







Exploring community dynamics around the plague outbreak in Ituri province, DRC

© UNICEF Izzy Scott Moncrieff

Introduction

In April 2021, the Social Sciences Analytics Cell (CASS), in collaboration with UNICEF and the Provincial Health Division (DPS) in Bunia conducted [exploratory research](#) applying the [Integrated Outbreak Analytics \(IOA\)](#) approach in three health zones affected by a suspected plague outbreak in Ituri Province, eastern Democratic Republic of the Congo (DRC). The objective was to complement existing entomological and epidemiological data through a better understanding of transmission risk factors and community socio-behavioural dynamics and provide evidence to inform operational decision making for plague response actors.

Summary of key results

<p>Not a knowledge problem</p> 	<p>Disease and risk factors are understood, but a lack of resources and uncontrollable, aggravating risk factors lead communities and households to make "choiceless choices" (e.g. sleeping on floor, unsafe funeral practice, waste disposal close to houses); gaps exist in identifying potential innovative solutions.</p>
<p>Behavioural factors</p> 	<ul style="list-style-type: none"> ▶ Children are considerably more exposed to the risk factors of plague and the effects of other diseases (lack of beds so exposed to flea bites overnight, lack of mosquito nets increasing risk of mosquito bites and malaria, sleeping in kitchen and exposed to smoke exacerbating risk of respiratory infection). ▶ Positive health care seeking around plague related to proximity to cases (and deaths) and fear of consequences of infection (e.g. seeking treatment in health facilities rather than traditional methods; safe and dignified burials; prophylaxis for contacts). ▶ Communities store food (crops) in unprotected sacks inside their homes to avoid theft - previous generations used outdoor "grainieres"; in Rethy, some keep livestock in their homes at night, attracting fleas and rats.
<p>Confounding factors</p> 	<p>Aggravated risk factors (poverty, conflict, climate change) in recent years, coinciding with an increase in plague cases, - increased population movement and displacement in some areas (Rethy, Aungba, Rimba); inability to protect crops and livestock; reduced access to basic services.</p> <p>Communities severely neglected in terms of WASH, maternity, and child support structures (including schooling, following the closure of schools imposed in response to COVID-19), increasing potential risk of other diseases and public health problems (including teenage pregnancy and early marriage) - may increase vulnerability to plague.</p>
<p>Structural influencers</p> 	<p>Limited testing capacity restricting ability to provide laboratory diagnosis of plague cases at local level (treatment is largely provided as prevention), risking misdiagnosis, influencing prevention and treatment measures.</p>

¹ Mandre M (2021). Approche pluridisciplinaire "one health" au suivi de l'épidémie suspecte de peste bubonique dans la zone de sante de Biringi, province de l'Ituri, RD Congo. Rapport de mission scientifique.

Use of evidence: planned and ongoing implementation of actions

Evidence presented to UNICEF programmes sections, the DPS in Ituri, and response partners has resulted in the co-development of 25 recommendations to support the development of plague interventions. These recommendations are in the process of being implemented:

Recommendations co-developed with the DPS in Bunia (implementation in progress)



Exposure to rats (carrying infected fleas)

- Food is stored in households to prevent the risk of theft (communities do not see an alternative).
 - Local production of secure food storage containers for households (e.g. metal boxes).
 - Construction of secure communal food repositories.
- Poor sanitation and hygiene conditions in and around households create an optimal environment for rats.
 - Support construction of hygienic latrines (considering gender-specific needs), and waste disposal sites - digging rubbish pits, and providing bins.
 - Community engagement messages promoting management of household waste.
 - Promote community-level, periodic peri-domiciliary environmental hygiene programmes (monitored by community leaders).
- Recent years have yielded particularly poor harvest - the limited availability of food for wild rats (carrying fleas) in the fields forces them into villages and homes.
 - Work with communities to cultivate crops adapted to climate (promote agricultural resilience).
 - Provide trainings for men and women, adapted to specific needs relating to gender, and climate changes.
 - Supply seeds and equipment for the cultivation of different plants, and train on process.



Poor harvest

- Existing crops grown by communities are not adapted to changes in climate (warmer temperature, unpredictable seasons, flooding).
 - Agricultural resilience (as above - provision of more appropriate seeds and equipment, train on use).



