads to ensure the information collected from the survey is fed back to the community from which it came.

Study Findings

6 Study Description

The survey was conducted in May 2014 and included 1255 households from 50 clusters around Fizi Health Zone with 7301 people.

Four households were excluded from the analysis. This includes two who refused to participate, one because the member of the household present did not want to sign without their husband's permission, and the other because the interviewee, an elderly woman, was tired. Two additional were excluded because a signature was not obtained for the informed consent. The last two are a direct result of general distrust of the required signature. Respondents often had no problem with answering questions but did not want to sign before starting, instead agreeing to answer questions and sign afterwards. The two exclusions due to lack of signature were the result of interviewers forgetting to get the individuals' signatures after interviewing.

7 Study Demographics

7.1 Results

Females represented 51.6% (95% CI 50.24-52.88% DEFF 1.21) of the study population. In the 15-29 year age groups, females outnumber males almost considerably (see Figure 4). This may be a result of the mobility of this group moving elsewhere for school and work (including military service, fishing, or commerce). The mean age for the sample population was 17.65 (95% CI 17.17-18.14, DEFF 1.40) with a median age of 11 years.

The average household size throughout the recall period was 5.84 (95% CI 5.57-6.11 DEFF 3.38). This number includes all persons in the study sample, including deaths. Excluding deaths the average household size is 5.61. Both estimates are close to the expected size of households of 5.5 persons used in the sample size calculations. The household size is also in line with general estimates and the previous Fizi vaccination coverage survey, which found 5.86 people per household⁴. Households contained, on average, 1.44 children under the age of five representing 24.61% of total sample (95% CI 23.52-25.71%, DEFF 1.16) (Table 3).

Figure 4: Age and sex breakdown of the living survey population

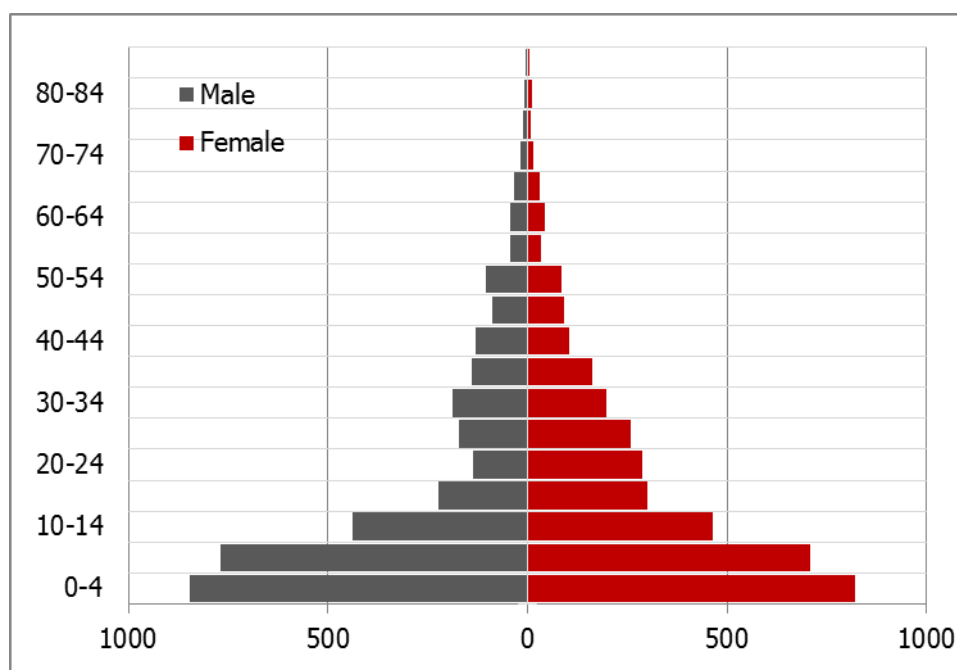


Table 3: Proportion of individuals according to age group

Age group	Number in group	Percent	Lower CI	Upper CI
<i>Under 5</i>	1,797	24.61%	23.52%	25.71%
<i>5 to 14 years</i>	2,439	33.41%	31.94%	34.87%
<i>15 to 30 years</i>	1,401	19.19%	18.03%	20.35%
<i>50 to 50 years</i>	1,128	15.45%	14.73%	16.17%
<i>Over 50 years</i>	536	7.34%	6.55%	8.13%

While literacy was not directly assessed, 60.96% (95% CI 56.18-65.74% DEFF 2.98) of respondents signed their consent form with a signature, the remainder signed with a fingerprint.

7.2 Discussion

Demographically the survey population is constructed as expected for Fizi Health Zone. Of note are the slightly skewed balance between females and males in the young adult age groups and the high proportion of children under five years of age per households (close to 25% compared to the usual estimate of 19%)⁵. The results are similar to the demographics identified in previous MSF studies in the region^{4,6}.

8 Status

8.1 Results

The vast majority of households, 95.78% (95% CI 94.36-97.19% DEFF 1.53) totaling 1,202 households, classified themselves as permanent. Only 35 households classified themselves as displaced or returned. Another 18 households, 1.43%, classified themselves as being some form of temporary resident of the area, generally for work related purposes such as military service, selling goods, or fishing. Following household status, the breakdown of status by individual also shows the majority of the population is permanent (Table 5).

Table 4: Status of households in the survey.

Household Status	Number of HH	Percent	Lower CI	Upper CI
<i>Displaced</i>	31	2.47%	1.45%	3.49%
<i>Returned</i>	4	0.32%	0.01%	0.63%
<i>Permanent</i>	1,202	95.78%	94.36%	97.19%
<i>Temporary</i>	18	1.43%	0.72%	2.15%

Table 5: Status of individuals in the survey.

Status	Number of individuals	Percent	Lower CI	Upper CI
<i>Displaced</i>	190	2.71%	1.44%	3.97%
<i>Returned</i>	32	0.46%	0.05%	0.86%
<i>Permanent</i>	6,678	95.13%	93.51%	96.74%
<i>Absent</i>	77	1.10%	0.67%	1.52%
<i>Temporary</i>	43	0.61%	0.15%	1.08%

Displaced households came largely from the neighboring Kimbi Health Zone (Table 6). A number also came from Ubwari, the peninsula part of Fizi Health Zone, also referred to as the "Presque île". The principle reason for displacement was insecurity, with 22 instances (70.97%). Direct attack, being asked to leave, and landslides were also represented, though in lower numbers (Table 7: Reasons for displacement.).

Table 6: Region of residence for displaced households .

