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Living with risk in Mayotte: a study of social vulnerability to water pollution risk in one of the island's informal settlements

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Résumé

La recherche présentée ici s'intéresse à la gestion sociale de l'eau des usagers du quartier Kierson de la commune de Koungou à Mayotte. Dans un contexte de risque sanitaire lié à la pollution de l'eau et pour lequel le risque épidémique (cas récurrents de fièvre typhoïde) a été exacerbé par la crise de l'eau qui a sévi durant plusieurs mois sur l'île en 2017, la recherche sociologique dresse le portrait des populations vulnérables au risque sanitaire en vue d'améliorer les capacités à faire face de ces populations. L'enjeu social et sanitaire est fort s'il existe une surveillance épidémiologique à Mayotte et une volonté institutionnelle de réduire le risque épidémique, son opérationnalisation n'est pas encore efficace. La promotion de la santé en vue de la réduction des inégalités sociales de santé par l'accès à l'eau pour tous pâtit d'un manque de données sociales de terrain notamment pour l'identification des diverses formes de gestion sociale de l'eau. La recherche examine ce qui conditionne la vulnérabilité sociale face au risque de pollution de l'eau à la fois sous l'angle structurel (accès à l'eau, conditions de vie, précarité économique) et sous l'angle des pratiques liées à l'eau et des représentations du risque épidémique qui en découlent.

Mots-clés : Risque, environnement, eau, vulnérabilité sociale, Mayotte.

Abstract

The research presented here focuses on the social management of water for users in the Kierson district of the municipality of Koungou in Mayotte. In a context of health risk linked to water pollution and for which the epidemic risk (recurrent cases of typhoid fever) was exacerbated by the water crisis which raged for several months on the island in 2017, this research draws up the profile of populations vulnerable to health risk with a view to improving the coping capacities of these populations. The island faces major social and health issues. Despite epidemiological surveillance in Mayotte and an institutional desire to reduce the epidemic risk, it has not yet been effectively operationalised. The promotion of health with a view to reducing social inequalities in health through access to water for all suffers from a lack of social data in the field, particularly for the identification of various forms of social water management. This research examines what conditions social vulnerability to the risk of water pollution both from a structural point of view (access to water, living conditions, economic precariousness) and from the angle of practices linked to water pollution and the resulting representations of the epidemic risk.

Keywords: Risk, Environment, Water, Social vulnerability, Mayotte.

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Introduction

Mayotte is a small (374 km²) French overseas department on the Mozambique canal between the East African coast and Madagascar. Over the last thirty years, it has seen a significant rise in health and environmental risks resulting from its rapid development, notably the health risk of water pollution. The use of a water management and sanitation model developed in mainland France but not adapted to local conditions has worsened the island's already complex sanitary situation¹.

Mayotte is the "poorest" French department, "the most unequal and the worst affected by unemployment and experiencing rapid population growth"². According to INSEE, the French National Institute of Statistics and Economic Studies, in 2017 the island had a population of just over 256,500. In less than thirty years, the population has increased fourfold due to a natural rate of increase and a growth in immigration. Half of the population was born outside Mayotte, mostly from the Comorian islands, most notably Anjouan. Average annual earnings were estimated at €9,500 in 2012, three times less than in mainland France³. Out of 53,200 homes recorded by INSEE in 2013, 37% were corrugated metal houses of which 97% did not have a toilet, 28% did not have household access to running water, and 65% of all dwellings did not have basic sanitary facilities⁴.

This department has not been spared the sector-centric vision of water management that has long given priority to drinking water access over management and sanitation⁵. Delays implementing water management and sanitation measures on the island have led to poor public sanitation conditions, giving rise to a cholera alert in the 2000's and an increase in typhoid cases in 2008⁶. The lack of public policy on water management and sanitation until 2008, added to difficulties accessing drinking water for much of the population, has worsened the health risks associated with water pollution. Although 72% of dwellings built in Mayotte have running water, some 60% of homes do not have toilets. Some 19% of wastewater is discharged into the public sewerage system, 35% into a septic tank, and 46% directly into the ground⁷. Stagnant wastewater, water withdrawals from polluted sources (springs or rivers), poorly adapted storage, and structural failures in providing effective sanitation give rise to health risks including the spread of disease by faecal-oral route, vector-borne disease

¹ Aude Sturma. Les défis de l'assainissement à Mayotte : Dynamiques de changement social et effets pervers de l'action publique. 2013.

² Nicolas Roinsard. "Chômage, pauvreté, inégalités : où en sont les politiques sociales à Mayotte ?" 2014.

³ INSEE. Enquête budget de famille à Mayotte. 2012.

⁴ Basic sanitary facilities are defined by INSEE as household access to running water, a shower and toilet.

⁵ A. Finet. Expertise à Mayotte sur la problématique de l'assainissement. 2006.

⁶ Bulletin de Veille Sanitaire, 2009.

⁷ INSEE. Enquête Logement à Mayotte. 2014.

like chikungunya and malaria, and Hepatitis A. Cases of typhoid fever are recorded by Santé Publique France (SPF) every year. In 2016, out of 149 cases diagnosed in France, 40 indigenous cases were reported in Mayotte, accounting for almost a third of cases diagnosed in France⁸.

Lastly, since identity papers are required to connect households to the water supply system, the social precariousness of undocumented migrants has led to the sharing of water meters. This increases the price per cubic metre of water⁹. In 2013, more than 50% of Mayotte residents spent 10% of their income on water¹⁰ whereas the WHO considers a household to be economically vulnerable when it spends more than 5% of its income on water¹¹.