Exposure to fleas in the household

- In some communities it is normal to keep livestock in houses during the night to prevent theft: animals carry fleas, which are easily exposed to humans.
 - Support an alternative for households to keep livestock outside the home at night (e.g. guarded, collective farm, fenced area).
 - Partition houses so that animals and people do not share the same space inside (promote proper sanitation and hygiene).
- Very few households have a bed - most people sleep on the ground (particularly children).
 - Provide and reinforce community-level initiatives to build beds from locally available materials.
 - Through Community Animation Cells (CAC) and RECOs, provide training on construction and sleeping on beds.
 - Subsidise families to purchase locally made beds.
 - Within their means, encourage communities to build larger houses in order to make space for more than one bed (promote gender equality, and plague risk-prevention for children).



Burial and funeral practice

- It is a factor of local culture to bury the dead inside or very close to houses. This creates a risk of being contaminated by plague-infected fleas carried by rats.
 - Establishment of community cemeteries divided into village, or family plots.
 - Community engagement messages on the health risks associated with burying dead too close to homes (regardless of cause of death).

Recommendations co-developed with UNICEF in Kinshasa, Goma, and Bunia (execution in progress through implementing partners)



Weak surveillance of plague cases

1. No capacity to conduct laboratory testing for screening at a local level.

- Increase capacity for case identification, diagnosis and screening at local level (with a focus on laboratory capacity).
- Continued analysis of health service utilisation (DHIS2) and perception and use of prevention opportunities (e.g. community initiatives).



Action implemented

August 2021: Institut National de Recherche Biomédicale (INRB), with the support of partners, will establish a laboratory in Bunia with plague testing capacity.

Women and children are most at risk and most affected by plague, but are not a priority for prevention and treatment

- Apply innovative and community-defined solutions for treatment seeking in the most disadvantaged communities, targeting women and children (*lessons learned from the Ebola epidemic on health care utilisation, as well as existing DHIS2 and other health service utilisation data as a baseline*).

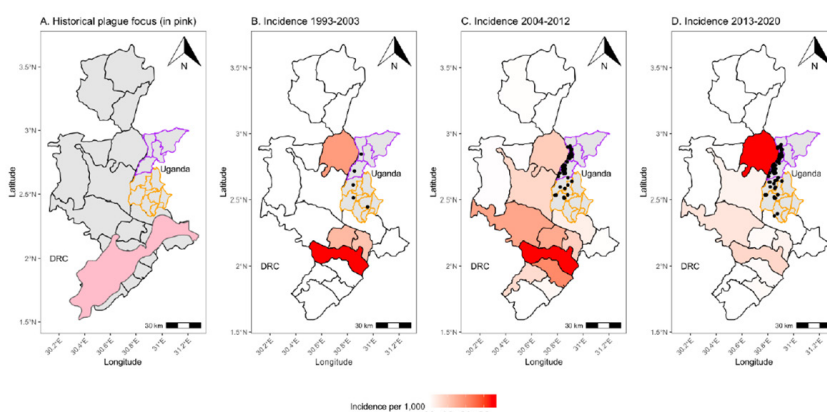
Plague prevention is not a question of knowledge, but a question of capacity

- Local level solutions for home food storage should be piloted and community groups (e.g. CACs) will be provided with mobile money to strengthen prevention and protection activities.
- The Communication for Development (C4D) teams will work with the CACs and U-Report to document the various innovations developed locally in order to strengthen and encourage a snowball effect (including funding for these activities).

Scope of the problem

Ituri has reported cases of Plague since 1928, and the disease has remained largely endemic in several areas of the province, namely those bordering Uganda and South Sudan to the east. From the 1940s, testing, vaccination, prevention, and control efforts were managed locally by a specialised regional laboratory, which provided near-to-real-time analysis of the outbreak and facilitated ongoing surveillance. However, for over thirty years this has not been functional, leaving the sole province in the DRC affected by the outbreak without capacity to test samples or monitor progression of the disease.

Recent years have seen a resurgence of suspected plague in areas that have not seen cases for several decades, and epidemiological trends indicate a northward spread (figure 1). The largest number of cases reported in 2020 was in Biringi health zone, which hosts southern Sudanese refugees and is close to the border with Uganda. Despite generally well controlled border movements between the DRC and neighbouring countries, instability and internal population displacement considerably increase the risk of cross-border transmission. In May 2021, ten people of 39 suspect cases in Fataki health zone in eastern Ituri were reported to have died from pneumonic plague. This situation is particularly concerning given the higher rate of transmission of this plague form, and the degree of insecurity of the area, making it difficult to access for surveillance or as a part of a response (2 of 7 samples tested by the Institut Pasteur in France were positive).



