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The influence of socio-economic, environmental, institutional and cultural contexts on the fight against the plague in Madagascar

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Résumé

Pays caractérisé par sa situation de pauvreté extrême, Madagascar, la Grande Île de l'Océan Indien, a connu en 2017, une épidémie de peste sans précédent. La peste a toujours été présente dans le pays –depuis 1898-, mais cela n'est jamais allé jusqu'au stade d'épidémie depuis plusieurs années. Dans ce contexte, il faut alors se demander pourquoi cette étape a été franchie et quels sont les facteurs qui ont accéléré le processus. Si les causes ayant provoqué cette situation sont sans doute inhérentes à la pauvreté extrême dans laquelle vit la population, les mesures prises pour pallier le problème ont été nombreuses, mais parfois inadaptées aux réalités locales, même si l'épidémie a été surmontée.

La question qui se pose est alors la suivante : dans quelle mesure les contextes socio-économique, environnemental, institutionnel et culturel ont-ils influé sur la réussite de la sensibilisation dans la lutte contre la peste à Madagascar pendant l'épidémie de 2017 ?

Nous faisons le constat d'une sensibilisation réussie en théorie parce que la population maîtrise théoriquement les éléments relatifs à la maladie, mais il s'agit d'un échec sur le plan pratique, car elle n'applique aucune norme de comportement qu'elle a apprise. Par ailleurs, les sphères socio-économique (dont l'éducation), culturelle et environnementale détiennent un rôle fondamental dans la lutte contre la peste à Madagascar. Les places des sphères éducative et culturelle apparaissent comme primordiales dans cette lutte, bien que l'éducation soit pour le moment, la grande absente du système.

Mots-clés : peste, épidémie, sensibilisation, risque, santé, culture, tradition.

Summary

Madagascar, the Great Island of the Indian Ocean, which is characterised by its extreme poverty, experienced an unprecedented epidemic outbreak of the plague in 2017. Although the plague has existed in the country since 1898, it had not reached the epidemic stage for many years. In this context, we must look at why this stage was reached and what factors accelerated the process. Whilst the causes that provoked the situation are undoubtedly inherent to the extreme poverty of the population, the many measures taken to solve the problem have not always been adapted to local realities, even though the epidemic has now been overcome.

The question is: to what extent did the socio-economic, environmental, institutional and cultural contexts impact the success of the awareness-raising campaign in the fight against the plague in Madagascar during the 2017 epidemic outbreak?

We observed that, in theory, the plague awareness campaign was successful because the population was able to master the theoretical information about the disease. But in practice, it has not delivered the expected positive results, because it has had no impact on the population, which still does not apply the required standards of behaviour. Moreover, the socio-economic sphere (including education) and the cultural and environmental spheres play a fundamental role in the fight against the plague in Madagascar. The educational and cultural domains appear to be essential, although education is currently conspicuous by its absence in the fight against the disease.

Keywords: plague, epidemic, awareness, risk, health, culture, tradition.

The Influence of Socio-Economic, Environmental, Institutional and Cultural Contexts on the Fight Against the Plague in Madagascar

Introduction

Madagascar, the Great Island of the Indian Ocean, which is characterised by its situation of extreme poverty, experienced an unprecedented epidemic plague outbreak in 2017. The plague has been present in the country since 1898, but it had not reached the epidemic stage for a number of years. In this context, we need to ask why this stage was reached and which factors accelerated the process. Whilst the causes that provoked this situation are undoubtedly inherent to the extreme poverty of the population, the measures taken to address the problem were numerous, but at times not adapted to local realities, even though the epidemic was eventually overcome.

The question therefore arises: to what extent did the socio-economic, environmental, institutional and cultural contexts influence the success of the awareness-raising campaign against the plague in Madagascar during the 2017 epidemic outbreak?

To address this question, we will first analyse the determinants of the management of epidemic crises and health crises in the literature. This is necessary in order to understand the kind of context that would be favourable for an awareness-raising campaign to be successful both in theory and in practice. We will then look at the elements that characterised the fight against the plague in Madagascar, given that it is a problem that affects all spheres: socio-economic, environmental, institutional and cultural. Fieldwork was carried out with 724 respondents, enabling us to highlight the fact that the population's behaviours are incompatible with the fight against the plague, and therefore represent a failure of awareness-raising on a practical level. In parallel, the semi-directive interviews that we carried out shed light on the importance of other determinants besides successful awareness-raising. Our empirical approach was characterised by two stages: first, determining the effects of awareness-raising, and second, analysing the overlap between the Malagasy context and a context which would be favourable to successful awareness-raising, in theory and in practice.

