

## THE GEO-QUALIMETRIC METHOD (GQM) AS TOOL FOR MEASUREMENT, VISUALISATION OF STAKEHOLDER PRACTICES AND SOCIO-SANITARY PREVENTION

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### Abstract

The socio-technical tools of measures for prevention are often confronted by a methodological challenge integrating the “space” variable. It is this challenge that Geo-Qualimetric Method (GQM) seeks to address. The Geo-Qualimetric Method is a process of production of scientific knowledge that is focused on a methodological triangulation between qualitative, quantitative and spatial analysis demarches. The present experimental study is based on a specific empirical framework: the stakeholders practice in household management of treated mosquito nets in the Health District of Cité des Palmiers, Douala – Cameroon. The results show the aptitude of this tool to measure and visualize stakeholder practices as well as geo-strategic planning of socio-sanitary prevention. This study ends by opening the debate on the importance and challenges of this methodological innovation.

**Keywords:** Geo-Qualimetric Method, measure, visualization, socio-sanitary prevention, methodological innovation.

### Introduction

Measurements in social sciences have enhanced a better understanding of facilities planning. The measurement of features and phenomena of human societies, their causes, characteristics and impact have facilitated their understanding as well as their prediction from the levels of interpretations and simulations be they quantitative or qualitative. Measurement is more and more seen as unavoidable instrument of strategic prevention in various domains issuant of political, economic, socio-cultural and environmental sectors. Mindful that the use of measurement has permitted the prevention of a certain number of dangers or to minimise their recurrence, it is worthy to note that it is often marked by a several approximations, extrapolations and errors. The expected results are sometimes approximate, poorly attained or not even attained all together. This reality is often remarked in the social sciences where variables, indicators, parameters and socio-empirical data are highly evolving in time and space.

Mindful that the timing of studies permits that continuous adaptation of the strategies of prevention in time, the socio-technical basis adapted in these studies find it difficult to take the aspect of space into consideration. The generalisation of indicators of

the observed variables to the whole study area is often confronted with significant micro geographical variations of the said variables within the given space, even small as the case may be. This creates disconnected prevention strategies rather than geostrategic prevention that integrate spatial specificities and the elements that are indicative of each micro space. Within this context of the non-mastery of space, the limited efficiency of prevention strategies issuant of measurement becomes necessary.

Generally, the socio-technical basis of quantification for prevention are faced by a problem of methodology with regards to the integration of the space variable. It is this problem that The Geo-Qualimetric Method (Meva'a Abomo, 2014a) attempts to solve though without necessarily in its totality. The present experimental study is based on a precise empirical framework that shows demonstrates the virtues of the Geo-Qualimetric Method in measurement, visualisation of stakeholder practices and that of geostrategic planning of socio-sanitary planning. It also plays a role in the vulgarisation of this method of production of scientific knowledge that is anchored on methodological triangulation approaches of qualitative, quantitative and spatial analyses.

## **Materials and Methods**

### **Empirical Framework**

This study results from an observation that the intensification of preventive measures against transmissible diseases like malaria shows a contrast by the increase in the epidemiological and socioeconomic impacts in the town of Douala that is the economic capital of Cameroon (Meva'a Abomo, 2015a, 2011). This observation is attributed to many factors like the limited efficiency of the prevention policy through the use of mosquito nets. Whereas this policy receives a remarkable campaign with varies means of sensitisation of the free issuance of this too. It has even become a priority of public authorities and matters of mitigating urban epidemic endemism.

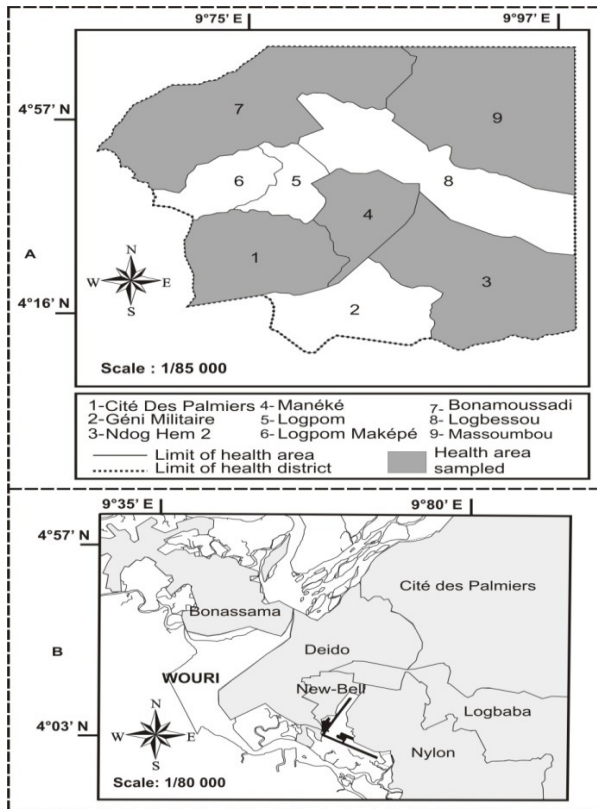
Empirical observations also revealed less significant variations in the prevalence of malaria of an urban household engaged in the use of mosquito nets from a neighbour that does not use. There is no major change in most cases. Though a plethora of reasons can account for this situation, this study singles out stakeholder practices in matters of the management of the said preventive in the tools in Cité des Palmiers Health District. This district serves some 423 502 inhabitants on the 1 907 479 inhabitants of Douala (BUCREP, 2010).

