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Opinion

Consequences of Drought on Subjective Weel-Being, Social Capital and Health in Rural Communities

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Introduction

Relevance of the topic and characterization of the problem: Chile is a country vulnerable to climate change and the impact has been manifested, mainly, by water drought conditions, which in the course of the last decade has affected the supply of drinking water in productive agricultural areas, especially small farmers, ranchers and small mining [1]. In Chile the Water Codedefinesthat the waters are national goods of public use,but the extraction and restitution of waters can be carried out privately, as long as it does not harm the rights of third parties constituted over the same waters [2]. Between the agricultural and forest sector, they occupy the 80% of Chile's water footprint [1].

The climate change and drought are a phenomenon that in the interior valleys of Valparaiso affects with greater intensity the most social and economically vulnerable population [3-6]. The issues related to drought and its impact on health, subjective well-being, and social capital in rural communities. There is little national scientific evidence about the consequences of drought on the subjective well-being, health, social and productive capital of small farmers in rural communities in the Valparaiso Region, which has been declare a catastrophic drought zone for 7 consecutive years [3-6]. International evidence shows that changes in climatic parameters have strong impact on physical and mental health, well-being and quality of life of the population [7-9]. On the hand, adaptative behaviors and responses are associated with psycological and social influences which should be considered to facilitate the adaptation process [10]. A study carried out in Mexico concludes that the stregthening of social capital constitute an asset that reduces vulnerability to climate change in the territories [11]. On the other hand, Sustainable Development Goal N° 6 Clean Water and Basic Sanitation aims to improve access to safe drinking water and sanitation, and the sound management of freshwater ecosystems among local communities, and Goal N° 13 Climate Action aims to strengthen the capacity to adapt to the risks related to climate change, and incorporate measures in policies, strategies and plans in accordance with local realities [12].

Analysis of the State of the Art: The report of the Intergovernmental Panel on Climate Change indicates that there is enough evidence to affirm that drought is a phenomenon of irreversible consequences and expressions, affirming that the impacts are diverse in the environmental, economic, health and social systems [8]. The climatic change [8], is manifested with an increase of the sea level, sustained retreat of the glaciers, change in the rainy periods and changes in the temperature having as a consequence prolonged cycles of drought [3,13]. Climate change affects with greater intensity the most socially and economically vulnerable population, impacting the social and environmental determinants of health, such as clean air, drinking water, food and safe housing [3-5].Chile is a country very vulnerable to drought due to the effects of climate change (1). Studies have shown that by the end of the century an increase in temperature of 4°C is expected and,

in addition, by the year 2030 a decrease in precipitation of between 5% and 15% is projected, especially in the central-southern part of the country [1,14,15].

The Ministry of the Interior and Public Security (2019) extended for the seventh consecutive year the validity of the drought disaster area with the Decree M.O.P N°42.461 of 2019 where it declares areas of water scarcity in the Region of Valparaiso, because there is a series of indexes that allow to establish the severity of a drought in intensity and duration [6,16]. Due to the fact that drought is a threat to the survival of humanity, because it is a phenomenon with complex interrelationships with society. The United Nations (UN) recognizes the right to water as a fundamental human right and urged States to provide healthy, clean, accessible and affordable water and sanitation for all. Currently, social inequalities persist that make it difficult to exercise this right, such as spatial location, social structure and privatization regulations, among others [17]. Chile is the Latin American country with the best human development index, the lowest poverty rate and one of the highest per capita income levels in the region [18]. At the same time, it has one of the highest inequality indexes in Latin America and is the most unequal country in the Organization for Economic Cooperation and Development (OECD) [17,19]. This translates into profound inequities and disparities that are unjust, avoidable and unnecessary [20,21]. In areas affected by drought, there are persistent disadvantages suffered mainly by poor families such as: problems of social behaviour, functional instability, precariousness of their assets, deterioration of bonds of affection and solidarity and health inequalities [18,22,23]. Countries with high rates of inequality have to incorporate compensatory public policies as a response to poverty and social vulnerability and climate change [18]. Poverty and economic insecurity affect family mental health, producing psychological disorders, anxiety, and depression [24]. The scientific literature provides evidence on the influence that social and environmental determinants have on the state of individual and family health, as a substrate of various diseases that express regardless of the universality of access that people have to health systems [25,26].

It is known that health disparities and inequalities are the objective expression of the socioeconomic backwardness that individuals accumulate throughout their lives, which must be prevented with early intervention strategies whose intensity and exposure time vary according to the vulnerability gradient [22,23,27,28]. In health policy, it has been pointed out that changes are required in the models and processes of "how to do, with what and with whom", because scenarios with complex environmental problems are being faced, which are generating an increasing social vulnerability and flow for social and health services [29-32]. The study of community health promotion and prevention interventions that address social environments with adverse determinants is necessary to generate evidence on the influence of drought on health status, subjective well-being and social capital of people exposed to environmental adversity [33-35].