Region	Number from Region	Percentage of total
<i>Ubwari</i>	8	25.81%
<i>Haute Plateau</i>	2	6.45%
<i>Kimbi</i>	13	41.94%

<i>Sebele</i>	2	6.45%
<i>Other</i>	2	6.45%
<i>Itombwe</i>	1	3.23%
<i>Mboko</i>	3	9.68%

Table 7: Reasons for displacement.

Reason for Displacement	Number displaced	Percent	Lower CI	Upper CI
<i>Attack</i>	4	12.90%	0.07%	25.74%
<i>Insecurity</i>	22	70.97%	51.57%	90.37%
<i>Asked to leave</i>	3	9.68%	-1.87%	21.22%
<i>Landslide</i>	2	6.45%	-6.93%	19.83%

8.2 Discussion

The vast majority of the survey population in Fizi Health Zone is permanent. This is consistent with the relatively stable security context where disturbances have largely been limited to isolated areas, not affecting the population in general. The reported displaced households are largely linked to insecurity in other Health Zones, those of Kimbi, Mboko, or Itombwe. Kimbi for example, where MSF-OCA also has a project, recently suffered a period of fighting around the town of Misisi. Ubwari also had a comparably high number of displaced peoples.

9 Household NFI Access

9.1 Results

Household ownership of important non-food items (NFI) was tested by collecting information on a number of key items (Table 8). The majority, 61.58% (95% CI 54.65-68.51%) of households surveyed owned a jerry can of 10 litre capacity or more. Only half (53%) of those could close properly.

Households had, on average 1.73 bed sheets in the household. However, 23.26% (17.65-28.86%) of households had no bed sheets. A further 69.91% (95% CI 64.48-75.34%) of households had both a large cooking pot and serving spoon. Agricultural tools, either a hoe or shovel, were present in 64.50% (95% CI 60.67-68.34%) of households.

Table 8: Ownership of NFIs

Jug presence	Number	Percent of households	Lower CI	Upper CI
<i>Jug present</i>	771	61.58%	54.65%	68.51%
<i>Jug that closes</i>	340	46.20%	40.66%	51.73%
<i>Bed sheets owned</i>	848	76.74%	71.14%	82.35%
<i>Large pot and spoon</i>	869	69.91%	64.48%	75.34%
<i>Agricultural Tools</i>	805	64.50%	60.67%	68.34%

* NB: the denominator for the above calculations was the total number of households in which the presence/absence of these items was visually verified.

Half of all households, where verification was possible, had at least one mosquito net (of good quality, which was defined as net that was in use with no visible holes) in use. Universal mosquito net coverage, as defined by one mosquito net for every two people in the household, stands at 3.67% with only 46 household meeting this standard (Table 9). Ownership of mosquito nets varied greatly between the axes surveyed (Table 10).

Table 9: Presence of mosquito nets.

Item owned	Number owning	Percent	Lower CI	Upper CI
<i>Mosquito net owned</i>	630	50.27%	44.41%	56.14%
<i>Universal net coverage (50%)</i>	46	3.67%	2.46%	4.87%

* NB: Mosquito net coverage is only for those in use and good condition and which have been verified by the survey team

Table 10: Mosquito net ownership by axe

Axis	Proportion of households without a mosquito net	Lower CI	Upper CI
<i>Bibokobok</i>	78.95%	78.95%	78.95%
<i>Haut plateau</i>	76.47%	63.94%	89.00%
<i>Ubwari (Presque ile) outside</i>	62.50%	55.24%	69.76%
<i>Mukera/Simbi</i>	56.76%	35.16%	78.36%
<i>Ubwari (Presque ile) interior</i>	52.83%	44.14%	61.52%
<i>Fizi</i>	48.82%	39.95%	57.69%
<i>Sebele</i>	45.77%	38.38%	53.17%
<i>Baraka</i>	27.78%	19.80%	35.76%
<i>Kalundja</i>	25.64%	21.11%	30.17%

Access to land to cultivate was available to 936 households, 74.70% of households (95% CI 71.04-78.36%) (Table 11). This can be broken down to those who own their field (55.07%) and those that

borrow their land (19.63%), whether money is exchanged or not. A further 5.91% of households have partial access to land, through working in the fields of another household.

Table 11: household access to agricultural land.

Field Ownership/ Access	Number Owning	Percent	Lower CI	Upper CI
<i>Owned</i>	690	55.07%	49.70%	60.43%
<i>Rented</i>	246	19.63%	15.37%	23.89%
<i>Working in the field of another</i>	74	5.91%	4.01%	7.80%
<i>Access to field</i>	936	74.70%	71.04%	78.36%
<i>Partial</i>	74	5.91%	4.01%	7.80%
<i>No access</i>	243	19.39%	15.38%	23.41%

9.2 Discussion

Ownership of NFIs in the surveyed population was not complete. It is important to note that close households often share items, especially large water jugs and cooking materials. Often two will share items with their family or neighbours when needed, resulting in many households not individually owning these items. This extends to fields for farming as often households will use parts of their extended family's or neighbour's field.

The mosquito net ownership is very low for an area with high endemic circulation of malaria. It is important to note that only nets in use (hanging or being washed) and without holes at the time of the visit were counted. These results are different than a 2013 survey in Baraka area specifically on mosquito net usage which found 92.38% (95% CI 83.70-96.63) of households had a mosquito net, of which 66.67% were in good condition⁶. The last mosquito net distribution throughout Fizi Health zone occurred in 2012.

10 Morbidity

10.1 Results

At least one individual was reported ill within the last two weeks before the survey in 83.75% (95% CI 80.57-86.92% DEFF 2.30) of households. For 36.96% of households this individual was a child under the age of 5 years. The average age of sick individuals was 18.69 years (median 8 years) and 57.72% of them were female. For children under 5 years of age females accounted for 48.13%. Most ill household member (67.78%; 95% CI: 63.83-71.73%), waited 2-7 days before seeking treatment (Table 12).

Table 12: Number of days waited prior to presenting to a health care facility for treatment. Only for those who attended a facility.

Days before treatment	Number	Percent	Lower CI	Upper CI
<i>Same day</i>	118	17.93%	14.53%	21.34%
<i>2- 7 days</i>	446	67.78%	63.83%	71.73%
<i>8-14 days</i>	45	6.84%	4.02%	9.66%
<i>More than 14 days</i>	49	7.45%	5.36%	9.53%

The most common symptom reported in sick individuals over the age of five was fever at 52.77% (95% CI 47.13-58.41% DEFF 1.99). This rises to 78.57% for children under the age of five. The second most common symptom in infants under five years was diarrhea (31.43%) and vomiting (14.76%). For those 5 years or older the second most common symptoms were headache and generalised pain (20.60% and 18.38% of those reported ill respectively). Table 13 and

Table 14 outline all the symptoms identified with some patients detailing multiple symptoms. Other symptoms are cancer, physical disability, cataract, poisoning, measles, typhoid, heart attack, and a congenital head malformation, each with 1 case. Patients identified an average of 1.6 symptoms.

