Participatory cartography, as a support for decision-making in public health, case: Metropolitan Area of Toluca

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Abstract

The work aims to revalidate environments participatory mapping, know the origin this practice, and the epistemological basis. Since this type of research can create links for reflection and action, between social perception and stakeholders focused on promoting social development and investigative actions. It articulate collective knowledge by the researcher becomes a challenge, involving a group of people in research and methodological schemes without losing objectivity cohesive give opinions, criticisms. From this idea analysis methodologies of the IAP, Geography of perception and participatory mapping was performed, and how they can help uncover the major public health problems currently facing the metropolitan area of Toluca because diagnoses by the Institute of health of the State of Mexico that identifies two focuses: environmental pollution, and chronic degenerative diseases (ISEM, 2015).

Participatory mapping, IAP, public health

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Health geography as antecedent

The attention to Public Health in the Metropolitan Area of Toluca is based on the development plan of the State of Mexico, whose approach is to meet a series of objectives, in an integral way, which seeks to solve three main issues: infectious diseases, environmental problems And chronic degenerative diseases.

The beginning of health studies from a geographical perspective begins in (5th century BC) with a medical book that established the characteristics that could be applied to geographical situations on different diseases in Asia and Europe (Somolinos, G. 1966). In the twentieth century began, theoretical innovations and methodologies related to technological progress.

For that same time, there was an answer to quantitative geography, it was the interest for social problems as social welfare, which led to the geography to incorporate studies of the quality of life through subjective indicators and objectives of the necessary conditions for the Reproduction of men "(Méndez, L. 1995).

The birth of the named Health Geography arose in France in 1843. The distinctive features of the studies of that time were based on a "hygienist" perspective under the name of "medical topography" or "medical paleography" included as those medical characteristics of a Geographical space (Olivera, P. 1986). Investigations of this period were made by doctors during the nineteenth century.

It is evident that the studies required to describe the geographical space that occupied and its pattern of behavior to explain the possible causes of what suffered the regions what besides knowing.

The movements, expansion and surface in relation to eg density of population, mode Of life and physical features.

In public health different perspectives are used to understand, explain and locate the topologies that are manifested in society that is why Geography plays an important role in the contextualization and explanation of these phenomena, through Human Geography as an approach General and particularly the Geography of Health (ISEM, 2015).

Public health environment in the Metropolitan Area of Toluca

There is a difference between the traditional medical approach and the concept of public health. On the one hand the population health strategies that address a wide range of determinants (social, environmental and epidemiological). And on the other hand should be looked for ways to manage social actions to reduce threats, since the work of government institutions in addition to pointing out the focus of attention is to implement the strategies designed.

Figure 1 shows the study area is the Metropolitan Area of Toluca (ZMT) consists of 15 municipalities and a population Approximately 1 900, 000 inhabitants (INEGI, 2010), where there is a growing accumulation of evidence on most Of health problems, this can be attributed to the social conditions in which people live or work, they are called "social determinants of health" which (Evans et al, 1994) sets out as goals to determine a profile of Health in a certain space.

At national level (ISEM, 2016) indicates that the main health problems, ie nine chronic-degenerative diseases: Diabetes mellitus, obesity, hypertension, cervical cancer, human papilloma breast cancer, tuberculosis, influenza and dengue.

Information from the "Instituto de Salud del Estado de México" (ISEM 2016) indicates that one of the main concerns in the entity is the cause of deaths since they consider this an indicator to measure the health care, although it is of Indirect form since knowing when, how and from what the individuals die, it is possible to deduce, approximately, the lifestyle of the members in a community.

A more concrete antecedent was an investigation directed by (Santana V. et al 2014) in which a diagnostic work was carried out based on the perception of environmental and health problems, an important element in the territorial planning for the construction of Cities of the Metropolitan Area of Toluca (ZMT).

Figure 2 shows the results that the mentioned author found as pockets of risk derived from social perception, such as: lack of surveillance, excess of non-domestic animals, lack of recreation areas, increase of litter, lack of lighting Pollution in the air.