The health risks associated with water pollution have been worsened by a water crisis in Mayotte caused by a shortage of drinking water between December 2016 and April 2017 leading to a spike in cases of acute diarrhoea reported on the island¹².

The aim of this paper is to understand how to improve the capacity of health institutions and users to address the epidemic risk associated with water pollution.

We have taken a coping capacity approach similar to the capacity concept developed by Amartya Sen (1992)¹³. According to Sen, capacity is the result of the combined physical and material potential of an individual to cope with a situation: in other words, a set of physical resources and capacities to implement, which are likened to an individual's immaterial and personal resources. Benoit Lallau (2004)¹⁴ operationalises this concept by distinguishing between resources: physical and monetary capital (equipment, tools, savings and so on), natural capital (in Mayotte, resources taken from fields and their cultivation, and the sea), human capital (school education, training and so on) and social capital corresponding to a network of interpersonal relationships on which an individual relies to cope with a risk before or after it occurs.

We also hypothesise that social vulnerability to the risk of water pollution partly depends on the social management of water. Although there is an initial social vulnerability covering the conventional sociological criteria associated with living standards (socio-professional category, income level, poverty level, type of accommodation and so on) and statistically ascertainable, we hypothesise the existence of a second additional form of vulnerability. This secondary social vulnerability relates to representations and individual practices associated with water and its associated risks. Several other hypotheses can be implied from this core hypothesis. Representations of health and environmental risks associated with water depend on their relationship with the space and their 'environment' in the sense of their 'living environment'. We implicitly accept there is no single environment but as many environments as there are social practices associated with them. Relationship with the space is determined here by the use of resources found in the space, and by the level of control individuals can exercise over it. These representations also depend on the socio-professional categories of

⁸ Marion Subiros. et al. "Health monitoring during water scarcity in Mayotte, France, 2017". 2019.

⁹ The per cubic metre price of water in Mayotte increases per consumer band as part of a public policy to save water.

¹⁰ Aude Sturma. Op. cit.

¹¹ Marie Tsanga Tabi. "Les services publics d'eau face à la vulnérabilité sociale des populations : vers un nouveau modèle de management des services publics essentiels ?" 2009.

¹² Marion Subiros et al. Op. cit.

¹³ Amartya SEN. *Repenser l'inégalité*. 1992.

¹⁴ Benoit LALLAU. "Pauvreté, durabilité et capacités de choix : Les paysans centrafricains peuvent-ils éviter le cercle vicieux ?". 2004

the inhabitants of Mayotte. Their social status conditions their representation of risks insofar as they can mobilise different resources to cope with risks. We lastly postulate the existence of observable sanitation measures implemented by the population. Although our intention is not to determine good practice from bad, we hypothesise that they can form a basis on which to improve field practices.

Methodology

Our study focuses on a district that provides a concrete example of the issues associated with water that could affect the whole island. The Kierson district in the municipality of Kounkou in the north of the island was considered particularly appropriate for study by the project's actors/partners (Agence Régionale de Santé, Santé Publique France, Agence française de Développement). Firstly, it is one of the areas of the island worst affected by typhoid fever, with an incidence rate of over 25 cases per 100,000 inhabitants in 2017. It is also densely populated; in 2015, INSEE estimated the population density of the municipality of Kounkou to be 1131 inhabitant/km. It encompasses a diversity of social conditions (permanent dwellings and slums). Some inhabitants are connected to the water supply system; others source their supplies from other resources including two untreated resurgence springs that tested positive for bacteriological contamination according to the Regional Health Agency (ARS).

To study practices relating to the social management of water, we carried out a qualitative study based on observations, semi-structured interviews and focus groups.

Following an initial phase during which we identified and explored the district, we made observations and carried out themed interviews with inhabitants to note the different uses of water and their underlying rationalities (28 households). The interviews focused on the themes of household water management (running water, withdrawal location and sanitary practices), the perception of health risks and representations of risks (relationship to risks, fear of disease and feelings of vulnerability).

We then organised twelve focus groups around two themes. The first theme aimed to understand the relationship of users with diseases spread through the faecal-oral route and to situate them in the hierarchy of risks applied by inhabitants of the Kierson district¹⁵. The purpose was to determine a local definition of diarrhoea. The second theme focused on the mediation tools perceived by inhabitants as appropriate to disseminate information.

We did a themed analysis of the interviews and a simple tabulation of the factors observed in the field¹⁶ which were then discussed by steering committees composed of institutional actors (ARS, Santé Publique France and Agence française de Développement) and field actors (Croix-Rouge française and Mahoran non-profit organisations). These discussions helped to consolidate knowledge and to put it into perspective by intersecting the views of different experts on the subject. As such, this research forms part of a research intervention as defined by Stassart, Mormont and Jamar¹⁷ "to produce knowledge in support of actors,

¹⁵ We used the wash'em method and its protocol to perform an assessment and produce a prevention plan adapted to complex humanitarian environments. <https://washem.info>

¹⁶ We grouped the observed elements using an observation grid on an Excel file to examine their distribution.

¹⁷ Pierre Stassart, Marc Mormont and Daniel Jamar, "La recherche-intervention pour une transition vers le développement durable", *Économie rurale*, 306 | 2008, 8-22.

and therefore what we are going to call knowledge actionable by them."