Table 13: Symptoms suffered by individuals that were sick within two weeks of the study interview, for those under 5 years.

Illness or Symptom of children under 5 years	Number of people identifying the condition	Percent of sick identifying condition	Lower CI	Upper CI
<i>Fever</i>	330	78.57%	73.39%	83.75%
<i>Diarrhea</i>	132	31.43%	25.89%	36.97%
<i>Cough</i>	79	18.81%	14.29%	23.33%
<i>Vomiting</i>	62	14.76%	11.08%	18.44%
<i>Anemia</i>	39	9.29%	5.45%	13.13%
<i>Abdominal Pain</i>	17	4.05%	1.46%	6.63%
<i>Respiratory symptoms</i>	16	3.81%	1.89%	5.73%
<i>Skin sores/spots</i>	14	3.33%	1.37%	5.30%
<i>Headache</i>	11	2.62%	1.05%	4.19%
<i>General Pain</i>	9	2.14%	0.82%	3.47%
<i>Fatigue</i>	3	0.71%	-0.08%	1.51%
<i>Conjunctivitis</i>	2	0.48%	-0.19%	1.15%
<i>Other Symptoms</i>	2	0.48%	-0.17%	1.13%
<i>Malnutrition</i>	2	0.48%	-0.20%	1.15%
<i>Convulsion</i>	2	0.48%	-0.18%	1.13%
<i>Accident related trauma</i>	1	0.24%	-0.24%	0.72%

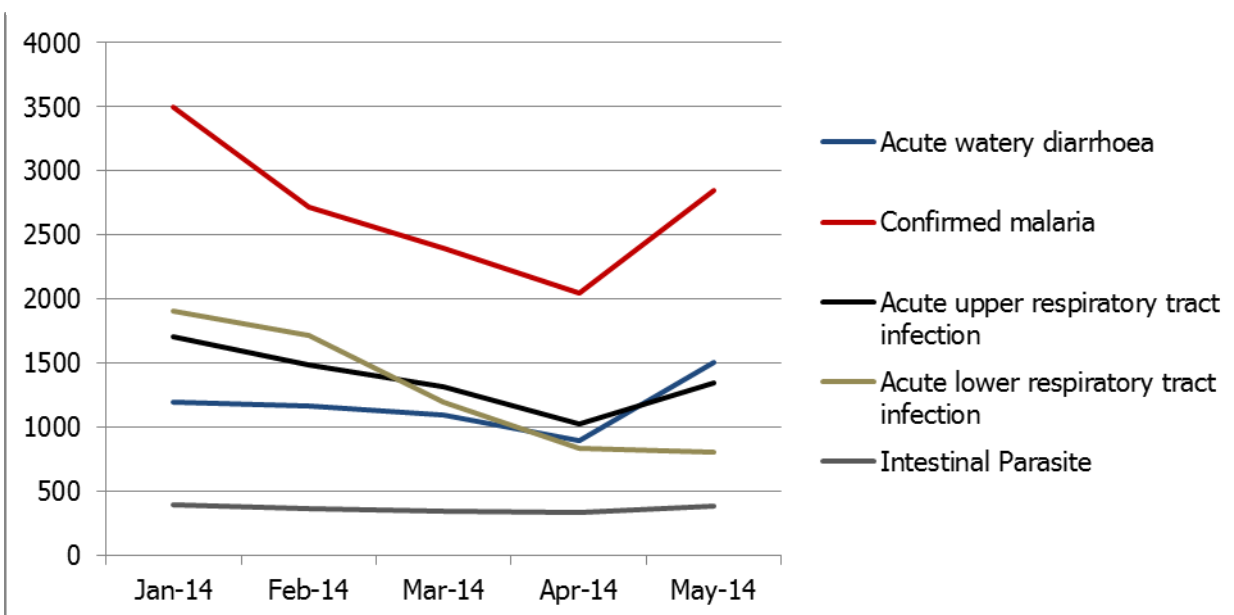
Table 14 Symptoms suffered by individuals that were sick within two weeks of the study interview, for those 5 years or older.

Illness or Symptom of people 5 years or older	Number of people identifying the condition	Percent of sick identifying condition	Lower CI	Upper CI
<i>Fever</i>	333	52.77%	47.13%	58.41%
<i>Headache</i>	130	20.60%	16.79%	24.42%
<i>Abdominal Pain</i>	116	18.38%	14.47%	22.30%
<i>General Pain</i>	81	12.84%	9.52%	16.16%
<i>Cough</i>	55	8.72%	6.32%	11.11%
<i>Vomiting</i>	54	8.56%	5.71%	11.40%
<i>Diarrhea</i>	47	7.45%	4.46%	10.44%
<i>Respiratory symptoms</i>	34	5.39%	3.55%	7.23%
<i>Pregnancy related</i>	15	2.38%	1.11%	3.64%
<i>Sexually transmitted infection</i>	15	2.38%	1.24%	3.51%
<i>Anemia</i>	14	2.22%	1.03%	3.41%
<i>Vertigo</i>	14	2.22%	1.03%	3.41%
<i>Hypertension</i>	12	1.90%	0.86%	2.94%
<i>Skin sores/spots</i>	11	1.74%	0.71%	2.78%
<i>Fatigue</i>	10	1.58%	0.39%	2.78%
<i>Conjunctivitis</i>	8	1.27%	0.44%	2.09%
<i>Convulsion</i>	8	1.27%	0.44%	2.09%
<i>Paralysis</i>	7	1.11%	0.00%	2.22%
<i>Accident related trauma</i>	6	0.95%	0.22%	1.68%
<i>Other Symptoms</i>	6	0.95%	0.22%	1.68%
<i>Malnutrition</i>	2	0.32%	-0.12%	0.76%
<i>Violence related trauma</i>	1	0.16%	-0.16%	0.48%
<i>Unsure of symptoms</i>	1	0.16%	-0.16%	0.48%

10.2 Discussion

The self-reported illness in a household is very high in this survey, which suggests that illness in at least one household member at any particular time in Fizi is a common occurrence. The symptoms outlined by the study population are generally congruent with the diseases identified by the Baraka hospital outpatient department (Figure 5). Though respiratory illness is lower than gastrointestinal illness in the survey and higher in OPD this could be because they are common symptoms of malaria and thusly could be identified together. These symptoms also seem to be in line with the proportions from the causes of death explored later.

