

Evaluation of MSF-OCP's response strategies during the 2015 measles epidemic in Katanga, DRC

"Vertical measles" approach, mass vaccination and treatment



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LIST OF ABBREVIATIONS

AR: Attack Rate, expressed per 100,000
BCZ: *Bureau Central de la Zone de santé* [health zone central office]
CTR: *Centre de Traitement Rougeole* (Measles Treatment Center)
DPS: *Division Provinciale de La Santé* [provincial health division]
DRC: Democratic Republic of the Congo
ERU: Emergency Response Unit
E-Prep: Emergency Preparedness
EPI: Expanded Programme on Immunisation
FM: First Mission
HA: Health Area (AS in DRC)
HC: Health Centre
HRO: Human Resource Officer
HZ: Health Zone (ZS in DRC)
INRB: Congolese National Institute of Biomedical Research
IRC: International Rescue Committee
Kin: Kinshasa
LBB: Lubumbashi
MCZ: *Médecin Chef de Zone* [chief medical officer of the health zone]
MTC: Measles Treatment Centre
MUAC: Mid-Upper Arm Circumference
MoH: Ministry of Health
MSF: Médecins sans Frontières
MSF-OCA: MSF – Operational Centre Amsterdam
MSF-OCB: MSF – Operational Centre Brussels
MSF-OCBA: MSF – Operational Centre Barcelona and Athens
MSF-OCG: MSF – Operational Centre Geneva
MSF-OCP: MSF – Operational Centre Paris
NGO: Non-Governmental Organisation
PEC: *Prise en Charge* (Patient care management)
PHC: Primary Health Care
PUKA: *Pool Urgence Katanga* [Katanga emergency pool]
RN: Registered Nurse
PPN: Plumpy'Nut
"Recherche active": active search (of cases)
RDT: Rapid Diagnostic Test
RUSK: *Réponse aux Urgences Sud Kivu* [Sud-Kivu emergency response]
SAM: Severe Acute Malnutrition
SIDA: Swedish International Development Cooperation Agency
SIA: Supplementary Immunisation Activity
"Test & Treat": Malaria treatment campaign (with RDT)
VC%: Vaccination coverage, expressed as a %
W: Week
WHO: World Health Organisation

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SUMMARY

Context

Measles epidemics are a regular feature in Katanga, a vast province of more than 13 million people in the Democratic Republic of the Congo (DRC). In 2011, a large-scale epidemic ravaged the DRC for nearly a year (OCP vaccinated 1.5 million people). MSF actively participated in the vaccination response and in treating cases.

Measles vaccination strategies in the DRC basically consist of routine Expanded Programme on Immunisation (EPI) activities and Supplementary Immunisation Activities (SIAs) or catch-up campaigns that were supposed to boost vaccine coverage (VC) above 95%. Despite these, the VC as estimated by a number of *reliable* surveys was still too low (barely above 50%), and a new epidemic was feared.

In March 2014, SIAs were planned throughout Katanga Province (an area the size of France). Of questionable quality, that campaign failed to prevent a new epidemic in early 2015. It started in the Haut-Lomami provincial health division (DPS) and then spread to other provinces, ultimately affecting twenty-seven out of a total of 68 rural health zones (HZs).

Methods

This evaluation, conducted at the request of the regular Desk and the Operations Department (including the Emergency Desk), analysed the responsiveness, relevance (did we make the right choices?), efficiency (appropriate resources?) and effectiveness (e.g., morbidity/mortality control) of the strategies implemented according to the resources available. This study is based on a literature review and a synthesis and analysis of the useful data and the information gathered during numerous interviews at every level.

Results

Despite some delay in diagnosing the epidemic in early 2015 (limited investigations, a delay in declaring the epidemic, complex evolution in each HZ, etc.), once the response was launched, MSF teams showed good responsiveness and covered five HZs at a time when few other actors had arrived in the field (except the Ministry of Public Health (MoH), whose effectiveness was fairly limited).

MSF-OCP chose a so-called “vertical” response (focused on measles), which consisted of treatment of measles only (13,674 uncomplicated cases were treated in the periphery and 1,029 complicated cases were hospitalised in measles treatment centres (MTCs)) and a vaccination campaign targeting children ages 6 months to 10 years. The vaccination campaign took ten days per HZ, and 317,399 children were vaccinated (resulting in a VC of 80% to 97% in four HZs, according to randomised population surveys). The operation lasted approximately six weeks per HZ.

The role of epidemiology

Though the MoH epidemiological data are often incomplete and late, they can be used to give the alert – if analysed in time (or even late) – and to monitor the major trends. Support from an epidemiologist, if possible, would thus be extremely advantageous in getting a more accurate prospective take on the situation. Requested in June, the formal Epicentre study did not begin until September, providing added value in the form of data analysis by HZ, mapping and dynamic surveillance. VC surveys then provided concrete help in decision-making.

Resources

Financial resources do not limit MSF-OCP’s desired level of responsiveness, unlike many other actors (OCP makes efficient use of whatever resources are available to it). The total cost for OCP was €1.7 million, of which 40% went for medical and

non-medical resources, 20% for transport-related costs and 30% for human resources. The overall cost per child vaccinated was an estimated US\$6, which is about average for other MSF sections that have conducted “vertical” measles activities (40% institutional funding).

The scarcity of human resources at the start of the intervention had a limiting operational impact, despite rapid adaptation by the coordination team, thanks to the national staff (reserve pool or seconded personnel) in particular.

Thanks to E-Prep (minimum stock available in Lubumbashi (LBB)), there were enough logistics resources and medical stock for good responsiveness. Those resources obviously had to be substantial given the emergency strategy chosen – especially for transport and the cold chain in a rural context (very widely-scattered communes).

Lobbying

The lack of lobbying was unfortunate during the delay in declaring the epidemic and in mobilising partners (i.e., other MSF sections and NGOs/Health Cluster). It can be explained, in part, by insufficient MSF intersection involvement and the lack of any clear agenda to follow (intersection position vacant for over a year). MSF’s institutional positioning is still essential in the DRC, given our organisation’s investment there (nearly €100M for five MSF sections).

Discussion/Conclusion (complete version at the end)

The “vertical” measles strategy, which allowed rapid intervention and good responsiveness, appears to have been justified in this context. However, the prevalence of malaria and malnutrition in the region should have been considered when choosing the initial strategy and in the post-intervention monitoring. OCG chose a more inclusive strategy (addressing three conditions: measles, severe acute malnutrition (SAM) and malaria), which was laudable but complicated to implement, given the “heavy” resources needed and the Tanganyika context (*cf.* OCP Eval. Report for OCG, January 2016). Managers at Paris and Geneva headquarters are contemplating a reflection on the strategies.

The vaccination strategy – which consisted of immediately vaccinating all of the health areas (HAs, of which there were about 20) in one HZ in the shortest possible time – helped control the measles epidemic, unlike other longer strategies (also tried in 2015). We should keep in mind that during an epidemic it is relevant to continue vaccinating as long as there are measles cases. A study based on data from a rural setting (modelling) would help us determine the value-added (number of preventable cases).

Those two activities (vaccination and treatment), in which MSF offers real value added, should be conducted at the same time, and a lobbying effort should be undertaken so that all actors take responsibility in this domain.

It is important that MSF-OCP continue to be proactive with regard to epidemiological information before an epidemic occurs. OCP should have a true career path policy (HR) for its personnel, so that it can maintain a real national pool in the DRC and internationally (experienced personnel are invaluable in dealing with such emergencies and outbreak responses).

Detailed recommendations are given at the end of each major section.

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Thanks also to the members of the other MSF sections, other partners, and the Ministry of Public Health/EPI for taking the time to answer our questions and offer us their explanations and opinions.

1. Introduction

Measles is endemic in the DRC, with recurrent epidemics in 2004 and 2007 and the occasional exceptionally large-scale epidemic, like the one in 2011. The present case concerns the 2015 epidemic, which had its beginnings in 2014. In 2011, MSF-OCP conducted a massive outbreak response operation in twenty-three HZs in Katanga Province (68 HZs), urban settings in particular. An internal evaluation of that response allowed us to learn from that experience and issue recommendations¹.

After the three-year “honeymoon*” period without a major epidemic, a new “predictable” epidemic was recorded in Katanga in early 2015, already affecting 25% of the HZs by June 2015. In April, MSF-OCP began its response, which continued until late 2015. In all, 27 HZs were affected.

* “Honeymoon period”: A 3- to 4-year (sometimes shorter) period of remission between measles epidemics, after which a large-scale epidemic can occur – an expected phenomenon.

In 2015, due to the spread of the ongoing epidemic, OCP Operations requested this evaluation with the aim of evaluating the results of the operational response strategies*. At the Desk/Cell’s request, it took into account the constraints encountered and the resources allocated (*cf.* Appendix 1). A similar evaluation is underway for OCG, and thus a comparison of the strategies should be possible. The relevance and coherence of the various responses in the field in connection with the 2011 recommendations are analysed for the purposes of joint reflection. Internal or external lobbying is also considered in the much politicised context of vaccination campaigns in the DRC.

*Comprehensive response strategies generally include a vertical activity with a measles vaccination campaign and treatment of cases to reduce morbidity and mortality. There are various options for the latter; OCP chose to target measles (and serious related conditions).

¹ Measles epidemic in Katanga (2010-2011), Review – Reflection Day MSF-OCP, 1st February 2012, C. Seguin – V. Brown

2. Context

2.1 Measles in the local context of Katanga

In late 2014, Katanga Province, which has a population of over 13 million, was divided into four provincial health divisions (DPSs); this created some internal adjustment problems at the MoH (changes in the power structure), at MSF and at other organisations. Those four DPSs encompassed 68 HZs, and some of the DPSs were divided into EPI sub-branches, further complicating the technical panorama of Katanga (which is as large as France). As expected, in 2015 the decision-making centres moved from Lubumbashi (LBB) to the four DPSs.

In the DRC, measles is one of the diseases of epidemic potential targeted by the Expanded Programme on Immunisation (EPI) and is in principle reported weekly. Case-by-case surveillance began in 2004, in Katanga. In 2013, fewer than 75% of the children in the DRC, and barely over half of those in Katanga, were vaccinated against measles².

Malaria* is also present throughout the country, all year long, with seasonal resurgences (seasonal peaks from October to February and then from May to June).

*In a national health survey² conducted from November 2013 to February 2014, 31.7% of the children ages 6 to 59 months from 8,360 households in Katanga Province had a positive malaria RDT (23% in Haut-Katanga, 42% in Lualaba, 43% in Haut-Lomami and 66% in Tanganyika).

The DRC's national vaccination strategies – often debatable – are shown below*(Table 1):

*They correspond to the WHO's 2012-2020 Measles & Rubella Initiative.

- Routine EPI with a single injection **between 9 and 11 months.**
- Supplementary Immunisation Activities (SIAs) should in principle reinforce EPI activities with follow-up vaccination campaigns (target: **6 months – 5 years**) and catch-up campaigns (target **6 months – 15 years**) every three to four years, depending on the context.
- Response plan: If an epidemic is declared, the strategy is in principle a non-selective mass vaccination campaign for all children ages **6 months to 15 years.**

While the age groups in Table 1 are clear, that is far from the case in practice.

Table 1: Theoretical age groups targeted by the various vaccination strategies, DRC, 2015

Routine EPI	SIA		Outbreak Response
9 – 11 mos.	Follow-up 6 – 59 mos.	Catch-up 6 mos. – 15 yrs.	6 mos. – 15 yrs.

2.2 Confirming a measles epidemic: a complex event in the DRC

In the DRC, the MoH confirms an epidemic if the number of cases doubles over two consecutive weeks **and** if the INRB laboratory in Kinshasa reports three blood samples positive for measles (requirement in practice in 2015).

The teams were faced with significant delays in laboratory confirmation, though the number of cases had already doubled several weeks earlier.

² Demographic health survey, DRC, 2013-2014, Preliminary report.

MoH intervention plan in 2015: classification scheme

The epidemic began in early 2015, and there were even a few episodes in 2014 (cf. Figure 1).