The empirical framework appears to be very appropriate for an applied experimental study of the Geo-Qualimetric method. The challenge here is the exhibition of the methodological triangulation of the measurement, structure and visualisation of stakeholder practices in matters of managing mosquito nets on one hand and the geostrategic planning of mosquito net based prevention on the other hand.

### ***Data collection***

Data was collected in five of the nine health areas<sup>1</sup> in the study space being those of Cité des Palmiers, Bonamoussadi, Massoumbou, Ndog Hem 2 and Manéké (Fig. 1). They were selected based on the socio-spatial sampling method (Meva'a Abomo, 2014). The sample

obtained therefore respects the triple representation of quality, statistics and geography of the population of the health districts.



**Figure 1:** (A) The health district sampled in the study in Cité des Palmiers; (B) Location of the Cité des Palmiers health district in Douala

The study was based on the geo-qualimetric method that exploits qualitative data collected through interviews. Thus, semi-directed interviews were carried out on 125 households that were equally distributed in the 5 health areas. Some 25 households were interviewed in each health area considered for the experimental study. The households were selected on the field on the basis of non-probabilist method of sampling that was based on the criteria of eligibility. The first criterion was related to the presence of treated mosquito nets in the households for at least two years and the second was to have a longevity of at least three years stay in the health unit. Such longevity permits us to attest that the household possesses some knowledge of any sort of the policy of prevention

through the treated mosquito nets. Equally the household knows how to use the preventive tools, be it in the wet or dry season. The semi-directed interview technique was exploited from a structured and fixed interview guide. The same variables were thus attempted in all the interviews. The three variables that were used for the interviews were: 1-the presence of mosquito nets in the homes, 2- the periodicity of their fitting 3- the quality of fitting. Lastly, other complementary data were collected using the on the spot observation technique.

**Data treatment**

Data from the field were treated by geo-qualimetric method that synchronises qualitative, quantitative and spatial analytic approaches. For the qualitative approach, the interview pronouncements were transcribed. Texts developed from the interviews were then exploited for the qualitative analysis of the contents. The information was then classified into qualitative categories according to content based on specific variables resemblances, associations, analogical combinations of the meanings of the affirmations whether real or apparent (Table 1).

Table 1 : Categories of Data in Common Affirmations

Variables	Categories of information	
1- The presence of mosquito nets in homes	Treated mosquito nets	Very low presence
		Low presence
		Average presence
		High presence
		Very high presence
	Simple mosquito nets	Very low presence
		Low presence
		Average presence
		High presence
		Very high presence
2- Periodicity of fitting	1- Fitting frequency	Never
		Scarcely
		Regularly but not every day
		Each day
	2- Timing of fitting	6pm-7pm
		7pm-8pm
		8pm-10pm
		After 10pm
3- The quality of fitting	Fully closed protection	
	Partially close protection	

According to the quantitative approach of analysis the categories of information of each variable were reconsidered in the statistical modalities. Numerical codes were given to each modality. This operation led to the creation of a decoding qualimetric database. The administration of the forms was realised from a reading of the affirmations from each health district then copied into the SPSS. 21 from the decoding form. The decoding forms were then subjected to a mono and bivariate analysis. This analysis of the quantification of quality is a qualimetric analysis.

For the spatial analysis, data from the qualimetric analysis were exploited by applying the different techniques of representing geographical data (Nathan Yau, 2013, 2011; Rican, 1998; Béguin and Pumain, 1994). This results in a geographical configuration and the visualisation of the object of study. Two scales levels of spatial analysis were used (Salem, 1998). The first maximises the variations between the health areas and minimises the internal variations within the areas. This scale was the basis of a comparative study between the health areas. The second minimises the variations between the health areas and maximises the internal variations within the areas. Though not fully exploited this scale has nonetheless permitted us to appreciate the behaviours, trends and weaknesses of the specific modalities studied in each health area studied.