Awareness-raising as dependent on the socio-economic, cultural and institutional situation in the country

The success of awareness-raising in the fight against a disease unquestionably depends on the quality of the efforts made in the framework of this awareness-raising, but also on the socio-economic, cultural and institutional situation ~~in~~ of the country. It is important to take into account the elements that will influence the population's perception of the gravity of the situation. We must also examine the functioning of communication in times of crisis and finally, the importance of each actor in a system that is made up of several interdependent and interconnected spheres, in a context of risk and uncertainty. It is therefore necessary to take a multidimensional approach, including each of these spheres and their respective organisation, and especially the cultural sphere[1].

The issue of the perception of the gravity of the situation

According to Milet (2005), it is necessary to determine a "perception framework" to emphasise the critical nature of the situation. In most cases, health crises are declared late, which makes their management more complicated. The perception of decision-makers in the face of a specific situation is key to improving the management of a given crisis. As long as these decision-makers do not emphasise the fact that the country is experiencing a health crisis, no decision will be taken to manage it. "The first steps in responding to the crisis directly depend on errors attributable to decision-makers' pre-established theories and images"[2].

With regard to health crises, different repetitive stages occur in all cases: the first is a stage of controversy, during which scientists oppose their theories based on a logic of evidence and counter-evidence. The second stage has two phases: a polemical phase, during which it is difficult to establish what is true and what is not, which informs a growing concern amongst an increasingly vulnerable population, and a phase of political crisis, where leaders' capacity to find a solution to the situation is called into question.

During periods of health crises, Adrot and Garreau (2010) stress that "actors are subjected to stronger emotional pressure, which makes communication more sensitive"[3]. In this context, scandals quickly erupt and the concerned population develops feelings of distrust and "suspicions of connivence"[4] with regard to politicians, who, as they see it, use health crises to satisfy certain political interests.

These authors also shed light on the fact that the reaction time in the face of an emerging health crisis is always too slow: "academics and experts come together to highlight the insufficient efforts made to qualify the event, the tendency to analyse the problems faced in terms of pre-existing scenarios and the most immediately conceivable solutions, the little account taken of the concerned parties, failures in communication, etc"[5]. In this logic, there appears to be an imbalance between the measures that are adopted and the realities on the ground. Flahault (2009) notes that in the case of chikungunya in the Reunion Island,

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[1] Caroline JONES, Holly WILLIAMS. The Social Burden of Malaria: what are we measuring?, p. 156.
[2] Marc MILET. Cadres de perception et luttes d'imputation dans la gestion de crise: l'exemple de «la canicule» August 2003, p. 591.
[3] Anouck ADROT and Lionel GARREAU. Interagir pour improviser en situation de crise. P.121.
[4] Claude GILBERT, Laurence RAPHAËL. Vers une gestion politique des crises sanitaires ? p. 55-60.
[5] *Idem*.

there were significant disparities between leaders' perceptions and those of the population: "in the midst of the epidemic […], the Reunionese ranked chikungunya as one of the most serious diseases"[6]. Faced with this point of view, the authorities advanced that the symptoms were not very severe. There was therefore a "gap between the population and the national and international authorities in charge of control and response"[7]. Scientists were also at odds with each other inasmuch as for clinicians, chikungunya was a benign disease whereas for epidemiologists, it was a serious disease, because the morbidity rate was significantly high. Finally, a link was made between the population's degree of vulnerability and the fact of contracting the disease. We can therefore see that disparities in actors' perceptions can lead to a slow and inefficient response.

With regard to the population, the perception of risk is fundamental to resolving the problem. In developing countries, however, this perception is influenced by different elements, namely from the cultural sphere. To help a community in matters of health, it is necessary to understand what determines their perception of health issues by observing their habits and how these habits are interconnected, giving rise to a particular health situation (Scrimshaw, 2006[8]; Jones and Williams, 2004).

The necessary bias of communication systems

Concerning communication, Ollivier-Yaniv (2015) highlighted the issues surrounding public health communication. He emphasised that in crisis situations, "information and communication are built as instruments of government"[9]. The State anticipates questions from journalists and aims to limit the risk of polemics as far as possible, a risk that is particularly high in times of health crises. These anticipations are fundamental inasmuch as they enable the State to find a means of reassuring the population whilst warning them of which behaviours to adopt in response to the epidemic.

These days, one of the problematic issues in this kind of situation is the emergence of the use of social networks, which enable information as well as "fake news" to circulate quickly and across all or most social strata. In general, and in a majority of countries, the State will consequently try to keep track of polemics online, in order to calm them in times of crisis.

In the context of a health crisis, communication is one of the cornerstones of crisis management. Nevertheless, communication is a tool that must be handled with care inasmuch as it will very quickly influence public opinion. On the one hand, it is important to show that we are in a crisis situation, but on the other hand, polemics must be avoided. It is therefore necessary to produce an "alert effect" whilst maintaining "a logic of attenuation with regard to alarmist messages". As a result, it is clear that in most cases, the State has control over the communication of health information in the case of epidemic crises, and its main objective is to limit polemics and achieve a coherent management of the crisis. The situation therefore tends to be presented as manageable, on the condition that the population makes the required efforts to curb the epidemic.