Results

The inhabitants of the Kierson district: a high level of structural vulnerability

According to INSEE (2019)¹⁸ the municipality of Koungou is classed as a municipality subject to housing precariousness. In fact, 48% of housing in this district cannot be accessed by vehicular road (compared with 44% on the rest of the island); only 24% of these dwellings have basic conveniences (electricity, toilet, shower or bath) (compared with 35% on the island as a whole) and 39% of housing is considered by INSEE as makeshift housing (compared with 32% on the island as a whole). Some 29% of housing has no household water supply point, 15% of people who live in this housing source their water from their courtyard or a relative and 10% from a third party; 2% source their water from an electronic-payment operated standpipe; and 2% withdraw water from other supplies (rain water recovery, river and resurgent springs).

Majority of foreign nationals living in precarious situations

Insofar as part of the Kierson district is composed of corrugated metal housing, people living in situations of precariousness, particularly irregular migrants, were strongly represented in our body of respondents. Out of 28 respondents, 26 individuals were foreign nationals including 25 individuals from Anjouan (18 undocumented migrants and seven documented migrants) and one person from Grandes Comores (documented migrant); there were also two Mahoran families.

We estimate¹⁹ the average monthly income of our body of respondents to be 284 euros, and the median income to be 150 euros, which means half of our respondents earn an income of less than 150 euros per month. This is explained by the large number of users interviewed who are not in gainful employment and ineligible for unemployment benefit. Ten individuals said they were engaged in an undeclared professional activity (odd jobs, construction, crop care, fishing) and only six individuals said they were in stable employment (teacher, nurse, home help).

The average age of respondents was 35. The average length of stay of non-natives in Mayotte was nine years and five years in the district.

The main reason given for leaving their country of origin is to "give their children a better future". Referring to the precariousness of their situation, many said their living conditions had not improved or even worsened, as confirmed by one of the women interviewed:

"I have a house in Anjouan, but I would be better off over there, it's tough here because I don't have any papers, so I don't dare leave home. Over there, I have a house, but my children go to school here and that's why I'm staying. Now they go to school I feel stuck. But I want them to have a future," (extract from an interview with an inhabitant of Kierson, February

¹⁸ Insee Analyses. "Évolution des conditions de logement à Mayotte". 2019

¹⁹ Based on answers given by respondents to the question, "How much are your monthly living costs?". When users said they did not work, we asked them to estimate their average monthly expenditure.

2020).

This extract also highlights another aspect of the difficulties faced by these individuals: the isolation caused by restrictions on their movements on the island. Fears of checks by the Border Police (PAF) lead users to limit their movements. Several users said they had not left their district in years.

One undocumented man said:

"I'm locked 'out' here. I haven't been to Mamoudzou in five years²⁰." Interview extract, man, Kierson, February 2020.

In terms of access to energy and water, 18 out of 28 households have access to electricity²¹ and 20 do not have a household water supply point²².

Limited movements of water users

Limitations on the movements of the individuals mentioned above also affect access to drinking water supplies and represent a disincentive to using electronic-payment operated standpipes. Although the ARS is aware of the problem on the island²³ and the team from the district municipal authority seems supportive of the idea of installing a standpipe close to slums in the Kierson district, the topping up of electronic-payment cards at the single available charging point in Mamoudzou²⁴ remains a problem. This leads to the development of alternative solutions including the resale of water in drums on the black market. It is impossible to control the resale price of this water.

Domestic overcrowding

Of 28 households surveyed, 22 were built from corrugated iron and six were permanent structures. Although it is generally agreed that permanent dwellings are more comfortable, living conditions in these dwellings do not always reflect the statistical trends highlighted by INSEE. According to the housing study published by INSEE (2017), permanent dwellings are more likely to be equipped with basic conveniences than corrugated metal houses. This is not always the case, however, and permanent dwellings can conceal highly precarious living conditions²⁵.

The average number of rooms is 2.4 for 5.7 inhabitants per household, above the average number of inhabitants per dwelling for Koungou in 2012 (4.4 individuals per dwelling, INSEE 2012) and above the average number of inhabitants for the whole of Mayotte in 2017 (four individuals per dwelling).

²⁰ Less than 9 kilometres from Koungou.

²¹ We have included illegal connections.

²² Of the eight households with a household water supply point, we were unable check the nature of the connection (water meter, shared meter or connection to an untreated water source), which implies that access to water by these households does not guarantee access to quality water.

²³ David Guyot. "Étude comportementale relative à l'utilisation des bornes-fontaines monétiques dans 3 villages de la commune de Mamoudzou". 2011.

²⁴ Mamoudzou is the island's main town some ten kilometres from the municipality of Koungou.

²⁵ We visited a permanent dwelling with unsanitary living conditions. The owner is a slum landlord.