Despite weekly epidemiological surveillance meetings, the MoH did not announce the provincial outbreak response plan³ until September 2015, after considerable delay (about 7 months). That plan defined three levels:

- **Category A:** HZ in epidemic (26 HZs). Response: Treatment + vaccination response for children 6 months to 15 years throughout the HZ.
- **Category B:** HZ bordering HZs in epidemic (16 HZs). Planned response: Reinforcement of routine EPI: Vaccination of children ages 6 to 59 months, throughout the HZ.
- **Category C:** HZ not bordering HZs in epidemic (26 HZs). Response: Reinforcement of EPI throughout the HZ, and measles vaccination of children ages 6 to 59 months not previously vaccinated.

The MoH justified its decisions (choice of NGOs) based on this classification scheme. That would have consequences for MSF in late September (cf. §4.4.1). Although the epidemiological situation was changing rapidly, the classification did not change as the weeks went by. It is hard to know whether that was due to the lack of laboratory results for two weeks, to a simple lack of responsiveness, or to some other reason (politics, negligence, etc.).

2.3 Evolution of the epidemiological situation: the 2011 and 2015 epidemics were different

In Katanga, during the previous large-scale measles epidemic from September 2010 to December 2011, there were 73,617 cases reported and 1,043 deaths (the overall case fatality rate (CFR) was 1.4%, and the hospital CFR often >10%), 78% of them under age 5. The overall attack rate was 611/100,000 (2010 – 2011).

At the time, Katanga accounted for the majority of measles cases in the DRC, but it then spread elsewhere (Orientale Province, 2013). The under-5 attack rate rose above 1,000/100,000 in some places (Malemba Nkulu: 1,019/100,000). The 2011 epidemic affected large urban areas – Lubumbashi in particular – while the 2015 epidemic was much more rural (cf. map, Appendix 3).

1.5 million children vaccinated in 2011!

In 2011, MSF-OCP supported 21 HZs during response campaigns, or 1.5 million children vaccinated. More than 50,000 people were treated over a 10.5-month period, as compared to 15,000 over a comparable period in 2015.

Age range/AR

In 2011, vaccination targeted children ages 6 months to 15 years in 17 HZs and 6 months to 10 years in the last four (since Epicentre showed that 95% of reported cases were under age 10 years). All sixty-eight HZs had vaccination campaigns by the different MSF sections or by the MoH.

Analysis of those parameters provided the information needed for OCP decisions regarding the scale of the epidemic. While the attack rates were, on the whole, lower in 2015 (Table 2) than in 2011, the most-affected age group remained the same (66 – 59 months). Reported ARs for children ages 12 – 59 months were in some cases very high (as high as 14,435 in 2011 and 11,557 in 2015, in Malemba Nkulu). The overall CFRs were comparable in the two epidemics, which did reflect the seriousness of the situation well (community deaths were usually underestimated).

³ Integrated response plan to the measles epidemic in Katanga Province, Sept 2015

Table 2: Comparison of measles epidemic indicators in Katanga, DRC in 2011 and 2015.

	Cases	AR/100,000	% cases 12 – 59 months	Deaths	Overall CFR
2011	73,617	611 (max. 4,147)	78 %	1,043	1.4 %
2015 (W1-W52)	41,201	298 (max. 2,847*)	77 %	483	1.2 %

*Attack rate in the Malemba Nkulu HZ - *See: 2011 Epicentre Risk Assessment Report, 2015 Epicentre Weekly Report, W52*

Though a few epidemic foci had been reported since 2011, there had been no significant spread. Outbreak response campaigns were set up on an ad-hoc basis. That no doubt reflects the quality of the 2011 campaigns. Vigilance was needed in the years that followed because the number of susceptible cases would rise each year (*cf.* §2.5).

2.4 The dark history of the SIAs (Figure 1)

It is commonly accepted that regular campaigns (with VC>95%) are needed to prevent new large-scale epidemics. In Katanga, an SIA campaign planned for late 2013 did not take place until March 2014 (for funding reasons). Due to an increase in the number of measles cases, that campaign was aimed at children ages 6 months to 10 years (instead of the usual 6 months – 59 months); the administrative VC reported was 90% for the entire province, but there were large disparities (in the Haut-Lomami DPS Kabondo Diandam EPI branch*, the VC ranged from 56.4% to 101%, depending on the HZ). The reliability of these VC figures and the protection/immunisation of children were called into question. There were doubts about the quality of the cold chain, even among the health authorities themselves (functional cold chain coverage was 40%³).

*Several of the HZs where OCP operated are covered by this branch, including Malemba Nkulu.

What good do SIAs do?

Though the 2014 SIAs failed to prevent the epidemic a few months later, they did help limit its spread, and sometimes the severity of the symptoms. It is indeed accepted that vaccinated children who come down with measles can exhibit less severe symptoms⁴. Of the five HZs where MSF-OCP operated, despite active case finding and a free referral system, only 7.5% of the cases were severe and required hospitalisation.

We see from Figure 1 that since 2011 (no SIA in 2010), the DRC had experienced a few epidemic jumps, particularly in 2013; the same was true for Katanga (in Kabalo and Tanganyika, among other places). There was a resurgence of cases in 2014 (exploratory missions by OCA, OCP, ALIMA, etc.), but no international response. The result was the 2015 epidemic, the subject of this work. About 80% of the measles cases in the DRC at the time were occurring in Katanga (Figure 1).

⁴ Mitchell P. et al. Previous vaccination modifies both the clinical disease and immunological features in children with measles. *J Prim Health Care* 2013; 5(2): 93-98

Figure 1: Measles epidemics in the DRC and Katanga from 2011 to 2015.



Source: DLM Kinshasa,

DRC.

2.5 Predictable measles epidemics

National population surveys⁵ showed measles vaccination coverage growing painfully slowly from 63% in 2007 to 72% in 2013 for the DRC as a whole.

In Katanga, the EPI administrative vaccination coverage from 2012 to 2014 was from 78% to 90%, with large disparities between health zones. The more reliable VC measurement by population survey gives 52%, with a few significant differences among the DPSs (Haut-Katanga 67%, Haut-Lomami 55%, Lualaba 39% and Tanganyika 28%). Seroprevalence surveys done on that occasion showed that only 51% of children between the ages of 12 and 59 months were positive for measles antibodies. Those low coverage rates sowed the seeds of future epidemics.

Thousands of susceptibles = hundreds of expected cases

The efficacy of the measles vaccine is an estimated 85% when administered between 9 and 12 months of age. This means that even if routine EPI activities immunise all children properly with a high quality vaccine, 15% of children will still be susceptible to measles. In this context, where the true VC was very low (*cf.* section below) and the cold chain quality was highly uncertain*, it is clear that the number of susceptible and unvaccinated children was even higher. The number of such unprotected children grows year after year, finally reaching a critical size conducive to a new epidemic. As calculated by mathematical modelling, that figure can reach into the thousands.

*As a rough guide, it is generally accepted that a third of the vaccines administered probably lost effectiveness due to cold chain failures, especially in the periphery.

⁵ Demographic and health survey (DRC-DHS II 2013-2014), Supplemental vaccine - preventable disease report: a sero-survey of population immunity to measles rubella and tetanus among children 6-59 months

RECO: Anticipation and interpretation of measles epidemics

- Start preparing for large-scale epidemics before the end of the “honeymoon” period and think about things that are essential to the alert – surveillance, epi curve monitoring and investigation.
- Raise the teams’ awareness of the need to have a high VC (>95%) to be effective and to better control the well-known phenomenon of increasing numbers of *susceptibles* year after year – this can be done by vaccination campaign or by strengthening EPI activity.
- Think about the possibility of modelling based on epidemic experiences and vaccination campaigns *in rural settings* (number of cases expected and prevented, number of *susceptibles*, etc.); the goal is to adapt future strategies (in relation to changes in the epi curve) to be more effective.
- Anticipate the necessary groundwork, preparations before epidemics/at the MoH level, between MSF sections and within OCP (think about the best strategies).

3. Methods

MSF-OCP wanted to examine its emergency response strategies in the 2015 measles epidemic in Katanga; those were evaluated and discussed by two senior evaluators from the MSF Paris Evaluation Unit (Strategy/Outbreak Response and Specialist/Resources). This was done in accordance with the request from the regular Desk (or cell) for the DRC (also includes the Emergency Desk's intervention from October on) (cf. Appendix 1).

- The relevance, efficiency and effectiveness were analysed based on the results achieved.
- To assess the necessary responsiveness and the deployment of the teams, a detailed timeline of the operations conducted by MSF teams was analysed, taking into account the (human and environmental) constraints.

Bibliography and lessons learned

- A detailed literature review was done to survey current knowledge and past experiences (and see the extent to which they could be used for MSF's purposes).
- This included action plans and recent national and international strategy documents covering known control measures (vaccination campaigns and treatment of complicated and uncomplicated cases, age, SIA, etc.).
- Also included were publications, studies and reports relevant to the context of this epidemic.

Timeline and lessons learned

- The annual epi curves since 2011 and the various operational responses (adequate or not) were analysed over time (by year, by W).
- Previous lessons and evaluations/recommendations (in Katanga, the DRC, or the region) were reviewed and compared to current strategies – basic elements and new avenues considered.
- Relevant "sitreps" (situation reports) and technical reports (on treatment, vaccination and outreach activities) were searched for and used, if available – as were epidemiological documents (data, trends, dynamic maps, results from population VC and mortality surveys, etc.).
- Significant effort was required to organise the information and data (which were widely scattered): this took about one third of the total time.

Triangulation meetings and interviews: headquarters and field decision-makers and actors

- The interviews (>70) represent the heart of this effort; the evaluators were looking for detailed information (invaluable) on the activities; they shared with those concerned the working conditions and perspectives on the operational choices (Who, When, How, etc.).
- Triangulation: putting the various opinions (or in some cases narratives) into perspective; the goal was to reach a certain level of confidence and put elements helpful to the discussion and debates into the MSF "kitty".
- The above-mentioned elements were compared to the quantitative data; this had to be done in order to analyse the relevance, the efficiency relative to the means and resources available, and the effectiveness of the measures taken in terms of the epidemic (morbidity/mortality control).

Data analysis/putting into action/needs

- Obtaining (and analysing) the available data on the number of cases and ARs (uncomplicated/complicated measles, GAM/SAM, malaria incidence, etc.) plays a cross-cutting role in understanding the different sectors' needs (= medical, logistics/WASH, human resource, financial, communication/lobbying, etc. needs).
- The needs led to an analysis of the appropriate resources to be implemented in this type of emergency operation (incomplete or missing data often made interpretation of the results difficult).

Feedback/dissemination

This was done first "on the spot" in the field, and then with the desks (regular and emergency, with an intermediate presentation – initial thoughts): this made it possible to share preliminary recommendations. The full evaluation results were officially presented at the end of the Operations meeting (desks), with the directors in attendance (January 2016); at the weekly PIM meeting; to the MSF Vaccination Working Group and at Eval Day Amsterdam (evaluation of OCP strategies/response and the same for OCG).

4. Results

The regular Desk's initial operational choice was a "limited" response (treatment + outbreak response vaccination), given the resources available – human resources, in particular. OCP planned, however, to cover five HZs with epidemics in Haut-Lomami, one of the new Katanga DPSs. Given the resources available, they reasonably planned for two teams.

The OCP response would be organised from LBB, where there were still experienced team members from the 2011 epidemic. In 2015, the coordination was evolving and was being organised from Kinshasa and LBB. Operations would be orchestrated in the complex Katanga context with its known issues and the particularly limited MoH health care resources and results there (*cf.* §2).

4.1 2011 Results/Recommendations

The 2011 recommendations – which were followed to varying degrees in 2014 and 2015 – are worth reviewing here, in particular for the actions undertaken since. Among other things, they recommended:

- Anticipating the end of the "honeymoon" period: an E-PREP was partially put in place in 2014*;
- Strengthening the alert system and continuing epidemiological support: though the interest in epidemiology was maintained, it was not really efficient until late 2015;
- Monitoring the dynamics of the epidemic with mapping tools: this became a reality in September 2015;
- Using indicators to determine vaccination strategies: they were, in fact, better used in 2015.
- Establishing a coordination arrangement with the MoH and intersection coordination: progress was reported in 2015 by the managers themselves.