Figure 5: Outpatient department top five morbidities for 2014 for children under 5 years.



11 Access to Health Care

11.1 Results

For the 1051 individuals that were ill, 659 or 62.70% (95% CI 58.42-66.99%, DEFF 2.04) sought care from a health facility. The most common single access point for health care was the health centre (HC) receiving 66.62% (95% CI 58.85-74.37%, DEFF 2.10) of visits. This was followed by the hospital, which saw 26.44% of visits, and the health post, a small remote clinic, which had 8.51%. A number of individuals (21) also visited multiple types of structures. Table 15 outlines the number of people who visited each facility, including those that visited multiple. Unfortunately it was not possible to extract information on persons that visited the same type of structure multiple times or in different locations.

Table 15: Visits to the different types of health facilities.

Facility attended	Number	Percent of sick identifying condition	Lower CI	Upper CI
Health Centre	418	66.62%	58.86%	74.37%
Hospital	154	26.44%	19.23%	33.66%
Health Post	55	8.51%	1.97%	15.05%
CTC	5	0.76%	-0.14%	1.66%
Other Clinic	3	0.46%	-0.22%	1.13%
Military Clinic	2	0.30%	-0.12%	0.73%

There was a large mix of responses in relation to the supporting organisation of the attended health structure. MSF was the most represented organisation, with 39.48% (95% CI 28.00-50.96% DEFF 2.99) of people attending a MSF supported facility (Table 16). Only 22.56% of people indicated having attended a BCZ only facility. It is likely that this is an underrepresentation, as discussed later. Other

NGOs found in the area were ICRC (identified by 13 people), IRC (3), churches (9), and unknown other NGOs (3).

Table 16: Organisations supporting the health structure visited by the sick person.

Organisation supporting the structure	Number	Percent of sick identifying condition	Lower CI	Upper CI
<i>MSF</i>	259	39.48%	28.00%	50.96%
<i>BCZ</i>	148	22.56%	14.32%	30.80%
<i>Not sure</i>	127	19.36%	13.87%	24.85%
<i>Private</i>	94	94	7.88%	20.78%
<i>Other ONG</i>	28	4.27%	1.34%	7.20%

Of the total 659 that sought treatment, 64.04% (n= 422, 95% CI 53.95-74.12%) paid for their treatment at some point during the course of their illness. For those that who attended multiple structures it may have been possible to pay on one occasion and not pay on another. For those that did not pay for their services (n=262), all except nine (9) did not pay because it was received at a centre that does not practice cost recovery. The remaining did not pay because: treatment was free for their type of illness (3), family worked at the clinic (2), a neighbour paid, they were allowed to leave, they don't know, it was a military clinic free for personnel. Out of persons that reported to have visited a MSF-supported health structure, 14% reported to have paid for the consultation.

The principle reason for the 392 (37.70%) who did not seek care at a health facility was the cost of treatment, identified by 51.28% (95% CI 41.21-61.34%) (Table 17). The second most commonly reported reason to not seek care was visiting and purchasing drugs at a pharmacy (Table 17).

Table 17: Reasons given for not seeking care at a health facility.

Reason for not seeking care	Number	Percent	Lower CI	Upper CI
<i>Treatment cost prohibitive</i>	201	51.28%	41.21%	61.34%
<i>Drugs purchased at pharmacy</i>	188	47.96%	40.80%	55.12%
<i>Transport cost prohibitive</i>	31	7.91%	4.19%	11.63%
<i>HC too far</i>	30	7.65%	3.98%	11.33%
<i>Illness was not severe</i>	28	7.14%	3.40%	10.88%
<i>No confidence in services</i>	19	4.85%	2.19%	7.50%
<i>Used traditional medication</i>	18	4.59%	2.26%	6.92%
<i>Felt refused</i>	14	3.57%	1.38%	5.76%
<i>No time to visit</i>	13	3.32%	1.14%	5.50%
<i>Other reasons</i>	10	2.55%	0.78%	4.32%
<i>No medication at HC</i>	9	2.30%	0.02%	4.57%
<i>Security situation prevented visit</i>	3	0.77%	-0.11%	1.64%

11.2 Discussion

A high number of those who did not seek care identified the cost of treatment as a prohibitive factor. Nevertheless, most people who feel ill in one form or another, 62.70%, visited a health care facility during the course of their illness despite the fact that the majority had to pay for the care they received.

Indeed, the number of people that paid for treatment to the number that did not seek treatment because of consultation cost is roughly three to one. This seems to indicate that the majority of the population can afford treatment (or will prioritise spending money for treatment) but that there remains a considerable proportion for which the financial implication remains an important barrier.

For support to structures, only 22.56% of people identified that they received care from a BCZ clinic. This supported by the number of people stating they did not know what kind of facility they visited. Furthermore, private facilities in the area were very uncommon yet 14.33% (n=94) stated they were at a private facility. Given that the majority of clinics were indeed BCZ structures this highlights the difficulty people have identifying the BCZ. This is especially true for BCZ facilities where patients had to pay their own medication outside the facility and return for instructions. As such many people were unaware of the form of support their structure received or erroneously identified it as private.

Traditional medicine was cited by 18 people as a reason that they did not take treatment. This does not, however, reflect the use of traditional medicine in the communities we serve as others may have used such practices before or after seeking care and this is not represented in the questionnaire.

12 Retrospective Mortality Rates

12.1 Results

A total of 276 deaths were reported during the recall period (136-150 days); 129 reported deaths were in children under the age of five. Calculations, taking into account specific dates for arrivals, births, departures, and deaths, the survey calculated 984176 person-days in total, 231383 person-days for children under five (Table 18).

Table 18: Person-days calculated during the study.

Category	Person days	Average Person days	Lower CI	Upper CI
All	984176	134.80	132.96	136.64
Under 5	231383	128.76	126.92	130.61

The crude mortality estimated by this survey was 2.80 deaths (95% CI 2.40-3.28, DEFF 1.03) (Table 19) per 10,000 person days. The under 5 mortality rate was 5.58 deaths (95% CI 4.60-6.76, DEFF 1.17) per 10,000 person days. The male and female mortality rates were 2.29 and 3.35 respectively. Fifty-nine (59) deaths were reported in children less than 1 year. This means 15.61% (95% CI 11.41-19.81) of children in this age group died during the period of interest.

Table 19: Mortality rates.