Derived from the above (Santana V. et al 2014) indicates which municipalities are the ones that have greater recurrence of problems besides the type of problem perceived. And Lerma Zinacantepec and Toluca are those that demonstrate that status.

The role of Geography in the face of social perception

The Geography of Perception, also known as Geography of the subjectivity, has its roots in works on the posture of the economic man, since it maintains a critical cut on the normative models of economist roots prevailing in the Quantitative Geography, in which the location Of activities is based on the perfect economic rationality of man's behavior (Millán E. 2004).

The complexity of this concept hinders the consensus on more general and common definitions in different areas of study. Based on the above the present work makes reference to studies of the abstraction of the population, that is to say the geography of the perception constituting a paradigm of the Human Geography. This position in the sixties sought to refute the deterministic and a priori principles that quantitative geography had elicited in its quest for scientificity.

Derrey (Perreyra C. 2012) argues that the fundamental basis of this approach is to recognize the existence of two types of space: on the one hand an absolute one that is reflected in official cartography and statistical data; On the other hand, the subjective space, which starts from the words (opinion, preferences, valuation, description) and the actions and behaviors of citizens, who live daily in the same space.

The space that has relation with the subject of this form the perception of the second about the first is hierarchized according to the places lived; The richness of this approach is that the object-space, when transformed by the subject, is linked to the symbolic, the affective, the lived and the subjective, which is called perceived space (Sotelo L. et al., 2003).

In this case, the object of study is to identify the challenges of documenting the perception of those who inhabit the Metropolitan Area of Toluca (ZMT).

The purpose is to develop studies and reports on appropriate healthy development measures, so it is necessary to consider within a geographic study, some cognitive representation of the autochthonous urban spaces. In such a way to the authentic thinking of the person who manifests his evaluation, to apply studies of descriptive analysis of data and spatial.

In summary, this line of research is based on the combination of many points of view to understand territorial ideologies, space conflicts, as well as their symbolic connotations at the individual and social levels, drawing on the individual's own vision of deficiencies represented through Participatory mapping and methods of Research and Participatory Action.

Research and Participatory Action (RPA)

In order to tackle issues related to participatory mapping, it is important to know from which approach the technique is born and what its epistemological beginnings are. In 1946 Kurt Lewuin used for the first time the term "action research" derived from observations in communities and groups that sought to solve problems and meet needs, Lewin's method started from psychosocial theory and proposed combining it with practice in action research through An analysis of the categorization of priorities and evaluation. It described a form of research that could link the experimental approach of social science to programs of community action that responded to the major social problems of the time.

Durston Jhon & Miranda (2002) point out that in the sixties in Latin America the framework of so-called social modernization emerged and was inserted in the process of social and educational planning. They affirm that during the 1970s it acquired specific strength to be linked from the Social Sciences as an expression of the insertion and commitment of intellectuals with the popular movements, in the eighties it took importance in processes of democratization that consolidated styles of development concentrating and excluding.

At the moment it is occupied like a technique that through the participation, it foments the social integration and facilitates processes of development where they break traditional research schemes since it combines a series of elements to strengthen the execution of projects and decision making. Then, based on a large literature on the subject, we could propose as an objective of the IAP To promote the collective production of knowledge by breaking the monopoly of knowledge and information, allowing both to become the heritage of the postponed groups. Encourage collective analysis in the ordering of information and in the use of which it can be done.

Increase critical reflection using ordered and classified information in order to determine the roots and causes of problems, and ways of solving them. Finally establish relations between individual and collective, functional and structural problems, as part of the search for collective solutions to the problems faced.

From the qualitative point of view, the IAP is structured in four stages according to (Villegas R. 2000). The first is thematic selection that begins with a plan focused on improvements and development, which at the same time is beneficial to the population, then a plan to implement it.

