https://dx.doi.org/10.22161/ijaers.74.17 ISSN: 2349-6495(P) | 2456-1908(O)

Co-occurrence of Economic, Political and Environmental Factors in the Perception of Social Groups in the Municipality of Uberlândia (Minas Gerais, Brazil) About Notified Cases of Dengue

Fabrício Pelizer Almeida[1], Rogério Gonçalves Lacerda de Gouveia[2], Moisés Keniel Guilherme de Lima[3], Flávia Alice Borges Soares Ribeiro[3], Jaínne Pereira Mendonça[4], Jéssica do Nascimento Oliveira[5]

[1]PhD in Environmental Planning and Management. Professor of Environmental Engineering Course. Institute of Technology, University of Uberaba (Uniube).
[2]Master in Agronomic Engineering. Professor of Environmental Engineering. Institute of Technology, University of Uberaba (Uniube), Brazil
[3]Master in Civil Engineering. Professor of Environmental Engineering. Institute of Technology, University of Uberaba (Uniube) , Brazil
[4]Undergraduate in Environmental Engineering. University of Uberaba, Brazil
[5]Undergraduate in Production Engineering. University of Uberaba, Brazil

Abstract *— The present study evaluated the perception of the urban population of Uberlândia/MG regarding the occurrence of notified dengue cases. A script of questions was developed that combined social, environmental, political and economic variables, which could explain, in the perception of the research participants, the current dengue scenario in the municipality. 384 randomized individuals living in the municipality were interviewed, from may to august 2019, through the survey of qualitative and quantitative data. The data obtained could compose a qualitative and quantitative model of NLR (Nominal Logistic Regression) that relates a set of predictors and a nominal response, and a set of co-occurrence maps of qualitative variables. The quantitative results showed that the female group correlates highly, significantly the set of variables determined in the research. In the outputs of maps of the qualitative models, the opposite decision of the preference preference groups (weak, moderate, good and high) was evident. Individuals who reported weak correlation of the proposed variables in determining the occurrence of notified cases of dengue showed a greater correlation between the codes "society" and "policies and local economy", attributing greater responsibility to the role of municipal public management in this scenario. The high and good correlation groups showed greater concern with environmental aspects, mainly regarding the issue of waste and urban pollutants. Therefore, it is concluded that in the quantitative model, there was a different pattern of responses, significantly among individuals declared in the research. And in relation to the quantitative data, the opposite decision of the preference response groups was evident. The role of the municipal public manager must consider the need for extension, inclusion and permanence of strategic actions in the areas most vulnerable to dengue in the municipality, given the fragility of health services and the scope of policies involving quality of life and environmental education.*

Keywords *— **environmental health. qualitative modeling. social research.***

I. INTRODUCTION

Global climate issues have been the scope of coincident reflections on the quality of life of urban and rural populations, sustainable development and socio-

https://dx.doi.org/10.22161/ijaers.74.17 ISSN: 2349-6495(P) | 2456-1908(O)

environmental vulnerability of communities. Despite being treated on divergent spatial scales, there is an almost unanimous understanding that global climate change due to anthropogenic causes precede profound changes in the dynamics of mobility and space organization of large cities and in the current model of food production and runoff(CONFALONIERI et al, 2007; EBI, 2011).

Almost irreversible effects on society are related to the prevalence of serious diseases and epidemics and difficult to manage and control by municipal public agents, especially when associated with the challenges posed by deteriorating conditions access to clean water and basic sanitation(McMICHAEL et al, 2004; EBI, 2011).

The works of Patz et al. (2007); Costello et al. (2011); Ebi (2011) associate the challenges related to people's health and quality of life, as opposed to the expansion of industrial activities and growth of urban conglomerates. In common, they associate the excessive and distorted model of consumption of urban space by local society, as part responsible for the increase in the activity of greenhouse gases and atmospheric thermal stress in urban areas, resulting in the worsening in the seasonal pattern and worsening of the pathogenicity of diseases.

For Shuman (2011), the burden of adverse effects on public health in vulnerable communities in developing countries is precisely due to the fragility of basic sanitation programs, drinking water services and better environmental conditions for proliferation of vector insects. McMichael et al., (2006); Patz et al. (2007), state that frequent changes in natural ecosystems can increase the prevalence of reservoir vectors and hosts, which when combined with decreased resistance of the human host, promote the occurrence of epidemics such as dengue. These effects related to sudden climate change are evident in conditions of social vulnerability, when they promote the overload of local health systems, and highlight the lack of a public governance model for the climate management of cities.

In Frumkin et al. (2008) give relative importance to monitoring integrity status to identify and solve local community health problems, the ability to inform, educate and empower people about health problems and assessment of the effectiveness, accessibility and quality of health services as important pillars to ensure minimum public health conditions in response to severe climate setbacks.

In the sense, Woodcock et al., (2009); Haines, (2012); Bouzid et al., (2013) there are relevant contributions from the low-carbon economy translated into promoting the environmental health of cities, focusing on the maintenance of urban green areas, combined with efficient mobility and public transport programs are coherent responses to the constant deterioration of urban microclimate and people's quality of life.

Therefore, multidisciplinary vector control programs and a set of community interventions aimed at dengue control are needed, appropriate to the wide variety of ecological and social environments, including: communication campaigns, educational initiatives, behavior change, biological control efforts and integrated control projects (STEWART-IBARRA et al, 2019).