These different points will be taken up again in the chapters that follow.

*The coordination team considered the risk of an epidemic, and a "measles stock" was prepared and kept up-to-date in LBB. This made it possible to set up a single team (base) and launch a treatment and vaccination operation, if needed (*cf.* §6.3).

4.2 Alert/Investigation

4.2.1 No dedicated OCP team

MSF-OCP had had no Emergency Pool for Katanga (PUKA) – which used to do surveillance, data analysis and, if necessary, on-the-ground investigation in the HZs – since April 2013.

Though the other MSF sections continued to use this system – with emergency pools for OCA (ERU), OCG (PUB, based in Bunia), OCBA (RUSK, based in Bukavu) and OCB (PUC, based in Kinshasa, but does not include Katanga) – their response during emergencies in Katanga was uneven.

Nevertheless, the MSF-OCP team (MedCo or Assistant MedCo) was still able to monitor the epidemiological situation in Katanga from LBB. It got its information at the weekly epidemiological surveillance meeting (formerly B4) (followed regularly with or without Epicentre). This system was more passive than active (depended on the information that was fed upward).

With no team dedicated to investigation*, the OCP coordination (in LBB and Kin) was relying on currently good collaboration between sections and partners, without being proactive itself. It was thus able to get the results from the OCA investigation for Malemba. The same was true with ALIMA for the Mukanga HZ. It was in that way that OCP was able to begin its measles response.

Though OCA's exploratory effort was appreciated (providing essential initial information), it created an additional step for OCP in the information/action chain. That operating mode was not ideal for MSF, an emergency medical organisation that consequently found itself a "second-line" compared to the other NGOs and the health cluster.

Subsequently, the coordination teams conducted exploratory missions in the HZs where OCP was working (Lwamba, Mulongo, Kitenge, etc.). For example, a rapid population mortality assessment done with convenience samples of 40/village in Mulongo revealed alarming statistics (about 2 - 8% measles deaths in children under 5 in the previous three months). However (opinion shared with the HoM), more detailed information would have been welcome, especially in outlying areas.

*As a reminder, the objective of the investigation is to collect the data needed to confirm an epidemic and analyse the initial actions taken by the MoH in response. So in order to be effective, the investigation must be started as soon as the first warning signs appear.⁶

4.2.2 The example of Malemba Nkulu: an early-2015 alert

In early 2015 (W7), the health authorities in the Malemba Nkulu HZ noted a doubling of measles cases and collected samples (the results were lost or never obtained). The Haut-Lomami DPS in Kamina was also alerted.

Five weeks later, in W12, MSF-OCA's ERU team (already present in the HZ, which bordered already-affected Kikondja) conducted an investigation that found rapid spread to the Malemba HZ. High community mortality was noted in two of the villages they visited (OCA + PHC and EPI supervisor). OCA again collected blood samples, the positive results of which were not known until W14. As MSF-OCA did not have the resources to get involved in the measles response in that HZ, they appealed to OCP (*cf.* Timeline by HZ, Appendix 3).

4.2.3 Confirmation of the epidemic

In the HZs where OCP was working, the time between the doubling of cases and laboratory confirmation was on the order of six weeks (4 to 12 weeks).

That length of time was explained by the delay in taking samples (on several occasions samples were taken only when there was an investigation by an NGO) and the delayed response from the INRB laboratory in Kinshasa, four weeks (2 to 6 weeks, depending on the HZ) after the samples were sent.

RECO: Proactivity of the teams in investigation/alert

- Motivate the OCP teams to be more proactive in the HZs during epidemic episodes (LBB and Kin): early visits to the field.
- Have a dedicated investigation/alert team: specify the modalities for responding to initial alerts (who, what and how).
- Analyse the delays due to dysfunction in the national system/principles for declaring a measles epidemic, and consider lobbying at the DPS and national EPI level (*cf.* §7) – issue to be pushed by MSF.
- Promote an effective MSF intersection alert system (coordination and skill sharing, or even pooling of resources/tools).

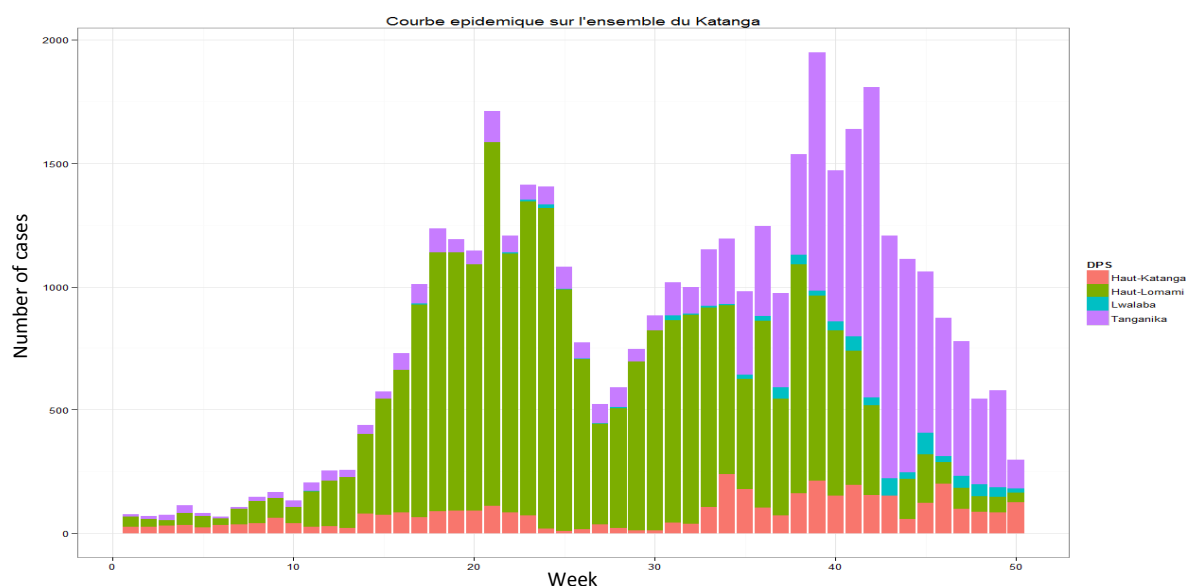
4.3 Setting up OCP activities: good responsiveness, limited efficiency

The initial response to the 2015 epidemic got organised very gradually. OCA, OCP and ALIMA got a late start in April, followed by OCG in August and OCBA in September (the epidemic was officially declared on 23 September 2015). Responses by other NGOs (IRCIRC, ADRA, AIDES, etc.) did not start until late August.

⁶ MSF Guidelines, Management of a Measles Epidemic, 2013 edition.

By W18, eight HZs were considered to have epidemics; by W23 that number was twelve, by W31 it was 21, and by W43 it was 26, and several other HZs were reporting a growing number of cases. After reaching Haut-Lomami, the massive spread continued into Tanganyika (May 2015) and, to a lesser extent, Haut-Katanga and Lualaba. That changing dynamic is illustrated in Figure 2.

Figure 2: Number of cases reported in the four Katanga DPSs, W1 – W50, 2015.



Source: Epicentre/MoH

Once the operation was launched, OCP’s operational responsiveness was adequate for treatment but less good for vaccination, which was always a few weeks out of sync (Table 3).

After the alert and the exploration conducted in W12, the coordination team and DRC desk quickly decided that OCP would intervene. Two weeks after the W14 (April) laboratory confirmation, an MSF-OCP team opened a mission and treatment in Malemba Nkulu could begin.

Though preparations for an emergency vaccination campaign should take no more than two weeks (MSF measles guidelines), the campaign did not start until W21 – that is, fourteen weeks after the alert (W7). For a contagious, rapidly-spreading disease like measles, such a delay has serious consequences and made it impossible for OCP to stop the spread of the epidemic, as it had hoped.

In terms of deployment and efficiency, MSF took too long (about a month) between when the teams arrived (“In”) and when treatment, and then vaccination, actually started. For example, for the Mukanga HZ, the team waited for the MTC to be completed before starting treatment, opting for a ten-day renovation. Having learned its lesson, organisation tended to improve for the succeeding HZs (Table 3).

It took an average of seven weeks (4 to 8 weeks) from the start of an outbreak (doubling of cases + laboratory confirmation) to the start of MSF treatment (cf. Timeline, Appendix 3).

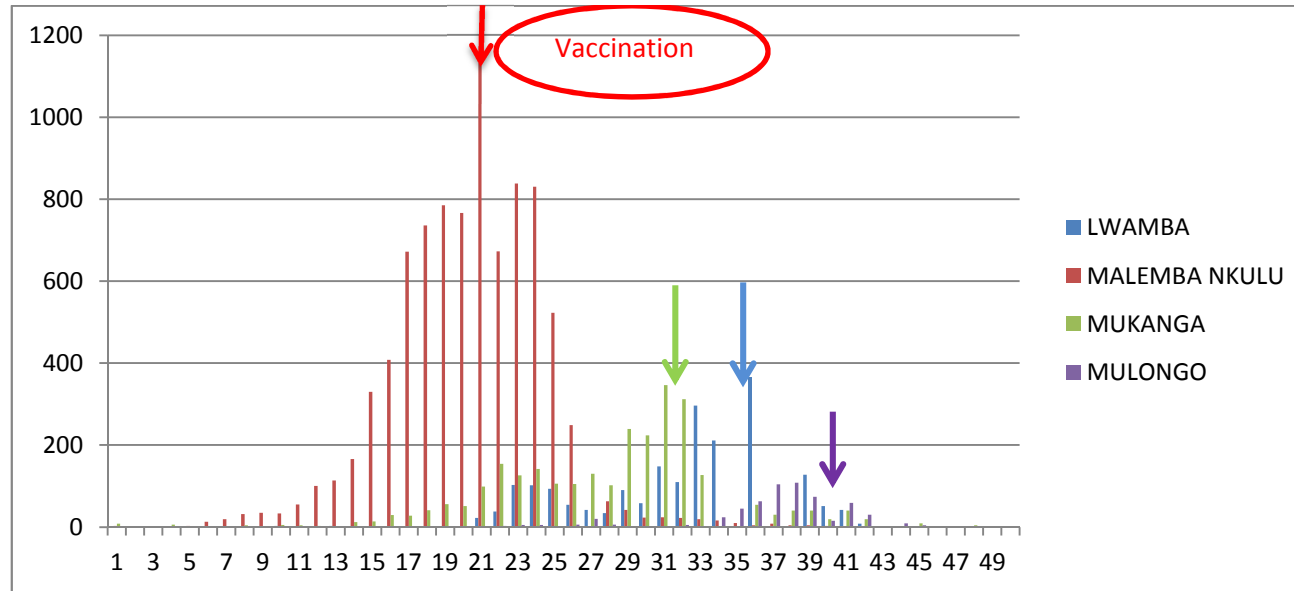
The Desk’s plan was to limit its operations to two HZs at a time, using two separate teams. This was not done until August (W32-35).

The HR and logistics situation made it necessary to optimise the HR and logistical resources needed (cf. § 6). Two teams were organised to work with overlaps and gaps between vaccination periods (Table 3 ↔).

Vaccination campaigns

In urban areas, even late vaccination campaigns can help reduce incidence and prevent cases. In the present case, in a rural area, the strategy did not seem so obvious (cases scattered geographically, lower population density). Vaccination within an “acceptable” timeframe seemed, however, to help reduce the number of cases and prevent a rebound in the curve in the months that followed. (Figure 4). The campaigns began in four HZs when the number of reported cases peaked, or just after. Other interpretation factors came into play – among others, under-reporting and the natural decline in the epi curve.

Figure 4: Number of measles cases, four HZs, MSF operations, Katanga, DRC 2015.



Sources: Epicentre/MoH.

Starting Sept: erroneous assessments (Kitenge HZ, Kayamba HZ and Kapanga HZ)

In Kitenge HZ (which had had an epidemic for the past 7 weeks), a Congolese operator (AIDES) was already positioned to do vaccination response several weeks earlier. It was waiting for funding to begin. In the hopes of swaying the MoH, OCP conducted a rapid investigation and immediately opened a mission. The MoH stood firm, however, and MSF was not given permission to vaccinate. The team decided to stop its activities in the HZ the following week (it had been treating cases for a month, but there were almost no severe confirmed cases*).