[6] Antoine FLAHAULT. Gestion d'une crise sanitaire: l'exemple du chikungunya. p. 53-66.
[7] *Idem*.
[8] Susan SCRIMSHAW. Culture, Behavior and Health, p. 43.
[9] Caroline OLLIVIER-YANIV. La communication publique sanitaire à l'épreuve des controverses, p. 72.

The importance of interaction between actors in the face of uncertainty and risk

According to Adrot and Garreau (2010), in crisis situations, the interaction between actors is fundamental inasmuch as crisis management requires a high degree of improvisation. It is during this kind of period that the reliability of the system is put to the test: "beyond the scale of the damage and the loss of human life, crises call into question the proper conduct of fundamental actions by organisations that must respond to the disaster no matter what"[10]. In this context, decision-making and action become almost simultaneous because of the emergency timeframe. Analysis therefore needs to be made of the "individual interactions that make up organisational improvisation"[11]. If we consider the parallel definitions of crisis and of improvisation, we can see that improvisation enables us to respond to a crisis. By definition, a crisis is "a situation that threatens the functioning, aims and values of an organisation and calls for the formulation of new practices"[12]. Improvisation can be defined as a way to "respond to the uncertainty and strong temporal pressure that characterise a crisis situation"[13].

Although improvisation is an indispensable step in health crisis situations, it is clear that prevention and awareness-raising measures could often have avoided the crisis situation, especially in the case of the plague. With regard to the crisis caused by the H1N1 virus in France, Gilbert and Raphaël (2011) noted that "it is usually considered that the authorities in charge are not always able to gauge emerging threats. Although surveillance systems guarantee a high level of vigilance and enable anticipation and rapid responses, it turns out that neither the methods of expertise nor the methods of decision-making allowed the public authorities to get a proper hold on the situation"[14]. Flahault (2009) observed that the controversy phase, in the case of chikungunya, persisted: it was unclear for a long time whether the disease was benign or not. This effectively limited the measures that were taken at the beginning of the crisis.

Organisational improvisation must incidentally be coherent, but in a crisis situation, the coordination of actions by different actors is complicated inasmuch as each actor has their own perception of the emergency, and their own vision of the situation that needs to be overcome. This results in the implementation of disproportionate solutions and inadequate approaches. The organisation therefore becomes dispersed, since the system's different structures are not sufficiently coordinated.

Forster and Charnoz (2013)[15] highlight the different dimensions that need to be taken into account in the management of a health crisis: the role of organisations, the role of the State and the effects on society. Nevertheless, they point out that a balance is necessary in the face of different distortions in order to increase the efficiency of action in a limited timeframe. The risk of bias in the measures taken must, for this reason, be reduced as far as possible. The actors (people, organisations, objects) must each have their part to play, whilst acting coherently in relation to one another. The first aim of international actors is the "security of the vital systems". They therefore support government efforts to secure essential infrastructures and public

[10] Anouck ADROT and Lionel GARREAU. *op.cit*. p. 120.
[11] *Idem*.
[12] *Ibid.* p.121.
[13] *Idem*.
[14] Claude GILBERT, Laurence RAPHAËL. *op.cit*.
[15] Paul FORSTER, Olivier CHARNOZ. La production de connaissances en temps de crise sanitaire. p. 112-144.

services, and to implement adequate institutions. As a result, countries should be less vulnerable in the face of events that are "unlikely, but have significant consequences", such as in the case of an epidemic.

The fundamental elements to consider are therefore the public actors, the links between private and public actors, the dynamics between international, national, private and public actors, and each challenge that accompanies the implementation of emergency response in a complex political, social and ecological environment (Forster and Charnoz, 2013). Very often, it seems that local contexts are overlooked in the decision-making process. We therefore need to be permanently reevaluating the situation in order to avoid any distortion between policy objectives and the local context.

According to Figuié et al.[16], recurrent health crises over the past few years have led international organisations to "promote a new global governance". The authors therefore raise the issue of national specificities, pointing out that "the project of global health governance must not underestimate the complexities at the local level". These complexities are characterised by local dynamics, as well as socio-economic and cultural vectors. In this framework, two fundamental concepts emerge: that of "risk" and that of "uncertainty". The WHO's 2005 report, entitled "Communication in the case of an epidemic outbreak", highlighted the fact that uncertainty holds an important place in the implementation of crisis response. Indeed, in the event of an epidemic crisis, many questions remain unanswered (Figuié et al.). Then, in the face of risks, the system of actors involved in risk governance is expanded.