Behavioral changes can help reduce infestation of household containers if individual community practices are properly targeted. For Kabir et al. (2016) the best experiences based on the perception of local communities in tropical regions regarding the worsening epidemiological risks associated with climate events are aligned with the mobilization networks and social organizations, efficiency in the implementation of public policies aimed at educating and reaching families. It is necessary to establish a new paradigm of relationship between government institutions and individuals, and that epidemiological programs be developed based on the local sanitation structure. In short, programs should incorporate epidemiological surveillance, community participation, environmental management and basic public services, permanent case monitoring, education and control, and effective vector training.

Ebi (2011) proposes stakeholder engagement as one of the bases for adaptive management of public health risks by referring to climate change. Stakeholders, according to the author, include local, regional and national policymakers, as well as representatives of relevant public health programs and organizations aware of climate change and its effects on current and projected health risks. Preventive social perception of climate change by affected communities is essential for governments and society to build effective strategies and policies that minimize the consequences of associated epidemiological risks (LIM et al, 2004).

In fact, Stewart-Ibarra et al. (2019) rightly highlights the importance of considering the ways of perception and association of climate events and alteration of the urban environment by the local community as an active response to behavior change and engagement in strategic actions for epidemic control and monitoring, specifically in urban centers of tropical climate regions. Guiding clear and objective information on how climate can influence dengue cases would increase public acceptability and improve community response in a climate-based alert monitoring program (ZAKI et al,

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

2019).

Therefore, it is essential to understand how socially vulnerable populations understand and act as part of the dynamics of the social fabric in the environment in which they live (BOLLYKY et al, 2015). It should also reflect its interlocution between health, society and the environment, recognizing local environmental risks and problems, as well as their notions of self-care and socio-environmental impact. For Lermen and Fisher (2010), these premises are met, attitudes can be taken that effectively improve the quality of life of these people, because public health should be seen and discussed horizontally, recognizing the particularities of each population and adapting to them.

In this sense, and in a contributory way, this work aims to evaluate the qualitative and quantitative aspects about the perception of urban social groups in the city of Uberlândia/MG, about the occurrence of notified cases of dengue, based on a combinatorial model of social, environmental, political and economic variables.

II. METHODOLOGY

1. Characterization of the Study Area

The municipality of Uberlândia (Figure 1) is located in the Mesoregion of triângulo mineiro and alto paranaíba, State of Minas Gerais, in the Southeastern Region of Brazil. The geographic coordinates, referenced in the water box tower of block II of the Virgilio Galassi administrative center, are of latitude 18º54'41,09582"S and longitude 48º15'21,63093"W, and altitude 864.80 meters. The municipality is included in the territory covered by the hydrographic basins of the Araguari and Tijuco rivers, and the predominant climate is the semihumid tropical, with the occurrence of dry winters and hot and humid summers (UBERLÂNDIA, 2016).

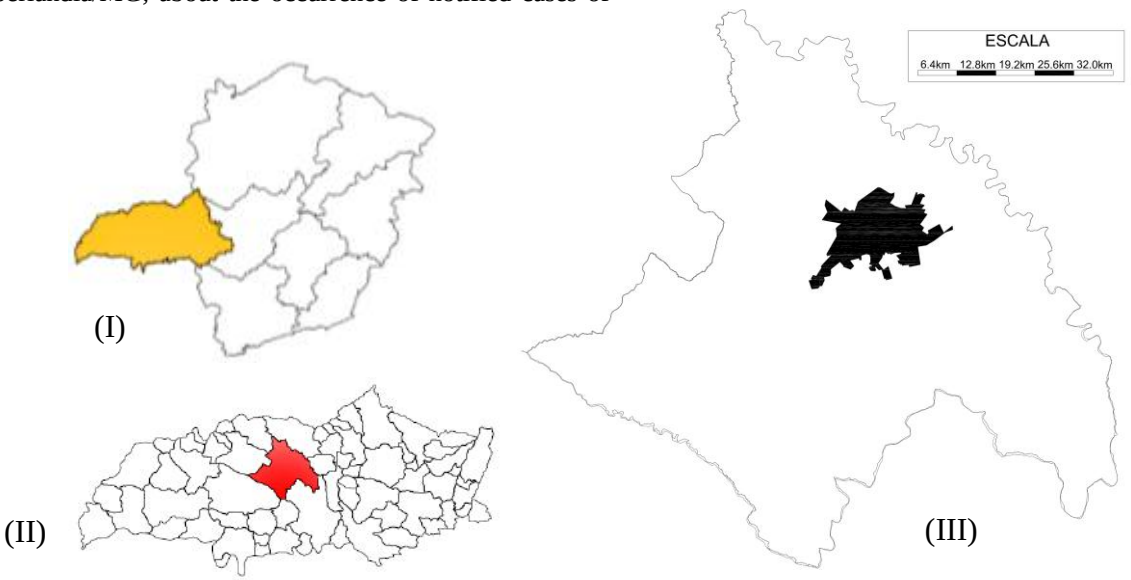

Fig.1: *Location of the Triângulo Mineiro (I), the Municipality of Uberlândia (II) and the Headquarters District in the Municipality of Uberlândia (III) in the State of Minas Gerais.*

Source: Lima (2017).

According to IBGEDATA (2010), between 2000 and 2010, the total population of the municipality of Uberlândia grew 20.5%, while in the same period, there was a population growth of 2232.8 hab*km^{-2}, to 2706.2 habitant*km^{-2} in 2010.