Human plague activity along the eastern border of DRC (hotspots) and the western border of Uganda from 1993 to present, with historical boundaries of plague endemic areas (pink, Figure 1a), parishes reporting plague in Uganda (black dots in Figure 1 b,c,d), and illustration of northward extension with the Aru health zone in northern DRC (red Figure 1 b,c,d) (SOURCE: Laudisoit and Bagge, unpublished).

Suspected plague cases in the region primarily affect children and adolescents under 18, and more cases have been reported in women than men (table 1). This reinforces the need for targeted efforts which address sex and age-specific issues responsible for the propagation of the outbreak.

Table 1: Aru, Biringi and Rethy Zds combined, between S22 2020 and S15 2021

Age group	Total					
	M	M (%)	F	F (%)	Total (N°)	Total (%)
< 18 years	117	41	166	59	283	70
> 18 years	44	35	83	64	127	30
TOTAL	161	39	249	61	410	

Actors in the province have tended to apply plague interventions as components of a broader package of care within individual WASH and health programmes. Whilst this has been somewhat successful in bringing localised outbreaks under control, it has missed an opportunity for a consolidated, multisectoral effort to prevent ongoing transmission. National and global attention is focused on COVID-19, yet plague is still a very real threat for communities in Ituri. There is a risk that this isolated, neglected disease will continue to be overlooked, despite its epidemic potential. This research intended to support existing evidence in highlighting the issues and risk factors, and provide justification for UNICEF, the DPS and implementing partners to develop operational and strategic programmes to address them.

Integrated Outbreak Analytics (IOA)

The CASS employs an Integrated Analytics (IA/ IOA) approach, whereby data from existing and ongoing research and programmes are sourced and analysed together to ensure the most complete and robust evidence base with which to support and improve operational decision making. Each data source or study included in this process has its own unique methodology, uninfluenced by any hypotheses or CASS analyses. Whilst this report includes certain evidence from additional sources, it principally highlights key findings from CASS primary field research conducted between 19-28 April 2021.

Objectives of operational analyses

Key objective

Understand transmission risk factors and community behavioural dynamics around the suspected plague outbreak in Ituri province.

Secondary objectives

1. Understand the knowledge and perceptions of plague, prevention methods, and risk factors for transmission.
2. Determine social, behavioural and environmental factors influencing the risk of plague transmission, and barriers to care and case management.
3. Identify opportunities for strategic modifications or adaptations to existing or planned programmes (WASH, health, communication, and community engagement) to address plague.
4. Explore opportunities for support of community-level development of innovative, locally adapted solutions to key public health issues, and potential aggravating risk factors for plague.

Methodology

Exploratory analyses

Exploratory qualitative

- Focus group discussions (FGD), key informant interviews
- Open questions to identify and explore new themes, probing questions to understand the “why”

Site selection

Specific health zones and villages based on recent plague incidence and prevalence, in collaboration with the MCZ (Médecin Chef de Zone) and the BCZ (Bureau Centrale de la Zone).