It should be noted that the uncertainty that arises in the case of epidemic crises is not solely a technical or scientific uncertainty, since we must remember to take into account the country-specific contextual factors such as organisational capacity and the political and regulatory culture, as well as the culture of risk and the social climate. For this reason, risk and uncertainty also includes "the uncertainty relative to the social consequences and to the capacity to control the risk" (Borraz, 2008). Hence, the population's capacity to react in a given country will primarily depend on economic, social, institutional and cultural factors. For Figuié et al., it is necessary to "examine the national differences in the cultures and methods of risk management and analyse how they mutually influence each other". It is therefore impossible to determine a method of management that would be applicable from an international point of view.

Development of a multidimensional approach

According to Tabuteau (2007), public authorities are having to shoulder increasingly onerous responsibilities with regard to health issues. One of the main challenges is the coordination of institutions and health security policies. Health professionals consider that their work is not limited to providing care. They must also determine what the risks are and how to manage them. "Risks do not paralyse […] political action […]. On the contrary, they open up new political options". Hence, a multidimensional approach must be privileged, without excluding any sphere that may influence health actions, and especially the results of these actions[17].

Meslé and Vallin (2000) highlighted the respective roles of medical progress and economic and social development in the resolution of health issues. They particularly focused on the issue of health progress. In their view, based on that of 21st century scientists, "neither of these two factors can deliver health progress

[16] Muriel FIGUIÉ, Tristan FOURNIER. Risques sanitaires globaux et politiques nationales : la gestion de la grippe aviaire au Vietnam. p. 327-343.

[17] Didier TABUTEAU. La sécurité sanitaire, réforme institutionnelle ou résurgence des politiques de santé publique?, p. 87-103.

on its own, and even both of them together is not sufficient. The reality is much more complex and also highly variable across space and time". For this reason, we can only understand and improve the health system in a given country by taking multiple factors into account. The idea of interaction between actors, mentioned above, is also emphasised by these authors: "the factors of health progress indubitably form a complex technical, socio-economic, cultural and political whole where each element interacts with the others". In other words, each of the technical, socio-economic, cultural, institutional and political spheres has an influence on the development of the way that health issues are addressed. These spheres are therefore indissociable[18].

From a socio-economic point of view, and with regard to population wellbeing, Garenne et al. (2000) emphasise that "efforts must be made in terms of sanitation and hygiene, then in terms of medical infrastructures, especially hospitals, medical training, access to care for disadvantaged populations, etc". Indeed, for reasons related to their history, their economy or their culture[19], a number of developing countries have been unable to meet certain milestones in terms of health progress. Yet the only way to improve their situation is to take these factors into consideration.

At the institutional level, the development of the concepts of "coordination" and "cooperation" is fundamental. "The socio-economic dimension of institutions […] has proven to be a determining factor to interpret past developments, but also perhaps to shed light on future choices"[20] in matters of health (Tizio, 2005).

Moreover, according to Healey (2008), culture and the knowledge of traditions have an impact on the health of populations. It is therefore important to implement policies and programmes that take cultural aspects into account and that enable a better understanding of the needs of local populations[21]. Gravel and Battaglini (2005) also emphasise the fact that "health is influenced by factors associated with ethnicity, that is, by characteristics specific to members of a group and that therefore represent distinctive elements of their identity for them"[22]. For Jodelet (2006), culture must be integrated into a multidimensional approach that enables us to understand the complex processes of health issues[23].

Criteria for "good management" and "epidemic crisis management"

From everything that has been put forward, we can retain the fact that the management of an epidemic crisis must involve a multidimensional approach that takes into account the socio-economic, institutional and cultural elements ~~in~~ of the country. This includes the role of different actors in the process of resolving the crisis situation, the interactions between them, the convergence and coordination of the different actions that are carried out, and the place of institutions in this process. The success of awareness-raising will depend on the characteristics of the context it is applied to, and awareness-raising is an integral part of the process of crisis management. We note that these contextual elements echo the criteria of "good

[18] France MESLÉ, Jacques VALLIN. *Transition sanitaire: tendances et perspectives*. 2000.

[19] Michel GARENNE, *et al*. La transition sanitaire en Afrique subsaharienne, p. 30.

[20] Stéphane TIZIO. Trajectoires socio-économiques de la régulation des systèmes de santé dans les pays en développement: une problématique institutionnelle. p. 45.

[21] Gwen K. HEALEY. Tradition and culture : an important determinant of Inuit women's health. p.25-33.

[22] Sylvie GRAVEL, A. BATTAGLINI. Culture, santé et ethnicité.

[23] Denise JODELET. Culture et pratiques de santé. p. 219-239.

management" developed by Ostrom (2010) in the case of commons management[24]. These criteria are therefore applicable to the management of health crises.