Secondary social vulnerability: practices and representations

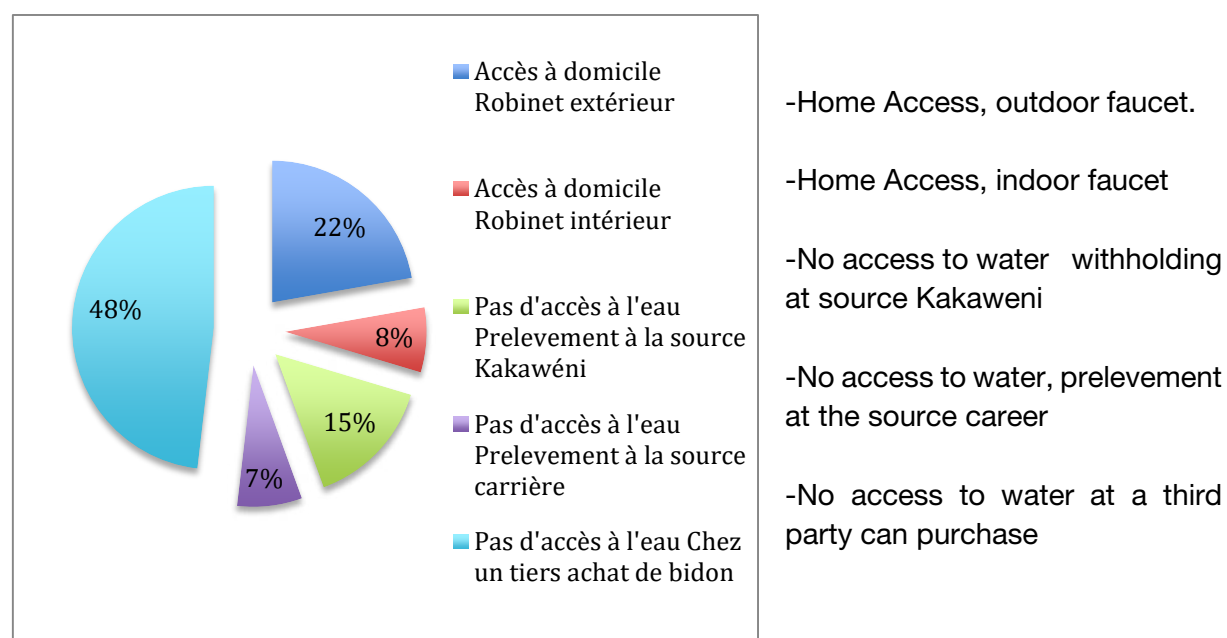
Poor access to water in the district has resulted in the development of fairly effective coping mechanisms and risk-mitigation practices. Perception of health risks and the priority given to them in the everyday lives of users can impede effective risk management.

Practices

Different withdrawals according to use

With limited means to access water, some users source supplies from third parties while others, owing to limited financial resources, have no other option than to drink water from untreated sources. These coping mechanisms give rise to other problems such as the transportation and storage of water. This leads to overlapping uses and raises questions about the effectiveness of handwashing.

In the municipality of Koungou, INSEE estimates that 10% of the population obtains their drinking water from a third party; in our sample half of respondents (14 out of 28 households) obtain their drinking water from those around them (See Figure 1).



**Figure 1 - Water access methods in the Kierson district
VulnéEau 2020.**

Users rely on a third party either by sharing a water meter or buying drums of water. When water is used for drinking, inhabitants close to the only person selling drums of water prefer this option²⁶. Users living on higher ground in the district are less likely to make the

²⁶ This option depends on a household's budget and is therefore not always available to inhabitants.

journey to buy a drum of water. They have no other option but to drink contaminated water from a nearby source.

According to users, the price of a drum of water (containing approximately 20 litres) is set at 50 centimes per drum. Respondents said they fill this drum four to five times a day on average at a cost of approximately two euros a day or sixty euros a month. This option depends on the ability of each household to pay for their water; most respondents said they cannot afford to access it every day. As a result, they sometimes use untreated sources of water when they have no other option. The three households that access water by sharing a water meter with another household pay on average 54 euros every two months, a considerable amount for families who often have very low incomes.



Open drums in traditional personal-hygiene areas. Photographs taken by the author, 2020

Out of 28 households surveyed, 16 access water in several ways, compared with 12 households that use only one resource. Of the households using a single water source, six have a household pipe, often located outside, and six have no option but to use contaminated resurgent water sources. In general, the inhabitants of Kierson aim to reduce their spending on water, leading to overlapping uses.

Water storage: Outdoor drums frequently dirty and poorly sealed

Whether withdrawn from an untreated source or supplied by a third party, water is not always stored under optimal conditions. We noted that drums used to transport water are frequently dirty. The containers used to store water for cooking or drinking are mostly kept in a cooking area inside the dwelling. Most drums are covered with a lid and appear to be clean, whereas drums used for personal hygiene purposes, which are often stored outside dwellings in *m'rabawashos*²⁷, are not covered with a lid and appear to be less clean (see photographs below).

The different ways of protecting water (a covered drum inside kitchens and uncovered outdoors) reflect a difference in perceived requirements for water quality according to use.

²⁷ Traditional wet areas mostly located outdoors and hidden from view by corrugated metal walls and equipped with a hole.

Although users are careful to have water that is, to all appearances, clean to drink and cook, the quality or purity criterion appears less important when water is used for personal hygiene purposes. This makes the question of the impact of prevention campaigns on vector-borne diseases such as dengue and chikungunya and precautions to prevent the nesting of mosquitoes particularly relevant, especially since an outbreak of dengue fever on the island coincided with the first wave of Covid-19.

Personal hygiene and household chores: overlapping uses

Users without a household water supply wash in water from the river or water from taps supplied by contaminated resurgent springs. The choice of resource mostly depends on the distance of the source from a dwelling, and users take advantage of their movement to accomplish a set of different tasks. Women often wash themselves and their children at the same time as they wash their laundry. The necessary overlapping of uses, both in terms of the river and pipes supplied with water from resurgent springs, does not allow a connection to be made between the quality of water from a resource and a health risk which would require a change in behaviour that is impossible to effect.

In a minority of cases (two households), the women prefer to wash laundry in the river despite having a household water supply. The reasons given for using this resource situate it within the register of socialisation and sharing and the desire to save money on water.

"[...] Yes, I have water at home, but I prefer to go to the river to do my laundry because I get to see my friends, we chat, and that's how I like it... And it lowers my bills!" Interview extract, woman, Kierson, February 2020.