2. Planning and Data Modeling

The study is supported by a qualitative and quantitative spatial survey, structured from an interview form, applied to individuals living in the city of Uberlândia, Minas Gerais, aged over 18 years old. The sample of volunteer participants was estimated using a generic function described in Gil (2009), according to equation 1:

$$n = \frac{(N*1/e^2)}{(N+1/e^2)} \text{(eq. 1)}$$

where *n* is the sample size;*N* is the population size and e² is the maximum error (5%). In the research, 384 possible questionnaires were considered and sent at random by electronic mail in a form template, during the period from may to august 2019, using random contact lists and data from residents in the municipality.

The form was divided into four sections, with

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

limited quantitative data being obtained in the first, second and third sections, while qualitative data were tabulated in the fourth section. The first section consists of 5 questions of socioeconomic characterization of the individual –*sex, age group, monthly family income* (in number of minimum wages), *education level* (regardless of whether completed or not) and *neighborhood in which he lives in the urban area of the municipality of Uberlândia* (spontaneously described and later organized by residential area) – asdescribed in Table1.

Table 1:*Terminologies used for each item of socioeconomic characterization of the individuals participating in the research regarding the socio-environmental perception about the occurrence of dengue in the city of Uberlândia/MG.*

Section	Interview of Variables	Grades
1ª Section	**Sex**	**1** (female); **2** (male);
	Age[1]	**1** (young people, 18-25 years old); **2** (young adults, 26-40 years old); **3** (adults, 41-60 years old); **4** (elderly, > 60 years old).
	Family Monthly Income[2]	**1** (≤ 2 minimum wages); **2** (from 3 to 4 minimum wages); **3** (from 5 to 10 minimum wages); **4** (from 11 to 20 minimum wages); **5** (≥ 21 minimum wages)[4].
	Schooling[2]	**1** (elementary school); **2** (high school); **3** (graduate); **4** (postgraduate).
	Residential Zone[3]	**1** (Central Z.); **2** (East Z.); **3** (North Z.); **4** (West Z.); **5** (South Z.).

[1]According to Botti (2010). [2] According to IBGE methodology (2010). [3]The smallest numerical value is the most central zone or neighborhood of the municipality and increases east-north and west-south, due to the greater connection and urban road mobility. [4] No interviewee indicated in the alternative ≥ 20 m.w. in survey.

The second section, consisting of 11 multiple-choice questions, addressed environmental perceptions, addressing the relationships and associations between the growth in the number of properties, industrial activity, basic sanitation service, management of green areas and current climatic conditions, in the case record dengue fever, according to the individual's perception. A discrete scale of "0" (when the participant does not recognize the relationship between the variables described in the question) was assigned up to the limit of "3" (when the participant recognizes a high relationship between the variables proposed in the question), as described in Table 2.

A table of the sum of the discrete responses per participant was proposed, obtaining a score between "3" (lowest possible combination between responses per participant) and "33" (highest possible combination between responses per participant). For the purpose of analyzing the scores, 4 groups were established - week, moderate, good, high - using the minimum, maximum, first and third quartiles limits and the median of continuous data (Table 2). The scores are described in Table 3.

Table 2:Descriptive statistics of the sum of discrete responses (N = 384 forms) regarding the socio-environmental perception of individuals participating in the research about the occurrence of dengue in the city of Uberlândia / MG.

Variable	N	Average	Minimum	1st Q	Median	3rd Q	Maximum
Scores	384	23,622	3,000	20,000	25,000	29,000	33,000

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

Table 3:Questions and scores adopted in the research and associated with aspects of social and environmental perception related to the occurrence of dengue in the city of Uberlândia/MG.

Section	*Questions about aspects of social and environmental perception*	Grades
2ª Section	1. The growth in the number of properties, shopping centers and urban infrastructure in Uberlândia affects variations in temperature, humidity, and in the periods and volume of rainfall recorded in the city.	**0** (*does not affect*); **1** (*affects a little*); **2** (*affect*); **3** (*greatly affects*)
	2. The industrial activity in Uberlândia affects the variations in temperature, air humidity and in the periods and volume of rainfall recorded in the city.	
	3. The water harvesting service for supply of the population of Uberlândia affects variations in temperature, air humidity and periods and volume of rains recorded in the city.	
	4. Treatment given to urban sewage affects variations in temperature, air humidity and periods and volume of rains recorded in the city.	
	5. The amount and current circulation of the fleet of vehicles in Uberlândia affect the variations in temperature, air humidity and periods and volume of rainfall recorded in the city itself.	
	6. The current management of parks, squares and urban green areas in Uberlândia affects variations in temperature, air humidity and periods and volume of rainfall recorded in the city.	
	7. Industrial activity in Uberlândia affects air quality in the city.	
	8. The current quantity and circulation of the vehicle fleet in Uberlândia affects air quality in the city.	
	9. The type, volume and treatment given to urban solid waste generated in Uberlândia affect the environmental quality of the city.	
	10. The growth in the number of properties, shopping centers and urban infrastructure in Uberlândia affect the number of dengue cases registered in the city.	
	11. Variations in temperature, air humidity and rainfall periods in the city of Uberlândia are related to reported dengue case records.	
	Link-up	**1** (*weak* correlation, of scores from 3 to 20); **2**(*moderate* correlation, of scores from 21 to 25); **3** (*good* correlation, of scores from 26 to 28); **4** (*high* correlation, of scores from 29 to 33).