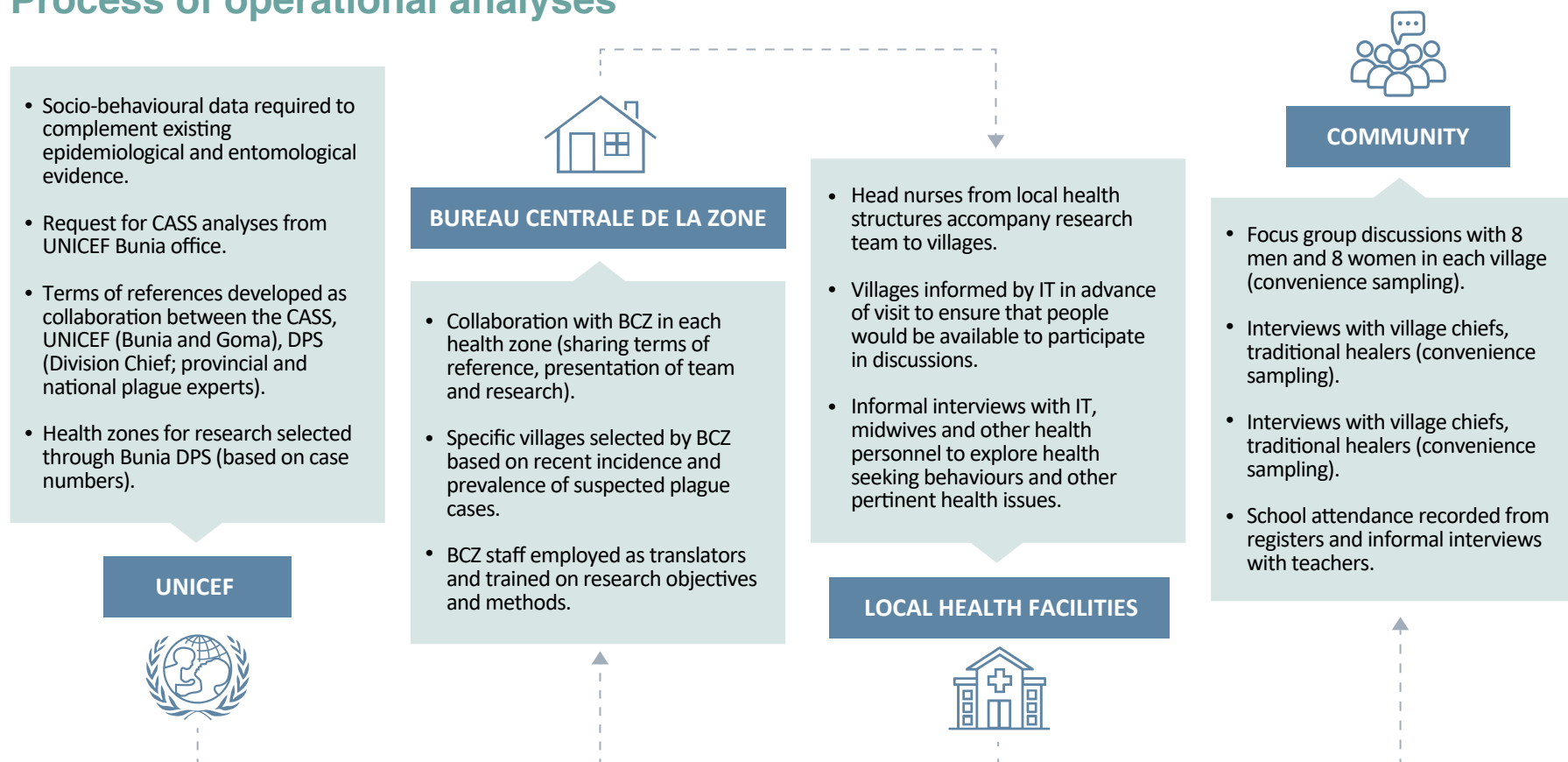
Target groups (selected by convenience sampling)

- Men and women (focus group discussions)
- Traditional healers, community leaders, midwives, IT (in charge of health structures) (interviews)

Target groups									
Health zone	N° of Villages	Women (no. FGD)	Men (no. FGD)	BCZ personnel	Traditional healers	IT (Health structure in-charge)	Midwives	Village/area chiefs	Total discussions/interviews
ARU	4	4	4	8	1	4	2	4	27
BIRINGI	4	4	4	3	1	4	4	5	25
RETHY	6	6	6	5	3	6	2	6	34
Total	14	14	14	16	5	14	8	15	86

Each group was comprised of 6 to 8 people

Process of operational analyses



Detailed results

> Healthcare seeking behaviour for plague



Plant used to relieve discomfort and treat buboes (symptoms) - leaves burned and rubbed on affected areas (some older men reported effectiveness as treatment for plague)

1. Preference for modern medicine in formal health facilities

Most people said they would go directly to a health facility for a suspected case of plague – communities understand the severity of the disease:

- Aware that plague is fatal if not treated
- Quick death" - cannot delay access to plague treatment
- Trust the medicines and treatment provided by healthcare workers

2. Traditional and self-medication to relieve symptoms

Some reported that they treat the first symptoms (fever) with paracetamol purchased from a pharmacy, but as soon as more advanced symptoms appear, they would go to a health facility.

**Very few people trust traditional healers to provide appropriate treatment*.*

> Knowledge of disease and transmission risk factors

1. Not a knowledge problem

- Generally high level of understanding by health staff and communities (men/women) of plague symptoms, transmission, prevention, and treatment (in some cases, people have less understanding of the links in the chain of transmission).
- No obvious difference in understanding between men and women.

The level of knowledge depends on the proximity of plague cases (and deaths).

