



Natural and cultural longevity zones from an anthropological and geographical viewpoint

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Abstract

There are natural and cultural variables that have an impact on the longevity of older adults. In the case of the former, it is necessary to know and territorialize them, and in the case of the latter, it is necessary to understand them through the analysis of customs and lifestyles. The zones of natural longevity, for this analysis, are those in which low levels of ionizing and ultraviolet radiation converge, as well as the presence of water containing deuterium oxide among its components. To address the cultural longevity zones, an ethnography was carried out in which it was observed that both the consumption of heavy water and the lifestyles generated by the production of coffee and sugar cane prolong life and good old age in the town of El Espinal, municipality of Naolinco, Veracruz.

Keywords Geography · Ethnography · Natural longevity · Cultural Longevity · Radiation · Blue zones

Introduction

Studies on the society-nature relationship present a diversity of definitions, however, there are two tendencies: the first uses the term ‘culture’ as separate from politics, the environment, the economy, etc., while the second uses the term ‘culture’ as a way

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of life that encompasses everything (political, environmental aspects etc.), as in the geography of Sauer who emphasized a lot on the human modification of nature (Lee, 1998). However, this last comprehensive approach, in the field of homeopathic medicine, cultural and environmental elements are downplayed (Cavagna et al., 2021).

Despite this academic geopolitics, there are works aimed at quantifying and qualifying the contributions of nature to people (Burnett et al., 2019), three examples of biocultural interactions are: (1) the ultraviolet radiation-pigmentation relationship, where the weight of current evidence supports the theory that ultraviolet radiation is the main selective agent that has influenced the evolution of human skin pigmentation (Jablonski, 2021); (2) the physical characteristics of the environment promote health and well-being (Melnyk et al., 2018); and (3) the country of origin influences the aesthetic value and function given to certain parts of oral health (Nassani et al., 2015). Hence, Hinchliffe et al., (2018), point out that aging requires not only investing in biomedical remedies to combat cognitive decline, but also in recognizing cultural and environmental factors.

Despite this, epistemologically, the bulk of the community still sees natural environments as the 'missing link' in health research. In this regard, this research recognizes the influence of socio-environmental conditions on a social group, since we assume that health depends directly on the pattern of consumption of the type of water and food, in turn, this pattern consists of a triad: clean environment, stable social environment and personal care.

As can be seen, studies on the interaction between humanity and the environment are becoming more relevant today, as there is evidence that some physical and social spaces are more favorable for life. Therefore, it is necessary to document the natural and cultural aspects that influence longevity by delving into the reciprocal relationships between people and the environment. Therefore, for this analysis, methods of geography and gerontological anthropology are used to territorialize and explain the factors, causes, conditions and dynamics that influence the fact that certain communities have a greater number of nonagenarians.

The geography approach, hand in hand with environmental law, has had a influence in Mexico on the programs the Ministry of the Environment and Natural Resources (SEMARNAT) and the National Institute of Ecology (INE). These analyses promoted the protection of various living spaces and ecosystems, since their deterioration may imply alterations in the social, economic and even health spheres (Bocco et al., 2005).

With regard to the socio-anthropological perspective, the most outstanding works followed the guidelines of the Network of Studies in Disaster Prevention in Latin America, so that the most essential conceptual elements were taken to interpret the complex relationships between society and climatic events, highlighting some factors involved such as deforestation, erosion, paving of large urban areas or excessive extraction of water from the subsoil, since these actions modify, condition and amplify natural hazards in a context of globalization (García, 2004).

In this work, we start from the theories of biogeography proposed by Appel (2008) and Chavarría (2010), to methodologically expand the environmental correlations with certain conditions or characteristics of the population. This approach is complemented by methodological reflection, typical of anthropology, such as ethnographic

fieldwork, which allows us to delve into the characteristics, experiences, biographies, lifestyles¹ and experiences that people have when living in a given space, in order to explain their situation and the active role they play in the configuration of these circumstances.

This allows us to delve methodologically into the understanding of the dynamic and symbiotic relationship of the aging process with the environment. In other words, the overlapping methods of geography allow us to see the big geophysical picture, while the ethnographic methods of anthropology give voice to people and their actions.

Methodology

This study, due to its interdisciplinary nature, follows a strategy divided into two methodological routes defined by the characteristics of the disciplines involved. It should be noted that, despite the differences in the results obtained through each of these routes, we seek to analyze them side by side, because in reality, natural and demographic conditions are not isolated from the social and cultural dynamics that occur in different geographical spaces.