## Results

### **The density of protection beds with treated mosquito nets**

Empirical investigations permitted the identification of 318 beds in 125 homes sampled giving a density of 2.5 beds / home. This density varies from one health area to the other. Also, 216 mosquito nets were counted in the 125 homes sampled being a density of 1.7 nets/home that practice the prevention of transmissible diseases through the use mosquito net. The rate of protection of the nets was therefore 67.92%<sup>2</sup>. Therefore some 204 nets were identified as treated on some 216 nets. The rate of use of treated nets was thus 94.44 %. Though the presence of ordinary nets (5.56 %) is indicative of the resistance to treated nets that explains the exposure and vulnerability of the population to practice prevention as testified by the declaration, that:

I do not get treated nets because I have been told that they are laden with deadly chemical products. I wonder whether it is only mosquitoes that these chemicals kill. I am sick of asthma and do not just have to breath in any toxic element. The two nets that are in my home are not treated Even my elder brother has only simple nets for this same reason.

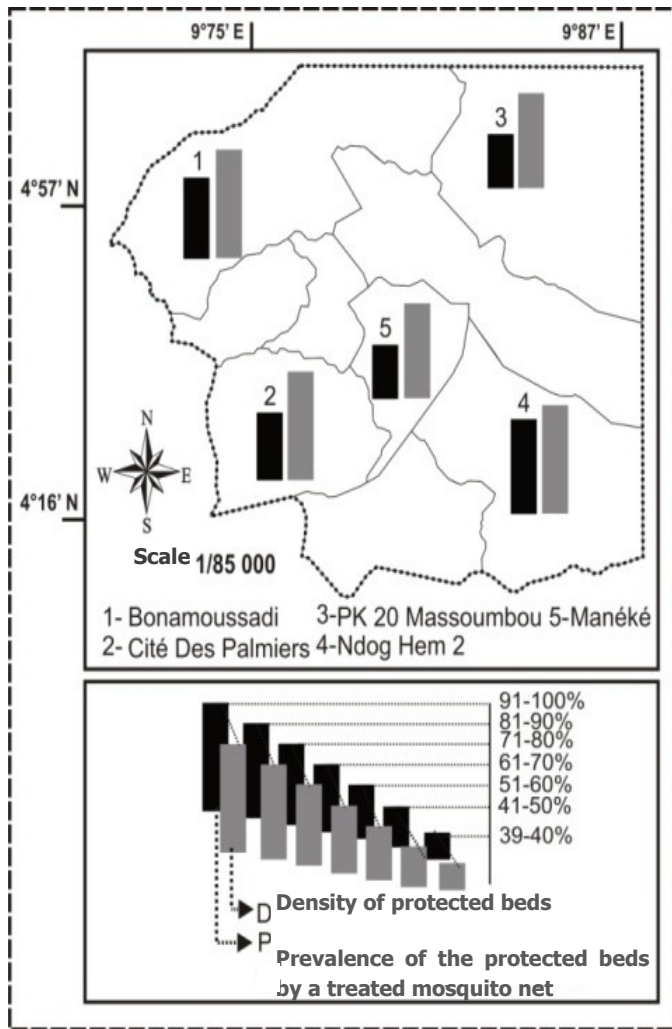
This declaration is indicative of the dynamics of the geographical dynamics of the propagation of barriers to the policy of prevention through the use of mosquito nets within a given community. It shows the weakness of the information, education and communication system on the treated mosquito nets. If the rate of usage is high<sup>3</sup> in the homes that practice the prevention of transmissible diseases through the use of mosquito net, it should be observed that there exist discrepancies on the use being 32,08 % which is significant and capable of causing exposure and vulnerability to infections. These

inequalities are noticeable at three levels: socio-spatial, within the homes and within and outside the health districts.

Common affirmations indicate that within the homes that practice the prevention of transmissible diseases through the use of mosquito net, all beds are not covered by nets. This exposes the most vulnerable groups like children as can be attested by this declaration:

... My house has three rooms. My room with my husband had a bed with a net. That of my junior brother who is a student also has a bed but he objects to the use of the net. The room of our three children has a bong bed (stepped) and I did not put a net there to avoid them from suffocating. Even so I do not know how to climb on a bong bed even if the two nets are there. My husband said we shall use them when our wears out,...

This declaration reveals that the system of bong beds that is greatly used in homes with many people is a major constraint to the practice the prevention of transmissible diseases through the use of mosquito net. In then like manner the refusal by the student indicates the weaknesses of the problem of sensitisation of youths that are even the most vulnerable groups. This problem is therefore not a financial or economic problem because the possession of a net does not necessarily imply its usage. These discrepancies in the usage are also noticeable from one household to the other that practices the prevention of transmissible diseases through the use of mosquito net in all the health districts (Fig.2).