In the third section, the profile of the individuals' choice was drawn as to the correlation capacity between the social, economic and environmental factors addressed in the 11 research questions, with the response variable being the term "*link-up*". In this phase of the research, the use of the Nominal Logistic Regression (NLR) model allows the development of a model that relates a set of predictors and a nominal response (HOSMER et al., 2013). Thus, the probabilities tested in the logit model are described for the first response group, as described in equation 2:

$$P_r(y_i = 1|x_i) = P_{i1} = \frac{1}{1+\exp(x_i'\beta_2)+\exp(x_i'\beta_3)+\exp(x_i'\beta_4)} \text{ (eq. 2)}$$

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

and assumes generic notation for the other groups, where k = 4 (number of response categories), as described in equation 3:

$$P_r(y_i = k|x_i) = P_{in} = \frac{\exp(x_i'\beta_n)}{1+\exp(x_i'\beta_k)+\exp(x_i'\beta_{k+1})+\exp(x_i'\beta_{k+2})} \text{(eq.3)}$$

Therefore, two logit functions with *k* response categories are obtained, being (k = 4, weak, moderate, good, high), corresponding to three logit models of estimated differences in chances (*high-weak; high-moderate; high-good*), described in equation 4.

$$g_k(\boldsymbol{x}) = em\left(\frac{\pi_k(\mathbf{x})}{\pi_k(\mathbf{x})}\right) = \theta_k + \boldsymbol{x}\boldsymbol{b}_k \text{ (eq. 4)}$$

where, $g_k(\boldsymbol{x})$is the logit link function, θ_k, the constant associated with the k[th] different response category, $\boldsymbol{x}_k$the vector of the predictor variables, and $\boldsymbol{b}_k$the vector of the coefficients associated with the k[th] logit function (HOSMER et al., 2013). To obtain the data output of the Nominal Logistic Regression (NLR) model, MINITAB v. 19

In the fourth and last section of the research, the participant was asked about the spontaneous opinion about the causes, impacts and urgency of the occurrence of dengue in the city of Uberlândia. In the case of an opinionated aspect, there was no character limit for filling in this field of the form, already with the aim of applying a qualitative study about the discourse. Therefore, opinions were coded in 3 axes and subdivided into 3 subcodes each, totaling 9 coding possibilities(Table 4).

Table 4:Axes of coding and subcoding of the interviewees' opinions about the social, economic and environmental aspects that explain the occurrence of notified dengue cases in the city of Uberlândia/MG.

Code	Subcode	
society	socioeconomic inequality	public health and social assistance
	socioenvironmental education	
politics and local economy	local economic activity	planning and ordering of urban space
	public management and governance	
environment	urban microclimate	waste and pollutants
	urban green area management	

The codes are related to the general association of the social, political-economic and environmental pillars and the individual perception about dengue, that is, when the individual spontaneously correlates the occurrence of the epidemic with some social, political-economic or environmental aspect. It is important to highlight that the subcode allows the code to be detailed, and reflects the individual's approach with greater clarity regarding his intention to correlate dengue with explanatory factors.

The free and dissertative opinions of the participants were treated as explanatory data and, therefore, could be intertwined with the other research items described in Tables 1 and 3. For this, a search engine was created throughout the text using keywords identical or approximate keys of codes and subcodes. In this way, it was possible to build several response composition and occurrence maps of hierarchical variables, combining qualitative data and mixed methods with the aid of the MAXQDA AnalyticsPro software (v. 18.2).

III. RESULTS AND DISCUSSION

The output of Nominal Logistic Regression (NLR) proposes three comparative models of preference between the dependent variables (response) –*high-weak*; *high-moderate*; *high-good* – being the highest response parameter (*high correlation*) taken as a reference value. The predictors *age, family monthly income, schooling and residential zone* were not significant for the three models of comparative preference (Table 5).

The *sex variable* was significant in the three models, at 1% logit (1), 5% logit (2) and 10% logit (3) of significance. The probability of response between individuals declared in the survey –*womenand men*– is significantly higher, observing the extremes of responses in the survey - *weak and high correlation* - and preferably increases the response by high correlation in the sense of the female group. The estimated odds ratio for female preference between weak and high correlation is about four times higher than among men (Table 5).

In the other models logit (2) and logit (3), the odds ratio decreases among women in the sense of response to high correlation, but still significant ($p < 0.05$; $p < 0.10$, respectively). Within the female group, the preference for the high correlation between the socioenvironmental

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

aspects of the research in relation to the moderate and good condition, is 2.82 and 2.29 times higher than men, respectively. This important qualitative and quantitative observation of the research reinforces the significant difference of the female group, in terms of response and association of the public health problem with the other attributes that make up the urban environment.

Table 5:Results of Nominal Logistic Regression (NLR) for three logit models (weak/high, moderate/high, good/high) that associate the environmental preference for the occurrence of dengue and the socioeconomic variables in the city of Uberlândia, Minas Gerais state, Brazil.

Predictor	Coef.	SE Coef.	Z	*p-value*	Odds ratio	CI de 95% *Lower*	CI de 95% *Upper*
Logit 1 [l(1)]: (*weak/high*)							
Intercept	-2,70413	1,36505	-1,98	0,048 **			
Sex	1,38808	0,446776	3,11	0,002 ***	4,01	1,67	9,62
Age	0,0739688	0,290168	0,25	0,799	1,08	0,61	1,90
Family Monthly Income	0,368693	0,259475	1,42	0,155	1,45	0,87	2,40
Schooling	-0,0027564	0,302981	-0,01	0,993	1,00	0,55	1,81
Residential Zone	-0,108339	0,159923	-0,68	0,498	0,90	0,66	1,23
Logit 2 [l(2)]: (*moderate/high*)							
Intercept	-2,72566	1,46423	-1,86	0,063 *			
Sex	1,03596	0,483643	2,14	0,032 **	2,82	1,09	7,27
Age	0,0044417	0,315429	0,01	0,989	1,00	0,54	1,86
Family Monthly Income	-0,208349	0,281100	-0,74	0,459	0,81	0,47	1,41
Schooling	0,381943	0,334628	1,14	0,254	1,47	0,76	2,82
Residential Zone	0,0957496	0,174383	0,55	0,583	1,10	0,78	1,55
Logit 3 [l(3)]: (*good/high*)							
Intercept	-0,899890	1,36666	-0,66	0,510			
Sex	0,830146	0,458014	1,81	0,070 *	2,29	0,93	5,63
Age	0,0278781	0,296119	0,09	0,925	1,03	0,58	1,84
Family Monthly Income	-0,0137107	0,271210	-0,05	0,960	0,99	0,58	1,68
Schooling	-0,182558	0,308969	-0,59	0,555	0,83	0,45	1,53
Residential Zone	0,0368106	0,167333	0,22	0,826	1,04	0,75	1,44