Management as a next step is part of the action of the researcher in shaping and observing the results of which is being worked. Finally an analysis of the results obtained to what the author calls "self-reflection and spiral intervention"

Collective cartography

Cartography, whose origin lies in the human need to be located in the space in which it develops its life through its graphic representation, can be defined as the science, technique and art in charge of "the realization and the study of maps, In all its aspects "(Robinson et al., 1987, p.3).

It is important to emphasize that in any field of human activity and in any field of knowledge, since its practical use and application is not limited to the field of geography and sciences, but extends to any other branch, such as Humanities, social sciences or technology.

Authors especially highlight the graphic value of this discipline, for the ability to represent and expose "ideas, forms and relationships that take place in a bi or three-dimensional space" (Robinson, Sale, Morrison & Muehrcke, 1987, p.3). And refer to the importance of cartography for a few years, motivated by the "progressive general awareness of the strategic value of space" and the need for "useful tools for the control and planning of the territory"

However, there is a tool that enables the use of these methods of data structures such as the appearance of web 2.0 as it is commonly associated with a social phenomenon, based on the interaction that is achieved from different applications on the web.

That facilitate information sharing, interoperability, user-centered design, or DCU And collaboration on the World Wide Web.

Examples of Web 2.0 are web communities, web services, web applications, social networking services, video hosting services, wikis, blogs, mashups and folksonomies. A Web 2.0 site allows its users to interact with other users or to change website content, in contrast to non-interactive web sites where users are limited to the passive display of information provided to them (IM, 2015).

Supported by this scheme, the process of obtaining data on social participation has its origin in methods of rural evaluation, which underwent a great development during the decade of the eighties and that had as a starting point the inclusion of all the members of the community in any activity related to development initiatives or to community decision-making processes? In this context, participatory mapping became a "method for incorporating oral information into a map, with the aim of integrating secondary voices into a tangible and visible medium" (IFAD, 2010, p.7)

Contributing in this way to citizen and community empowerment, through the georeferencing of their space through these online map applications. (Subires M. 2011), points out that applications that in addition to becoming channels for the transmission of ideas, projects and proposals for improvement, have the added value of the multimedia nature of the network enriching it in this way.

He mentions that participatory maps often constitute a socially or culturally distinct way of understanding the landscape and contain information that is excluded from the usual maps, which normally represent the views of the dominant sectors of society.

And they can, in turn, propose alternatives to the stories and images of existing power structures and become a means of empowerment by allowing local communities to spatially represent themselves.

They encourage greater community cohesion, encourage the participation of its members in land-based decision-making, and raise awareness of the most pressing problems that threaten it. This leads, finally, to the fact that this method can contribute, as already mentioned, to "the empowerment of local communities and their members" (IFAD, 2010, p.4).

Instruments of participatory mapping

According to the Popayan Association of Community Projects cited by (Iratxe, B 20012), the methodology of participatory mapping has conceptual foundations in IPA which are based on the territory as the main factor of the methodological scheme, Table 2.

There are a number of tools that can record and document the happenings and challenges of the settlers as mentioned (Ardón M 1998). They provide graphical information to participants and enrich the perception of how the relationships between real-world changes and the consequences that can be viewed as an opportunity or a threat are shaped.

Community mapping becomes an instrument of support as spatially projected routes, workshops, discussions, and contributions so that as far as subjective knowledge is concerned, it is necessary to find a coherence and spatial association between what is being registered and the Territory, in addition to contextualizing in social, urban and environmental environment.

Interviews, It is important to emphasize that an interview is reciprocal, where the interviewee uses a collection technique through a structured interrogation or a totally free conversation; In both cases a form or scheme is used with questions or questions to focus the talk that serve as a guide.

Participatory Observation That is why we must talk about qualitative research, provide researchers with methods to revise non-verbal expressions of feelings, determine who interacts with who, understand how participants communicate with each other, and verify how long they are Spending on certain activities

Open interviews, in them of favors the communication leaving to speak freely and making the participant feel the researcher asks few questions and it is dedicated to redirect the subjects of which it is spoken. It is used when interested in information regarding subjectivity or, in its absence, personality.