According to Ostrom (2010), a country has a system of "good management" if it respects a certain number of criteria, namely: that it is populated by individuals who respect behavioural norms; that there is an organisation such that actors act in an interdependent and coordinated way, thereby avoiding divergent objectives which would lead to tensions arising between them and a weakened management policy; that this interdependence facilitates the links between actors; that there are efficient institutions - by institutions, we mean established rules enabling us to manage these links; that leaders are present to enforce compliance with these rules; and that sanctions are applied in the event that the rules are not respected[25] (Razafindrabe, 2015).

Nevertheless, it must be noted that in the case of an epidemic, the capacity to react in the face of a crisis situation must also be taken into account. This gives a prominent place to improvisation, the control of risks and uncertainties, and the use of communication.

Methodology

To understand the extent to which socio-economic, environmental, institutional and cultural contexts influenced the success of awareness-raising initiatives in the fight against the plague in Madagascar during the 2017 epidemic, we must first look at the real effects of this awareness-raising. We must then take into account that the success of awareness-raising does not depend solely on its contents, nor on the way in which it is received by the population, but also on the context in which it is applied. This context must respect the criteria of "good management" in order for the management of the epidemic or health crisis to be feasible.

We were able to highlight the following criteria to be taken into account in a system with good management:

- Respect of behavioural norms by the population;
- The existence of an organisation where actors act in a coordinated and interdependent way, in order to achieve the same goal;
- Interaction facilitating links between individuals;
- The existence of efficient institutions;
- The presence of leaders;
- The existence of sanctions.

When considering the health sphere in particular in times of crisis, we can add the following criteria:

- The population's capacity for reaction (improvisation);
- The optimisation of control over risks and uncertainty;
- Adapted use of communication.

[24] Elinor OSTROM (scientific review by Laurent BAECHLER) (2010), *Gouvernance des biens communs*.

[25] Alexandra RAZAFINDRABE. Politiques forestières et «bonne gestion» des ressources: le cas de Madagascar.

We began with a socio-economic study of 724 individuals, from plague red zones in Madagascar, and 27 semi-directive interviews with people representing certain private and public actors in the fight against the plague.

Firstly, we defined the behavioural variables and tried to see whether individuals moved towards or away from positive behaviours in the fight against the plague in Madagascar, highlighting the determining factors behind these behaviours by means of logit models.

For a dependent variable, the dichotomous probit and logit models provide the probability of the appearance of this event, conditional on exogenous variables, as opposed to quantitative coding associated with the realisation of an event (as in the case of linear specification) (Hurlin, 2003)[26].

The model under consideration is therefore:

$$p_i = Prob(y_i = 1|x_i) = F(x_i\beta)$$

with F as the distribution function corresponding to the logistic function

In summary, the aim was to explain the advent of the event, considered as a function of a certain number of observed characteristics amongst the individuals in the sample. We therefore sought to specify the probability that this event would occur.

In our case, the variables to be explained were the different elements held up as being representative of behavioural norms:

- The fact of having taken particular measures during the fight against the plague,
- The fact of managing household waste correctly.

We tried to explain the probability of an individual answering that they took particular measures during the plague or giving an answer that indicated that they knew how to manage their waste correctly, by means of different variables, such as the interest they showed in information about the plague, whether they had access to this information during the epidemic period, and after, whether they received awareness-raising in the field, and whether they considered that awareness-raising had improved their understanding of disease-information. Initially, we focused on elements characterising communication and awareness-raising.

We were therefore interested in the following models:

- for the fact of having taken particular measures during the fight against the plague:

$$y_i = \{1\ if\ yes\ 0\ if\ not$$

- for the fact of managing their household waste correctly:

$$y_i = \{1\ if\ public\ bins\ 0\ if\ not$$

So:

$$p_i = Prob(y_i = 1|x_i) = F(x_i\beta)$$

with x_i being the set of explanatory variables relating to awareness-raising and communication

We then proceeded in the same way with the explanatory variables relating to the environmental, cultural and socio-economic spheres.

[26] HURLIN, Christophe. *Économétrie des Variables Qualitatives*. 2003.

We were therefore able to determine the elements that influenced the appropriation, or lack of appropriation, of these norms by individuals. This stage was vital to the analysis since once these elements had been highlighted, we were able to understand why the norms were integrated or not into the local actors' general behaviour.

Secondly, we focused on each previously-defined criterion other than the appropriation of behavioural norms, and tried to see from our data whether the criterion was effectively met. We were therefore able to shed light on different factors influencing the success of awareness-raising in the fight against the plague in Madagascar.