High (reference event). * significant coefficient at 10%, ** at 5% and *** at 1%. Likelihood log = -223,804. Test of all slopes equal to zero: df = 15; G = 24,407; [p-value = 0,058]. Fit Quality Tests (Pearson Method): Chi-square = 354,521; [p-value = 0,057].

In the qualitative analysis, the code map of the opinions of individuals including the variables sex, link-up (Figure 2a) reinforces the greater frequency of response associations among women and the probability of high correlation. Both the female and the male groups emphasize in their spontaneous opinions the need to change a behavioral posture in society, however the female group is able to include and approximate environmental factors as explanatory items to the occurrence of notified dengue cases.

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

The participation of the male group predominates in most of the residential areas sampled in the survey, while the female group is better represented in the north, central and east areas (Figure 2b), corroborating the low impact of environmental perception due to the micro-region of residence declared by the individual.

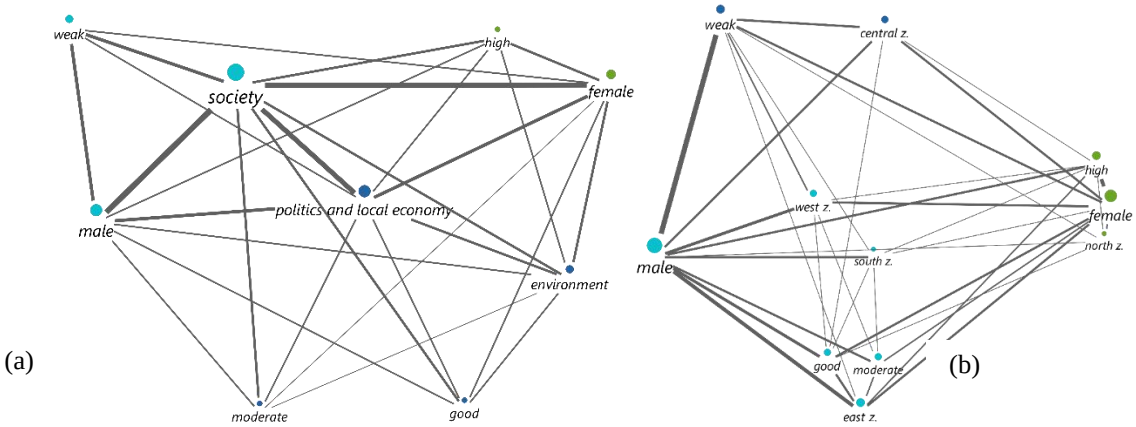

Fig.2: Map of codes hierarchized by frequency of the opinions of individuals identified by male and female groups, associated with the link-up (a) and the residential zones (b) in the city of Uberlândia/MG.

There is an intrinsic relationship between response preferences (weak, moderate, good and high) and the attribution to the code "society", reiterating that the responses converged the occurrence of dengue in the municipality to social responsibility. On a hierarchical level, the code "society" is more evident when the preferences of responses are interposed, than the codes "environment" and "politics and local economy". Only the weak preference directs responses to the "local economy and politics" and "society" codes, while the good and high preferences, in addition to greater proximity to the "environment" code, considers responses also shared with the other listed codes (Figure 3).

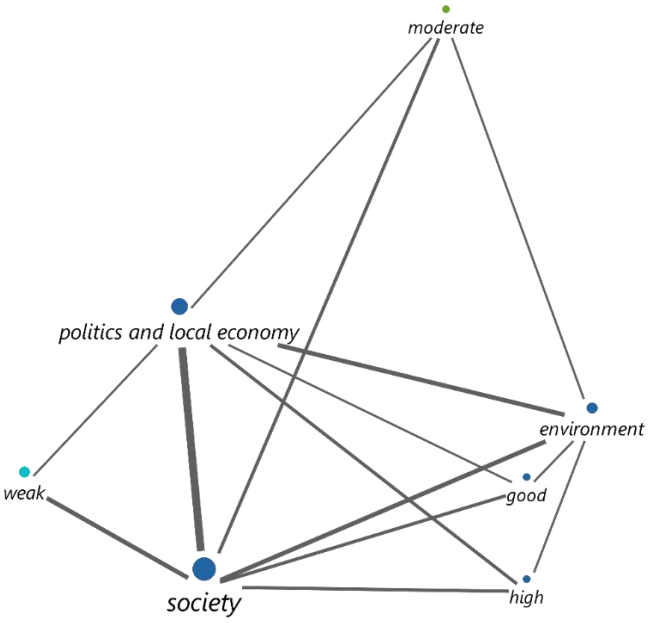

Fig.3: Map of codes hierarchized by frequency of the preferences of individuals associated with the link-up in the city of Uberlândia/MG.