Perception surveys It is linked to the open interview, however it is the main stage within the method of participatory mapping, it puts in commitment to objectively document information that may not be structured or depends on the type of variable that needs to be documented

Participatory cartography challenges in the ZMT

Investigations similar to those of (Alberich, T. 2000) indicate that the field work itself has as its main purpose to obtain the information required by applying the techniques and procedures indicated above. It means that it will expand the knowledge of the reality about which it will act. At this stage of the process there are two main types of tasks:

Compilation of field data (primary data), identification and collection of data already available (secondary data) for later use, depending on the study to be performed.

For the fieldwork, the operations plan entails making decisions on the following issues: in what place or sectors will the different techniques be applied; At which point the data collection will be carried out (in particular the dates of initiation); Duration of the field work (expected time for this phase of the work); How many people will be required for each activity; Distribution of tasks and responsibilities; How and when will be trained the people who will perform the field work; What elements of support must be provided (transport, previous contacts, search for addresses and completion of interviews, authorizations, preparation of forms, etc.).

After the data collection stage, a certain amount of information is available. This is the moment when it is necessary to sort and classify it according to certain criteria of systematization. It is an orderly presentation of the collected data.

They can be tabulation tasks (counting and recording the totals obtained for each value when it comes to quantitative data). In other cases, it will be a simple ordering of the material, so that everything that deals with the same subject is in the same place (usually, in folders classified according to the issues that have been studied).

In this phase of the work, in some cases will have to amalgamate various data to obtain more synthetic information. This will be done by enumeration, description, comparison, distinction, classification or definition. What matters, in this phase, is to reveal uniformities, similarities and differences within the set of facts and phenomena studied.

Once ordered, grouped, arranged and related the data according to the objectives of the research, it is already in a position to elaborate the information in the sense of analyzing and interpreting it. That is why if it is necessary to approach a specific group of people, it is necessary to know the type of conditions that the population can access and thus determine the universe of study based on this indicator (Jiménez P. 2001).

Finally, at the end of the previous stage, the dissemination of results can be done in several ways: verbal communication in the form of a talk or seminar; in presentation to a large group: assembly of settlers; Mural posters, popular newspaper, flyers, leaflets or folding, or in a web viewer.

In this new context, that of the digital age, in which Communication and Information Technologies are present digital inclusion becomes a basic element, and the development of applications and improvements in web interaction a primary objective. In spite of the enormous importance that the Internet has acquired in recent years, the gap between countries, regions and sectors of the population remains, preventing access on an equal footing in a society where the use of technology .

On the other hand there are advantages to society and have virtually eliminated the barrier of time and space itself that is not only economic, but also generational, between people of different ages. In this sense, (Habergger S. 2006). Reflecting on the concept of digital citizen states that there are three basic requirements that must comply: "Internet access, digital skills and perception of the utility of technologies."

In order to carry out social inclusion in this case, it is necessary to think about Internet users and in Mexico, D.F. Last year, 44.4 percent of Mexico's population aged six or more declared themselves to be Internet users, or 47.4 million people, according to the National Institute of Statistics and Geography (INEGI 2015).

On May 17, the institute noted that the Mexican population that uses the services offered by the Internet shows an annual growth rate of 12.5 percent in the period from 2006 to 2014. Based on the Module on Availability and Use of Technologies Of Information in Homes 2014 (MODUTIH 2014), pointed out that 74.2 percent of Mexican netizens are under 35.

Esto significa que los usuarios potenciales pertenecen a un rango de edad y en la ZMT la población hasta el 2010 de personas entre 15 y 44 años es de 960, 814 habitantes es decir el 49% de la población (INEGI 2015). Esto quiere decir que se tiene mayor posibilidad encontrar interesados en contribuir con el estudio.