Type of Mortality Rate	Deaths	Rate per 10,000 persons per day	Lower CI	Upper CI	DEFF
Crude mortality	276	2.80	2.40	3.28	1.03
Under 5 mortality	129	5.58	4.60	6.76	1.17
Female Mortality	116	2.29	1.87	2.80	1.18
Male mortality	160	3.35	2.76	4.08	1.52

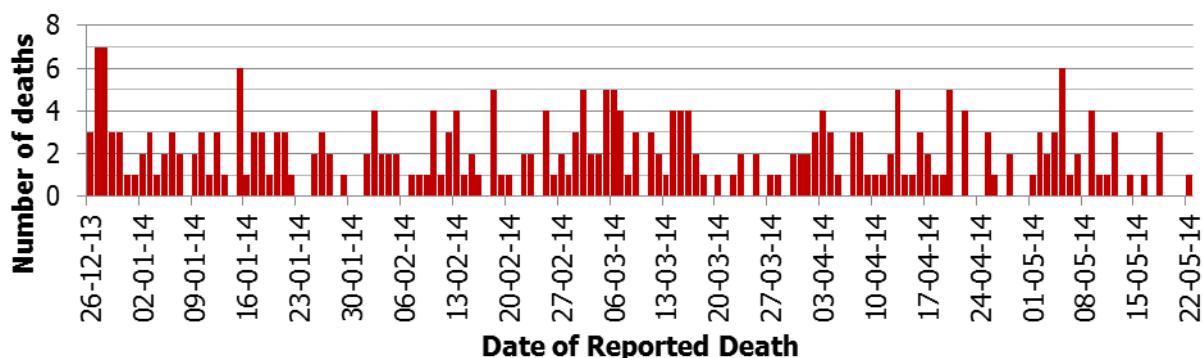
There is some variability in the point estimates for mortality when analysed between axes, but as the confidence intervals are overlapping for all of them, it is not possible to say that one axe has a significantly higher mortality than another (Table 20). It is important to note that all axes, apart from Bibokobok, have estimated mortality rates that are well above the emergency thresholds.

Table 20: Crude mortality rates for different axes surveyed in Fizi Health Zone.

Axis	Crude Mortality	Lower CI	Upper CI
<i>Fizi</i>	2.41	1.66	3.50
<i>Haut plateau</i>	2.87	2.14	3.84
<i>Mukera/Simbi</i>	5.10	3.38	7.70
<i>Sebele</i>	3.70	2.77	4.95
<i>Kalundja</i>	4.52	2.89	7.06
<i>Baraka</i>	2.19	1.68	2.83
<i>Bibokobok</i>	0.96	0.24	3.78
<i>Ubwari (Presque ile) interior</i>	2.09	1.39	3.16
<i>Ubwari (Presque ile) outside</i>	2.43	1.81	3.26

The recall period began on December 25th, with deaths recorded from Dec 26th up until the day before the survey visited the household. Some mild clustering of deaths occurs at the beginning of the recall period. Otherwise deaths are evenly distributed with the recall period (Figure 6).

Figure 6: Date of deaths throughout the period of interest.



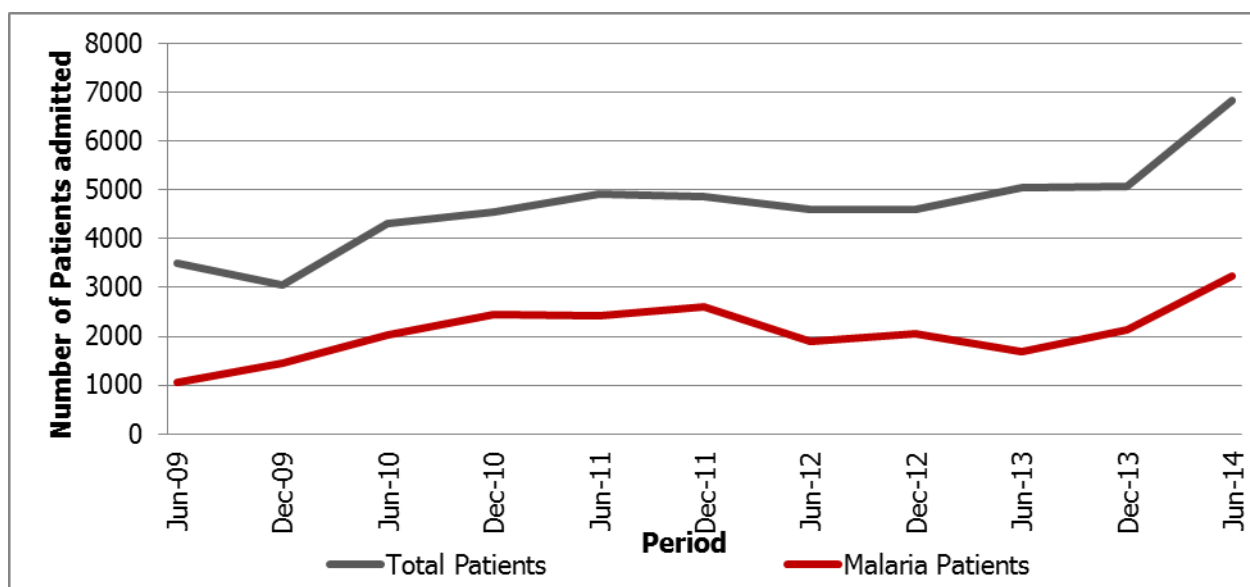
12.2 Discussion

The crude mortality identified is more than two and a half times MSF's emergency threshold. Other studies in previous years in South Kivu have found crude mortalities ranging from 0.2 to 1.7^{2,7-11}. A study with the same methods performed by MSF-OCA in North Kivu around Walikale after recent fighting in 2013 found a crude mortality rate of 1.4¹². This reinforces that the crude mortality rate discovered in the Fizi survey is very elevated.

One possible explanation for the high mortality could be the period of recall used. The period of the included the most active period of disease activity the project has seen since 2009 (see Figure 7). Overall from January to June 2014 (recall period was roughly January until the end of May and case numbers dropped off considerably in June) the Baraka hospital saw almost 2000 more admissions than its previous maximum number of admissions. Also, a 50% increase in admissions was observed compared to

the previous highest average consultations per 6 months. With respect to diseases for which patients were admitted, during the recall period, malaria admissions (usually for severe malaria clinical presentation) were almost 1000 more than the previous maximum. Interestingly, January-May is a highly abnormal malaria season. Normally the malaria peak occurs in November and decreases the end of December. However, in Baraka, we know that in late 2013 the cases continued to climb until January 2014 and then remained at high levels for multiple months. Suggesting the 2013-14 seasons was higher, later, and longer than usual, contributing to an increased burden of disease and possibly mortality in the community during this time.