Climate change, adaptation and mitigation: There is international consensus on the effects of climate change as a threat to people's health and well-being [36]. To prevent the impacts of climate change, it is recommended to implement adaptation and mitigation measures with actions aimed at reducing and limiting greenhouse gas emissions and adaptation measures that reduce the vulnerability of the effects derived [37]. Within this order of ideas, it should be mentioned that the consequences of drought in underdeveloped or developing countries have a highly social character due to the lack of food, migration, reduction in welfare and quality of life. On the other hand, it has been observed that in times of drought the technological development is accelerated by the need to make the little available water yield better [38]. There is an opportunity to look for direct and indirect adaptation strategies to face the challenges related to make agricultural production more productive and, at the same time, more sustainable and, also, to undertake a corrective and coordinated intervention at local, national and international levels for the monitoring and surveillance of drought-related diseases, addressing prevention, education and public outreach [39,40]. Chile currently has a National Climate Change Adaptation Plan for the health sector that aims to strengthen the response by identifying and implementing short, medium and long-term measures to reduce the impact on health. In this plan, eight objectives and lines of action were proposed, such as strengthening institutions, strengthening human capital, research studies, promoting public health, providing emergency response, reducing vulnerability, and providing universal health care. There is no evidence of progress on this plan [41].

Climate change influences social determinants, therefore, WHO recommends that the health sector should be prepared to recognize, understand and assist the population in order to mitigate the impacts and facilitate adaptation to the unfavorable scenario in equitable conditions for all people. On the other hand, health personnel must be trained to identify and know the effect of climate change on the health of the population [3]. In relation to the exposed problem, in the country more than a decade ago that the territory between the regions of Coquimbo and La Araucanía have experienced a precipitation deficit close to 30%, exacerbating the water deficit through evaporation from lakes, reservoirs and crops. Due to its temporal persistence and spatial extension, this phenomenon has been called "mega-drought" [42]. Governmental institutions have responded to the phenomenon of mega-drought with multiple practices and strategies at national and local scales, in order to ensure the supply of drinking water for the population and

to improve the technological transfer to optimize water efficiency [42]. It has been verified that severe droughts have a slow onset and long duration with impacts on the economy, environment and health of the affected populations [43].

Drought and health: There are evidence that the burden of disease and death from environmental hazards will affect the most socially and economically vulnerable population, who are most at risk and, therefore, the resulting needs must be addressed in a timely manner [3]. The health problems produced by drought are associated with a decrease in the quality and quantity of water and food, poor air quality due to increased concentrations of combustion gases, fires, increased tropospheric ozone and airborne allergens mediated by increased average and extreme temperatures [41]. Consequently, societies exposed to water shortages have increased susceptibility to adverse impacts that can develop slowly, last for years, and accumulate as the event continues. People's health depends on the ability to prepare for and cope with scarcity adaptation hazards, which are difficult to quantify because they depend on the severity of the drought, access to water use, the intensity of the population's vulnerability, health system surveillance, infrastructure and the resources available to mitigate the impact [44,45]. From this perspective, it is vitally important to investigate its impact on human health and its implications for social welfare, the economy and food security, in order to understand its consequences primarily for the optimal survival and subsequent quality of life of the communities that suffer from it [39,46].

There are studies that demonstrate that the effects on health influence in diverse areas causing morbidity, mainly in the digestive, respiratory, cardiovascular, nervous and mental health systems. Diseases related to exposure to toxins, food safety and water stress stand out. There has also been an increase in injury rates and infectious diseases, including food, water and vector-borne diseases associated mainly with poverty [39]. Studies performed in Brazil, in the context of its history of droughts, confirm that the health impacts are mainly nutritional deficiencies, mental health problems, water and air quality problems [47]. Likewise, a study conducted in rural Australia on the mental health impact of severe drought has shown that the most affected were farmers and agricultural workers due to the elimination or reduction of the productivity of their land [48]. In relation to the previous idea, studies carried out in the United States indicate that the impacts of drought on the population are evidenced by the exacerbation of chronic diseases and effects on mental health as a consequence of the financial impact on the most vulnerable agricultural populations [48,49]. Similarly, in the United States, older people are especially vulnerable to all of the stressors associated with climate change. While there is growing evidence reporting on the adverse health effects of heat on older adults, research gaps persist for other climate-related risks such as drought [50]. As a result of a study carried out in China, it has been noted that the direct impact of droughts on the population has been on vulnerable older people, with health and social consequences mainly cardiovascular and respiratory diseases [51]. Other authors have pointed out that this situation is a challenge for public health services, so they propose to improve information activities on the assistance available for drought and to extend mental health services to the affected community [48,49].