Discussion

There is a need to create instruments that conform to the new forms of social interaction, which at the same time are based on methodologies that facilitate the modeling of reality. Collaborative mapping is an alternative method that works to enrich the global knowledge of a specific territory and requires a social culture that encourages the action or participation of the population oriented to different age groups and with different socioeconomic characteristics.

The task of mapping is a process of management and articulation between research and new ideas, that is to say, it must have a comprehensive overview that allows to favor within the results as many social groups as possible and thus to include different sectors since the idea Main is to attend to the demands or complaints that are being registered.

New instruments are now required because of the complexity of the trends and the volume of data that can be generated in different media. These tools, such as database managers, web platforms and tools previously mentioned, may have a The way in which a community is organized socially and facilitating or promoting this process by granting joint power and sovereignty in decision-making or public policies.

Among the main challenges are three points on the one hand the human part, the scientific part and finally the tools that support implementation: On the one hand educate the population not only to manifest their concerns and experiences in terms of health problems, If it is part of the solution and knows how it can eradicate the problems encountered, methodologically there is a discussion about the way in which the model of the scientific method contrasts with the IAP method, however from the point of view Geographical is Valid qualitative analysis.

Finally, the use of web tools, social networks and the media nowadays become means of distraction rather than empowerment of knowledge which indicates a certain vulnerability to the investigative use of such means. However, the promotion of mobile applications and web platforms focused on this type of studies is fundamental to generate information and structured data useful for describing and exploring hidden data.

Figura 1 Location of the study area, Source: Own elaboration with INEGI 2015 data

| Factor	Characteristics
Socioeconomic stability.	Its importance is significant when studying the behavior of a group as the state of health improves as it rises on the income scale.
Support and social integrity	The support of families, friends and the social fabric which in turn is related to recreational and productive activities.
Education	Increases income opportunities, safety at work, factors that influence the quality of life.
Employment and laboral conditions.	Income level and employment characteristics are associated with security, concern, stress and income level, a situation that influences social and family development
Enviroment	Physical and geographic variables such as air, water and soil quality are influences on health. Urban infrastructure, housing, workplaces, roads and services must have a sustainable and environmentally friendly design.
Life styles.	Personal habits allow and support choices and healthy lifestyles, as well as skills, intentions, and adaptive skills to cope with life in a healthy way.
Health services.	Factors to promote, maintain and restore health, is called healthy culture whose main objective is the prevention of diseases, the development of healthy population is included as a determining factor in urban policies.

Table 1 Determinants, Source: Evans et al, 1994
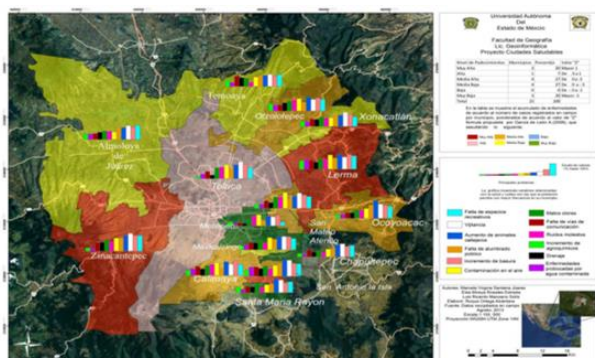
Figure 2 Percepción social de problemas de salud en la ZMT Fuente: Santana V. et al 2014

Etapa	Insumos	Descripción
Investigation	Objective, universe of study, social actors	Stage that allows to dimension the knowledge and practices to make sustainable the objective raised
Action	Data, opinions and documentation	Validation process regarding the objectives that are sought with each research topic is to say what type of information will be stored and how.
Participation	Community Databases	Framework for dialogue and investigative expression consists of consistently carrying out individual or joint reflections, of course social integration is sought
Systematization	Support tools Web maps and reports	It consists of moving from theory to practice as it is the main element to be able to replicate the process that at one time was disorganized and without structure, due to the diversity in obtaining collaborative data.

Table 2 Metodología de la Cartografía participativa Fuente: Elaboración propia con base en (Iratxe, B 20012)

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