**Figure 2:** Density of protected beds and treated mosquito net prevalence in the districts that practice the prevention through the use of mosquito net in sampled health areas

In the homes sampled in the Bonamoussadi health area, some 63 were identified but with only 47 with nets being a usage rate of 74.60 %. Usage is high in this area where all the nets are of the treated type. Some 59 beds were sampled in the Cité des Palmiers area with 41 having nets giving a usage rate of 69.49 % being also high with treated nets. Some 73

beds were sampled in the Massoumbou area where only 42 had nets being a usage rate of 57.53 %. The usage rate is therefore average with practice the prevention of transmissible diseases through the use of treated mosquito net estimated at 83.33 %. Some 54 beds were sampled in the Ndog Hem 2 area with 46 having nets. The usage rate is 85.18 % being very high in this district and all are treated nets. Some 69 beds were sampled in the Manéké area with 40 having nets being a usage rate of 57.97 %. The usage on average with treated nets is 87.5 %.

In all, none of the health areas presents a usage that is total. Though there is a deficit in the usage those of the Massoumbou and Manéké areas are the most affected and this is where the greater part of the population request more for untreated nets. This exposes quite a good number of people in the homes. In the framework of transmission of malaria, the cohabitation of infected and uninfected persons exposes the uninfected to the anopheles female mosquitoes even out of the net. In this way therefore the disparities in the usage results in the high prevalence of malaria in the homes that practice the prevention of transmissible diseases through the use of mosquito nets.

### **The period of usage**

Empirical declarations have revealed that the use of mosquito nets suffers from several disparities. With regards to periodicity there were discrepancies with regards to the fitting, the time of fitting and removal as a function of seasons.

#### **- The frequency of fitting of the nets**

Homes having nets suffers from a crises of regularity in their utilisation. Generally, 6.4 % of the interviewed declared nets have never been used and 50% of these nets were found in the Ndog Hem 2 area. The most significant frequency of fitting was in the Cité des Palmiers District where all the nets declared are used. However the regularity in the usage varies with seasons.

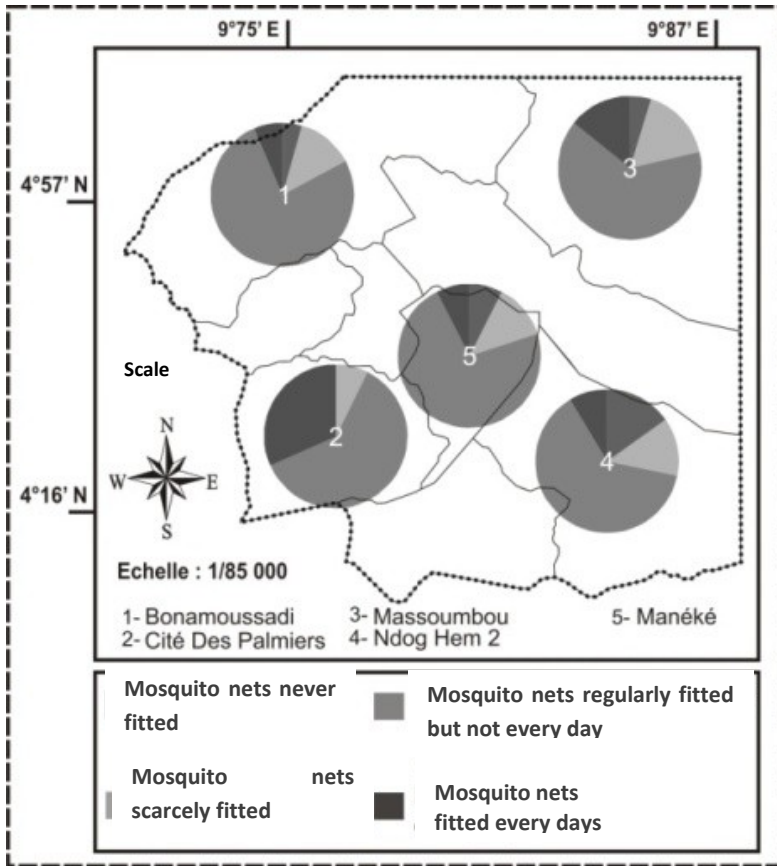
In the wet season for example, only 16.8 % of the nets are fitted each day; 64.8 % are regularly fitted but not every day and some 12 % scarcely fitted. Reasons for the non-fitting range from forgetfulness, tiredness, laziness, etc. Stigmatisation is also considered as a reason for the disregard of the regulatory role of these nets in homes as this declaration puts it:

I only fit my net when I feel the presence of a mosquito around. There are moments like in the wet season that there are often too many mosquitoes. It is only at such moments that I mount my nets. Above all the with the heat of Douala, it is hard to sleep with the net that suffocates and adds heat in the rooms. And even more whether I and my wife and children sleep under a mosquito net we still end up having malaria and even very often. I do not even still know what role the net plays if it is not that it gets mosquitoes to come and disturb my sleep.