The similarity of responses that strongly correlates the codes "society" and "policies and local economy", attributes the character of responsibility for the current model of ordering urban space and public health conditions that affect mainly the most vulnerable locations to public management municipal. Figure 4 clarifies this aspect better, demonstrating the weak response mode in hierarchical evidence in relation to moderate, good and

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

high, associating with the "socioenvironmental education" response pattern as an explanatory condition for the occurrence of dengue in the municipality and, sequentially attributing it to "Public management and governance" and the "public health and social assistance" model adopted by the local government as responsible for the current disease scenario.

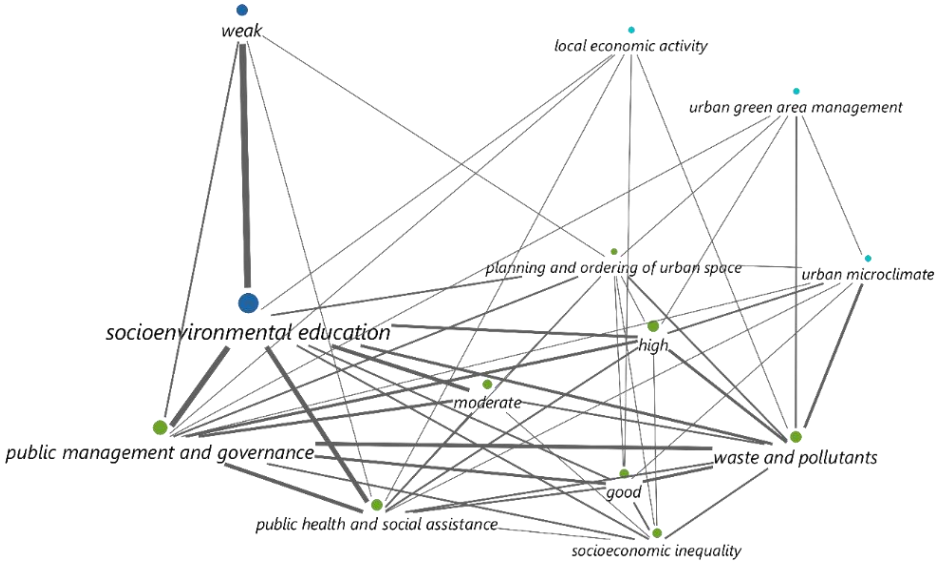

Fig.4: Map of codes and subcodes hierarchized by frequency of the preferences of individuals associated with the link-up in the city of Uberlândia/MG.

However, the associative reasoning of the high and good response preference can be quite diverse and amplified, considering environmental aspects such as the operation and management model of waste and pollutants, the maintenance and diversity policy of urban green areas and the variation urban microclimate as variants to the dengue scenario in the municipality, approaching the results discussed in Miranda et al (2013). From the hierarchical point of view of the qualitative model, these preferences differ from the group's response pattern that attributes weak correlation between the various variables questioned in the research.

The opposition of the associative reasoning of the preference preference groups (*weak, moderate, good and high*) reinforces the importance of environmental education as an instrument capable of discerning aspects of citizenship, shared responsibility and a holistic, critical and integrated perception of the environment and the reality in which the individual is inserted, as discussed in Mongensen (1997); Jacobi (2003); Sauvé and Godmaire (2004); Pedreti (2014); Silva and Bertoldi (2016).

The effective participation and socioenvironmental engagement of individuals is evident in Figure 5. The profile of younger individuals (18 to 25 years old), with complete secondary education and income between 3-4 minimum wages make up the ¬good and high preferences most strongly. The weak preference is more strongly associated with individuals who claimed to have completed the undergraduate course, have a family income between 5-10 and 11-20 minimum wages, and that comprise the age group of 26 to 40 years.