In Mayotte, women traditionally wash their laundry in the river when they go to or near a village, in the countryside. Although living standards rise every year and some households are equipped with washing machines, washing laundry in the river is an opportunity for the women of the village to come together and discuss their lives. The river is a space where social ties are maintained. Since the Department for the Environment, Development and Housing (DEAL) banned washing laundry in the river, women are required to wash their laundry at home in their courtyard, or in laundries not always adapted to traditional laundry practices, often in return for payment. The ban on washing laundry in rivers is often ignored. The strategy of saving money on water mentioned by users reveals the considerable burden placed on small household budgets by spending on water. In the light of the financial resources available to the inhabitants of Kierson (outlined above) it is easy to understand the desire of these women to save money.

Soap, technical equipment and washing habits

Although the use of soap for personal hygiene and laundry purposes is effective, soap is very often missing from areas used for cooking and personal hygiene. Of the 27 dwellings²⁸ visited, 21 households did not keep soap close to water supply points (water taps and drums, areas devoted to cooking and personal hygiene). Soap use is not always dependent on household income. We found that soap was missing from bathroom sinks and toilets in permanent dwellings with basic sanitation (running water for drinking, Western-style sinks and toilets, bathroom and kitchen).

During a focus group with men from the district close to the mosque, the attendees explained that they washed their hands regularly for religious reasons, since Islam requires them to perform ritual ablutions before prayer. Some users consider these ablutions as an effective handwashing practice without considering the issue of usage.

If the absence of soap is attributable in part to the non-perception of risks associated with poor hygiene, we think it can also be attributed to the absence of technical equipment for effective handwashing. If a household does not have running water, neither does it have the technical equipment (tap) required to rinse fingers. When soap is present it is usually placed on the floor or next to a bucket of water without a clearly defined space. In corrugated metal dwellings without sinks there is no social space specifically dedicated to this activity.

Water drums are also impractical for handwashing: they are placed on the floor, often several litres heavy, and are not fitted with a tap to produce a stream of water. The only device found in most houses is the *Kapoka*²⁹, which is used to pour water. However, if someone wished to use this device to wash their hands they would require the presence of a third party.

Moreover, for users having to travel to withdraw water, the notion of waste mentioned by some respondents reflects an approach focused on saving the water they have travelled to withdraw rather than preventing disease. A *bouéni*³⁰ encountered during the identification phase summed up the situation as follows:

"If you saw what we have to do every day (the effort required to make the journey) to fetch the water, you'd understand why we don't waste it washing our hands!" Bouéni, Kierson, February 2020.

A large number of respondents said they do not wash their hands or only very rarely, and although this can be attributed to the technical limitations outlined above and the bias induced by the practice of performing ablutions before prayer, respondents clearly mentioned the fact that it was not something they were accustomed to doing³¹.

"I sell soap but I don't use it at home. I use it for the laundry and shower, yes, but not to wash my hands. I'm not used to doing it and I don't have the time." Interview extract, woman, Kierson, February 2020.

²⁸ One household refused to allow researchers to visit their dwelling.

²⁹ Plastic container with a handle to pour water.

³⁰ Woman in shimaoré

³¹ The population survey was carried out in February 2020, a few weeks before the declaration of the state of emergency and the lockdown (March 2020). Handwashing habits have probably changed as a result of the awareness work performed by the ARS and the organisations working in the field during the Covid-19 health crisis.

Boiling and filtering: seldom used prevention practices

As mentioned above, drums of water used for cooking and drinking are often covered, perhaps because users want to conserve the water being stored.

The fact that users without household access to drinking water prefer to source their supplies of this water from a third party demonstrates an awareness of the health risks associated with the contamination of water and a desire to protect themselves from it.

Nevertheless, in terms of prevention and drinking water purification, none of the respondents said they filter their water sourced from resurgent springs, due to a lack of technical equipment, and not a single household systematically boils their water. The biggest obstacle to this prevention practice is that it is considered to be restrictive and too costly in terms of the time and energy it takes to boil a quantity of water often judged to be too small.

Most of the women who boil their water do so after observing the symptoms of diarrhoea in their children. It should be noted that, as regards the perceived risks associated with water, it is difficult to judge water quality since the risk of water contamination is an invisible risk (Becerra, Roussary, 2008). The illness increases the visibility of this diffuse risk and triggers a preventive behaviour, but as described by users it appears to be done with curative intent.

"I don't often boil water, it's too tiring. When the children have diarrhoea, I do it so they drink cleaner water, but most of the time I don't boil it. I don't have time." Interview extract, woman, Kierson, February 2020.

Lastly, we did not observe the practice of household water filtering. When women wash their laundry, they sometimes use a *lamb*³² to "filter the river water", but mainly to prevent mud from spoiling their laundry, and it is not in itself a health risk prevention practice.

During individual interviews, users often expressed the need for quality drinking water.

"We want clean water. We have to go to the river, but there are no standpipes around here. And they are too far away for us." Interview extract, woman, Kierson, 2020.

Social representations of the environment and their influence on risk perception in Mayotte

Although practices appear to be strongly conditioned by how water is accessed and the material resources available to reduce the health risk (gas to boil water and so on), representations of the environment, in the sense of the living environment, influence risk perception.

Risk perception is a classic question studied extensively by sociologists over a period of forty years³³. In the social sciences, many researchers agree that risk, a social construct, is primarily a cultural fact.

"Our culture supplies us with a specific framework of perception that determines the way we understand the world around us, interpret the information we receive and therefore also the way we assess risk. Our values give meaning to the risks around us, they invest them with a specific significance, in such a way that each culture has its corresponding 'good' risks that it is appropriate to take and 'bad' risks that should be avoided" (Peretty Wattel, 2000, p.65)

³² Fabric

³³ We are referring to the works of Mary Douglas (1983), Slovic (1987), Duclos (1987), Wildavsky and Dake (1990) and Peretty-Wattel (2000, 2003).