A variation in the fitting of nets was equally noted within the same homes. And then from one home to the other in the health areas just as the case of the sampled health areas (Fig. 3). In the Massoumbou Health area, nets are hardly fitted being 16.66 %. In all the districts, there was a high usage of above 60 % though not daily. The highest regularity was in the Cité des Palmiers area where 31.7 % of the nets are dressed daily. The

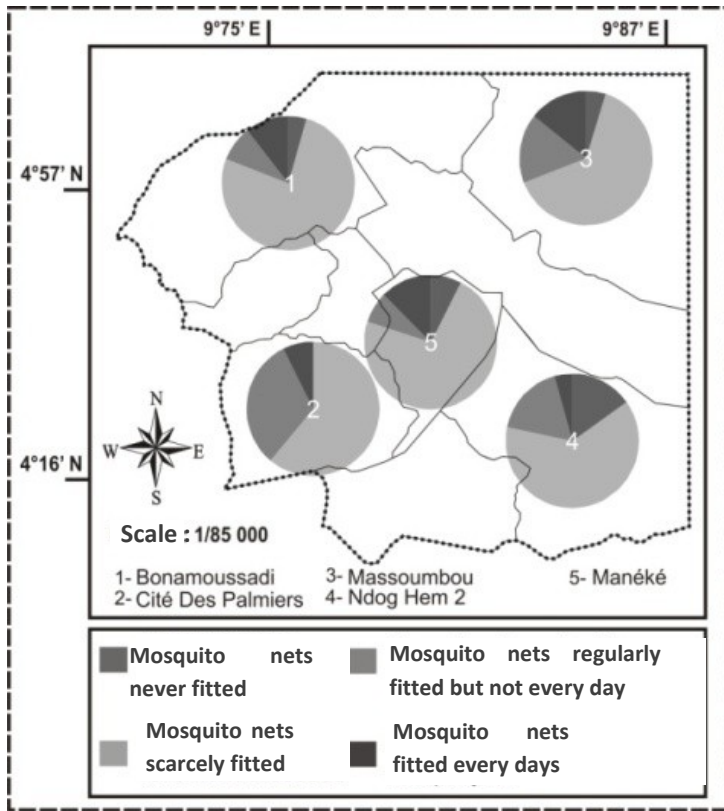


Bonamoussadi and Manéké areas are those in which the daily fitting is least significant with 6.38 % and 7.5 % of nets fitted daily.

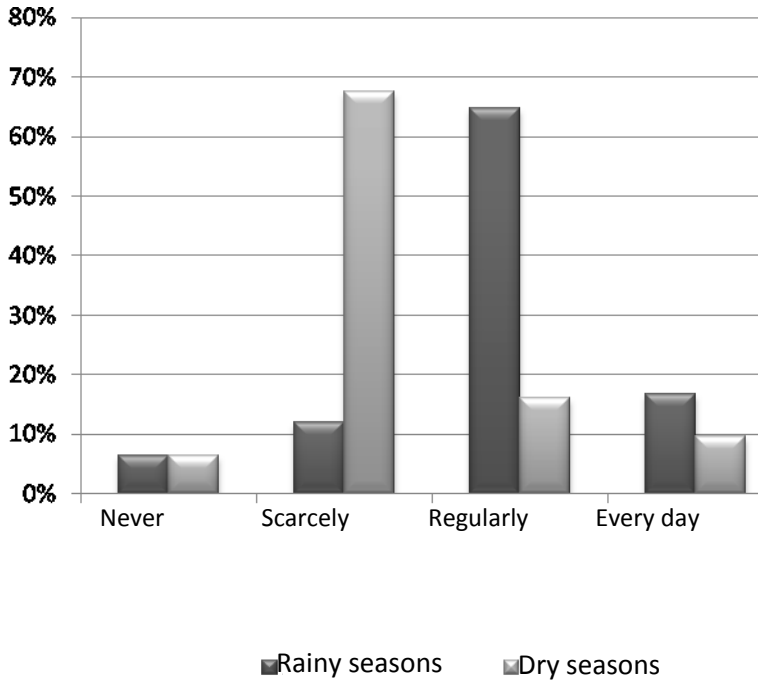


**Figure 3:** Frequency of fitting of mosquito nets in the rainy season

In the dry season, 67.59 % of the nets are hardly fitted. Some 16.20 % are regularly fitted but not daily with only 9.72 % fitted daily. There is equally variation in the fitting within the homes, one home and the other within the area and between one area and the other (Fig. 4). Based on the seasonal comparative approach it is revealed that the prevalence of refusal to fit bed nets is high in the dry season (Fig. 5). Generally with regards to spatial variations the frequency of the fitting of nets whether within or outside the areas can be superimposed. The differences in the fitting contribute to give an idea about the exposure and vulnerability of the population which ought to be part of the practice to prevent transmissible diseases with the use of mosquito nets