A) Methodological route of geography linked to natural longevity:

The geophysical data in this study were obtained from the synthesis of the topography of the National Institute of Statistics and Geography (2015) and international analyses of Chulliat et al., (2018); Valdés-Barrón et al., (2013) y Hobson et al., (2012).

With the geophysical data, all published, thematic mapping was performed with a scale of 1: 2 000 000 for the electromagnetic field intensity maps and 1: 250 000 for the ultraviolet radiation maps. The GvSIG 2.5.1 tool was used which, through the process of overall or cartographic superimposition, made it possible to relate the different spatial variables considered in this study:

- - The intensity of the magnetosphere.
- - The territorial distribution of ultraviolet radiation.
- - The territorial distribution of deuterium in water.

Once the mapping was done, we proceeded to establish a relationship between the natural conditions of certain areas and longevity statistics, which required explaining the different effects of solar radiation and the presence of water with deuterium on health; mainly emphasizing the way in which these factors favor or affect reproduction and cellular life, since this is intimately linked to chronic diseases related to old age.

B) Methodological route of anthropology to define cultural longevity zones.

¹ Lifestyles are understood as the characteristic ways or modes of acting and thinking of people (in this case older adults) in the same socio-historical, economic and geographical environment, where they share and adapt a set of answers and questions to practical problems, convenient for their objective and subjective needs.

The methodology used in anthropology is the analysis of the life course of the social actors in the locality, by observing the customs, in the understanding of lifestyles, all this through ethnographic work, notes in the field diary and the collection of information through in-depth interviews (in-person, summer season 2019), since this allows knowing those aspects in detail that have an impact on longevity.

This study is based on the premise that there is a reciprocal influence between the environment and culture, so it is necessary to delve into the adaptive process of humanity to the environment, which is accompanied by a mixture of physiological, behavioral and social changes of the person, as well as environmental changes that, as will be seen below, have an interdependent impact on the aging process and, therefore, on longevity. This approach to the problem of study allows us to appreciate the heterogeneity of the old age-environment relationship, which presupposes diverse interactions and adaptive experiences of aging that generate identity and a sense of old age, as shown in the studies on the relationship between humanity and nature by White (1993), Rappaport (1975) and Steward (1993).

An important issue in these methodologies suggests geography tells about the correlations of socio-environmental that take place in the different territories and anthropology of the social context, of people's lives, their culture, their strategies, their vulnerabilities and their resilience, introducing dynamism to the interaction that humanity has with his living space. Therefore, by uniting the methodology of geography with anthropology, a dialogue is achieved between the global and the local, between the natural and the human, the statistical and the experiential, in which the various exceptions to the rules that rigid data present us with are made visible, which is extremely important to show the capacity of agency of the different human groups and, in this case, of the elderly in Mexico, which is necessary, above all, if we wish to formulate public policies and social programs that favor the living conditions and aging of Mexicans.

Study area

Geographically, the municipality of Naolinco is located south of the Chiconquiaco mountain range (Fig. 1), on the foothills of the Transversal Volcanic System, to the north of where the springs and streams that feed the Actopan River originate, in geological terms, its soil is andosol and consists of igneous rocks exposed to the influence of the semi-warm humid climate, with rainfall throughout the year and an oscillating temperature range of 18°-24 °C and an average annual rainfall regime of between 1100 and 1600 millimeters (SIEGVER, 2021). This locality belongs to one of the 212 municipalities of the state of Veracruz, which is located in its central portion at an altitude ranging between 650 and 1700 m above sea level, with a land area of 108.8 km², of which 70.1% is dedicated to agricultural activities, 14.1% to extensive livestock, the rest is covered by secondary and natural vegetation. Its population as of the INEGI census (2021) is 23 thousand inhabitants, of which 54.4% live in rural localities, while the remaining 45.6% live in urban localities.

Its municipal seat is located at the geographic coordinates of: 19° 39' 15" north latitude and 96° 52' 25" west longitude at an altitude of 1555 m above sea level. This

municipality is bordered to the south by the municipalities of Actopan, Emiliano Zapata, Xalapa and Jilotepec; to the west by the municipalities of Jilotepec, Coacoatzintla, Tonayán and Miahuatlán; to the north by the municipalities of Miahuatlán, Acatlán and Tepetlán; and to the east by the municipalities of Tepetlán, Alto Lucero de Gutiérrez Barrios and Actopan (INEGI, 2009). It is one of the municipalities in the center of the state that experiences landslides and mudslides during the rainy season. So it is not surprising that floods and torrential rains have been the most frequent disasters in the last 30 years according to the (Red de Estudios Sociales en Prevención de Desastres en América Latina (2018).