*Given the lack of regular laboratory confirmation and the mild symptoms, there is some question about the possibility of a flare-up of rubella cases⁷.

By late September, every HZ with an epidemic already had a designated partner (active or not). OCP directed its investigations and rapid openings toward Kayamba and Kapanga, Category B and C HZs (*cf.* §2.2), banking on the fact that those zones were exposed (bordering the zones with epidemics or increasing numbers of cases).

In both situations, the number of cases was still low and there was no laboratory confirmation of measles (“B” status unchanged, page 9). After multiple negotiations for Kayamba, the DPS did not authorise MSF to vaccinate, choosing the

⁷ De Graaf Pim, Measles in DRC, a review with recommendations for MSF, 26 May 2015

WHO instead; OCP was notified three days before the expected start date of the campaign (preparations for the campaign were nearly finished and an expatriate team had arrived especially for the campaign).

The choice of these three HZs raises several points:

- There was an obvious lack of visibility on how local outbreaks were progressing.
- The investigations started late, and the small number of HZs explored made it impossible to prioritise one over another (3 HZs investigated = 3 HZs chosen too (?) quickly for an intervention).
- The investigations were brief and in some cases there was no written report; the OCP team in Kitenge cast doubt on the numbers after the fact.
- There was no laboratory confirmation due to dysfunction at the INRB (lack of reagents for several weeks, with no very convincing explanation).
- There was a failure to adopt the new MoH rules on the distribution of NGOs in the HZs.

4.4.2 Efficiency of the vertical treatment strategy

From the start of this measles response, the coordination and Desk wondered about the choice of treatment strategy – a vertical measles strategy or more comprehensive strategy for children under 5 including (or not) malaria and malnutrition treatment.

After debate within OCP, it was decided to treat only measles cases (and serious associated conditions, including malaria and SAM). The objective of reducing measles-related morbidity and mortality was difficult to achieve during the first few weeks.

OCP's measles treatment was based on:

- Active measles case finding in the community by community liaisons, in order to refer cases as quickly as possible to health care facilities, and awareness-raising regarding the free care.
- Outreach activities: training the HC RNs, offering free medications and setting up a free referral system where complicated measles cases were taken to the MTC by motorcycle.
- Free treatment of complicated measles cases at the MTC (hospitalisation and intensive care).

In the beginning, the priority was on treatment at the MTC and then on outreach activities, followed by vaccination and finally by active case finding. That scenario was motivated by the limited human resources and a certain lack of organisational experience in vaccination. That would improve for the HZs that followed.

The outreach activities, in collaboration with the existing health care network (HCs and BCZs), would make it possible to collect data (RNs), treat 13,674 uncomplicated measles cases and refer more than 800 complicated cases to the MTCs (*cf.* Table 6).

A total of 1,029 complicated measles cases were treated at the MTCs. The overall CFR of 9.7% was under control (the expected CFR was <15% in this context (Table 6). It is important to note that in each HZ, and more particularly in Malemba, the CFR at the MTC was very high (near 20%) at the start of the operation. The outreach activities made it possible see children sooner and to limit the severity of the cases. Training and reinforcing the teams improved treatment and especially patient monitoring. Hence the case fatality rate declined as the weeks went by.

The operation lasted an average of six weeks for each of the four HZs (except Malemba, which lasted 11 weeks). That was a good result, which met OCP's "realistic" objectives.

Table 6: Measles treatment in the HZs where MSF-OCP worked, Katanga, DRC, 2015

	Uncomplicated cases treated	Complicated cases	MTC CFR	MTC stay In weeks
Malemba	8,562	675	10%	11
Mukanga	1,526	128	12.4%	6
Lwamba	1,969	156	6.4%	7
Mulongo	724	65	9.3%	6
Kitenge	893	5		4
TOTAL	13,674	1,029	9.7%	

4.4.3 Vaccination strategies

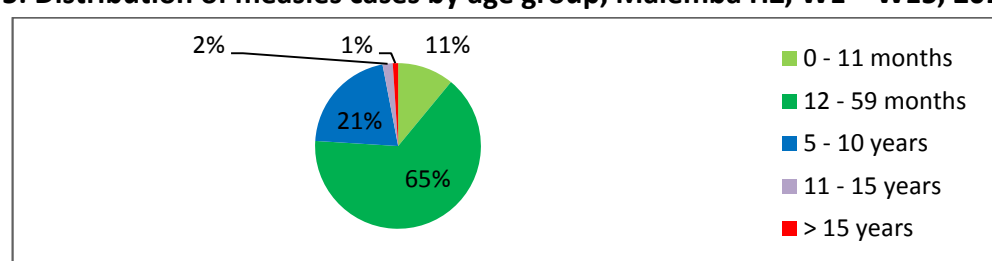
MSF had to consider various criteria in the MoH recommendations, including age group and campaign duration. These were important negotiating points between MSF and the MoH (DPSs, EPI).

An appropriate target age group (6 months – 10 years)

Beginning with the first operation in Malemba, MSF analysed the BCZ’s linear lists (more than 1,000 cases from W1 to W11). The age distribution and attack rates showed that four out of five cases were children under 10 years of age (Figure 5). After negotiation, the results of that study convinced the chief zone medical officer (MCZ) to go back on the national protocol (6 months – 15 years) and instead vaccinate the children at risk, i.e., ages 6 months to 10 years (approximately 85% of the children).

That age group would continue be vaccinated in the HZs that followed, where analysis of the linear lists (smaller scale) showed similar figures.

Figure 5: Distribution of measles cases by age group, Malemba HZ, W1 – W15, 2015



Source: MSF/MoH

Not all MSF sections had the same strategy; MSF-OCG vaccinated children 6 to 59 months in two HZs and 6 months to 15 years in one HZ. The other sections (MSF-OCA and MSF-OCBA) and NGOs (ALIMA, AIDES, ADRA, etc.) vaccinated children from 6 months to 15 years.

Vaccination strategy: all of the HAs in five days, according to the MoH?

The vaccination strategy prompted numerous discussions, as the national protocol was to vaccinate all of the HZs in just five days. MSF’s objective was to conduct a high quality vaccination campaign (cold chain and supervision) for 100% of the target group, which seemed impossible in five days. MSF therefore decided, in collaboration with the EPI and MCZs, to do the campaign in two 5-day stages. That was done with some degree of success* by following the main roads of the HZ, beginning with the hardest-hit and most densely-populated HAs.

Except for Malemba Town, most of the vaccination took place in rural areas, where the fixed strategy was immediately combined with forward – or even mobile – strategies, essential in HAs where some villages were very far from health centres or health posts.

Despite those constraints, MSF managed to vaccinate more than 300,000 children ages 6 months to 10 years (VC according to Epicentre surveys: 80% to 97% for 4 HZs; duration: 10 to 15 days).

*It was a different case in Mukanga, where a week of catch-up was needed. In some hard-to-access HAs (lake areas, Mai-Mai, etc.), delegating the vaccination to the EPI supervisor supported by MSF resources allowed good improvement of the VC.

Awareness-raising: an essential step in vaccination

Awareness-raising in this rural context – with its lake areas (scattered, mobile population) and resistance to vaccinations (prayer camp, sects, etc.) – depended primarily on the involvement of local authorities (health, religious and civil society). In some HZs, like Mulongo (active local coordination committee) and Lwamba (highly mobilised for an educational opening day), such activities had a real impact on the vaccination coverage. In Mukanga, the MSF team asked for local help too late; even after catch-up vaccination, the VC suffered and in 69% of cases vaccination was refused based on religious beliefs, tradition or fear of the vaccine. The refusal rate was from 32% to 40% in the other HZs (Epicentre Survey 2015).

RECO: Vertical treatment + vaccination strategy

In the context of measles-only vertical treatment:

- Keep operations short in each HZ (6 weeks: reasonable length used with some success in 2015).
- Document and monitor the CFR at the MTC in order to adapt the operational response to the priorities (early treatment, qualified staff, specialised equipment, etc).
- Strengthen active case finding in the periphery.
- Think about broadening the vertical measles approach to other deadly conditions like malnutrition (depending on the prevalence) and malaria, if there is a seasonal resurgence (anticipate resources).

Strategy of vaccinating via campaigns

- Keep analysing the priorities with a calculation of attack rates (over time, by age and by location); consider the population density and accessibility of the HZs and earlier VCs, etc.
- Vaccinate over short periods in accordance with the national protocol, but provide enough time for quality vaccination given the resources (about ten days per HZ).
- Enlist the local authorities' help in raising the awareness of the populations to be vaccinated.
- Continue to vaccinate during epidemics, as long as there are cases.
- Delegate vaccination to the MoH in hard-to-access areas while providing, for example, MSF logistical support for the forward/mobile strategy (e.g. motorcycles and dugout canoes).

5. The role of epidemiology

Epidemiology is expected to provide the information needed for decision-making (data → action) at every stage: the initial alert, the investigation, surveillance and activity monitoring. This evaluation shows that these different phases were not sufficiently documented.

The MoH's epidemiological data: not that useless

The reliability, and even lack, of the data provided by the surveillance unit in LBB (formerly B4) are often questioned, and justifiably so. For example, there was under-reporting of cases due to lack of access to care or to negligence. The distance and communication problems between certain HAs, the BCZ and the DPS are exacerbating factors. There was no local data verification, contrary to the 2011 recommendations (to have an MSF epidemiologist inside Katanga – in connection with the DPS/LBB). For example, this would have helped ease any doubts about some commonly-encountered uncertainties, e.g., the artificial increase in the number of cases counted when an MSF team arrives in the field (free care).

Though the system did not perform very well, it did make it possible to sound the alert a week or two late and to monitor the major epidemiological trends (demonstrated objectively by Epicentre's study at the end of the epidemic).

Concrete help in decision-making: surveillance and surveys

An epidemiologist was requested in June 2015 to coordinate the surveillance (and alert) data for the different MSF sections in Katanga. Set up late, in early August, this position did not give the hoped-for results. By September, however, information was being produced apace in the form of maps and epi curves of cases in each HZ*. That work was sorely lacking at the start of the epidemic, in May 2015, when it could have helped the teams make their decisions.

* Epicentre's work formatting the data (by HZ for the four Katanga DPSs) was really formalised in September. That made it possible to retrospectively monitor changes in the curve as the weeks went by, and the analysis caught up by October 2015. Monitoring of the weekly trends became more efficient. Dynamic mapping helped provide a better view of the epidemic's spread (2011 recommendation).

Epicentre conducted four VC surveys in September (W38 – W42). They provided relevant information (1 to 3 weeks later) for the final three vaccination campaigns (three OCP HZs), but were too late for the Malemba HZ (sixteen weeks after the vaccination campaign). In late December – that is, ten months after the epidemic started – a retrospective mortality survey was done in Malemba. Those results will be essential for completing the ongoing reflection on the effectiveness of the OCP operation (treatment and vaccination campaign). They will not have any direct impact, in operational terms, for this epidemic.

Epicentre finalised a tool for evaluating at-risk HZs in early November. It helps the investigation team (with epidemiologist support) prioritise its interventions, but at a time when the epidemic is declining.

MSF/Epicentre is planning a measles sero-prevalence study in Katanga in order to get a more accurate picture of measles protection in children and consider possible targeted vaccinations for populations at greatest risk. Modelling in rural settings* is another subject of interest.

*Measles epidemics have been modelled in urban settings⁸, and the question of the relevance of late vaccination in rural settings came up again during this epidemic. A study about that would still be pertinent.

RECO: The role of epidemiology in response strategies – measles epidemic

MSF

- Dynamically monitor epidemics in the affected HZs (need for Epicentre support in the field/LBB).
- Share the data within the team and outside (MoH epidemiology unit, B4, even D4): make greater use of it in decision-making, lobbying and communication.
- Use the data in a more prospective way for deciding which actions to take (go look for them).
- At the end of the “honeymoon” period, submit a formal request to Epicentre on the need for updated tools, surveillance and epidemiological alert.
- Include epidemiological support in the measles E-Prep to improve the response strategies.