Awareness-raising in the fight against the plague in Madagascar in a delicate socio-economic, environmental, cultural and institutional context

As a first step, we were able to observe that awareness-raising had not produced the expected results in practice. Indeed, whilst individuals understood what was important in the struggle against the plague and what needed to be changed in theory, they did not integrate these elements into their behaviour. Ostrom's first criterion was therefore not met.

We then turned our attention to the other variables that were likely to influence the development of behaviours, including environmental, cultural and socio-economic variables.

Finally, we concluded that there is a disparity between the situation in Madagascar and the criteria of "good management".

Variables linked to behavioural norms

The real effects of awareness-raising on the integration of behavioural norms

If we focus on the first behavioural variable, we can say that awareness-raising does indeed appear to have had an impact on individuals' behaviours since the fact that they were informed encouraged them to take particular measures during the plague period. Nevertheless, it also appears that the fact that an individual declared having improved their knowledge of the plague thanks to awareness-raising had almost no influence, or sometimes a negative influence, on the probability of them taking measures. This is therefore contradictory. We can conclude that there is a distortion between what an individual declares doing and what they effectively do.

With regard to the second behavioural variable, most of the results were counterintuitive since communication and information also had no effect on the probability of having "normative" behaviours, or if this effect did exist, it seemed to reduce this probability. The only positive detail here is the favourable effect of awareness-raising by field agents. As a result, only direct awareness-raising appeared to have a real impact on behaviours. This second variable was much more illustrative of individual behaviours, since we asked people what they were concretely doing. There is therefore an incoherence between the real behaviour of the individual and the fact that they were informed. If the information had had the expected effect, it ought to have increased the probability of people displaying "normative" behaviour.

The question then arises of what might influence the integration of behavioural norms into individual attitudes, beyond awareness-raising. We looked at socio-economic, environmental and cultural

determinants. In the literature, the influence of these elements on health has been highlighted, specifically for the cases of malaria and tuberculosis. According to Jones and Wlliams (2004)[27], for malaria, there is a tendency to keep these spheres on the sidelines, although their role is fundamental given that they affect perceptions, individual behaviours, social structures and social action. Socio-economic and cultural factors especially influence people's capacity and desire to change their behaviour, by integrating norms that, if they were respected, would have a positive effect on the fight against the disease.

The role of the educational sphere in learning behavioural norms

The first sphere that we looked at was the educational sphere. We observed that there was no link between educational variables and behavioural variables. Hence, on this level, it can be concluded that education is conspicuous by its absence from the system, even though it is the sphere where a solution must be sought in order to have a real effect on individual behaviours. The interviews confirmed that the problem is one of mentalities. By means of a key-word approach, we were able to observe that the recurring themes in our respondent's answers were that "there are too many bad habits amongst the Malagasy people", that "people need to change their mentality" and that "everyone must feel responsible". It was put forward that the population is too used to "receiving" and does not take responsibility, because people feel that someone else is always going to act for them. The only sphere where measures might be put in place to revolutionise mentalities is the educational sphere, because for a change to last, it is necessary to start from the source. Yet the problem that appeared was that teachers themselves had failed to integrate hygiene and cleanliness norms. Moreover, school is not accessible to everyone. So how can the transmission of good habits be achieved on a large scale?

Understanding the link between the plague, environmental factors, and behavioural norms

In terms of the environment, we focused on several variables which could be taken into account in the analysis of the fight against the plague in Madagascar. To build these variables, we asked individuals the following questions: "Do you think that waste increases the number of rats in your neighbourhood?", "Do you know what waste sorting is?", "Do you think there is a link between climate change and the proliferation of rats?", "In your view, are humans responsible for climate change?", "Do you think that forest fires help to fight against the plague, contribute to the spread of the plague, or have no incidence on the plague?", "Do you think that deforestation could be a cause of the plague, or that it has no link with the plague?". The working hypothesis here was that a good understanding of the potential environmental causes of the plague should help improve individuals' behaviours. We therefore tried to explain the behavioural variables based on the environmental variables which arose from these different questions. Based on the answers, and always according to a logistical model, we were therefore able to observe that when an individual believed that the presence of waste increased the number of rats in their neighbourhood, the probability of them adopting "normative" behaviour decreased. This suggests that the increase in the number of rats due to the presence of waste did not concern the respondents at all.

Therefore, we can once again see that even though the population theoretically understood the cause of the situation, nothing was done from a practical point of view. Nevertheless, the population's awareness of

[27] Caroline JONES, Holly WILLIAMS. *op.cit.*

environmental issues in the fight against the disease is necessary in order for the fight to be efficient. This is also part of individuals' perception of the risk. We recall that the success or failure of the fight against the plague depends on this perception (Rubel and Garro, 1992)[28].