Natural longevity zones

The magnetosphere is a layer that is approximately 20,000 km wide and protects the earth from the solar wind and its cosmic rays, without it there would be no ozone layer, which protects the biosphere from ultraviolet radiation (Shlermeler, 2005) and ionizing radiation². This layer has different levels of intensity that vary according to geographical areas and different degrees and levels of solar exposure. At the poles, the intensity of the geomagnetic field is around 65,000 nanotesla or nT (nanotesla is the unit of measurement of magnetic flux density) and near the equator it is 25,000 nT. This allows that in places with higher nT intensity there is a damping of radiation, so that, thanks to the magnetosphere, the solar spectrum that impacts the surface of our planet has a range that goes from 300 to 900 nT (Fanjul, 2013).

One of the risks of radiation is the induction of cancer with a latent period of years or decades after exposure (WHO, 2016). The effects of ionizing radiation, according to Valentin (2007) are classified into two types:

- - Deterministic effects linked to cell death or malfunction. This causes mutant cells, zombie cells, tumors and cancer, mainly at advanced ages.
- - Hereditary effects linked to somatic cell mutation or the proliferation of heritable diseases such as diabetes and pancreatic cancer, also essentially at advanced ages.

This is because ultraviolet radiation is absorbed by proteins and nucleic acids, which causes damage to cells increasing their mutation or death rate (Fanjul, 2013).

Therefore, mapping the intensity of the electromagnetic field, as a proxy data, helps to locate areas of maximum or minimum protection from ionizing and ultraviolet radiation and determine those areas that are more favorable for life, which have a greater number of nonagenarians.

In Veracruz the geomagnetic field is weaker over the south of the municipality of Coatzacoalcos, while it is stronger over the north of the state. This can be observed in Fig. 2, where the regions of maximum intensity of the electromagnetic field are shown, highlighting municipalities located in the north of the state of Veracruz

² Ionizing radiation is a type of energy released by atoms in the form of electromagnetic waves from cosmic rays. Examples of this type of radiation are naturally occurring X-rays and gamma rays.

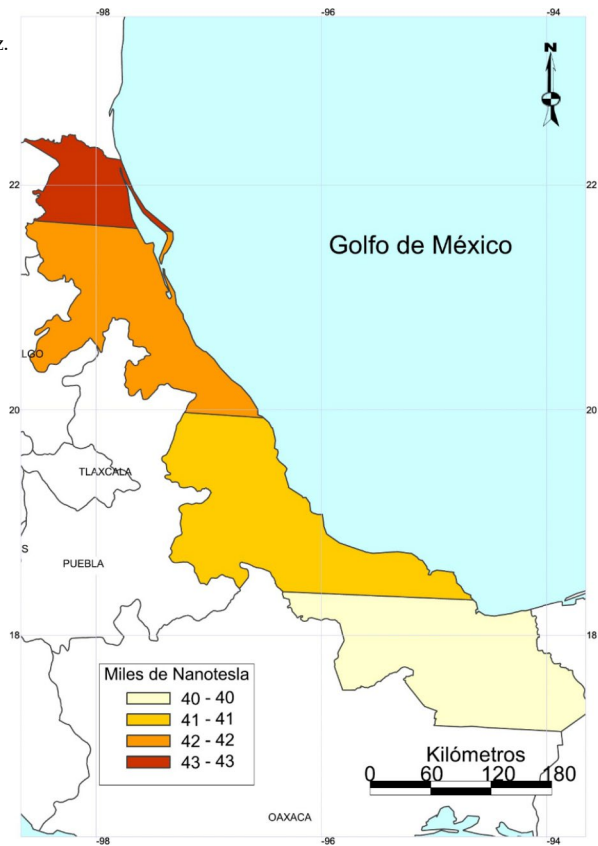


Fig. 1 Location of the municipality of Naolinco. Source: Own elaboration based on (INEGI, 2009)

for having the best geophysical conditions so that the cells of the elderly naturally develop the least amount of free radicals.