Figure 7: Patient admissions for 6 month periods from January 2009 to June 2014.



There are a number of alternative possible reasons for the study's results. The first is a misunderstanding in the surveyed population concerning the recall period. We think this is unlikely as dates were recorded for all deaths, arrival, departures, and births as precisely as possible. Dates were always checked to ensure they were in our period of interest. A second possibility is that the surveyed population over reported the number of deaths for a perceived benefit in doing so. The low design effect across all the clusters for the mortality rates, suggest that the variance for death reports was minimal. We therefore also think that this is unlikely. Finally, security rules and transportation times ensured that much of the interviewing took place between the hours of 0900 and 1400. If families that were absent from their village at this time were more likely to have suffered a death than households that remained in the village, this might have introduced a bias in terms of sampling error. However, we think this is unlikely as the methods in this survey have been used for other mortality surveys and vaccination coverage surveys and never really highlighted this bias.

13 Causes of Death

13.1 Results

The most common cause of mortality was attributed to fever/malaria, identified by 48.19% (95% CI 41.34-55.04%, DEFF 1.28) (Table 21). This rate is significantly higher in the under 5 age group where

65.89% (95% CI 58.91-72.88%) of deaths were reportedly caused by fever (Table 22). The rates of fever are substantially and significantly higher than those of the second most commonly reported cause of death, diarrhea with 10.14% (95% CI 6.41-13.88%).

The reported causes of death that were classified as "other diagnoses" included: Hepatitis B (2), cleft palate (1), intestinal malformation (1), leprosy (1), Measles (1), Typhoid (1), and Meningitis (1). These diseases may be represented in the other categories, such as fever and diarrhea, but were specifically identified for these 8 individuals. The uncategorised symptoms identified were: vomiting blood (2), back pain (2), an abscess (1), swollen throat (1), swollen legs (1), convulsion (1), breast problem (1).

Table 21: Cause of death for all deaths identified during the period of interest

Cause of death (all ages)	Number	Percent of deaths	Lower CI	Upper CI
<i>Fever/Malaria</i>	133	48.19%	41.34%	55.04%
<i>Diarrhea</i>	28	10.14%	6.41%	13.88%
<i>Respiratory illness</i>	20	7.25%	4.11%	10.38%
<i>Pregnancy/ Birth Related</i>	19	6.88%	3.55%	10.21%
<i>Violence</i>	16	5.80%	2.91%	8.69%
<i>Poison</i>	13	4.71%	2.08%	7.34%
<i>Symptoms only</i>	9	3.26%	1.26%	5.26%
<i>Chronic disease</i>	8	2.90%	0.46%	5.33%
<i>Other diagnosis</i>	8	2.90%	1.07%	4.72%
<i>Abdominal pain</i>	8	2.90%	0.78%	5.01%
<i>Accident</i>	7	2.54%	0.43%	4.64%
<i>Unknown</i>	7	2.54%	0.75%	4.32%
<i>Total</i>	276	100%		

Table 22: Cause of deaths for children under the age of 5.

Cause of death (children under 5 years)	Number	Percent of deaths	Lower CI	Upper CI
<i>Fever/Malaria</i>	85	65.89%	58.91%	72.88%
<i>Diarrhea</i>	13	10.08%	5.55%	14.60%
<i>Pregnancy/ Birth Related</i>	9	6.98%	2.27%	11.68%
<i>Respiratory illness</i>	8	6.20%	1.60%	10.81%
<i>Other diagnosis</i>	4	3.10%	0.19%	6.02%
<i>Violence</i>	3	2.33%	-0.34%	4.99%
<i>Unknown</i>	3	2.33%	-0.36%	5.01%
<i>Symptoms only</i>	2	1.55%	-0.57%	3.67%
<i>Accident</i>	1	0.78%	-0.79%	2.34%
<i>Poison</i>	1	0.78%	-0.78%	2.33%
<i>Total</i>	129	100%		

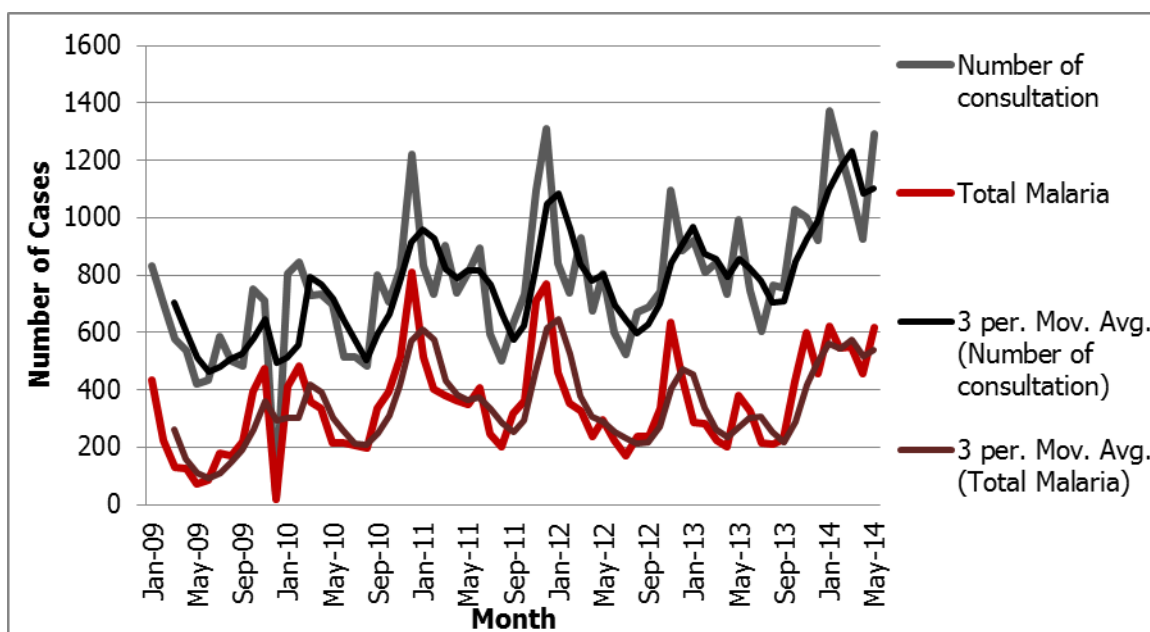
13.2 Discussion

As with the retrospective mortality surveys conducted in Walikale in 2013 and 2014, fever/malaria is the principal cause for mortality in Fizi Health Zone. Almost half of all deaths were reportedly from fever and just over 65% for children under 5 years during the recall period. This suggests that malaria was of a considerable burden on the population during this time.