Previous research has highlighted the concentric management of space³⁴ by people in Mayotte (see Figure 2 p. 14). Space can be divided into four spheres gradually extending from the domestic social space (a plot of land and village) to the wild space (the fringes of the village, countryside, sea and forest). Domestic social spaces correspond to the intimate sphere of the plot and village. Observed by others, these spaces are regularly maintained, and the risks associated with these living environments are perceived as under control. Once we move away from these domesticated social spaces and deeper into the countryside, the risks associated with the environment are perceived as unpredictable and uncorrelated with human action. These spaces (the intermediate area corresponding to the third circle and the "non-human" space corresponding to the last circle) belong to the register of the "wild, danger, risk and what is unpredictable"³⁵.

Users in the district of Kierson and its surrounding area lie within the intermediate area between the domestic world and the wild world³⁶. This geographic situation, on the fringes of town, is part of a specific hierarchy of risks.

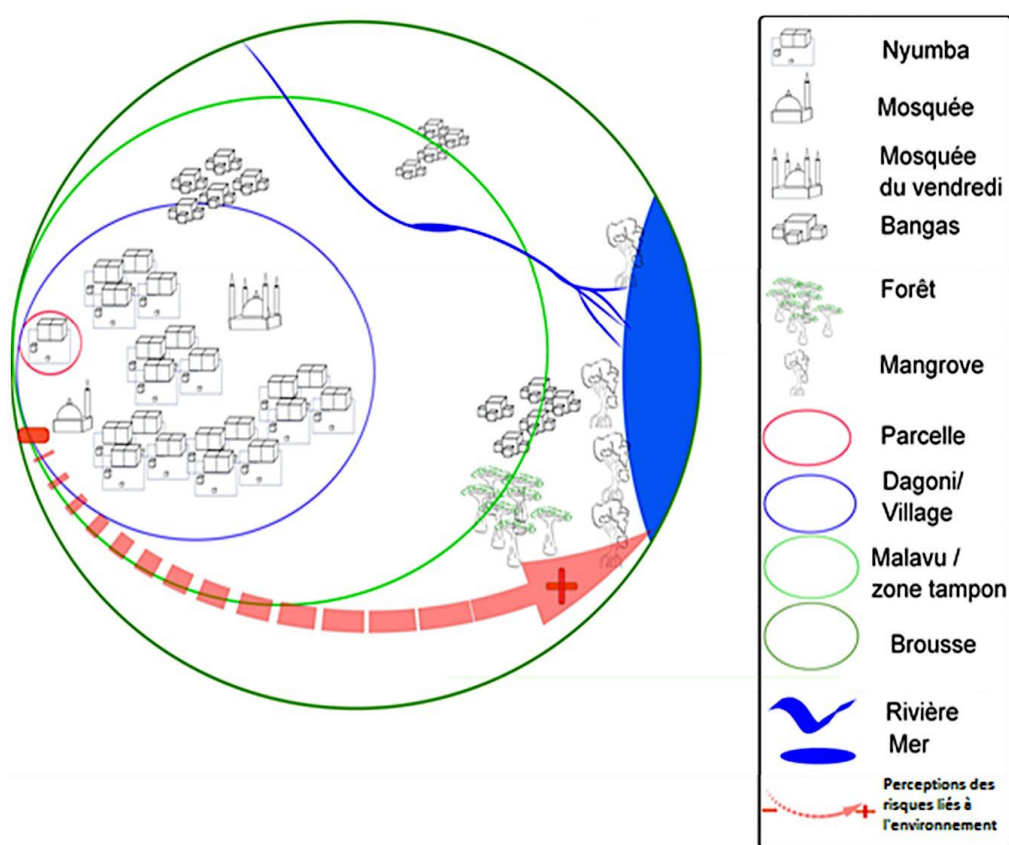


Figure 2 - Representations of space and perception of risks associated with the environment in Mayotte (Sturma, 2013).

³⁴ Sophie Blanchy Daurel. La vie quotidienne à Mayotte. 1990.

³⁵ Aude Sturma. Op. cit. p. 147.

³⁶ Descola Philippe. Le sauvage et le domestique. 2004.

Hierarchy of fears: insecurity before disease

When asked what worries them most in their everyday lives, the fear of insecurity was broadly shared by users (20 households). This can be explained in part by their living environment that, as explained above, lies in a "buffer" space on the outskirts of town where there is a strong sense of exclusion from district life. This isolation makes them feel unimportant to the community. This point was emphasised by most respondents and, combined with the fact that some households do not have access to electricity, contributes to a heightened sense of insecurity. The municipality of Koungou was the scene of clashes between groups of youths that spilled over into the Kierson district. In 2017, a banga at the centre of the district was destroyed in an arson attack and many users mentioned this event as an example of the threat they perceive themselves to be under.

Beyond the everyday insecurity they face, users cited their living conditions as their second main cause for concern. Inactivity and the fear of being unable to feed their families are often brought up by interviewees. Worklessness caused by the lack of stable employment – an everyday issue for a great many users – is heightened by the fear of travelling around the island, since not all inhabitants are documented. Many mention the limitations placed on their movements as an obstacle to managing their daily lives. Some women, for example, stated that they do not always fetch their children from school themselves for fear of being arrested by the border force.

The only families to say they do not feel a specific sense of fear in their everyday lives are Mahoran families. The difference in perception can be explained by the feeling of being integrated into and important to the district due to their higher income level and living environment (household water supply, permanent dwelling, electricity, stable employment and so on). In that respect, this confirms the hypothesis that socio-professional category and, more generally, social origin influence the perception of risks associated with the environment (in the sense of the living environment).