This information can be complemented with the following map showing the intensity of UVB rays that accelerate cell deterioration and propitiate the emergence of free radicals (Fig. 3), as well as damage to mitochondria due to oxidation that reduces their efficiency and impairs DNA repair until reaching apoptosis or programmed cell death. In this regard, it is important to note that Skjærvø et al., (2015) documented a correlation between solar activity over the last four centuries and life expectancy by

Fig. 2 Intensity of the Earth's electromagnetic field over Veracruz. Source: own elaboration based on Chulliat et al., (2018)



statistically showing that people born at times of high solar activity lived, on average, 5.2 years less than their counterparts.

As can be seen in Fig. 3, the northern, eastern and southern municipalities of Veracruz have the best spatial climate conditions for the cells of the elderly to naturally develop the least amount of cancer and blindness cells.

Along with the atmospheric variables, the impact of geochemical components that participate in the molecular constitution of cells and potentiate their half-life was taken into consideration; among these components, deuterium water or heavy water stands out, which is relevant because, since 1939, it is known that deuterium oxide has a certain relationship with biosynthesis, the prolongation of the half-life of some neurotransmitters and the delay in the growth of tumors.

At the beginning of the 21st century, Shchepinov (2007) concluded that deuterium or enriched hydrogen, acts in the body to strengthen cells against deterioration caused by free radicals and attacks linked to Alzheimer's and Parkinson's disease. This finding has been so important that Ignatov et al., (2014) considered the possibilities of extending human lifespan and reducing genetic replication errors by selecting and consuming the type of water consumed.

It is therefore not surprising that hydrology had a strong heyday and measurements of natural deuterium concentrations were made to trace the geographic origin

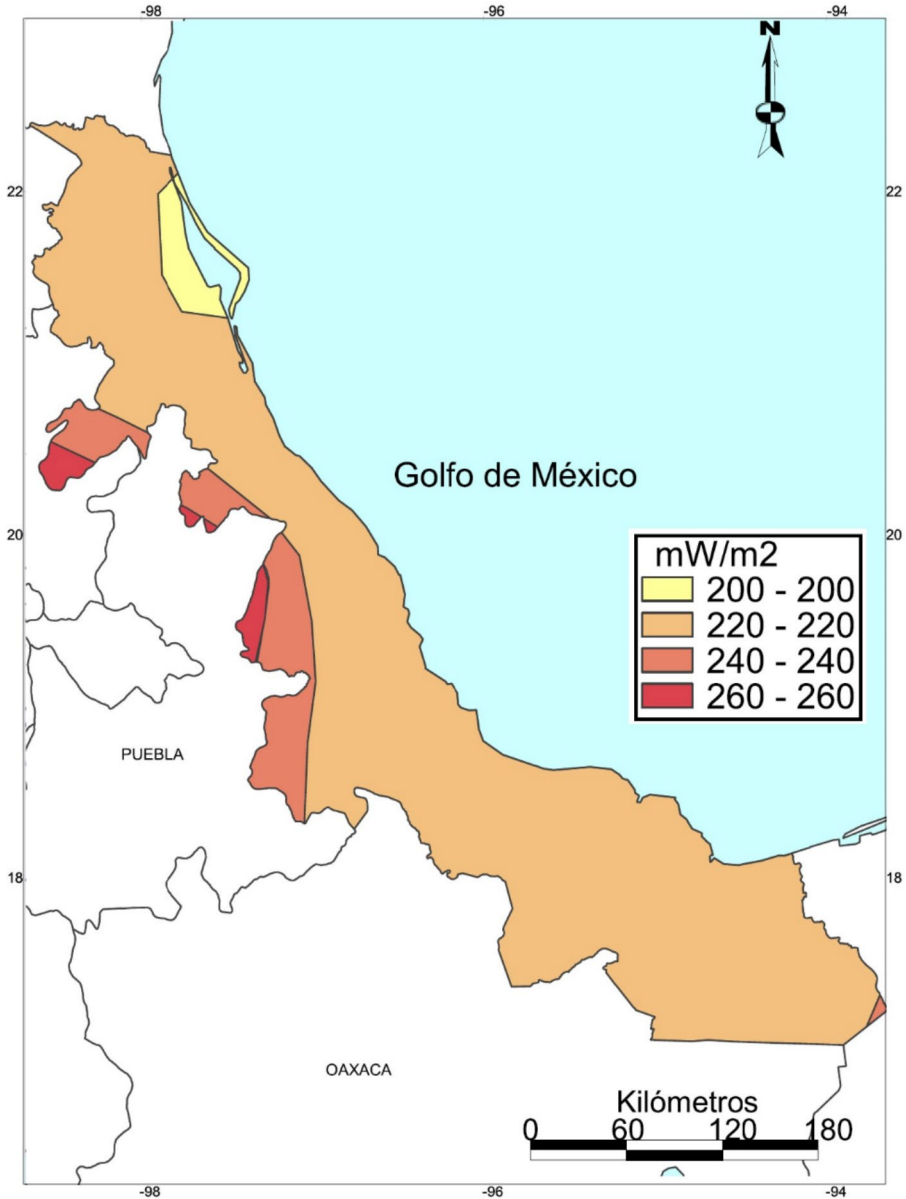
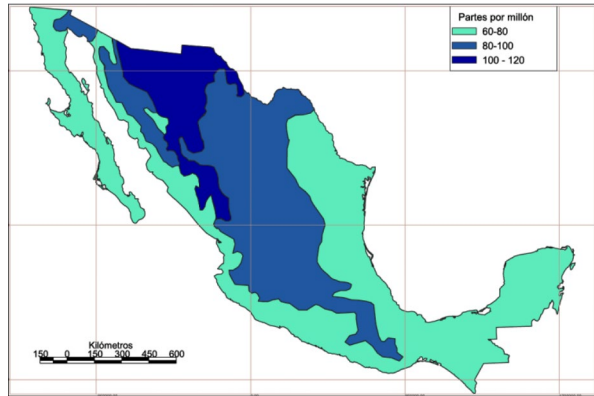