Socio-economic factors and behavioural norms

Very often, the recurring situation was as follows: individuals considered that the country had more important problems than the plague, since these problems conditioned their daily lives. This was why they did not take the disease seriously and why the epidemic was sometimes perceived as being a rumour. Some numbers to bear in mind: 53.6% of respondents, or over half, believed that the most important problem was the lack of infrastructures, and 18.2% emphasised that the main problem was the lack of food.

During the study, and over the course of the interviews, it was put forward that a large proportion of the population in 2017 perceived the plague as a means used by politicians to divert attention away from the country's real problems. "Political" polemics are very frequent in times of epidemic crises, as the literature on the question has shown.

The issue of poverty was approached differently by respondents in the interviews. The interviews enabled us to observe that individuals' main concerns were about daily income, or the lack of infrastructures. For this reason, the plague was not really seen as a problem. In the interviews, economic issues were perceived differently. It was often put forward that the Malagasy people were too used to "receiving" and that extreme poverty had led them to the logic that they would only accept to do something in exchange for a monetary reward (this same logic is the basis for the corruption in the country). Hence, adopting good habits or acting on their own initiative, without a reward in exchange, seems impossible. We therefore come back to the need to revolutionise mentalities, and the only way that this can be achieved is through education.

In light of this analysis, we can conclude that Ostrom's first criterion was not met. According to this first criterion, in order to speak of "good management", the population needs to have integrated "norms" with regard to their behaviour, which was absolutely not the case here. Awareness-raising can therefore be said to have been a failure from a practical point of view. Moreover, the different factors (socio-economic, environmental) that have an influence on the integration of norms into individuals' behaviours are not understood.

A limited coordination between actions, and communication breakdown

Ostrom's second criterion is the existence of an organisation where actors act in an interdependent and coordinated way, to meet a common goal. The goal here is to manage to fight sustainably against the plague. With regard to organisation, we previously showed that the situation was one of communication breakdown, inasmuch as the population perfectly understood what was being explained about the plague, but took no action. The main actor affected by the scourge of the plague, that is, the population, was consequently already out of action. With regard to other actors, in the health sphere and beyond, coordination appeared to exist in theory, inasmuch as the plan of action was drawn up by the Ministry of Health and then applied by all the other ministries.

[28] Arthur RUBEL, Linda GARRO. Social and Cultural Factors in the Successful Control of Tuberculosis. p. 626.

Nevertheless, we can highlight the fact that the absence of actors from the educational sphere, mentioned previously, represents a weakness in the system given that it is imperative to have a multidimensional approach in order to achieve a coherent result. Since we are in a context of communication breakdown, the main way to really reach the population, from early childhood, is education. For this reason, we can currently conclude that there is a limited coordination and interdependence of actions, since there is insufficient intervention by the educational sphere in the fight against the plague.

Moreover, awareness-raising in itself is also seen as insufficient, according to certain actors in the system. It takes place only in times of crisis, whereas it ought to be permanent in order to produce tangible, long-term results. It is also important, on this level, to consider what kind of awareness-raising needs to be done. Since mass communication does not seem to affect practices, only ideas, priority must be given to field awareness-raising campaigns.

Rubel and Garro (1992) demonstrated that a person's reaction to a threat is dependent on several factors: they will feel concerned or not, then judge whether the illness is serious or not, and finally, reason in terms of advantages by asking what preventive measures are going to mean for them. Hence, if awareness-raising does not allow us to reach individuals on these points, it will serve no purpose. Finally, Rogers (1973) explained that mass communication is useless, since interindividual contact is necessary in order to persuade people to adopt new behaviours[29].

Lack of transparency

The third criterion is closely connected to the previous one, since it involves an interaction to facilitate the links between individuals. It was difficult for us to perceive the existence of this interaction, or otherwise, since certain actors were reticent to take part in the interviews. Therefore, we do not exactly know what scope their action had in the fight against the plague, or what their links were to other system actors. We therefore concluded that there was a lack of transparency in the system, possibly indicating a problem at the level of interaction between actors.

We must recall that according to Forster and Charnoz (2013), the fundamental elements to consider are the public actors, the links between private and public actors, the dynamic between international, national, private and public actors, and each challenge that accompanies the implementation of emergency response in a complex political, social and ecological environment. Although international actors play a vital role in the fight against the plague, local actors do as well. Yet our different respondents emphasised the fact that very often, the latter wait for action from the Ministry, even though they are responsible for certain parts of the action plan. Similarly, the local population feels in no way responsible for the situation and does not take part in actions to fight against the plague.

As a result, as long as each actor affected by the fight against the plague fails to recognise their role in this fight, it will be impossible for them to truly interact to achieve the same goal, namely, that of definitively eradicating the plague.

Ostrom's second and third criteria were therefore not met either: we cannot speak of an organisation where actors act in an interdependent and coordinated way, in pursuit of a common goal, nor of interaction that facilitates the links between individuals.