"Rats from the bush come into the house and die...the fleas that were on the bodies of the rats look for something else, and it's like they will just take refuge on people in the houses, transmitting the plague to them..."

Woman, Aru



2. Not a knowledge problem: sources of information

Different sources of information cited:



- Radio
- Trainings (some provided by Community Animation Cells (CAC))

Communities with an active CAC recalled their knowledge more quickly and accurately; men in one village had received training from the CAC on how to build basic beds.

- RECOs (responsible for orienting suspected plague cases towards health structure)
- Health workers who diagnose cases at health facilities sensitise the community and contact cases

> Plague transmission: knowledge of risk factors

Defeatist attitude to rats in homes - suggestion that it is something that people have to accept, and there is no effective and long-term way to prevent them.

RISKS

1. **Communities are aware that keeping food indoors attracts rats**, but do not feel presented with an alternative (risk of theft if food is stored outside in grain stores)



2. **Reported increase in the number of rats** in houses in recent years (*correlated with resurgence of plague cases?*)
3. **Seasonality:** more rats in houses during the rainy season (*harsher outdoor living conditions*)
4. **Decline in agricultural production** - rats look for food in the houses that they cannot find outside. (*Domestic rats exposed to wild rats (carrying fleas)*)

PREVENTION AND MANAGEMENT OF RATS IN THE HOME

1. **Vector prevention and control** using traps, poison, cats, filling holes, clearing long grass and vegetation around houses, avoiding crumbs, covering leftover food (some people reported that rats are also eaten)

(*Poison is less effective during the rainy season - "rats drink water to wash it away"*)

People know the risks, but generally do not feel able to prevent them.

****Spontaneous death of rats (or other hosts) can be a sign of plague****



Management of dead rats in households - (depending on the community's familiarity with plague)

- Some said they would report a dead rat to a health facility, and health personnel would come to remove, burn and bury it, before disinfecting the house
- Most people say that they remove them themselves (with a stick), throw them away or bury them outside (nobody said that they would tell their neighbours).

> Plague transmission: fleas

Fleas are known to the community as vectors of plague.

1. Live in cracks in the floors and walls of houses, and are carried by livestock (often kept in the houses overnight).
2. Bite during the night (when people spend time in houses).

PREVENTION AND MANAGEMENT OF FLEAS IN THE HOME



1. Frequent paving of floors and walls of houses (to fill cracks)
2. Cleaning the area outside the houses (cutting long grass, "good hygiene and sanitation")
3. Mosquito nets treated with insect repellent - reports that this kills/prevents fleas on beds

(Most people reported either not having bed nets in their homes, or having just one for the bed, but not for those (primarily children) sleeping on the floor).

> Risk factors: "choiceless choices"

Small houses and lack of beds

- Aru and Biringi - round houses; Rethy - square houses (better suited to accommodate several beds?)
- Very few households have more than one bed - priority given to parents (**sometimes only father**).
- Children invariably sleep on the floor on papyrus mats, exposed to flea bites.

REASONS FOR LACK OF BEDS

- **Financial means** - inability to prioritise over food, clothing, education, etc.
- **Space** (too many children/people in the household, house too small)
- **Lack of knowledge** of how to make a small local bed called "Graba", etc.
- **Insecurity** - forced to flee villages several times, return to damaged or destroyed houses (reported in Rethy)



Locally produced beds ("graba") in the observation room of a health centre in Biringi).

> Risk factors: sleeping on the floor

Why do children sleep on the floor?

Some answers given...

- There are too many children, and "we can't give priority or show preference".
- Children wet the bed.
- They will fall out of bed and break their legs.
- This is "part of our culture".
- Rooms are so messy, fleas are everywhere - children are no more at risk on the floor than adults on a bed.



Additional risks for children of plague and other diseases

Children frequently sleep on the kitchen and living room floor:

- **More exposed** to rats and fleas
- **Unavoidable smoke inhalation** - increased risk of respiratory infection
- **Difficulty/impossibility of installing mosquito nets** (risk of fires) - risk of malaria

> Risk factors: Food and livestock kept inside houses

- Food stored in sacks in houses to avoid theft (risk exacerbated by poverty and conflict) (*attracts rats*) *
- Animals (e.g. goats, chickens, dogs, pigs) kept in houses overnight to avoid theft (*exposure to fleas*) (Rethy)

A perceived high risk of theft forces people to store food in their homes.