Fig. 3 Ultraviolet B radiation in Veracruz (1978–2003). Source: Own elaboration based on Valdés-Barrón et al., (2013)

of the earth's waters, since the isotopes in rainwater are concentrated as a function of latitude. The geographic patterns that allow locating heavy waters are plotted on maps called isoscapes (geological maps of isotope distribution, in this case of the deuterium isotope). However, although deuterium water has proven to be one of the

Fig. 4 Deuterium isoscape of pluvial origin in Mexico. Source: Own elaboration based on Hobson et al., (2012)



most important factors in achieving longevity and it is advisable to know its geographic distribution, very little is known about its natural distribution in Mexico.

The following map (Fig. 4) shows graphically the areas where deuterium water deposits are found and which, therefore, need to be protected from exogenous agents that alter the natural balance and affect the composition of the water through the creation of drinking water systems, because if such alterations occur it will be impossible to reverse them, which translates into unprecedented ecological damage with negative repercussions on the different populations.

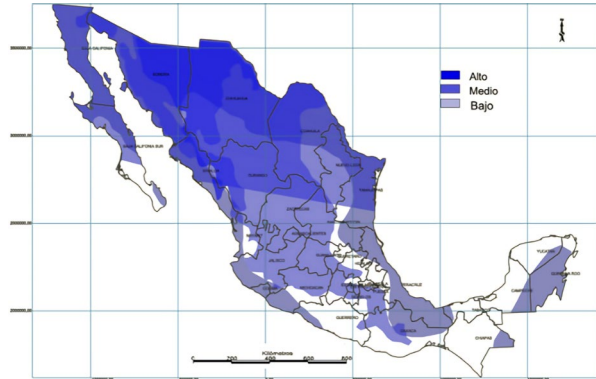
All this is synthesized below in Fig. 5, in which it can be seen that there are three zones with the most favorable geophysical and geochemical characteristics for natural longevity. In descending order, these zones are:

1. Northeastern Sinaloa, portions of western Durango, northwestern Chihuahua and northeastern Sonora.
2. Central Oaxaca, eastern Colima, western Durango, northwestern Sinaloa, northwestern Coahuila, southwestern and eastern Chihuahua, a large part of Sonora and northeastern Baja California Norte.
3. Veracruz, Michoacán, Jalisco, Aguascalientes, Zacatecas and south-central Nuevo León.

This means that, in natural terms, these states are the ones with the best geophysical and geochemical conditions for the cells of older adults to develop naturally and with the least possible deterioration.

It should be noted, for the moment, that the cartographic correlation of geophysical and geochemical characteristics helps to delimit isothermatically comparable geographic zones. In this case, in order to define the regions that are conducive to or have the greatest potential for longevity, a gerontological analysis is needed to help us understand why longevity is conducive in these areas, otherwise comparing regions with different longevity potential would lead to inadvertent biases. In other words, it should be taken into account that in the same state there are different conditions for natural longevity, as in the cases of San Luis Potosí, Hidalgo, Puebla or Baja California Sur. On the other hand, there are other states that, despite their large size, show homogeneity in terms of geophysical-chemical longevity, such as Veracruz, Mexico.