Drought, subjective wellbeing and public policies: Globally, there is consensus that climate change will have a tremendous impact on the poor, however, there are few studies that relate vulnerability, exposure, sensitivity, adaptive capacity, quality of life, and subjective wellbeing [52]. The concept of subjective well-being corresponds to the account of the positive and negative perceptions that people have about their lives, corresponding to the psychosocial aspect of quality of life [53]. The subjective evaluation that the individual perceives of his social capital among which is the social support received associated to the amount of links or relations that he establishes with his social network, while the perceived social support is centered in the existence of significant relations and the subjective evaluation that provides emotional stability and is associated to a better quality of life [54]. Ryff operationalizes the concept of well-being in dimensions such as self-acceptance, autonomy, positive relationships with others, purpose in life, mastery of the environment, and personal growth [55]. A study in Australia revealed that people feel insecure about the productive future due to the drought, which has affected their life satisfaction [56]. A study in Chile on resilience to climate change showed that when efforts are made to build resilience as an ability or capacity to recover and adapt, the opportunity to transform, to reorganize and to improve universal equitable access to information and education is generated [57]. The direct association between socioeconomic status and subjective well-being has been confirmed. It has been suggested to elaborate indicators related to the evaluation of satisfaction with the advances in health, in order to know the perception of the users of health services in these contexts [53]. International evidence highlights that it is increasingly relevant to include the element of subjective wellbeing in the evaluation of public policies, because there is the conviction of integrating it due to the beneficial consequences and positive effects on other areas of people's lives such as creativity, the autoimmune system and productivity, among others [58]. According to international experiences where they related subjective wellbeing with public policies, they demonstrated that this can make a relevant difference at the moment of making decisions in the health area considering capacities that are not usually estimated, but rather are complemented with a new approach [58]. There are authors who indicate that it is possible to modify the way in which public policies are designed, implemented, executed and evaluated, in

order to integrate the capacities valued by people, placing the multiple dimensions of human well-being at the center [59].

Drought, social and productive capital: It is worth considering that there are gaps in the access to opportunities between those who lack resources and those who concentrate them, which causes the exclusion of a not lesser number of populations that is left aside and cannot generate assertive strategies to palliate the effects of climate change and drought [60]. In a study conducted in Cordoba, Argentina, where they analyzed the vulnerability of farmers to drought and the strategy of adoption of mechanized irrigation, the findings indicated that this technology has a differentiating effect on vulnerability as it tends to reproduce inequality among farmers, because there are substantial differences with the possession of physical capital (possession of land, productive surface, economic and material goods) and environmental capital (resources such as soil, air, water or animal and plant species). Thus, those who possess these capitals are in a position of less vulnerability [61]. Another study, on the vulnerability of the rural population to possible biophysical impacts produced by droughts, frosts and forest fires, have revealed that education and information is the most significant factor in vulnerability, followed by economic income [62].

The consequences of drought on the social and productive capital of small farmers are a permanent concern of the Ministry of Agriculture of Chile, which provides them with a decentralized service that aims to support the economic, social and technological development of small farmers and peasants [63]. Currently in Chile, the management of water resources recognizes various factors that are causing an overexploitation of water, by the extraction of natural sources in quantities greater than what has been defined as available, caused by the over-granting on behalf of user organizations that administer the rights. In addition to the above, there is illegal extraction of water, constituting a major problem in sectors where there is scarcity and serious environmental damage [40]. According to the analysis on the development of the Water Radiography, a study carried out by national and international experts determined that from Los Vilos to Aysén there is an extensive meteorological drought of territories with the lack of quantity and quality of available water and possible social, environmental and/or economic damage that, mainly in the agricultural and energy sector present greater vulnerability. Added to the above, groundwater is manifested by the decrease of glaciers [64].

The average availability of cultivated land per capita in low-income countries is less than half that of high-income countries, and the quality of land for agriculture is lower. Furthermore, the lack of water affects ecosystems, reducing food supplies, impairs the development of agriculture and livestock, thus causing damage to productive capital, the subjective well-being of the community and its recreational and cultural heritage values, where poor farmers living in low-income countries are the most vulnerable and less able to adapt to these changes [65,66]. In the context of social equity in the agricultural sector, the Chilean state has set the challenge of optimizing the supply of drinking water in semi-concentrated rural communities, which will lead to an improvement in the quality of life of 540 rural communities. This challenge aims to improve the efficiency of water use by increasing irrigation technology and implementing water storage works [40].

Finally, in relation to the literature reviewed, some questions arise to answer: What consequences does drought have on the subjective well-being and health of small farmers in rural communities? What implications has the drought had on the social and productive capital of small farmers in terms of: access to water for irrigation and consumption? How have small farmers been supported by the social actors implementing the Health Sector Climate Change Adaptation Plan?

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Conflict of interest

There is no conflict of interest.

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