A comparison with IPD data from Baraka during the same period (Figure 8) shows that admissions for malaria from January 2014 onwards were at peak levels compared to previous years and remained consistently high for the duration of the recall period of the survey. Additionally, IPD data from 2009 suggests that malaria is not only responsible for a consistent admission rate of more than 200 patients per month, but during its epidemic periods, monthly admissions for malaria can reach 600; malaria is therefore not only endemic, but causes seasonal peaks.

Poisoning was cited as the cause of 13 deaths during the period. This condition is generally considered to be related to murder or sorcery but can also be sometimes linked to traditional medicine. In this case the individual falls ill and is given poison to stimulate a stronger response from the body. The symptoms associated with poisoning however can also be associated with Hepatitis B which is known to circulate in the community. Nevertheless, without further research it is impossible to identifying the cause of poisoning deaths.

Figure 8: Monthly admissions to Baraka IPD



14 Violence

14.1 Results

In total 230 people suffered at least one incident of violence during the period of interest (**Error! Reference source not found.**). This represents 3.01% (95% CI 2.28-3.75, DEFF 3.2) of the total surveyed sample population. Most of the violent incidents (n=119, 51.7%, 95%CI: 45.2-58.2) were experienced by men (**Error! Reference source not found.**). Ten (10), five males and five females, of these individuals suffered more than one incident of violence during the time frame.

The most common type of violence suffered was beating with 1.89% (95% CI 1.42-2.36%, DEFF 2.14) of the survey population having experienced a beating (138 episodes experience by 137 people). The second most common form of violence reported was sexual violence. A total of 57 people (58 episodes) experienced sexual violence, representing 0.78% of the total population. All cases of sexual violence were from women meaning the rate was 1.58% in women. Detention was the third most common type of violence with 38 instances from 35 people, 0.48% of the population. Table 23 outlines, the number of individuals instances (for those that were violated twice), the number of people that suffered, and the proportion of total people from the study that experienced each type of violence identified.

Table 23: Number of incidences and number of people who suffered types of violence during 3 month recall period.

Type of Violence	Experienced at least one incident	Proportion of people who suffered incident % (95%CI)
<i>Beaten</i>	137	59.6% (53.3-66.0)
<i>Sexual Violence</i>	57	24.8% (19.2-30.4)
<i>Shooting</i>	15	6.5% (3.3-9.7)
<i>Blade Attack</i>	16	7.0% (3.7-10.3)
<i>Detention</i>	35	15.2% (10.6-19.8)
<i>Does not want to specify</i>	5	2.2% (0.3-4.1)
Total	230	

Rates of violence differed significantly with age (Table 24). Individuals between 15-29 years were most likely to experience violence with 7.42% of the total surveyed population having experienced some form of violence (45.2% of all violent incidents reported in this age group).

Table 24: Incidents of violence for age groups.

Age group	Number of people experience an incident	% (95%CI)
<i><5 years</i>	12	5.2 (2.3-8.1)
<i>5 to 14 years</i>	33	14.3 (9.8-18.8)
<i>15-29 years</i>	104	45.2 (38.8-51.6)
<i>30-49 years</i>	68	29.6 (23.7-35.5)
<i>>50 years</i>	13	5.7 (2.7-8.7)
Total	230	

For all violent incidents, excluding theft, the majority were perpetrated by armed groups (60.87%, 95%CI: 50.1-71.7). Non-armed and unknown groups were responsible for 18.70% (95%CI: 11.9-25.5) and 22.17% (95%CI: 9.61-34.74) of violent incidents excluding theft respectively.

14.2 Discussion

In general the rates of violence are surprisingly high for the area. This highlights that, even in a fairly stable context with limited direct fighting, some forms of insecurity continue.

Of particular note is the level of sexual violence. In Sebele region for example, one remote village had been twice attacked by unknown bandits. This resulted in a large number of rapes and beatings in the area, driving the axes violence figure up substantially. This may point to the importance of identifying and targeting hotspots where rape is commonplace.

15 Limitations

- The recall period used in the survey included the precise peak of the malaria season in Baraka, therefore it is likely that the mortality rates captured a large proportion the mortality that could be attributed to the unusual peak and duration of malaria. The mortality rates estimated at a different time of the year would probably have been lower;
- A large number of deaths were reported close to the Christmas time limit of the survey. This may be the result of less access to or accessing of health care during this period but may also be the result of improper recall by the population.

Conclusions

Though other studies have at times found mortalities as higher or higher than the Baraka findings, these are generally for areas with active conflict^{17,18}. Baraka area and Fizi Health Zone have been a relatively stable context for a number of years and do not have the risks and resulting health conditions that result from such insecurity. This makes the result all the more surprising.

It is integral to understand that this is for a specific point in time, a five month period that included a unique malaria season that saw more cases admitted to hospital than any similar period before (Figure 7). This very much highlights that malaria, even in a stable context, can cause excess levels of mortality.

Nevertheless, the results also highlight that Fizi health zone continues to have important health needs. It is impossible to guess at the normal mortality rate for the area but even if the baseline level of mortality is much lower it is likely that they remain somewhat high. Additionally, the area has the potential, as shown in this study, to experience considerable peaks.

An important point that comes out of the survey findings is the importance of surveillance system to monitor and identify need as they change. If a more robust system is in place perhaps increased widespread mortality can be identified and interventions put in place. At the very least proper surveillance allows us to better understand the health context of the area and create our strategy accordingly.

This could also lead into a case for more dispersed activities. No specific area of the zone seems to have a lower mortality rate. This seems to suggest that there are needs everywhere in Fizi zone. Indeed it is

more a question of programme goals but if the project identifies Fizi Health Zone, in its entirety, as the target catchment area for the project than it points to the importance of dispersed interventions to account for these widespread needs.

Recommendations

- Strengthen surveillance beyond the communities within easy access from Baraka Hospital and MSF-supported health centres by establishing relationships with focal points in communities, training them on how to recognise unusual events (i.e. those causing high morbidity and mortality) and establishing communication routes to alert MoH and MSF teams of such events (SKERU team could incorporate this);
- An additional focus added to MSF's current activities that focus on outreach and community based programs (particularly for malaria) to strengthen early detection and treatment of preventable diseases;
- In terms of advocacy and lobbying for other stakeholders:
 - Dissemination of this report to national and international stakeholders as a baseline status of data and information on this part of DRC and call to an increased presence of NGOs in the health zone of Fizi;
 - Increasing access to primary health care through an increasingly decentralised approach by MOH and partners;
 - Consultations and treatment for mainly malaria should be for free for the host and displaced population and that other actors (in addition to the MoH) should step up their interventions against this disease.