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

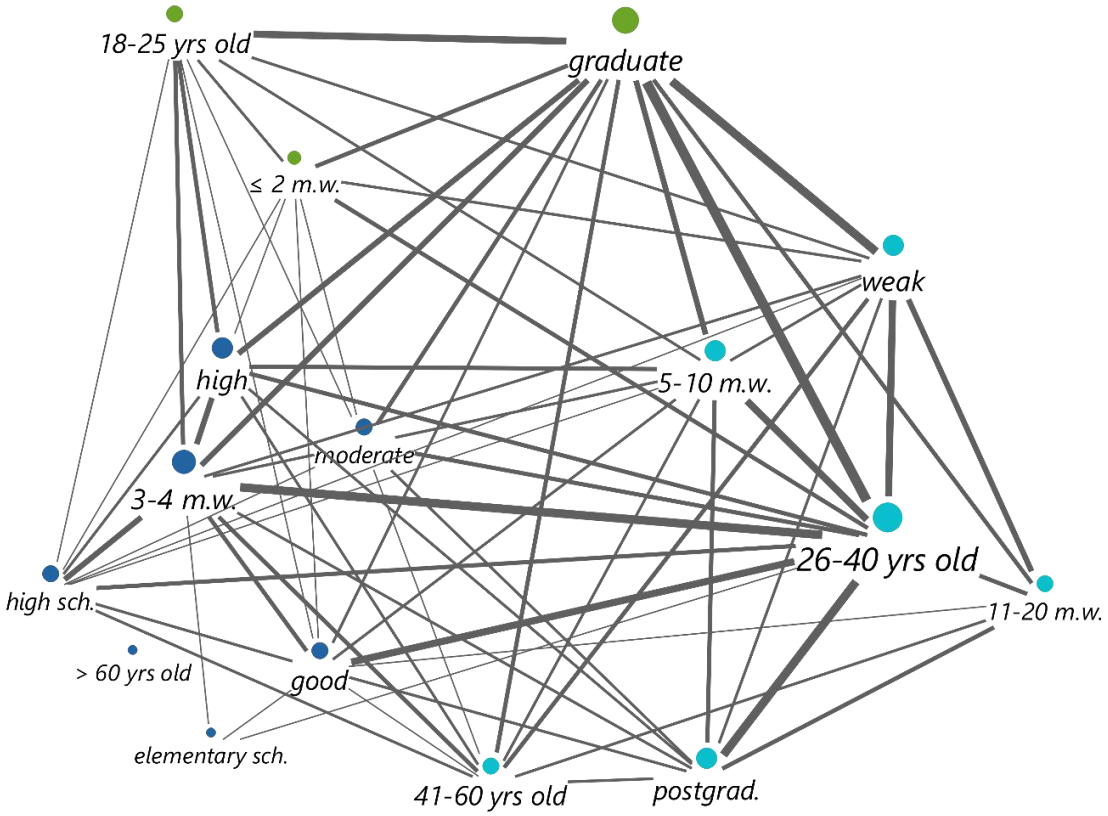

Fig.5: Map of codes hierarchized by frequency of the preferences of individuals associated with the variables age, family monthly income and schooling in the city of Uberlândia/MG.

Although not evident in the answers to the qualitative research model, the response of individuals cannot be disregarded as part of the experience of living with the risk of infection by the insect vector, associated with the serious problems of public health care and the deterioration of urban ecosystem services (SUBARIS, et al., 2016; LADNER et al., 2017). It is a broader reflection: proposing the dialogue between environmental events, especially the issues involving the accumulation of urban waste in vacant lots, the variation of the local microclimate and the severity of air pollutants (Figure 4) and the occurrence of dengue in the municipality of Uberlândia.

It is also not possible to dissociate the duties of municipal public management and the worsening of dengue in the municipality. However, strategic actions are needed to reduce social and environmental asymmetries in the city. Therefore, it is essential to revise and modernize the Master Plan in order to enable structural improvements in the city, including regarding the viable planning of urban occupation.

In addition, greater proximity to the municipal public administration and peripheral neighborhoods, especially those with structural and housing deficits, is expected. Preventive care in risky places with advice from the local public health network and the extension of environmental services, translated into inclusion and improved quality of life in the most vulnerable areas are viable strategies for the care and economic treatment of dengue and other epidemiological challenges (BOLLYKY et al, 2015).

Finally, environmental education practices need to be constant (and not seasonal), combined with the modern learning methodology of young people and adults. They must be accompanied by a joint effort by society and public managers to instruct, invest and recognize improvement practices with local communities.

IV. CONCLUSION

The present study demonstrated in the quantitative model, a different pattern of responses, significantly between individuals declared in the research - women and men, with a preference for high correlation in the sense of the female group.

In the qualitative model, the opposite decision of the preference preference groups (weak, moderate, good and high) was evident. The weak correlation reports were connected to the codes “society” and “policies and local economy”, attributing greater responsibility to the role of municipal public management in this scenario. They

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

covered more clearly the profile of individuals aged between 26 and 40 years, undergraduate course and family income between 5-10 and 11-20 minimum wages. The high and good correlation groups have diversified the associative capacity between waste and pollutant management, the policy of maintaining and diversity of urban green areas and urban microclimate variation, and express more clearly the profile of younger individuals (18 to 25 years), with complete high school and income between 3-4 minimum wages.

There is a need for proximity to public management and society, with the formulation of inclusive policies that reach communities at greatest epidemiological risk

REFERENCES

[1] BOLLYKY, T. J., TEMPLIN, T., ANDRIDGE, C., DIELEMAN, J. L Understanding The Relationships Between Noncommunicable Diseases, Unhealthy Lifestyles, And Country Wealth.. Health Affairs. v. 34 n 9., p. 1464-1471. Dez. 2015.

[2] BOUZID M.; HOOPER L.; HUNTER P. R. The effectiveness of public health interventions to reduce the health impact of climate change: a systematic review of systematic reviews. PLoS ONE. v. 8, n. 4, p.620- 641, 2013.

[3] CONFALONIERI, U., MENNE B., EBI K.L. *et. al.* Human health. Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, p. 391–431.

[4] COSTELLO. A., MASLIN, M., MONTGOMERY, H. JOHNSON, A. M., EKINS, P. Global health and climate change: moving from denial and catastrophic fatalism to positive action. Phil. Trans. R. Soc. A. P. v. 369, n. 1942, p. 1866–1882. Maio, 2011.

[5] EBI K.. Climate change and health risks: assessing and responding to them through ‘adaptive management”. Health Affairs, n. 5, p. 924–930, maio,2011.

[6] FRUMKIN, H., MD, HESS, J., LUBER, G., MALILAY, J., MCGEEHIN, M.. Climate change: the public health response. American Journal of Public Health v. 98, n. 3, p. 435-445.Mar, 2008.

[7] GIL, A. C. Métodos e técnicas de pesquisa social. 6.ed. – São Paulo: Atlas, 2008.

[8] HAINES, A.; KOVATSA, R.S.; CAMPBELL-LENDRUMB, D.; CORVALAN, C. Climate change and human health: Impacts, vulnerability and public health. Public Health. v.120, n.7, p.585-96, Jul. 2006.

[9] HOSMER, D. W.; LEMESHOW. S.; STURDIVANT, R. X.. Applied Logistic Regression, Third Edition, John Wiley and Sons, Inc., New York. 2013. 528p.