Fig. 5 Geomagnetic, deuterium and UVB potential for longevity.
Source: Own elaboration



Areas of cultural longevity

In order to analyze in detail the zones of cultural longevity, the town of Espinal was chosen, which belongs to the municipality of Naolinco, Veracruz, Mexico. Among its environmental characteristics we can mention that: it is located 980 m above sea level, that it has a warm humid climate with a maximum temperature of 25 degrees and a minimum of 12 degrees. According to the last census of 2020, it has 2,050 inhabitants of which 347 are people over 60 years of age, that is, 17% of the population, a figure that may not be so high, but that has a particularity, since most of them are elderly and in very good health.

It is worth noting that the generations of rural elderly who have settled in this area and have reached 60 years of age or older, have lived in conditions of marginalization and poverty, have always been working hard and have had to get used to enormous physical exertion from an early age. To this must be added the lack of institutional coverage and governmental support such as credits, assistance programs, medical services, little or no education, lack of alternatives and/or life expectations other than those generated by the production of sugar cane and coffee.

And, as if this were not enough, another problem to be added is the constant insecurity in the prices of their products and the frequent fragmentation of their farmland, among other adversities. In spite of these conditions, most of the elderly experience advanced ages and their economic, social and physical limitations are expressed in a serene manner, perhaps due to the diverse forms of religious life that they maintain, that make them grateful to life for being able to enjoy their family, with the necessary strength that life gives them to face the adversities that daily life presents them in the rural context. Or perhaps, as discovered (Jablonski, 2021) ultraviolet radiation plays an important role in the evolution of human health.

This led to the question: How are these contrasts observed between the economic, social and physical limitations generated by sugarcane and coffee production and the forms of satisfaction with life and health? How can these two parallel ways of looking at life be harmonized in the sugarcane and coffee old age?

It was observed in the fieldwork that having been a coffee or sugarcane producer generates differences in old age, regardless of whether one lives in the same context, one or the other will always have different problems and needs and, therefore, dif-

Fig. 6 Third grade informants in 1959 and who are now over 60 years of age. Source: Field work



ferent lifestyles with perceptible effects in old age, hence the need to recognize that aging requires not only a biomedical approach to combat cognitive decline, but also the need to recognize cultural and environmental factors as marked by Hinchliffe et al., (2018).

However, the interaction within the same social process puts these two lifestyles and conceptions in contact between adversity and satisfaction with life, especially with regard to care and health, religious life, and in the modification of the environment through agricultural production, as Sauer pointed out more than half a century ago (Lee, 1998).

This led to harmonize these two opposites in the life trajectories of the elderly by guiding the ethnographic work through in-depth interviews with twenty-five people³, trying to maintain homogeneity in the sample in terms of gender. All the informants belonged to a generation of graduates from the third year of primary school in the locality and are currently over 60 years old (Fig. 6). The ethical principles that guided this research adhered to the Declaration of Helsinki.

It is noteworthy that they all knew each other, which made it possible to corroborate the information provided by the informants and to weave a story from parallel narratives, whit dialogue through shared experiences. The information was systematized in an Excel table, in which the questions were placed in the first column and the informants' answers in the following columns, which allowed comparing the answers of several informants to the same question and finding differences, similarities and parallels between them.

One aspect that was observed is that the elderly, aware of their vulnerability, have established quite solid solidarity networks, which are strengthened by the smallness of the locality. An example of this is that, with a certain humor, older people greet each other at different times of the day or ask outside the houses in a loud voice: "How are you, Juana? I haven't seen you all day, are you dead yet?"

But what caused the most astonishment during the investigation was the constant reference to the water they consumed: heavy water from a spring to which they attrib-

³ All the interviews were carried out after the informed consent of the people, of whom, to maintain their moral integrity they are cited under pseudonyms, all of this following the institutional ethical principles that have guided the Center for Research and Higher Studies in Social Anthropology for 40 years.

Fig. 7 El Espinal spring, Naolinco, Veracruz. Source: field work



uted healing properties, remember the words of Melnyk, Szalacha and Megan (2018), regarding the physical characteristics of the environment and its role in the natural strengthening of health and well-being. This water had such a special place for the local inhabitants (Fig. 7), to the extent that they have refused to consume water from bottling companies, or drinking water, since according to them it is not natural. “The drinking water is only used for washing or watering”.