Epicentre

- Keep an advisor at Epicentre for certain countries (with a high risk of epidemics and inadequate surveillance/alert systems) – field-oriented post to be coordinated with MSF.
- Revive research activities on modelling measles epidemics in rural settings – in particular, the impact of measles vaccination campaigns (urban studies already exist).

⁸ Grais RF et al. Time is of the essence: exploring a measles outbreak response vaccination in Niamey, Niger; *J R Soc Interface* 2008 Jan 6;5(18):67-74.

6. Means given strategies used

Because certain resources are “limited”, the Desk decided to intervene in two HZs simultaneously, but no more. That decision was the result of HR availability in April and May 2015.

The handover from the regular Desk to the Emergency Desk was not accompanied by any significant change in resources. The HRO from the regular Desk kept the DRC until November 2015 (that is, a month after the handover between desks), making it easier to monitor the Katanga mission. The regular Desk maintained permanent responsibility for financial monitoring.

OCP’s presence in the country – and in LBB in particular – allowed good responsiveness once MSF intervened, adapting the available resources. As explained previously, there were a variety of reasons for the earlier delays in field operations (*cf.* §4.2).

6.1 Financial resources

Financial resources for this mission were not limited (no fixed budgetary framework), for either the regular Desk (seven months) or the Emergency Desk (three months); to learn anything, we need to look at the overall cost of the operation. Specific analyses are limited because the accounting information was incomplete and not consolidated as of 31 December 2015.

OCP’s financial independence makes it easier to deploy operations, in contrast to other NGOs, who depend entirely on funding from institutional donors. For example, though ALINA intended to intervene in the second half of 2014, it was unable to do so until April 2015, in Kilwa.

The budgets that UNICEF typically allocates range from US\$15,000 to 35,000 per HZ (depending on the size of the target population) and are thus incompatible with conducting stand-alone vaccination campaigns and treatment programmes*. Indeed, doing such activities on an emergency basis requires much more substantial resources.

The paradox is that the MoH takes those inadequate amounts as a reference, asking the local NGOs to work under those conditions (which they agree to do).

*ALIMA reports that it “brought” UNICEF to the field to see the real costs on the ground; the result was a realised budget of more than US\$120,000, despite ALIMA’s well-known frugality.

6.1.1 Involvement/comprehension of institutional donors

The MSF-OCP-NY (advocacy) “Vaccination Focal Point” was asked to do a special study to clarify the institutional donor-related issues (e.g., resources, cold chain, HC support, etc.)⁹.

That included a clarification on the funding mechanisms that have operational impacts. Health centre funding was accused of being capable of eliciting biased reports; as found in 2014, unrealistic VCs (SIA) were reported in an attempt to obtain initial and continuation funding.

In 2015, the UN Office for the Coordination of Humanitarian Affairs (OCHA) made US\$2.4 million available to various partners for vaccination in Katanga. That funding arrived late (in September 2015) and made reading the operational scenario more complicated (Health Cluster/local and international NGOs). The selection was based on several criteria (not communicated) favouring partners already present in the area. OCHA acknowledged that some of the partners were weak and did not have the required operational capacity; it even had doubts about the quality of their responses.

OCP did little or nothing to follow that funding mechanism during the first few months of the epidemic, positioning itself as a mere “observer” at Health Cluster meetings.

⁹ Saitta B. Report Field visit Katanga, measles outbreak, 2015

For the record, OCP got two institutionally-funded grants from SIDA, for a total of about US\$700,000, on proposals by the institutional funding coordinator (about 40% of the total, cf. §6.1.2).

6.1.2 A few comparisons to put things in perspective

In an attempt to analyse the financial resources, the often very different budgets are shown below, for perspective (UNICEF/funded NGOs versus MSF).

*Excluding the cost of vaccines given by the MoH.

Important factors to consider include:

- First of all, the costly mobile/forward strategy across the HZs/very difficult environments to access (exceptional transport logistics).
- The type of activities: single or multiple (vertical measles treatment with or without malaria and malnutrition components).
- Whether or not there is a collaborator: joint/shared actions, e.g., ALIMA for treatment, OCA for the vaccination campaign in Bukama.
- Using national and/or international staff leads to very variable scenarios: when OCP deployed about ten expatriates in one HZ (for example, the organisational scheme in Kapanga with 20 seconded and more than 80 national staff), ALIMA had none (only national staff). UNICEF'S strategy relies mainly on the MoH staff in place (paid by "slingshot").
- The same is true for the logistical resources allocated; these are considerable for MSF and often nonexistent elsewhere. For example, the MoH cold chain covers barely half of the HCs (GAVI funding, among others). As for transport, an MoH nurse often has to do a half-day or more bike ride between the HC and BCZ. Free motorcycle referral systems were nonexistent for medical emergencies; that was set up by MSF.

Breakdown of costs (by budget family)

Figure 6 below shows the cost breakdown (by budget family) for OCP; it is compared with that of OCG, to illustrate the cost of the different strategies (OCP's vertical measles vs. OCG's "3-component" project; cf. ToR, Appendix 1).

For OCP, the total budget validated in July 2015 was €1.7 million for a vertical measles strategy in five HZs. It was over €5.5 million for OCG's "3-headed" activity with multiple foci: Measles & Malaria & Malnutrition (including vaccination campaigns, Malaria Test & Treat, and PPN in the periphery). The number of children vaccinated was 317,399 (OCP) and 187,883 (OCG), respectively.

The operation lasted an average of six to seven weeks per HZ for OCP (cf. §4.4.2) and eight to ten weeks for OCG (see separate evaluation).

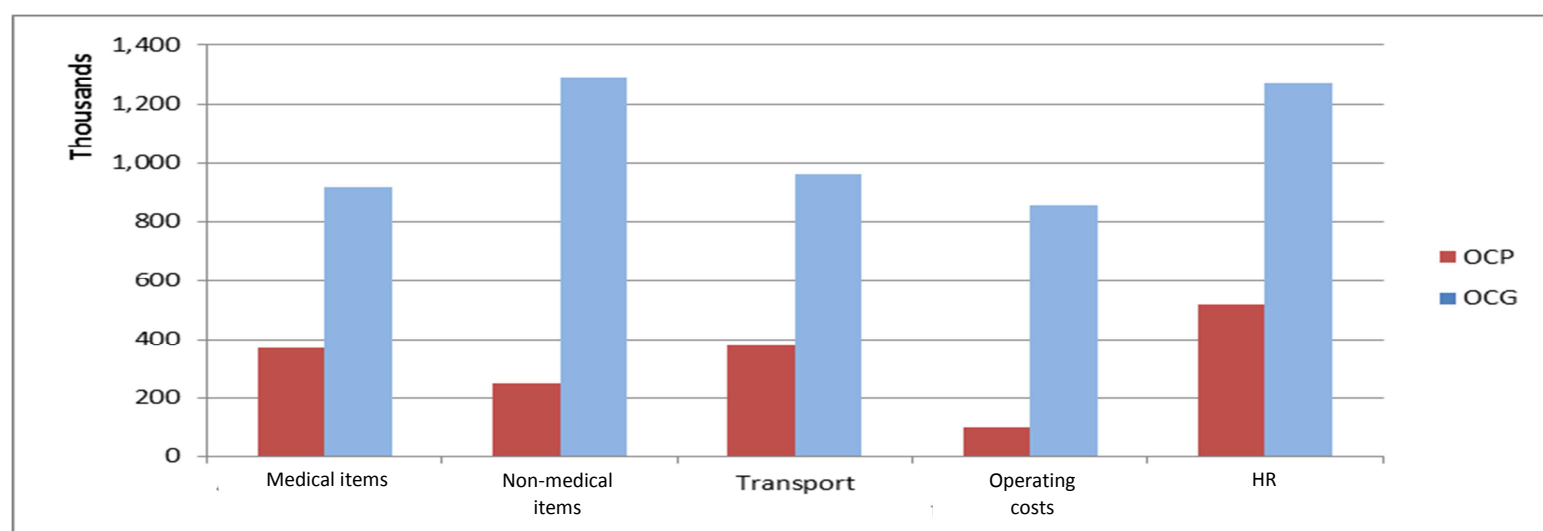
The cost breakdown by large family does not show significant disparities for medical and non-medical resources, which were about 40% of the total.

The high transport costs, accounting for about 20% (in five HZs for OCP vs. 3 HZs for OCG), are in large part explained by the considerable resources needed to reach the most remote areas. A non-negligible portion of the motorcycles were dedicated to medical referrals.

HR costs (national and international) represented 30% and 23% of the total budget for OCP and OCG, respectively (cf. Figure 6).

The kinds of expenditures connected to other subcontracted costs and services are not shown here (about 15%).

Figure 6: Breakdown of costs in euros (by budget family) for MSF-OCP and OCG, for two different response strategies, Katanga, DRC, 2015.



Source: MSF

Estimated cost per vaccinated child

To give a rough idea, an estimate helps illustrate some significant differences between operators; this allows a comparison of budgets for different strategies and different activities (*cf.* ToR, Appendix 1). The calculations are done based on the most recent known budget estimates, including coordination. The exact budgets are not given because they have not yet been consolidated.

-For four “comparable” NGOs with “vertical” measles activities (Alima, OCBA, OCA and OCP), the average cost per child vaccinated is US\$5.6/child, all activities combined.

-For the reasons stated previously, UNICEF is well below what is needed, at US\$0.4/child, which is not compatible with acceptable quality operations (only includes vaccination and depends on MoH staff and logistics).

-Regarding OCG, the budget is large because the multisectoral activity must be taken into account (measles treatment and vaccination, malaria “test & treat”, nutrition/PPN, etc.); here the cost exceeds US\$30/child (analyses in progress in January 2016). The coordination that needs to be set up in LBB also needs to be taken into account.

Table 7: Cost per child vaccinated: overall estimate, Katanga measles epidemic, 2015.

NGO	Cost/child US\$	Children vaccinated	Number of HZs	Comments
ALIMA	3.09	153,258	3 HZs (8-> 4 HAs)	Vacci + Treat + screening (PPN by WFP)
UNICEF	0.41	568,862	16 HZs (272 HAs)	Vacci
OCBA	8.70	115,326	2 HZs	Vacci + Treat + MUAC (6-59 mos.)
OCA	4.54	150,354	4 HZs (+/- whole)	Vacci +/- Treat
OCP	5.96	317,399	5 HZs	Vacci + Treat

Misjudgements/variable bonuses (too variable?)

The MoH has asked several times for transparency on the MSF budget and for “traceability of funds” = the possibility of having the bonuses to its facilities and staff deposited directly into its bank account. The MoH (DPS/MCZ)’s more or less

hidden reason is, apparently, to strengthen its negotiating position regarding the intervention conditions (bonuses, supply donations, etc.). While this is inconceivable, it needs to be explained to the partners again (*cf.* §7).

The DPS and MCZs frequently expressed their satisfaction with MSF's logistical capacities, but also their unhappiness concerning the remuneration of certain positions (EPI supervisor for the branches or the BCZ, etc.). MSF felt that there were too many of those positions, or that they were outside the HZ – a decision that may have appeared arbitrary to the people at the MoH.

The eternal question of the gap between MSF salaries and the MoH staff bonuses was also brought up on a regular basis. Non-relocated, non-supervisor nurses employed by MSF are paid about US\$ 330/month, or US\$ 15/day; this is more than twice the US\$6/day bonus paid for activity in a general reference hospital or at a vaccination site (in addition, MoH staff do not receive employer contributions or medical care).

MSF sections helped fuel to those complaints with bonuses that were not just random from one section to another, but also differed significantly from one HZ to another for a given section. For example, the Administrator/Manager of the general reference hospital would receive either \$125 or \$250/month, based solely on his location.

RECO: Financial resources to consider/emergency measles treatment

- Train administrators to monitor expenditure items, especially the largest ones, during vaccination campaigns (transport, cold chain, HR, medical inputs).
- Make the teams more conscious about monitoring clear indicators (number of days worked, number of teams, etc.) to get a more accurate estimate of the operation's cost.
- Analyse and know the amounts committed in order to optimise resource use at all levels –particularly in the field.
- Cultivate enough curiosity to gain an overarching view (compare/know the strategies of MSF or other organisations).
- Measure the operational implications of institutional donors' late funding of other NGOs (and draw conclusions regarding its impact on MSF; the current ignorance is bad for MSF's positioning).
- Give project coordinators and administrators the resources and know-how to present and negotiate the choice of MSF activities (bonuses, MoU, etc.).
- Harmonise the bonuses between sections and between HZs (differences are too large).