**People KNOW they should not do this, and that it is a risk, but what little they have, they feel that they have to keep safe, close to them, in order to be able to eat or sell (and survive).*

Aru and Biringi

- Reports that increased **poverty is making people more desperate.**
- **Increased unemployment** (impact of the COVID-19 response?).
- **Lower agricultural yields** (everyone has less food) - more likely to steal/cling to food.

Rethy

- **Insecurity** - since 1999 (start of war in eastern Congo), frequent looting of villages.

> Risk factors: Unsafe burial practices

People in Biringi and Aru reported burying their family members very close to, or inside their houses.

**Generally no public cemeteries*

(In Rethy, people are buried either in family or village/community cemeteries, at some distance from houses).



Photo of a grave next to houses in Biringi health zone.

- Risk of plague transmission when handling the bodies of plague victims - preparing the body for burial / funeral.
- Bodies of plague victims buried close to homes risk contaminating people (corpses in contact with rats, fleas, etc.).
- Reports of different burial practices if the deceased is a known plague victim (e.g. burying away from houses, avoiding touching the body).

In case of a plague death in the community or in a health facility:

- Health facilities take charge of the body, sometimes putting it in a body bag before burial.
- The body is taken back to the village and buried away from the houses.
- Health workers disinfect the house and administer prophylaxis to contacts.

***This process was largely accepted by communities, although some people reported feeling that it was impersonal, and that family members and friends could not view bodies.*

> Risk factors: Conflict and displacement

- Prolonged and escalating conflict situation - Rethy ZdS.
- Large population displacements that influence high-risk behaviour and the inability of populations to protect themselves.
- Outcomes impacting on the risk of exposure to plague.



> Impact of climate on food security and risk of plague infection

Men and women reported a considerable reduction in agricultural production over the past two years (particularly peanuts, maize, millet, beans).

Does this coincide with the reappearance of plague cases?

Main reasons given

- **Seasonal unpredictability** - rains do not come when expected, affecting decisions to plant and start cultivation
- **Warmer climate** (Biringi)
- Soil is infertile and **land is over-exploited**
- **Monoculture** – people typically only grow one or two types of crops (degrades soil nutrients, reduced food biodiversity)



***No coping mechanisms adopted ("we just wait for rain")*

Impacts on risk of infection

- **People have less, so the impact of theft will be greater** - they store what little they have in their houses (attracts rats + plague)
- Lack of food/ crops in the fields **drives wild rats (vectors) into villages and houses in search of food.**

> Limited testing capacity: All cases are "suspected" - laboratory confirmation is required

Testing is presently conducted by the INRB in Kinshasa (2,000 km from the outbreak site).

- Regional laboratory previously present in the province (operational 30 years ago): testing, study of bacterial strains, prevention efforts through vector elimination.

(including community mobilisation to chase rats from villages).



Communities remember when treatments, tests and vaccinations were available locally, and many said they were involved in efforts to control rats:

"The plague exists here. It's not like before...teams would come every fortnight from the nearby laboratory and hunt the rats. The whole village was involved..."

Man, Rethy



Although a **rapid diagnostic test is available, it is not considered a sufficient diagnostic tool**

(Low level of specificity: high rate of false positives - risk of misdiagnosis, resulting in possible omission of treatment for other diseases).

> Confounding health risk factors: Inadequate water, sanitation, and hygiene

1. **Most people reported an inadequate supply of clean water in their village** (women may spend 4 hours a day fetching water, which they report as increasing the risk of sexual violence).

2. **The majority of households do not have latrines:** they share family members', use neighbours' latrines when out or sleeping (which creates conflict in the community), or go in the open.

3. **Waste disposal:** some villages have dedicated areas for household waste, but most people just throw it outside the house, despite being aware that this can encourage rats.