This finding challenges the tropism that affects how we think about risks. Although, in the eyes of health actors in Mayotte, access to water is central to these districts, it hides the hierarchy of risks developed by users who, living in situations of extreme precariousness, do not consider health and water to be among the greatest risks they face.

The most feared diseases

When asked³⁷ about the diseases they feared most, users gave a variety of responses that differed according to their age and geographical situation.

The diseases most frequently mentioned by users during focus groups were AIDS, malaria and chikungunya. Users appear to be very familiar with these diseases. Mindful of the risk of overinterpreting these results, we can assume that AIDS is the disease foremost in people's minds because of the screening campaigns run by the ARS and the efforts made in the field to raise awareness of sexual health by non-profit organisations such as the Red Cross. Epidemics of the vector-borne diseases mentioned (chikungunya and malaria) occurred within recent memory - there was a chikungunya epidemic in 2008 - and both were the focus of large-scale awareness-raising and disinfection campaigns organised by the ARS.

³⁷ Findings based on the responses made by the focus group on the theme of the local definition of diarrhoea.

Nonetheless, these diseases point to gaps in health provision for these populations, namely the difficulties encountered in mounting a sexual health prevention campaign targeted at vulnerable groups and the nesting of mosquitoes where action on an individual level seems not to have been sufficiently effective to prevent an epidemic of dengue fever in Mayotte in the spring of 2020.

Among the diseases mentioned several times are cholera, diabetes, coronavirus and toothache, in that order. We believe that fears around coronavirus were connected to the context of the survey, which was carried out during a period when the national media had begun to communicate on the need for social distancing in order to prevent its spread. At the time of the field survey (February 2020), France had not yet begun to test for COVID, and health actors thought that Mayotte was unaffected since the virus did not yet seem to be circulating on the island.

The fact that diabetes was mentioned on several occasions may reflect the effectiveness of awareness-raising campaigns on this subject organised by the ARS over many years.

Cholera is the main diarrhoeal disease mentioned by respondents. Although no cases have been recorded on the island for several years, this suggests users are concerned by the possibility of contracting a disease known to be fatal and the subject of a health alert in the 2000s.

Typhoid and the symptoms of diarrhoea more generally were only mentioned by one focus group. This suggests diarrhoeal diseases only occupy a small place in the everyday concerns of users.

We did however note variations in responses according to respondent type.

Firstly, people in more precarious situations living on the furthest outskirts of town found it difficult to cite five diseases of concern to them. The disease was sometimes referred to by symptom – stomach ache, toothache, ear pain and so on – rather than by name. This lack of technical vocabulary is due to the social situation of users (foreign nationals) and the language barrier, since users asked for questions to be translated into shimaoré during these two focus groups. This highlighted the complexity of talking about diseases for which translations did not necessarily exist in shimaoré or kibushi. This observation raises the question of how disease is perceived and what understanding individuals have of their causes and symptoms and their diagnosis, which can be an obstacle to seeking medical advice or the use of another coping resource such as self-medication. This obstacle also sheds light on the sort of information that needs to be included in prevention messages on waterborne diseases. Although it is a good idea to promote best practices, it also seems important to provide knowledge adapted to the linguistic and literary abilities of users in order to help them recognise and describe the diseases they might potentially contract.

During our focus group with young adolescent men, the diseases that concerned them most were AIDS and gonorrhoea (which they called "Hot piss"). This fear of sexually transmissible diseases appears consistent with their age, a period when young people discover their sexuality.

Diarrhoea: a dangerous but commonplace sickness

When asked more specifically about diarrhoea, all users interviewed said they had already had diarrhoea. They appeared to be familiar with the symptoms, which were mentioned by all the focus groups (liquid stools, the need to go the toilet repeatedly, stomach pains, vomiting and possible fever). They also appeared to have identified the direct and main causes and always mentioned food and water quality. The focus group with the most users using river water as drinking water remarked that cases of diarrhoea are more frequent during the rainy season due, they said, to the turbidity of the water which gave it a cloudy appearance and increased the visibility of the risk. Nonetheless, contamination due to "dirty hands" was never mentioned by the respondents.

When asked about the symptoms of diarrhoea, our attention was drawn to the fact that members of the focus groups would often mention a "runny nose". This symptom, which does not appear to be part of the clinic picture of diarrhoea, highlights the need for a solid knowledge of diarrhoeal diseases. It would seem helpful, before communities implement public health surveillance, to provide accurate information and specific knowledge on diseases. It is vital, when translating and adapting messages for people in the most precarious situations, to take into account their level of knowledge.

When asked about the frequency with which they contracted diarrhoea, participants of six out of seven focus groups said cases in their family (parents or children) were very regular (several times a month); a single focus group said cases were less frequent (once a month). During the discussions held with the focus groups, many users described the symptoms as fairly common and familiar to them. In contrast, all participants believed that diarrhoea could have severe complications or be fatal.

Many foreign nationals said the risk of contracting diarrhoea in their current living environment is higher than when they were living in their country of origin (four out of seven focus groups).

When users were asked to say which preventive measures they take against diarrhoea, they mentioned the quality of the water ("drink clean water") and food. One focus group mentioned the possibility of boiling water but explained that they did not do this systematically for the reasons cited above (tiredness, time and expense). Lastly, only one group mentioned washing hands with soap.

When users were asked about handwashing, all said they washed their hands several times a day.