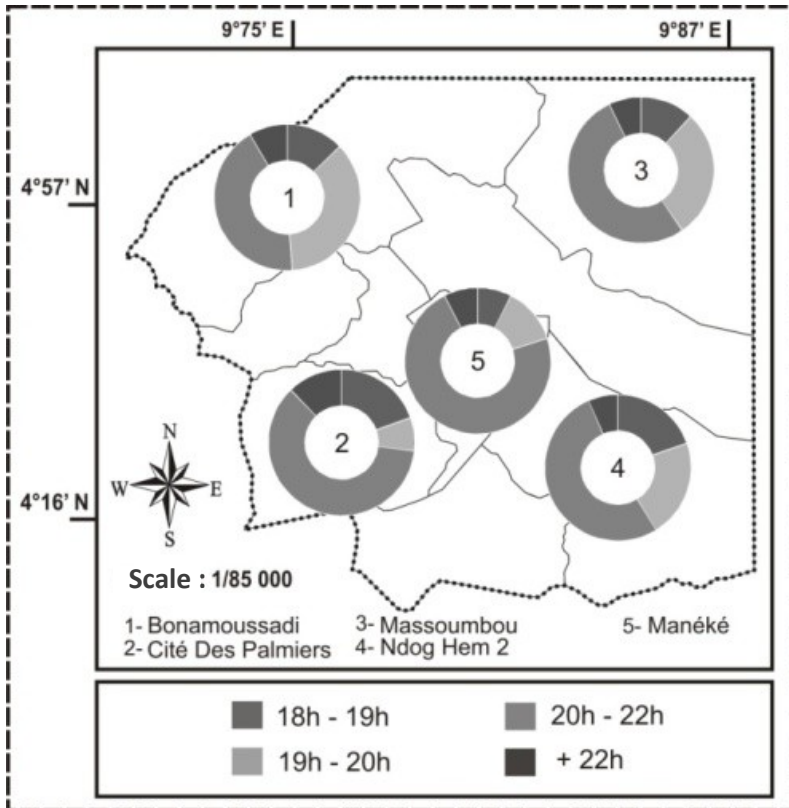
**Figure 4:** Frequency of fitting mosquito nets in the dry season



**Figure 5** : Comparison of the frequency of fitting mosquito nets between the rainy and dry seasons

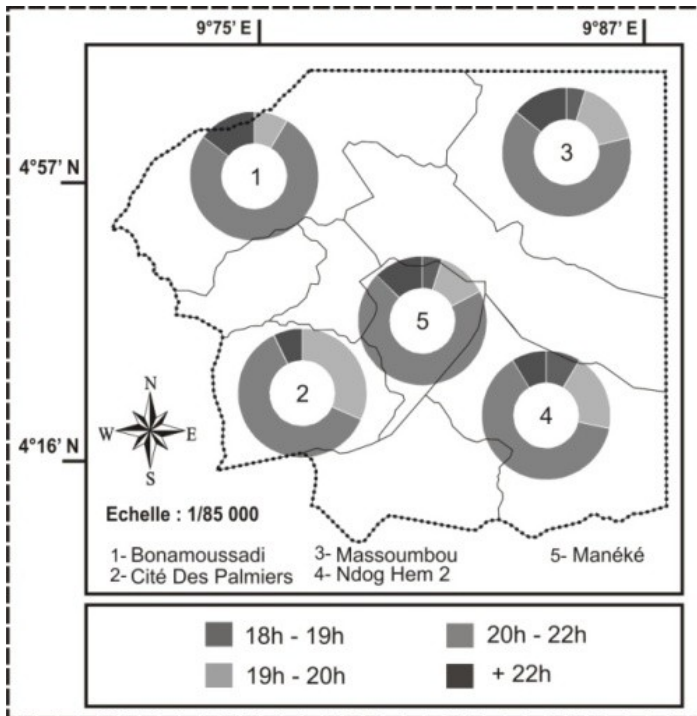
- Timing of the fitting of the nets

The analysis of common opinions about the timing of the mosquito nets shows important variations as a function of the seasons. In the rainy season, 85.63 % of the nets are fitted after 7 pm and some 63.88 % after 8 pm. This timing of the preventive fitting does not fall in line with the instructions of the services of Public Health that make it clear that the fitting should be done at 6 pm before nightfall being the period of intense mosquito activity. This recommendation is less adhered to in the Manéké and Cité de Massoumbou Health areas where 92.5 % and 88.10 % of the nets are fitted after 7 pm respectively (Fig.6).