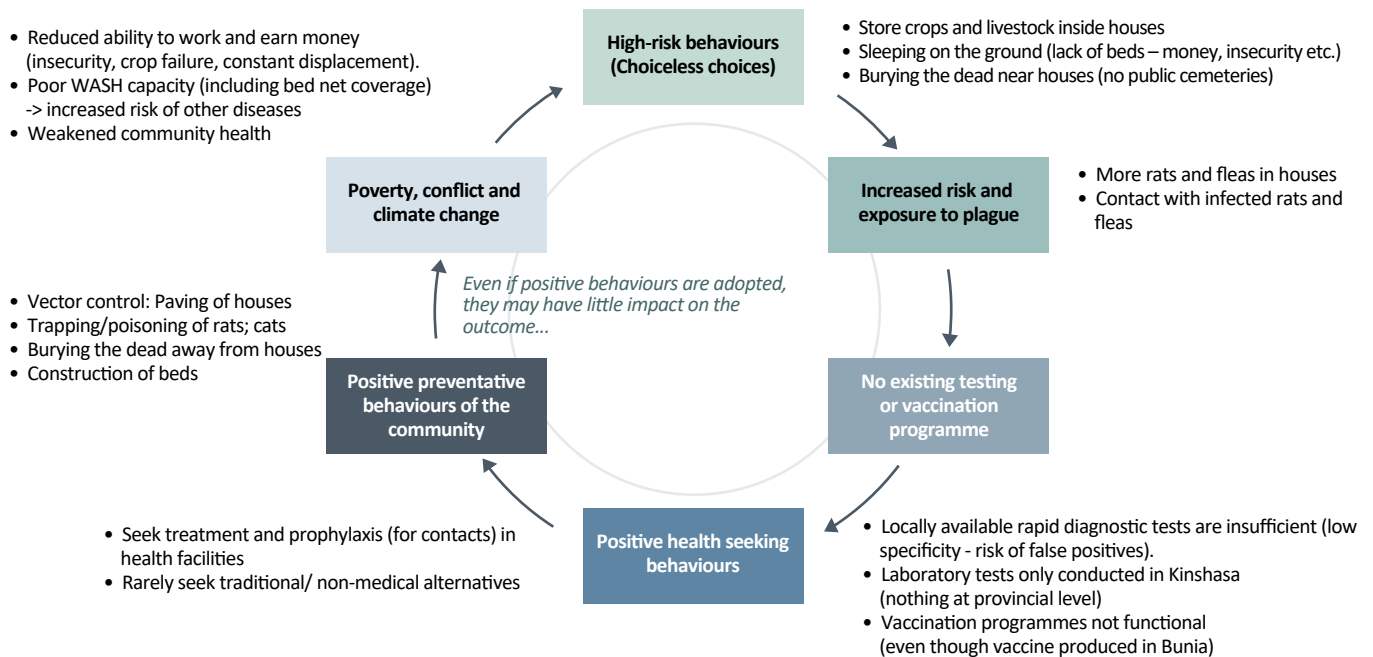
***Children already living with a WASH-related illness may be more vulnerable to the severe effects of plague (due to weakened immune system) and vice versa.*



Women queuing for water in Rethy ZdS

Reflections and considerations for action

CYCLE OF POVERTY AND CONFLICT, AND POOR HEALTH OUTCOMES



Summary

This Integrated Analysis (AI/AIE) has provided outbreak response actors with robust evidence highlighting the key risk factors for plague, paving the way for the design, and implementation of preventative multidisciplinary WASH, health and community engagement programmes with real potential to prevent transmission. Whilst some of the specific findings may not be new to those with experience in this sector, they serve to reinforce existing evidence to ensure its reliability and viability.

Reinstating local laboratory facilities will support regional testing and facilitate surveillance to understand the true extent of the outbreak. Prevention programmes established at community level will maximise engagement and build local capacity for sustained impact.

Through multisectoral collaboration, ambitious objectives by UNICEF and partners to eradicate plague from the DRC may be realistic.

The Social Science Analytics Cell

The Social Sciences Analytics Cell (CASS) is an operational research unit in the Democratic Republic of Congo that supports UNICEF and emergency response actors by providing evidence to inform decision making and improve interventions and strategies. The CASS uses an Integrated Analytics (IA/ IOA) approach to explain issues and trends in epidemiological, programmatic and other research data, bringing together different actors and data sources to provide a more comprehensive understanding of the dynamics of epidemics and public health outcomes.

For more information, contact:

Simone Carter

Lead, Integrated Outbreak Analytics (IOA), UNICEF Public Health Emergencies UNICEF (scarter@unicef.org)

Izzy Scott Moncrieff

CASS Field Supervisor, Social Sciences Research Specialist UNICEF DRC (isscott@unicef.org)

For access to additional IOA/CASS resources:



Website



YouTube

If you or your organisation has any analysis needs, or if you have data you would like to share with the CASS, please contact us. The more data that can be included in these analyses, the more robust and reliable the evidence will be to inform decision making, and result in optimised community health outcomes.

All photos were taken with permission during field research in April 2021.