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Annex

1 Informed Consent form

Retrospective mortality survey in the MSF catchment area Fizi Health zone, Democratic Republic of Congo

Please administer the information sheet before seeking consent

I have understood the above information and my questions have been answered to my satisfaction. I give voluntary consent for the participation in this study. I understand that I am free to withdraw from the study at any time.

I hereby declare that I consent to the above.

Date: |_|_| / |_|_| / 2014
d d / m m / y y y y

Head of household's signature/fingerprint:

Interviewer's name:

Interviewer's signature:

2 Household Questionnaire

Cluster #:		Household #:	
Team #:		Date:	
ACCESS TO HEALTH CARE			
1. Has someone in your Household been sick in the last two weeks. <i>If yes, continue with question 2. If no, continue with question 11.</i>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know	
2. If yes, Who was the last person sick in your family in the last two weeks?		_____Relation to respondent _____Age (years) _____Age (months) <input type="checkbox"/> Male <input type="checkbox"/> Female	
3. Which disease/symptoms did the person have?		<input type="checkbox"/> Diarrhea <input type="checkbox"/> Respiratory infection <input type="checkbox"/> Fever/malaria <input type="checkbox"/> Pregnancy related <input type="checkbox"/> During or less than one month after the birth of a child (mother or baby) <input type="checkbox"/> Accident <input type="checkbox"/> Violence <input type="checkbox"/> Doesn't know	

	<input type="checkbox"/> Other disease(specify)_____
<p>4. Did the person receive health care in a health structure?</p> <p>If yes, continue with question 5. If no continue with question 10.</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know
<p>5. If yes, specify which health facility they visited</p>	<input type="checkbox"/> Hospital <input type="checkbox"/> Health clinic <input type="checkbox"/> Health centre <input type="checkbox"/> Other Specify_____
<p>6. Who supports the health facility you visited?</p>	<input type="checkbox"/> MSF <input type="checkbox"/> Only Ministry of Health <input type="checkbox"/> Other NGO. (Specify _____) <input type="checkbox"/> Private clinic <input type="checkbox"/> Other. (Specify _____) <input type="checkbox"/> Don't know
<p>7. How many days after the person was sick did you seek healthcare?</p>	<input type="checkbox"/> Same day <input type="checkbox"/> 2-7 days after <input type="checkbox"/> 8-14 days after <input type="checkbox"/> More
<p>8. Did you pay for the consultation?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know
<p>9. If no, why not?</p>	<input type="checkbox"/> Not enough financial resources <input type="checkbox"/> It was free <input type="checkbox"/> Others
<p>10. If no why did they not receive any health care?</p>	<input type="checkbox"/> Not sick enough

	<input type="checkbox"/> Health post/centre was too far <input type="checkbox"/> Medication in the market or at the pharmacy <input type="checkbox"/> Traditional medicine <input type="checkbox"/> No financial means to pay for consultation <input type="checkbox"/> No financial means to pay for transportation <input type="checkbox"/> Don't trust the healthcare services offered <input type="checkbox"/> There were security problems <input type="checkbox"/> We didn't have time to go <input type="checkbox"/> Person was refused at the healthcare facility <input type="checkbox"/> Other reason (specify): _____
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HOUSEHOLD SITUATION	
11. Situation of the family Multiple responses possible <i>If displaced/returned continue with question 12</i> <i>If permanent go to question 17</i>	<input type="checkbox"/> Displaced <input type="checkbox"/> Returned/Repatriated <input type="checkbox"/> Permanent <input type="checkbox"/> Mixed (specify) _____
Village(s) of origin of the family/Household	
If displaced, provide the reason and number of displacements here Multiple responses possible <div style="text-align: right;"> Attacked _____ Insecurity _____ Ordered to leave _____ Other(specify _____) _____ </div>	Number of times during recall _____ _____ _____ _____
Were household goods and items damaged or stolen?	<input type="checkbox"/> Yes

	<input type="checkbox"/> No <input type="checkbox"/> Dont know
Which Household items were stolen? Multiple responses possible	<input type="checkbox"/> money or valuables <input type="checkbox"/> Household goods <input type="checkbox"/> Cattle/livestock <input type="checkbox"/> Work materials <input type="checkbox"/> Other items of value
What happened to your home while you were displaced?	<input type="checkbox"/> Destroyed completely <input type="checkbox"/> Destroyed partially <input type="checkbox"/> Occupied by someone else <input type="checkbox"/> Abandoned <input type="checkbox"/> Don't know

NFI POSESSION

NFI POSESSION	
Jerrycan 10 liter capacity (minimum):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know
If yes, does it close properly	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not seen
How many blankets do you have that are in good condition? <i>((less than 10% of holes in the total surface))</i>	<input type="checkbox"/> Seen _____ <input type="checkbox"/> Not seen
If yes, how many mosquito nets do you own?	<input type="checkbox"/> Seen _____ <input type="checkbox"/> Not seen
Cooking items (at least one cooking pot and one large cooking spoon):	<input type="checkbox"/> Yes <input type="checkbox"/> No

	<input type="checkbox"/> Dont know
Agricultural tool (minimum 1 hoe/shovel)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know
Access to land for cultivation	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Rented/borrowed field <input type="checkbox"/> Daily worker in others' fields <input type="checkbox"/> Dont know

Team number: Date : / /
 Cluster number : Household number :

Demographics								Main cause of death	Violence episodes			
Nº	Sex	Age (years)	Actual status	Arrived during recall period	Left during the recall period	Born during recall period	Died during recall period		Number of violent episodes experienced?	Nature of the violence (multiple response possible)	Was the violence perpetrated from an armed group?	Period of the violence
	M/F	0= 0 -11 months	1=displaced 2=returned/repatriated 3=permanent 4=disappeared 5=taken 6=absent 7=deceased 8=other (specify)	Date of arrival (d/m/y)	Date of departure (d/m/y)	Date of birth (d/m/y)	Date of death (d/m/y)	1=accident 2= intentional violence 3= fever/malaria 4=diarrhea 5=respiratory problem 6=during or 1 month after birth 7=other (specify)	1=beaten 2=sexual violence 3=shot 4=knife/arrow/cutting wound 5=detained/kidnapped 6= does not want to respond 7=other (specify)	1=yes 2=no 3=doesn't know 4=does not want to respond	1=before displacement 2=during displacement 3=after displacement	
1												
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