6.2 Human resources (HR)

This is not meant to be a complete inventory of resources, but rather to highlight the things worth thinking about for conducting the desired strategy (vertical/emergency/measles).

Schematically, the human resources situation can be analysed in three different phases:

Start-up phase: March to June 2015: the outbreak response was run by the regular Desk, whose coordination was based partly in Lubumbashi, partly in Kinshasa. The response at that time relied on experienced national staff (from the PUKA/reserve pool or seconded from regular projects), some of whom had worked on previous vaccination campaigns (in 2011, for example – *cf.* §6.2.1). Key positions such as Medical Coordinator and Medical Advisor could thus be filled for Katanga.

Phase 2: late July to mid-October: the emergency coordinator was based in LBB and in the field. He was autonomous (no financial limitations) and reported to the regular Desk. Based in LBB, his experience would act as an engine for the operations conducted and in the field, where he himself went.

Phase 3: from mid-October on: the Emergency Desk took over, after which the project was independent of the regular DRC coordination office, the Emergency Coordinator reporting directly to the Emergency Desk.

6.2.1 Regular Desk presence in LBB

OCP, which has been in LBB for several years, has a sizeable HR pool (and “reserves”, in particular) that made it possible to assemble people on the spur of the moment, especially at a time when international staff were in short supply. That was extremely helpful – essential, even – during the visa “crisis” (cf. §6.2.2).

Though the coordination was in LBB, the team was split up in early 2015 (HoM and MedCo in Kinshasa) and was available only sporadically for a variety of reasons (problems replacing the LogCo, HoM seconded, Emergency Coordinator not yet arrived, no FiHRCo in LBB, etc.).

6.2.2 The HR shortage: why?

Several problems particularly exacerbated the HR problem: the summer vacation in Europe, coordinators with job experience and the ongoing visa problem.

Starting in May 2015, it took more than a month to obtain entry visas to the DRC. That change in the usual procedure was unforeseeable, and there were no possible shortcuts. That caused an unfortunate delay in the arrival of MSF teams and activity start-up.

It was also increasingly difficult to find staff, especially people with experience, during the summer (expatriates return to their families during their July-August break).

The initial needs were underestimated in Malemba*, particularly staffing for the MTC. Due to poor “real-time” information transmission, headquarters did not become fully aware of those difficulties until much later (when the first expatriate teams returned to Paris in June 2015).

*HR planning was also based on the numbers: while the number of complicated measles cases was estimated to be 152, 952 children would ultimately be treated at the MTC. That estimate, which was based on an attack rate of 500/100,000, was adjusted for the other HZs.

6.2.3 Ad-hoc solutions to the HR shortage

The shortage of field staff had to be managed at various levels from execution to coordination, especially since the skill level of locally-recruited staff in Katanga was considered too low.

Some helpful information

- National staff was seconded from regular projects (Kalemie, Rutshuru, Goma, etc.) to come help in Katanga when activities started. For example, national administrative assistants were made available to the Katanga teams. Their value-added (knowing the context and procedures, having mastered the software, being accustomed to the procedures, etc.) was considerable and especially necessary given that the expatriate administrators were “first missions” or inexperienced. That set-up, together with the ability of those duos (experienced national + first mission expat) to link up the various field projects, made daily administration – though reputed to be difficult in the DRC – possible (rapid HZ openings and closures). From June to September 2015, ten or so seconded staff members (from all occupations) were asked to fill in for roughly two-month periods while the relocated staff from Katanga took their breaks, thus allowing some degree of continuity.

- Flying paediatrician: From the start of the projects, in order to reduce hospital mortality, there was talk of sending paediatricians and experienced MSF national staff not just to fill supervisory positions but also to work in the inpatient

units to ensure quality of care. A flying paediatrician position was created, and was frequently cited by the other doctors as being highly relevant.

- There was a “reserve pool” in LBB that was used to fill in any gaps among the former PUKA members and seconded staff. Just a file of names to remember, the pool required no financial commitment but made it possible to find competent staff quickly. It now includes about ten people per sector (medical/paramedical, logistics, administration, etc.). MSF does minimal, informal follow-up on these people.

- Regular coordination team support consisted of numerous “reassignments” to fill vacant positions*. Those reinforcements were generally for short periods of less than a month.

*The HoM would fill in as PC, an FM admin would become Emergency FiHRCo in LBB after a stint in the field, the LogCo, theoretically based in KIN, would stay in LBB to be as close as possible to operations, the KIN HRCo would go help the Admin Assistant seconded from Rutshuru to Lwamba redo all the national staff contracts due to incorrectly-quoted salaries. Those reinforcements were generally for short periods of less than a month.

- When the decision was made not to intervene in Kitenge, and then Kayamba, the teams were quickly and fairly naturally redeployed according to the needs at other projects.

Lastly, headquarters support for Katanga/LBB took the form of a fairly limited number of visits (Vaccination Focal Point, Superlog and HRO), but above all regular email contact. Few or no members of the desk went to the HZs in the field, which is unfortunate.

The limitations in alternative solutions due to HR shortages (autonomy)

Despite the arrival of experienced national teams, their lack of autonomy was stressed. Finding themselves more or less isolated with new responsibilities, some logistics supervisors were uncomfortable with certain technical aspects (e.g., the LBB base log’s lack of vaccination experience). In addition, they often had to deal with inadequate planning and organisation – for the cold chain, in particular. That lack of autonomy bred a lack of initiative that was unfortunate, since it made things worse for the already very busy teams.

Though the MSF teams reported good initiatives, application suffered due to a lack of follow-up in the execution. Though the original idea was to place seconded national staff in “simple implementer” positions, they ended up in supervisory positions. In order to give them those positions, other previously-recruited staff had to be “downgraded”, causing unnecessary tension in the field. That also dangled career opportunities that weren’t real in front of the seconded personnel.

Ad-hoc measles training not done

During previous vaccination campaigns in 2011 and 2013, one-day “measles briefings” had been held with the idea of preparing all of the actors in a measles epidemic to run a campaign, from both a medical and logistics point of view.

The value-added of such training had been heavily emphasised, and it is all the more regrettable that it never happened, since the field teams made a point of saying that they lacked practical knowledge. The delay in obtaining visas would have made volunteers readily available.

The field teams found the MSF measles guidelines a great help in both treatment and vaccination (medical and logistics aspects), but felt that the topics that are undergoing change (such as hospital care, needs assessment, etc.) might be worth reworking.

6.2.4 Integration of local/MoH teams

The integration of MoH teams in the field caused some difficulty for MSF teams. The MoH staff in Lwamba, for example, was described as less effective on the unit because they were working in both the MTC and the hospital (in a different

unit) at the same time, and that overload compromised patient care. When the PC position in Malemba was handed over in June 2015, there was a request that MSF staff be chosen for intensive care, if possible.

Skills problems were reported often; some of the nurses at the Malemba site had trouble reading the thermometer for the vaccination campaign.

In the peripheral health centres, the RNs were called in for trainings and meetings at least monthly by their chief medical officers. That meant that RNs were gone for about a week out of every month from their HC, which was left in the hands of the assistant nurse, whose skills (in care and data collection) were often questionable. The issue of including those assistant nurses in MSF trainings is a pertinent one.

RECO: HR in a measles epidemic

- Foster autonomy among experienced MSF national staff with a real career path policy.
- Ensure follow-through; too many worthwhile initiatives don't go anywhere (good ideas should be followed by concrete actions).
- Train expatriate staff before they leave for the field (as was done in 2011 and 2013).
- Continue ad-hoc trainings in the field (the "mini-outbreak response" course, for example)
- Facilitate the placement of experienced MSF teams in sensitive positions (e.g., Intensive Care) and consider the skill level of MoH staff.
- During epidemics, include RNs and assistant nurses in MSF trainings in the periphery and at the MTC.

6.3 Logistics resources and medical supplies

The necessary resources were available locally so that a response could be launched quickly*, unlike in 2011, when the time required to get medical supplies from Zambia (due to customs clearance problems) delayed the start of the operation.

***E-PREP** available onsite in LBB: expo kit (treatments for 70 uncomplicated and 20 complicated cases); intervention kit (treatments for 1,600 uncomplicated and 400 complicated cases); vaccination supplies for 100,000 vaccines; and cold chain for one vaccination team.

6.3.1 Substantial resources – difficult deployment

MSF worked in rural HZs, where access was very difficult (bad or nonexistent roads). Logistics prepared for moving from one HZ to another, completely moving the bases, the stocks and the resources for each operation. Seventeen vehicles and three lorries helped with the moving, and an intersection plane became available in August 2015.

The vaccination campaigns required enormous organisational effort, to ensure transport and high quality cold chain for forward and mobile strategies. The MoH cold chain was only 40% functional (MoH report). In that context, MSF had to be completely self-reliant (active/passive: refrigerators, generators, RCW25, ice pack transport, etc.). Transporting the ice packs and resupplying the teams (by motorcycle, dugout canoes, etc.) required 20 to 25 motorcycles/day for each HZ. More than 2,000 ice packs were needed per operation; an HZ like Malemba only had 300 at the central office (only one domestic refrigerator, the rest of the freezers were out of order, etc.).

Only one cold chain was originally planned, though two teams were working simultaneously. That could have been anticipated. A plane should have been chartered from LBB to Lwamba to move already-frozen ice packs. The second cold chain was not in place until October 2015.

There is a UN/MoH plan to install solar refrigerators (in 20% of HCs in 2016 and more over the next 5 years).

6.3.2 Supply

Medical stock

The first medical order was drawn up in late May and validated on 3 June 2015. The first delivery arrived in LBB eight weeks later. The amount of time it took MSF Bordeaux (very busy in 2015) to process that order was long for an emergency operation. It was due, among other things, to a misunderstanding about the urgency of the order, as it was submitted by a regular desk.

As stated in §6.2.2, the needs in Malemba were underestimated, and that applied to the medical needs as well.

The Goma stocks were used to make up for those shortfalls and prevent significant stockouts. The impact on patient care was minimal.

Vaccine problems: constraints and delays

Prior to the epidemic, measles vaccines were stored in Kinshasa (intersection stock managed by MSF-OCB), though the EPI continued to monitor their use. That was not anticipated. The order was given to MSF-OCB on 2 May (two weeks after the teams arrived). The authorisation for use (after EPI supervision) was given on 12 May. Hence the vaccines arrived in Malemba two weeks late. Subsequently the teams would use EPI vaccines and then MSF vaccines with no authorisation requirements or supply delays.

RECO: Deployment of logistical resources and medical stock

- Keep an E-Prep in LBB (including logistics and medical stocks).
- Determine the number of teams needed and adjust the resources accordingly (medical orders, cold chain, operational bases, etc.).
- Maintain substantial transportation resources for rural intervention campaigns (forward and mobile strategies).
- Maintain a truly autonomous OCP cold chain (absolutely essential due to the lack of MoH resources).
- Follow the existing MSF intersection procedure for vaccine orders (notify the EPI).
- Plan medical orders (including vaccines) ahead, taking the supply constraints and follow-up needs into account.

7. LOBBYING

There were a number of worrisome issues during this epidemic. Lobbying efforts might focus specifically on several operational questions, and the following have been targeted:

- Alert as relates to declaration of the epidemic by the Congolese authorities (dependence on technical issues like laboratory confirmation at the Kinshasa INRB, and political issues as well).
- Mobilisation of partners (MSF or others) to participate in the emergency measles response.
- Power issues at the government and MoH level and administrative complications.
- MSF intersection's role.

7.1 Late alerts/Late epidemic declaration

There was a delay in declaring the epidemic in every intervention HZ, due often the factors below. Lobbying efforts might be considered for each:

- The principle by which an epidemic is officially declared, which requires waiting for three positive laboratory results (3+): "probable" epidemic status based on a doubling of cases could suffice for triggering an operational response.
- The delay in collecting and, above all, sending the tubes of blood (in the cold chain) to Kinshasa. There was also a lack of follow-up on these samples by the MSF teams and the MCZ. The teams were too passive during the nearly two-month period in which the INRB had no reagent (October-November 2015).
- The INRB's delay in analysing and forwarding the results and the dependence on only one laboratory in Kinshasa (weak link).