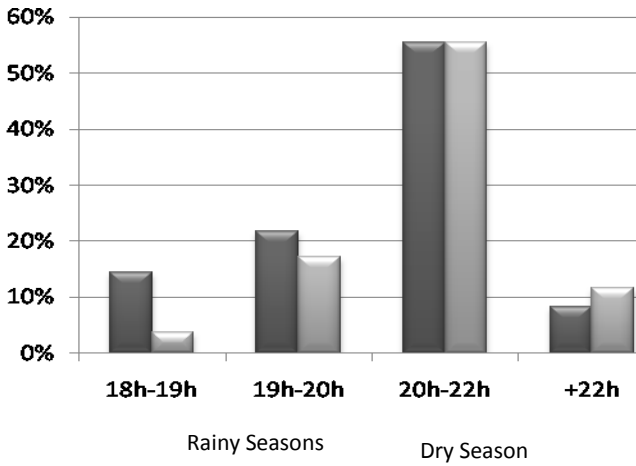
**Figure 6:** Time of the fitting of the mosquito nets in the rainy season

This fitting of the preventive tools therefore was often be done when the mosquitoes have already entered into the houses and would have hidden themselves in the dark small corners like under the beds, between dresses and hung objects like bags. Many persons therefore recognise having found mosquitoes inside their nets after having fitted. Exposure and vulnerability linked to late fitting of the nets are highest in the dry season where some 96.30 % and 79.18 % are only fitted in after 7 pm and 8 pm respectively. In the health area of Bonamoussadi and Cité des Palmiers not net is fitted before 8 pm. These variations are noticeable within the homes and between the homes of the same health area and even between the health areas (Fig. 7).



**Figure 7:** Time of fitting the mosquito nets in the dry season

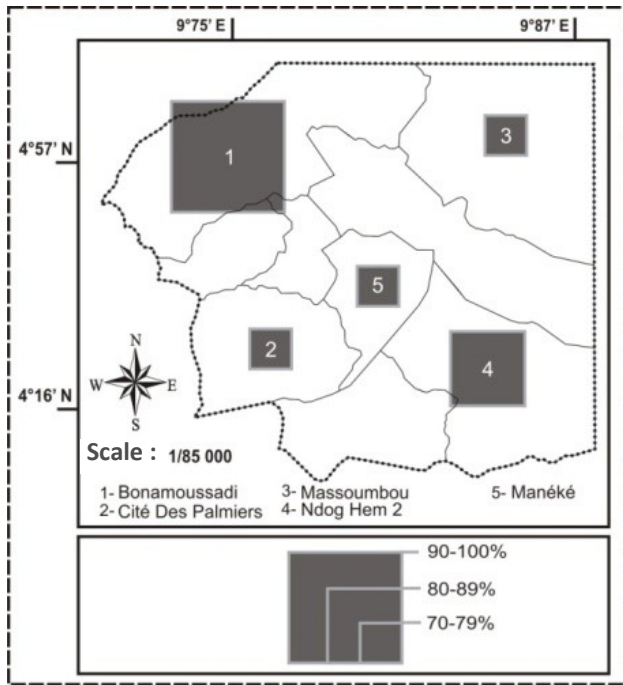
The seasonal comparative approach shows that the late fitting of the nets is highest in the dry season even though it is also in the rainy season (Fig. 8). Overly, the timing of the fitting of the nets is a pertinent indicator of the high malarial prevalence in the study area in general and in the homes that practice to prevent transmissible diseases with the use of mosquito nets in particular.



**Figure 8:** Comparison of time of fitting the mosquito nets between the rainy and dry seasons

***The quality of the fitting of the nets***

The quality of fitting the net is a fundamental determinant of the good management and exploitation of the preventive tool. Common opinion reveals a dominant poor management of the fitting with 81.01 % of the nets recorded in the sampled homes. Figure 9 shows that this is most recurrent in the Bonamoussadi (95.74 %) and Ndog Hem 2 (84.78 %) Health areas.



**Figure 9:** Prevalence of poor fitting (partial closure) of beds with mosquito nets

This does not adhere to the principle of total covering of the bed by the net in a way that the edges of the net are stuffed into the edges of the mattresses so as to prevent mosquitoes from entering inside the protective cover. Some nets just stretch out by the edge of the bed and are systematically reopened with the entries and exits of persons into and out of the beds. A high risk situation has been remarked in several homes being the mid-way fitting on the beds which is a common dry season practice. This is characterised by the folding of the edge of the net at dawn where it remains till next evening when they are again unfolded. Mosquitoes therefore have all the time to find their way in and so there are mosquitoes in during unfolding.