[10] IBGE. Instituto Brasileiro de Geografia e Estatística. Dados sobre o município de Uberlândia. Disponível em: < http://www.ibge.gov.br >. Acesso em 01 de julho de 2013.

[11] JACOBI, P. **Educação ambiental, cidadania e sustentabilidade.** Cadernos de Pesquisa, n. 118. p. 189-205, mar. 2003.

[12] KABIR, M. I.; RAHMAN, M. B.; SMITH, W.; LUSHA, M. A. F.; AZIM, S.; MILTON, A. H. Knowledge and perception about climate change and human health: findings from a baseline survey among vulnerable communities in Bangladesh. BMC Public Health v. 16. n. 266. p.1-10. 2016.

[13] LADNER, J., RODRIGUES, M., DAVIS, B., BESSON, M.´L., AUDUREAU, E., SABA, J.Societal impact of dengue outbreaks: Stakeholder perceptions and related implications. A qualitative study in Brazil. PLOS Neglected Tropical, mar, 2017.

[14] LERMEN, H. S., FISHER, P. D. Percepção ambiental como fator de saúde publica em área de vulnerabilidade social no Brasil. Juiz de Fora, v. 13, n. 1, p. 62-71, mar, 2010.

[15] LIM, B., SIEGFRIED E. S., BURTON, I., MALONE, E., HUQ, S. **Adaptation Policy Frameworks for Climate Change: Developing Strategies,Policies and Measures**. Madrid, Spain.: United Nations Development.2004. 263p.

[16] LIMA, M. K. G.; Análise da implantação de valas de detenção na Avenida Segismundo Pereira, bacia do córrego Jataí, na cidade de Uberlândia/ MG. 2017. 96 f. Dissertação (Mestrado) – Universidade Federal de Uberlândia. Uberlândia, 2017.

[17] McMICHAEL, A. J.; WOODRUFF, R. E.; HALES, S. Climate change and human health: present and future risks. **Lancet.** v. 367, n. 9513, p.859–869. 2006.

[18] MIRANDA, M. S. L., CAPRARA, A., PEIXOTO, A. C. R., MOTTA, C. M. V., SANTANA, R. P. Percepção de atores sociais responsáveis pela gestão de resíduos sólidos no contexto da dengue. Fortaleza, v.26 n.2, p. 233-241, jun., 2013

[19] MOGENSEN, F. Critical thinking: a central element in developing action competence in health and environmental education. Theory & Practice, v.12, n. 4, p. 429-436,1997

[20] PATZ, J. A.; GIBBS, H.; FOLEY, J.; ROGERS, J.; SMITH, K. Climate change and global health: quantifying a growing ethical crisis. **EcoHealth**. v. 4, n.4, p.397–405. 2007.

[21] PEDRETTI, E. Environmental Education and Science Education: Ideology, Hegemony, Traditional Knowledge, and Alignment. Revista Brasileira de Pesquisa em Educação em Ciências. v. 14, n. 2. 2014

[22] SAUVÉ, L., GODMAIRE, H. Environmental Health Education: A Participatory Holistic Approach. **EcoHealth** v. 1, p.35–46. 2004. Disponível em: < https://doi.org/10.1007/s10

[23] 393-004-0080-z>Acesso em: 01 de julho de 2013.

[24] SHUMAN. E.K. Global Climate Change and Infectious Diseases. The international jornal of Occupational and Environmental Medicine. v. 2, n.1, Jan, 2011.

[25] SILVA, M. A. M., BERTOLDI, M. R. Environmental

https://dx.doi.org/10.22161/ijaers.74.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

education for citizenship, an instrument for the realization of the right to a balanced environment in Brazil and in Portugal.Veredas do Direito, Belo Horizonte, v.13, n.27, p.291-314, Set./Dez. 2016

[26] STEWART-IBARRA, A. M.; ROMERO, M.; HINDS, A. Q. J.; LOWE, R.; MAHON, M.; Meerbeeck, C. J. V.; ROLLOCK, L.; GITTENS-ST. HILAIRE, M.; ST. VILLE, S.; RYAN, S. J.; TROTMAN, A. R.; BORBOR-CORDOVA, M. J. Co-developing climate services for public health: Stakeholder needs and perceptions for the prevention and control of *Aedes*-transmitted diseases in the Caribbean. PLoS Negl Trop Dis. v.13. n.10. p.1-26. 2019.

[27] SUBARIS, H., SUBIYANTO, KARTONO, D. T., LESTARY, E.Social Capital Capacity as Prediction of Dengue Control. International Journal of Public Health Science, v.5, n.1, p. 111-117, Mar, 2016.

[28] UBERLÂNDIA. Prefeitura Municipal. Cartilha do Plano de Emergência Pluviométrica – PEP 2010/2011. Disponível em: <http://www.uberlandia.mg.gov.br/2014/secretariapagina/41/485/defesa_civil.html> Acesso em: 10 Jan. 2016.

[29] WOODCOCK J.; EDWARDS P.; TONNE, C.; ARMSTRONG, B. G.; ASHIRU, O.; BANISTER, D. et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. **Lancet.** v. 374, n. 9705, p.1930–1943, 2009.

[30] ZAKI R.; ROFFEEI S. N.; HII Y. L.; YAHYA A.; APPANNAN M.; SAID M. A.; WAN N. C.; AGHAMOHAMMADI N.; HAIRI N. N.; BULGIBA A.; QUAM M.; ROCKLOV J. Public perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia. PLoS One. v.14. n. 2, p.1-22. fev. 2019.