7.2 Partner mobilisation

The OCP Desk's initial objective was to participate in the measles response in five HZs and to mobilise other actors for the other HZs, in order to avoid what happened in the 2011 epidemic (where MSF conducted nearly 50% of the activities).

The other MSF sections were asked to help at the Vaccination Working Group and the MSF inter-desk meeting. OCG and OCBA intervened in August and September 2015; OCB did not intervene in Katanga (OCA was already there, and intervened in Kikondja in June).

Even OCP's HoM admitted that MSF should have been more involved in lobbying the MoH around the long delays and getting official declarations/alerts earlier. All OCP did to sound the alarm about the scale of the epidemic and the need for other actors to intervene was put out a press release in June and September 2015. There was no further lobbying by OCP or anyone else.

One of the biggest difficulties is the problem (which has existed for years) of approaching the EPI management – the primary partner – to seriously discuss, again, the vaccination strategies orchestrated by MSF during vaccination campaigns.

7.3 Power issues/administrative complications

Despite some improvement since 2011 in MSF's relationship with the health authorities, DPS/MCZ expectations continued to increase, creating tensions – especially from September on (*cf.* §4.4.1). That was when the funds for Health Cluster NGOs were released. Once that happened, it was as if the MoH no longer had any use for MSF.

Though having numerous partners for response vaccination was a good thing overall, it meant an attitude change that MSF-OCP had not anticipated, especially in Kinshasa (*cf.* §6.1.1).

7.4 MSF intersection's role/"absentee" vaccination focal point

The role of the intersection "vaccination focal point" person in Kinshasa should have been to collect and analyse vaccination-related data, monitor MSF's vaccination action plan in the DRC and to lobby the MoH* on pressing matters such as epidemic declaration and vaccination campaigns on behalf of the various MSF sections.

The 18-month vacancy in that position explained the gaps in terms of lobbying during the epidemic:

- No preparation after the "honeymoon" period in Katanga (joint epidemiological surveillance, etc.).
- Little or no lobbying during the delay in declaring the epidemic in the DPSs and the first HZs affected (no speed-up in response to the ongoing epidemic emergencies – rather passive attitude).
- No negotiation in Kinshasa on the vaccination strategies.
- Lack of proactivity regarding certain essential high priority problems (e.g., the INRB lab, the disastrous cold chain: not enough ice packs, often replaced by plastic bags filled with ice cubes, in the periphery, etc.).

*In 2012 MSF decided to set up a vaccination focal point in several countries (DRC, CAR, Chad and South Sudan). That approach has been effective in South Sudan.

MSF's weight in the DRC

The financial weight of the five MSF sections for the 2015 measles epidemic was close to €10 million. Hence MSF's substantial contribution should certainly be used during negotiations to get better recognition of MSF activities. Perhaps that could help preserve our working space with the MoH.

RECO: Lobbying needed at various levels (to be continued)

- Make the principle for declaring a measles epidemic more flexible and dynamic (from the doubling of cases to laboratory confirmation and actual authorisation to vaccinate).
- Have MSF representatives from headquarters do a "lobbying tour" in the DRC and internationally to protect MSF's operational interests (the country coordination teams can take over later, using a schedule that continues over time, ahead of the next epidemic). The vaccination advisor and OCP operations director did this effectively in 2012.
- Use the financial weight of the five MSF sections working in the DRC in negotiations with the MoH.
- Mobilise all measles response actors at the start of the epidemic (capitalise on the intersection success in Katanga).
- Clarify the expectations and positions of each actor at every level (HZ, DPS and national), on MSF's role in particular.
- Facilitate the procedure for collecting samples and sending them to the laboratory (e.g., lobby for the use of filter paper) and advocate for the creation of a reference lab in LBB.
- Re-energise the intersection dynamic, which slowed considerably in 2015 (paradox – epidemic period).
- Revive the research on a heat-stable measles vaccine. Access campaign?

8. DISCUSSION

“Short vertical” versus “comprehensive integrated” operations

One of the major questions posed at the start of this evaluation was the relevance and efficiency/effectiveness of the (emergency) operational response relative to the available OCP resources. That was analysed as a function of the operational context – in Katanga.

The strategies used can differ operationally depending on MSF’s chosen objectives. Obviously, a vertical strategy targeting measles only will be faster and require fewer resources than a comprehensive strategy that includes other deadly diseases (such as acute malnutrition, epidemic malaria, etc.). OCP chose the short vertical strategy, based also on the resources available (other emergencies in progress).

Others opted for a more ambitious, comprehensive approach, including treatment for measles, malaria and malnutrition in both the hospital (paediatrics) and peripherally (HCs and community liaisons). That was the case with OCG, for example. In addition to treating those three conditions in the paediatrics unit, they used outreach activities (three components): measles vaccination campaigns, malaria “test & treat” and Plumpy’Nut distribution to children with severe acute malnutrition (MUAC<115 mm and oedema). Though it was intended as an emergency project, it was more cumbersome to set up.

The measles-only vertical strategy (treatment + vaccination) provided an efficient emergency response (six weeks per HZ), while the more integrated “3-headed” strategy required substantial resources and took longer (> 2.5 months per HZ). In terms of effectiveness, the first strategy offered the only opportunity to better control the spread of the measles epidemic, while the second option provided broader coverage of the most common childhood diseases (measles, malaria and malnutrition together account for about two thirds of the reported morbidity and mortality in Katanga). More research is needed to assess the impact of those strategies, as descriptive data alone are not enough. The OCP and OCG Operations Directors have suggested sharing the evaluations/reflections regarding their strategies (advantages/disadvantages/measurable results, etc.).

Given those elements, it is hard to decide which of the two approaches is better, since they depend on the local context and what precise objectives MSF chooses. Hence the urgency of a vertical strategy is justified during a measles epidemic (e.g. Malemba); it is relevant outside of the seasonal malaria peak or when the prevalence of malnutrition is not high (the case in 2015 for OCP). Elsewhere, if the need exists and conditions (access and resources) allow, a more integrated strategy (including specific activities to control and treat malaria and/or malnutrition) might be preferred.

We should keep in mind that acute malnutrition frequently occurs at the tail end of measles epidemics, as was seen in Katanga in 2015 (and before). That is what happened for OCG in some Tanganyika HZs like Manono (with the nutritional crises in late 2015). It would therefore have been better for OCP to do at least minimal follow-up on this issue as it left each vaccinated HZ. OCP failed to measure MUAC systematically during vaccination campaigns in a context with no comprehensive malnutrition care. That choice was questionable.

In terms of malaria, in September OCP mentioned, in the field, the possibility of doing “test & treat”. It was ultimately not done, despite the fact that the rainy season was starting. Had there been a marked increase in malaria cases, they would

of course have considered including that component (it would have required much greater human, financial and logistical resources; cf. OCG evaluation).

MSF vs. MoH/WHO vaccination strategies

OCP managed to get around the MoH's usual rule that measles vaccination campaigns should take no more than five days per HZ (MCZ misunderstandings were reported). In fact OCP's campaigns took ten days per HZ, which was a satisfactory result (this was true in three HZs, but not in Mukanga, where the campaign took two weeks). The explanation for that reasonable amount of extra time was the decision to vaccinate along at least two main roads per HZ, out of a justifiable desire to do high quality vaccination. That strategy should be retained, because it proved effective in the long run (six months later), when there was no secondary rebound in the epi curve (no resurgence in cases).

Others conducted longer campaigns in Katanga (Haut-Lomami and Tanganyika) with more delayed effect on the control of measles-related morbidity and mortality. In some cases the delay was such that the epidemic continued to flare up.

The MoH also demanded that all of the health areas (HAs) in a given HZ (about 25 HAs/HZ) be vaccinated right away. In theory, MSF should have been able to base its decision on an analysis of the attack rate in each HA, but that was difficult in practice (data not available until after the fact). More dialogue between MSF and the MoH on this point would be desirable. OCA's attempt to vaccinate only one HA in the Kikondja HZ failed to contain the epidemic in that HZ. As it turned out, OCA was forced to vaccinate the rest of the HZ a few weeks later (about 20 HAs). Given the highly contagious nature of measles, one should not hesitate to vaccinate more widely right away (several HAs or HZs). Coordination between actors was essential, especially in dividing up the HZs between NGOs (fairly constructive between the MSF sections in LBB in 2015). OCP's choice of age group (6 months to 10 years) was relevant in this context.

OCB, which is based in Kinshasa (near the D4/epidemiology), recommends very early intervention with dedicated teams; the principle is to contain the spread of the epidemic very locally (this is their so-called "*coup de poing*" – hit early, hit hard – strategy. That approach scored several successes (documented). There is no assurance, however, that it would be appropriate in remote health zones like Katanga's, due to delays in the transmitting epidemiological data and the rapidly-mobilised dedicated teams.

As a reminder, past experience has shown that in outbreak situations as extensive as the one in Katanga (extending across several HZs), epidemics can last nearly a year. That was again the case in 2015, with measles quickly spreading across all four health divisions (especially Haut-Lomami and Tanganyika). It was still relevant, however, to mass vaccinate HZs where there was an epidemic, as long as the outbreak was progressing (modelling studies in rural settings are nevertheless needed/impact measures desired by MSF). The delay in vaccinating the Manono (Tanganyika) HZ – due in part to how long it took to set up the 3-component treatment strategy (about 4 weeks) – ultimately complicated the control of morbidity and mortality (OCG).

MSF's place/resource shortage in the DRC/lobbying

An exacerbating factor for this region, in MSF's absence, is that there are few effective resources for forward and mobile strategies (terrible transport and cold chain logistics). The same holds true for medical care, which is particularly unreliable. MSF's presence makes a difference, as evidenced by the systematic increase in the number of measles cases

that were seen as soon as free treatment was available (either at the MTC/hospital or peripherally, via HCs/donated MSF kits). Those donations helped reduce the high measles mortality rate and should continue, along with medical care; vaccination campaigns are necessary because they are an essential addition in fighting and controlling such epidemics.

It is important to remind the teams that in order to be efficient and effective, both activities (treatment and vaccination campaign) have to be done at the same time.

OCP made the choice (relevant, given its resources) to operate in a pre-determined number of HZs (five) with epidemics, in the hopes of convincing the other MSF sections or other NGOs to take on new HZs with epidemics. Despite a substantial delay (several months), that did not really happen until the second half of 2015. That approach is in keeping with OCP's institutional position of not being the only major actor, as had been the case in the 2011 epidemic.

Such a choice is conceivable in the future if MSF really lobbies the Congolese and international partners to remind them of their responsibilities. Obviously, such lobbying would be much more productive if it were an intersection effort that followed a particular agenda. Institutional backing by the different headquarters would be essential.

9. Conclusions/major results from the evaluation, OCP response – Measles Katanga DRC

The evaluators have chosen to conclude in this section with the major points/operational results. ***The specific recommendations are listed in each section throughout the document.***

Overall, the OCP response was effective once operations were launched. However, the delay in diagnosing the epidemic was very unfortunate (unacceptable delays) and needs to be corrected (MSF, MoH and Health Cluster responsibility). MSF-OCP made strenuous efforts to adapt its strategy (time, place and age); the MSF movement can use its financial weight (€10 million in Katanga) to force progress on the fundamental issues (*cf.* this report).

A measles-only control strategy: still valid in this context

MSF-OCP's response to the 2015 Katanga measles epidemic was based on a fairly standard vertical response strategy targeting measles treatment and vaccination (six weeks per HZ). That response proved relatively effective, targeting children 6 months to 10 years in a maximum of five HZs (as originally planned). OCP counted on other sections or NGOs intervening, which they did – a fair amount of time later (often several months late).

On the whole, that strategy was reproducible and controlled the spread of the epidemic; the “foreseeable” effects of the vaccination remain to be seen during the next “honeymoon” period.