[29] Everett M. ROGERS, Mass Media and Interpersonal Communication, pp. 290-310.

The absence of precise rules, the lack of sanctions and the influence of tradition

The next criterion refers to the existence of efficient institutions. By institutions, we mean established rules enabling the management of the links between different actors. What emerged from the interviews was the near-total lack of rules throughout the country. Even when they did exist, these rules did not give rise to sanctions. As a result, individuals continued to maintain "non-normative" behaviour. For example, someone who disposed inappropriately of their waste, by throwing it into a gutter, a body of water or on the side of the road, would not be punished. He would therefore continue to do it, even if he knew that his behaviour was bad for the environment and for the inhabitants of the area. On this level, it is important to highlight that individuals therefore have no concept of mutual respect, and this can only be corrected by means of the educational sphere. Yet the Malagasy people are profoundly anchored in their culture, which promotes the respect of Elders and traditions.

Incidentally, this respect of traditions is a problem in the fight against the plague. The *famadihana,* or turning of the bones, is considered to be one of the main causes of the spread of the plague in Madagascar. The issue of culture and traditions is delicate, and also gives rise to ethical concerns. Is it possible to ask a population to give up their identity for health reasons? As highlighted by Scrimshaw (2006), it is essential in health matters to take cultural characteristics into account when considering what is good or bad for a community.

A national committee for the fight against major epidemics (CNCLEM) has recently been set up, particularly to address the problem of traditions. A bill regarding burials and exhumations is currently under review. The media have highlighted the fact that, during the 2017 epidemic, conflicts broke out between families and authorities because of the bodies of the dead: "In Toamasina, bodies buried in mass graves were dug up and stolen". It will therefore be difficult to make the population accept that a change to their traditions is necessary in order to limit the risks.

It must also be noted that a large proportion of Malagasy people turn to traditional healers when they are sick. Our study does not properly reflect this phenomenon, inasmuch as only 3% of respondents declared having visited with healers. Nevertheless, it must be noted that a healer receives hundreds of people every day, which is a significant figure. For non-traditional health actors, this is problematic, because if individuals do not go directly to the health centres, the disease has a greater chance of spreading.

Beyond traditions and the *famadihana*, the Malagasy population also has a culture based on *moramora*, literally "slowly, nonchalantly". According to this principle, nothing can alarm them. It is difficult to associate *moramora* with the concepts of "risk", "danger", or "responsibility", since *moramora* signifies a certain optimism where everything will happen or work out on its own, without effort, and without problems.

We therefore observed that the behaviour of individuals was influenced by cultural aspects, and by the lack of precise rules and sanctions. Once again, two of Ostrom's criteria for "good management" were not met. The implementation of rules and sanctions is necessary. Moreover, since individuals are influenced by culture, it is necessary to respond to the health issues that are produced by the culture using the culture itself. In other words, the current culture must be replaced by a culture of cleanliness, transmitted by older cultural mainstays like *hira gasy* or by more modern ones, in addition to what needs to be done by the educational sphere.

Conclusion

The aim of this study was to determine the extent of the influence of the socio-economic, environmental, institutional and cultural contexts on the success of awareness-raising in the struggle against the plague in Madagascar during the 2017 epidemic. The first observation that we can make is that awareness-raising during the fight against the plague was successful in theory, but not in practice. Even though individuals understood what the disease was and how to avoid it, they failed to apply the behavioural norms to limit the spread of the plague. The integration of behavioural norms is therefore not solely dependent on the quality of awareness-raising initiatives, but also on other socio-economic, cultural, institutional and environmental factors, which are themselves not yet fully understood.

We emphasised the leading role of the educational sphere in this fight against the plague, although it is currently conspicuous by its absence in the system, since nothing is done to make a lasting impression on people with regard to the gravity of the situation. Moreover, Malagasy culture and traditions also strongly influence behaviours in the fight against the plague. As a result, simultaneous action at the cultural and educational levels, and in interaction with other spheres, is essential in order to revolutionise mentalities.

To establish whether the management of the plague met the criteria of "good management", we compared the situation in which awareness-raising about the fight against the plague took place in Madagascar with Ostrom's "good management' criteria (2010). We observed that none of the criteria were met: the population did not integrate behavioural norms, we do not seem to be dealing with a case of coherent interdependence and coordination between actors, the links between individuals were not facilitated by any visible interaction, the rules were absent or when they did exist, they did not give rise to sanctions in the event of being broken. Hence, even though it is clear that awareness-raising plays an important role in the fight against the plague, the understanding of the other determinants of successful awareness-raising initiatives, characterised by these different criteria, is also essential.

Although the country was able to overcome the epidemic crisis in 2017, it could very easily experience a similar situation again if nothing is done to improve the situation in the light of the aforementioned criteria.

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