The importance of the spring water consumed by the inhabitants of Espinal is such that, from early in the morning, they go with demijohns to the northern part of the town to get their water, regardless of the fact that the spring is on private property. They fill their demijohns with the necessary amount for their consumption with the confidence that the water is clean and that it also protects them from disease (Fig. 8). Some of them, especially now that the COVID-19 pandemic is occurring, consider that the consumption of this water may be beneficial in combating the lethal disease.

As stated by Cavagna et al., (2021), despite the fact that even the majority of health professionals minimize the cultural and environmental elements, for the locals the spring has such a special place in the hearts of the inhabitants that they have even made it part of their cosmovision, to the extent that with their own resources they have built a small chapel to the Virgin of Guadalupe, which is a symbol that warns people not to damage the place. No invasive procedures are used to extract the water, only a hose is connected to the spring and leads to a fountain from where the pure water is taken directly. The local elders point out that many people from the capital and elsewhere come in their cars and take water to help their health; however, they do not see this as looting, but rather as another reason to take care of the water and ensure that the ecosystem is not damaged.

This could be confirmed from the field work, in which it was possible to document that the majority of the elderly did not complain of pain or illness and that, even at an

Fig. 8 Traditional water transport.
Source: field work



advanced age, they maintained the mental lucidity and physical strength necessary to face the demands of daily life in the countryside.

This does not imply that the inhabitants of Espinal do not have problems, because when talking about their daily chores, they commented that their health was compromised by activities related to planting and cutting coffee and sugar cane. Specifically, there was the case of an elderly woman who hurt herself carrying firewood. Some older people commented that they were prone to accidents such as insect or snake bites, falls, exposure to smoke and even sunstroke, among other mishaps.

Currently, the main economic activity of the people of Espinal is the production of sugarcane and coffee, although many of them comment that these have declined due to the constantly fluctuating prices, which has affected the economy of those engaged in these activities, to the extent that they have had to sell their crops, which, according to them, never seem to be enough to meet the requirements and impositions of intermediaries or companies that are dedicated to the purchase of their products. As a result, many of them had to diversify their economic activities and leave agriculture in the background. Some of them, those who had more physical strength, became bricklayers; others, those who had more economic resources, became merchants; some others were lucky enough to get a job in the tertiary sector of the capital, but the resources obtained were not enough. And so the countryside is being abandoned, since most of the young people dedicated themselves to study careers unrelated to their coffee and sugarcane legacy and set as their main goal to emigrate from the locality in search of jobs. As time went by, the labor field in the surrounding areas became saturated and the young people had to go to increasingly more distant places, such as the United States and Canada, which became viable alternatives to improve and maintain basic living conditions. Currently, in the population, 65% of the elderly are small landowners and 30% are ejidatarios and 5% are landless.

It is necessary to highlight that coffee and sugarcane never had any enmity in Espinal, which is due to the intervention of the now elders, who were able to combine these activities and allow their coexistence. Both sugarcane and coffee, each within its biological cycle, imposed times and rhythms to their activities. For example, coffee requires continuous work and sugar cane requires intermittent labor. Coffee is grown in the mountains, pastures or forests. Sugarcane requires extensive and flat land. In the sugar cane fields, work is done in the sunlight and with machetes. In

coffee, on the other hand, the work is done in the shade and mainly with the hoe and hands. The tasks of the coffee harvest are slow, joyful and family-oriented, while those of the sugar cane harvest always require speed, masculine strength and alcohol to be able to endure this task.

And so, in spite of the social and economic disadvantages, it is the coffee growers more than the sugar cane growers who, despite their age, are still seen in the fields performing various cleaning and maintenance tasks. The sugarcane farming tasks are more monotonous, while the coffee farming tasks are more varied because the family participates. Sugarcane as a crop does not allow or motivate the conservation of customs and traditions, because its agricultural activities are controlled by the technicians and engineers of the mill, and its social networks tend to be more horizontal; they are more interested in local politics, unions, retirements, pensions and administrative issues that are not always found in the locality. In the café, on the other hand, social networks are formed among equals and the social organization is based on the family with its own resources, not on an institution.