Treatment and vaccination campaigns: should be done in parallel

MSF's hospital treatment capacity proved indispensable for complicated measles cases and for controlling the (initially high) mortality rate – in special treatment units. It had to rely on outreach activities (detection/referral).

The teams should do everything they can to conduct vaccination campaigns at the same time, as early as possible (review the factors behind the significant delays – correctable aspects).

Comprehensive treatment or not (a question of needs and resources)

The decision to target measles only helped limit the resources needed over time, moving rapidly from one HZ to the next (without including outpatient malaria or malnutrition treatment). That choice was feasible at the time in the context of Katanga, where it was not malaria season and the prevalence of malnutrition was low (SAM not monitored after six weeks – MSF end date in each HZ). Though the possibility of having to add those components must be considered, doing so would require a much more complex comprehensive approach (substantially more resources, and a much longer operation).

Pool of available human resources

This operation was made possible, in large part, by the presence of national staff, and they should be followed with a real HR career path policy (HR already in a position or in the reserve pool). None of the staff, either national or expatriate, received measles training (ad-hoc workshop). The presence of skilled specialists (supervisors or not) is essential to compensating for the HR shortage.

Early alert and epidemic declaration principles

The delay in triggering the alert was inherent in the current Cluster-based system. MSF-OCP should nevertheless remain very proactive with regard to the epidemiological information available (including results from the INRB laboratory, which condition the official epidemic declaration). It is essential to stay informed of national and international issues and develop a lobbying strategy if justified (various possible priority subjects: *cf.* this report). It is important to validate the results achieved with retrospective VC and mortality surveys – communicate internally and externally.

**ToR (15 October 2015): Assessment of MSF-OCP Measles Response,
Katanga DRC**

Context

In the DRC, measles has been one of the eight diseases of epidemic potential targeted by the Expanded Programme on Immunisation (EPI) since 2000, and is in principle reported weekly. Measles surveillance began in 2004 in six provinces (Nord-Kivu, Kasai-Oriental, Kasai-Occidental, Sud-Kivu, Maniema and Katanga), and was extended in 2005-06 to five others (Equateur, Orientale, Bandundu, Bas-Congo and Kinshasa). Since 2006 there has been an emphasis on decentralisation (provincial health ministries).

Since 1978, the EPI has done measles vaccination with a single injection between ages 9 and 11 months. Catch-up campaigns have existed, in theory, since the early 2000s (SIA) to cover children ages 6 to 59 months. National vaccination coverage has nevertheless remained low – below 80% (from 63% to 72%) according to two surveys (DHS 2007 and MICS 2010); and 74% as measured by the MoH 2012 vaccination coverage survey, with significant differences between provinces. There are multiple reasons for the low coverage (access, security, supply, cold chain, planning, available funding, unmotivated HR, etc.).

As a result of these shortcomings, Katanga has frequent large-scale measles epidemics. These epidemics occur about every three to five years; they culminated in Katanga in 2011 and affected other provinces as well.

Critical review

A critical review has been suggested in order to provide an overview of MSF-OCP's ongoing measles outbreak response operation in Katanga, which began in May 2015, and to identify avenues for strategic and operational development that go beyond the 2011 recommendations (discussion: OCP Paris Eval. Unit/Operations/ Epicentre).

In 2010-11, Médecins Sans Frontières conducted an outbreak response operation, vaccinating about 3 million people. MSF-OCP teams vaccinated 1.5 million children over a period of 10.5 months, and treated 51,000 cases. There were MSF operations in twenty-three health zones (HZs) and 280 health areas; the teams supported 193 health centres and thirteen hospitals. The budget was 5.3 million euros, half of it allocated to vaccination.

Four years later, in early 2015, a new epidemic of measles cases was reported in Katanga. In April, after a request by OCA – which is based in the Kikondja HZ – MSF-OCP deployed its first teams in the field. The outbreak response began in Malemba Nkulu in Week 16 (W16). With the epidemic continuing to spread, operations were deployed in other Haut-Lomami HZs (mid-April to October): Lwamba (W30), Mukanga (W26), Mulongo (W35) and then Kitenge (W39), to complement the communication and lobbying effort around the epidemic declaration, the appeal to other actors to intervene and the mobilisation of institutional donors.

The realisation that they were powerless to control the epidemic came quickly: two HZs had epidemics in March, thirteen in June and twenty-three in September.

After the call from OCP, MSF-OCG arrived in Katanga in late June and positioned itself in the Tanganyika District's Kabalo, Ankoro and Manono health HZs.

By mid-July, OCBA – recently arrived in Katanga – was treating measles cases in Haut-Lomami's Songa, Kamina and Kinda HZs. OCA, for its part, was operating in Bukama, Mitwaba and Kiambi.

By September, there were (or had been) MSF operations in fourteen of the 23 HZs with epidemics.

Due to numerous determinants (the progress of the epidemic, the data available, the timing of the deployment, the human resource availability and constraints, etc.), a number of **different operational response have been attempted in the five health zones currently covered by MSF-OCP**, in terms of either treatment or vaccination.

The proposed reflection will look at the ongoing outbreak response in Katanga and the necessary evolution of our operations with regard to known constraints.

At the same time, Epicentre will conduct a study in collaboration with OCB to determine the prevalence of measles antibodies in children from age 6 months up to their 15th birthday in surveyed health zones, with the goals of improving our immunological knowledge of the populations from 6 months to 15 years and better orienting our future operational strategies.

Overall objective

- To evaluate the strategies that were preferred or feasible at OCP as a function of the constraints and allocated resources.
- To evaluate the coherence of OCP's different operational responses in the field (relative to the recommendations issued at the end of the last major measles response in Katanga, in 2010-2011).

Specific objectives

1. Operations: treatment and control of the epidemic in Katanga

To analyse the timeline and relevance/efficiency of the actual operational choices and of the preferred strategies in the DRC context*:

- o Responsiveness (time taken to make a decision);
- o Patient treatment strategies;
- o Vaccination strategy (age, timetable, etc.);
- o Major constraints (identified or not by the decision-makers – actors – stakeholders);
- o Coordination: consider the internal OCP (and intersection, if applicable) operational coordination and the coordination with the authorities and with other actors in the DRC at the various levels (WHO, UNICEF, EPI, MoH, Crisis Committee/measles, Health Cluster, etc.).

* Taking into account the recommendations from the Global Measles and Rubella Strategic Plan, 2012-20, MSF Policy Paper and the Measles epidemic in Katanga (2010-2011) review.

2. The role of epidemiology

To analyse the role of epidemiology (including Epicentre) in the operational process: decision-making, surveillance, investigation of new foci and usefulness of data.

- o To verify the role of surveillance in decision-making and operational choices.
- (Steps/decisions/areas to vaccinate, age groups, adaptation of strategies).
- o To assess the results of the operation according to the available data and pre-established criteria ("flexible indicators" needed for decision-making; population density, number of patients treated and hospital case fatality rate, population mortality rate, attack rate, number vaccinated and coverage, etc.)

3. If possible, to analyse the adequacy of the resources according to the available data (in this case, use an ad-hoc consultant for these analyses).

- o Indicative analysis of the cost of treatments and vaccination (according to the raw data) (see feasibility analyses of pilot data/1 zone).
- o HR (same as above): analysis of the human resources/vaccination needs (and also the key positions: coordination, know-how, management/supervision, first missions, briefing/ preparation of participants, etc.).

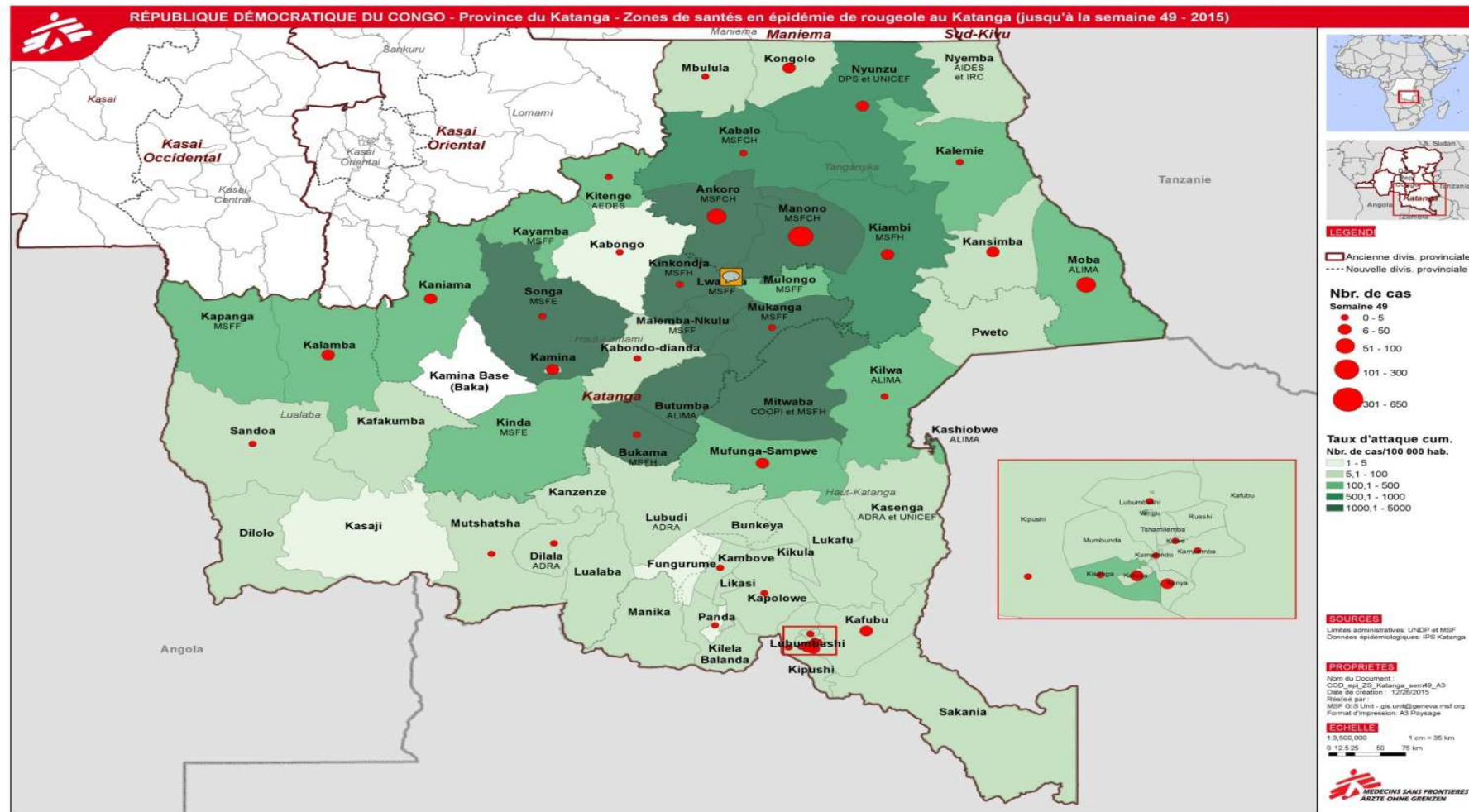
Critical review resources: 2.5- to 3-month consultancy

- (Including preparation with OCP teams at various levels = documentation – data – interviews. Analyses; preliminary mid-term results/field feedback (1st circle) – report and PPT = ad-hoc presentations, internal debates if pertinent).
- Active participation by the desk and support for the project by coordination and field teams and support departments essential.

Resources/CODE SDG EVA (Evaluation Unit) + OCP field treatment

- One senior consultant specialising in subjects related to vaccination and corresponding operational strategies (3 months).
- One supervisor (Evaluation Unit manager) – experienced in vaccination projects (MSF and elsewhere).
- Consider an ad-hoc/resource evaluation consultant if needed.
- Field visit to the DRC, two to three weeks.
- Sharing of preliminary results with the desk before final report and issuance.
- Ad-hoc meetings decided on and organised with the desk (and other operations and support stakeholders).
- Translation into English if pertinent (was the case in 2011, last evaluation).

Appendix 2: Map of Katanga HZs and measles attack rate, W1 - W49, 2015.



Appendix 3: Timeline of MSF-OCP measles operations by HZ, Katanga 2015