"I have my hands in water all the time, I've always got clean hands" (kakawéni focus group, Kierson, February 2020).

When asked if they use soap for handwashing, most users said they do not. The reasons given were lack of habit, lack of water, which incentivises them to save it, lack of resources to buy it, and lastly the lack of a place to wash hands at home.

"If we bring some home it's not to wash our hands with!"

Although diarrhoea is perceived as dangerous, the frequency with which users contract diarrhoea (several times a month for many users) appears to help normalise it. This turns diarrhoeal risk into an ordinary risk.

Access to care and medical consultation

The trivialisation of diarrhoea can be an obstacle to medical consultation. Once it is perceived as commonplace, no particular treatment is sought for the illness. On the other hand, falling ill arouses feelings of fatalism that can be linked to a belief in the divine will as mentioned by some users.

"If I fall ill, there's nothing I can do about it, it is God's will." Interview extract, man, Kierson, February 2020.

If the trivialisation of disease means users do not systematically seek an allopathic medical consultation, they do practice self-medication and use Western medication and local pharmacopoeia. They often start with local medicine and if the sickness does not go away, they then turn towards Western medicine.

"When I'm ill, I buy Anjouan medicine in the district, and then if it won't go away I take a drug like dafalgan." Interview extract, woman, Kierson, February 2020.

Even so, a fever lasting several days appears to trigger a decision to seek medical help.

"When my children are ill, I use Mahoran and Western medication (dalaos) and if it doesn't go, because they have a fever and if it doesn't go, I see the doctor." Interview extract, woman, Kierson, February 2020.

Another probable obstacle to medical consultation is the approximate knowledge of disease symptoms. As mentioned above, the lack of a 'technical' vocabulary or a translation for certain pathologies in shimaoré or kiboushi can lead to a delay in the decision to seek advice.

Lastly, since some people have no other option than to withdraw water from untreated sources, and in order to avoid the cognitive dissonance that the lack of an alternative provokes, they deny the risk by saying the quality of the water from untreated sources is good (only two users). As a consequence, since the cause of the illness had probably not been identified, users refrain from seeking medical help as they wait for the symptoms to disappear.

Conclusion

Understanding the drivers of social vulnerability to the risk of water pollution can help identify ways to improve social and institutional capacities to cope with the risk of water pollution. Although the extreme precariousness in which a large part of the population lives due to the social origin of users (foreign nationals living in precarious situations) and the lack of access to drinking water, representations of risk and the practices resulting from them further compound the problems users face. Our case study of the informal settlement of Kierson in the municipality of Koungou highlights the need to take into account both the actual living conditions of users and the hierarchy of risks they implement and which condition the way they cope with risk.

The extreme precariousness of users, the result of very low income levels and a lack of access to drinking water, reduces their capacity to cope with health risks. Firstly, lack of access to water makes it difficult to perform hygiene measures such as handwashing, made problematic by the lack of a household device (water tap). Next, the very low incomes of users prevent them from taking other measures, such as boiling water, a practice considered too expensive and restrictive. The geographic location of the district, on the outskirts of town, in an intermediate zone between the domestic world where risks are considered as under control and the wild world of uncertainties leads to the development of a hierarchy in which security risks come before health risks.

This representation of space coupled with a limited field of possibilities for individuals living in the most precarious situations gives rise to a short-term approach to managing the health risk.

Lastly, the lack of existing translations for names of diseases and the trivialisation of the highly regular symptoms of diarrhoea are disincentives to seeking medical help.

For people residing in the poor districts of the island, to live in Mayotte is to live, above all, in a situation of insecurity. Whether they are undocumented migrants or Mahoran, users express a fear of being victims of violence and theft. The violent clashes that occur every day in Mayotte, as revealed by the headlines in the Journal de Mayotte newspaper, create an anxiety-inducing environment for the island's inhabitants. Most undocumented migrants on the island, who also represent the majority of those living in the Kierson district, also fear being arrested by the border police. Lastly, the trivialisation of the health risk prevents the emergence of a collective discourse and requests for access to healthcare. Located on the margins, these individuals do not benefit from the right to access water despite it being considered a basic right by the UN. Users who have the material and economic resources to benefit from effective hygiene conditions do not use soap as part of their handwashing habits. This research has highlighted the need for prevention work to build the capacities of the population and institutional actors to cope with the risk of epidemics. It also shows the need to adapt prevention messages to the realities of what is possible for users. For example, although a lack of soap was noted in houses with mixed incomes, communication on the need to use soap appears better adapted to a family with the material resources to implement new habits than a family without favourable conditions (no access to water, no income and so on). Beyond the challenges around awareness-raising and prevention, there appears to be an urgent need to develop, on the one hand, the structural offer for accessing water and sanitation, independent of the social status of users in the medium term and, on the other hand, to promote the availability of tools to improve living conditions (filters, tiptap and so on).

in the short term.

Despite the lack of sociological research in Mayotte, non-profit organisations responsible for implementing community health schemes on access to water have performed assessments using the same techniques as this research, i.e. observations and focus groups. They revealed more or less the same trends in terms of the need for awareness-raising and access to care³⁸.

More generally, the study helps to underline the importance of taking into account the social and anthropological dimension in perceptions of risk, which are often neglected and hamper the implementation of effective public health measures. To this extent, this study aims to build the coping capacities of the population but also the institutions responsible for the health of users by taking into account the specific cultural aspects of Mayotte in order to strengthen the health system.

³⁸ Mégane Germain. Diagnostic santé des adultes et de leurs enfants dans le quartier de la Vigie à Petite Terre, Mayotte. Santé Sud. 2020. Mayotte. 28 p.

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