## Discussion

### **The Geo-Qualimetric Method (GQM): a tool for measurement and visualization?**

The Geo-Qualimetric Method used in this study is based on common opinions expressed to not only measure but to give geographic connotations and the visualisation of household management practices with the use of the mosquito net in the study area. It is therefore in the quest of the scientific truth of the elements under consideration rather than the rational that upholds that the truth is found in human reasoning.

The methodological triangulation between the qualitative, quantitative and spatial methods of analyses exploited permitted us to establish, structure, measure and spatialize inequalities of using mosquito nets as preventive tools (frequency, timing and quality of fitting) at three levels: inside the homes, in the areas and between the areas. Most of these inequalities and discrepancies have been established through a seasonal analysis approach. These spatial variations can be added to the seasonal variations between the homes, inside and between areas.

The methodological tool used permitted the construction of a model for the explanation of exposure and vulnerability of homes that are supposed to adhere to the practice of mosquito nets as a mosquito preventive measure. There is no doubt that a range of determinant factors are playing a role in the operation (I.N.S. 2013, 2011; Gruénais and Vernezza-Licht, 2003), but it is needful to bear in mind that the risky practices in the mode of usage of the nets only adds to the vulnerability. This is because the inefficiency of the use of the preventive tool is cause for concern. The explanatory model therefore permits a better understanding of the factors of inefficiency of the mosquito nets in the homes that have them and can serve as the bases for decision making on the geostrategic orientations to be taken. The Geo-Qualimetric Method is therefore not only to measure and spatialize studied phenomenon. It is a tool for geostrategic planning in socio-sanitary prevention.

### **Geo-Qualimetric Method: tool for planning in socio-sanitary prevention**

In this wise, the interpretation of risky practices in matters of the use of the mosquito net raised the issue of the health information system, education and communication that is a component of Public Health in the Cité des Palmiers Health District. The simple availability of the nets in the homes is surely indicative enough of the dynamics of the system. However discrepancies and challenges associated with the usage are noted to present certain geographical configuration that show the weaknesses of the system. The Geo-Qualimetric Method have permitted to coming out with a profile of qualitative variables to prioritise in the information and communication sensitisation with regards to the use of mosquito nets as a tool for malaria prevention in homes.

The results of the experimental study show that the educational sensitisation policy should be adapted as a function of each variable. The priority health districts are those in which the indicators (*density of beds with mosquito nets, availability of treated*



*mosquito nets, frequency, timing and quality of fitting of the nets*) are the major cause for concern. Ethno-cultural and sociological sensibilities that are the leading elements that inhibit adhesion and acceptance of the mosquito nets (Meva'a Abomo, 2015b ; Chambon, lemardeley, Louis, Foumane, Louis, 1997), should be taken into consideration to attain the target objective. In this way, variation of methods and techniques of sensitisation and information need to be taken within the homes, areas and between the areas so as to take individual specificities into consideration and obtain a sustainable action (Lamoureux, Lavoie, Mayer, Panet-Raymond, 2008). This approach is based on the geographical configuration of risky practices that permit us to agree that the Geo-Qualimetric Method is a tool for planning the prevention against malaria and socio-sanitary prevention on the whole.

### Conclusion

The current study permits us to show the virtues of the Geo-Qualimetric Method in the build-up of knowledge at a local level. It stands out as a symbol of interdisciplinarity in the social sciences though focusing on the space aspect. It is thus a new way to scientific production and elaborate knowledge, a means of reshaping knowledge at small scale. This experimental study shows that a methodological innovation can be the object of geopolitical planning and preventive socio-sanitary geo-strategies for such a case. From its ability to analyse localised observations, the triangulation of the qualitative, quantitative and spatial approaches appears to be the best option and emerges as new grounds for a socio-technical analysis of policies that can permit a better understanding of local problems and to mitigate them in a sustainable way. It is therefore worthwhile to integrate it in the academic and professional programmes in general and in preventive training programmes in particular, because as it can be seen, it contributes in the production of human capital. Can it therefore not be an opportunity to take cognisance of its interdisciplinary nature and use it to solve the complex problems of public health? Does it not also impose on experts the need to revisit current techniques used in domains that are as sensitive and complex as public health?

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**Endnote:**

1. The health area is a subdivision of the health district in the Cameroonian structuration of the health territory.
2. This rate is the total number of bed nets divided by the number of beds multiplied by a hundred.
3. Appreciation scale : very low : 0-20% ; low : 21-40% ; average : 41-60% ; high : 61-80% ; very high : 81-100%.