Perhaps it is for these reasons that coffee growers in Espinal are thought to be more laborious, more refined in their manners and are considered to be the richest, “those at the top” and the best prepared. The sugarcane growers, on the other hand, are poor people, mostly ejidatarios, they are the ones from “below,” their productive process makes them less laborious and more individualistic, and they age more quickly. The sugarcane growers, more than the coffee growers, are the ones who have more possibilities of dedicating themselves to other activities such as commerce or some other activity in the city, or they are the ones who have most resented the absence of a family member who has left in search of work “on the other side.”

This generates different lifestyles: on the one hand, a more interactive family and communal lifestyle, and on the other hand, a more homogeneous and stable lifestyle, but less interactive.

As can be observed, the elderly in this locality have had lifestyles that have been modifying in relation to several particular characteristics such as: their relationship with land ownership and its uses; the services and infrastructure that have been implemented in the locality; the frequent crises in the prices of their crops and regional politics; migration and institutional economic support through the various programs for the countryside and, especially, the role played by the elderly population.

Therefore, it can be pointed out after this anthropological ethnographic analysis, that although the heavy water found in the locality is not the only variable that influences the health and well-being of the elderly, the solid solidarity networks they have generated also play an important role, which are strengthened by the small size of the town of El Espinal and by their religious beliefs that fulfill their function of social cohesion very well. Despite the religious diversity that now exists not only in the town but also within the families themselves, where the parents may be Catholic and the children may belong to a Pentecostal group or take courses with Jehovah’s Witnesses, or even be Seventh Day Adventists, living together in a practical and harmonious way in the town.

Based on this analysis, it is possible to observe that it is not only important to take into consideration the natural variables, but also the socio-cultural aspects that allow these conditions to persist, since El Espinal would not be a zone of longevity if

people did not maintain peaceful lifestyles, if they did not take care of each other or if they did not respect the environment and preserve the deposits and springs where the heavy water that provides life emerges. Likewise, it can be pointed out that there would not be so many elderly people in good health if they did not dedicate themselves to activities that require physical effort and communal cooperation, such as sugar cane and coffee cultivation, which have resisted the agricultural crises that have hit the agricultural sector.

Conclusions

From a glolocal approach, an attempt was made to merge the two methodologies and the way in which longevity should be considered, that is, the geographical and anthropological perspectives were approached; the former served to territorialize and define certain conditions that favor longevity, the latter to penetrate into people's lifestyles and observe how these impact on whether or not they have an active and healthy old age. As can be seen, longevity is the result of the vertebration that older adults make with their environment, where, if the place is located in an area with favorable geographical characteristics for natural longevity and cultural practices promote healthy living, a favorable binomial is generated for older adults, as is observed in the case of the town of Espinal, where the longevity and health of its elderly inhabitants will be talked about at the state level.

It is thought that as long as the amount of UV radiation is not altered or increased and deuterium remains constant in the springs of the region, there will be favorable conditions for longevity, however, to this must be added the organization or reproduction of daily life with its most vital relationships, as this allows the elderly to adapt to the new environmental, social and economic relationships that culture and the environment impose on them. Only in this way, understanding the dynamism of the relationship between humanity and nature, will it be possible to have a longevity with a healthier and more peaceful life with greater and more significant satisfactions. On the contrary, to the extent that social actors do not participate, the precarious balance will be broken by increasing UV radiation due to global climate change, which will result in a strong deterioration of the main environmental and subsistence conditions of older adults who will experience a more arduous and difficult life, as well as less healthy, which will result in a reduction of their longevity and at the same time great challenges in terms of social security for the country.

Up to this point, the relationship between the environment, especially the sun's rays and water, and the aging process has been explained, but it should be noted that there are still processes of environmental deterioration, with their innumerable health problems, associated with industrialization and urbanization activities derived from an unsustainable civilization model, as well as the consequent modernization that has generated a severe crisis in various aspects that has made living conditions more difficult, especially in old age. However, we are aware that these challenges no longer require exclusively specialized sciences that dictate laws or maxims within the different fields of knowledge; rather, an interdisciplinary effort is required to establish diverse dialogues between reality that define human and environmental situations

and processes. Only in this way, recognizing the role of the context and people, will it be possible to understand how they impact each other and how positive changes can be achieved that will define the future starting from the present.

In other words, scientific activity should focus on showing and evidencing the different ways in which actions, conditions and situations define reality and in which better scenarios can be generated for a dignified, healthy and, above all, honorable life and longevity. In the same way, we must take into consideration eliminating the notion that advanced ages are situations that are alien to us, or that are distant in the trajectory of our life. It is necessary to project ourselves and see the future and the way in which we will live in the best possible way.

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