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Saúde e Pesquisa

Architecture and health promotion in the environment of single-family residences for the elderly

Arquitetura e promoção da saúde na ambientação de residências unifamiliares para idosos

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ABSTRACT
The objective of the present study is to provide subsidies for the architecture of healthy environments for the implementation of the National Health Policy for the Elderly in the state of Mato Grosso, more precisely in the city of Cuiabá. The data was collected online at the Health and Housing Secretariat, IT department of the Brazilian Unified Health System, Brazilian Institute of Geography and Statistics, and official websites of the municipality. The data obtained show that the ruling legislation does not cover specific projects for the elderly population. Therefore, the capital of the state of Mato Grosso demonstrates that it is not prepared for the growing elderly population in the municipality, especially when it relates to architecture as an element of health promotion.

Keywords: Elderly. Home. Quality of life. Health promotion.

RESUMO
O objetivo deste estudo é fornecer subsídios à reflexão do papel da arquitetura de ambientes saudáveis para a implantação da Política Nacional de Saúde da Pessoa Idosa no município de Cuiabá-MT, Brasil. Os dados foram coletados de forma *online* no banco de dados abertos da Secretaria de Saúde e de Habitação, Departamento de Informática do Sistema Único de Saúde (SUS), Instituto Brasileiro de Geografia e Estatística (IBGE), e *sites* oficiais do município. Os resultados demostram que as legislações em vigor no município em questão não abrangem projetos específicos para a população de idosos. Desse modo, parece não estar preparado para lidar com a crescente população de idosos, especialmente no que diz respeito à arquitetura como elemento de promoção da saúde.

Palavras-chave: Idoso. Moradia. Qualidade de vida. Promoção da saúde.

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INTRODUCTION

The interest and care to research the human aging process has been gaining notoriety as the world population gets older, usually associated with the demand for housing in a city or country[1]. Studies show that in countries like Brazil there has been a rapid growth of the population over 60 years old[1,2] and, with this new reality, the idea of a country of the youth belongs to the past[3].

Due to the extension of the urban grid in the cities, following the population development, the previously designed spaces are not properly suitable for the human necessities that comprise the Brazilian reality. Although the architects and urbanists develop new constructive methodologies year by year, the delay of the action of the public power results in projects and public constructions with difficulties to answer the demands because of the problems related to space and population[4].

In Brazil, it´s possible to notice an elderly population increase of 500% in the last 40 years, passing from 3 million, in 1960 to 7 million, in 1975, and 14 million, in 2002. These numbers demonstrate that the country has been following the world's tendencies, occupying the 4º place as the country with the biggest elderly population in Latin America. According to the Brazilian Institute of Geography and Statistics, it´s projected that this population will surpass 13,8%, in 2020, to 33,7%, in 2060[5].

Along with the changing demographic pyramid, in Brazil, life expectancies grow. Hence, the increase in the elderly population generates new challenges for health management, including offering alternatives to provide healthy and long lives to the senior population. The interdependency between the public policy formulation and implementation suffers many dissociations and this fragmentation manifests a complexity that involves a necessity of cooperation in the care of the elderly[4].

In different study subjects, there are more improvements in the studies about human aging each time. Concerning the public policies aimed at the quality of life of the old aged, for example, the National Health Promotion Policy has as one of its objectives to "promote the quality of life and reduce vulnerability and risks of health related to its determinants and conditions – ways of living, conditions of work, housing, environment(…)"[6]. That being the case, if treated as a topic of relevance, the aging process addresses both the health of the individual and society[7].

The public policies of the health ministry and the World Health Organization aimed at the active aging process have been advancing, especially the ones focused on the health promotion of the elderly. Of all the characteristics, related to context, which can influence individual and collective behavior, there is the environment and architecture[8]. Although everyone has their particularities, their home still is the

location where the elder person spends a great part of her/his time, performing their daily and social activities.

Households and environments with good architectural quality can be of service to the prevention of accidents, providing better agility and autonomy in the daily routine of the old aged, better impact in the reduction of damage and illnesses resulting from accidents, in addition to economic and social costs[9]. Thus, habitation can be visualized as a provider and maintainer of health as well as influences the daily life of the elderly[10].

The Elder constitution highlights the importance of the maintenance of the rights and health promotion of the elderly, towards the promotion of adequate spaces for the elder population that provide a healthy and dignifying living[11]. The understanding of this topic in question permeates the understanding of the objectives of the Sustainable Development Goals – SDG, especially, the number 3 which consists of "Good Health and well-being" [12,13].

Due to the need for housing for the elderly, this study focuses on the validation of the principles of integrity, universality, and equity between the individuals, through the creation and recreation of spaces such as housing for the elderly[14], firstly, from the perspective of health promotion and, secondly, through the eyes of the architect in his professional practice. It is highlighted, here, that the architect must plan spaces that meet the needs of their users[15].

Therefore, the objective is to provide subsidies to the reflection on the role of the architecture of healthy environments for the implementation of the National Health Policy of the Elder Person in the municipality of Cuiabá in the state of Mato Grosso, Brazil.

METHODOLOGY

The research characterizes as a study of an applied nature, with a qualitative approach of many documents, with exploratory methodological objectives. The period of the data collection, to support the discussion on the promotion of health for the elderly in architecture occurred between March 2019 and December 2020. Information was also collected, on open data from the municipality of Cuiabá, concerning the necessity and demand of architectural projects for new residential spaces, as well as the suitability of existing spaces, in addition to the number of elderly people in shelters and queues.

The data from the housing of the elderly and habitation projects were collected through the open data of the websites 1) Secretary of Housing and Land Regulation – SHRF; 2) Municipal Secretary of Environment and Sustainable Urban Development – SMADES; 3) Health Department, and 4) Housing Department of the municipality of Cuiabá. Other data that were researched are related to the use and managing of urban spaces, comparative data, and demographic census, all available

on the DATASUS and IBGE, related to the population of Cuiabá, Mato Grosso.

The following order was used to research the available documents on the secretary of Cuiabá: Location of the research material; preparation of the material for the analysis with classification and numbering of each document; production of documental files with information of all documents used, their relevant content and where they were found.

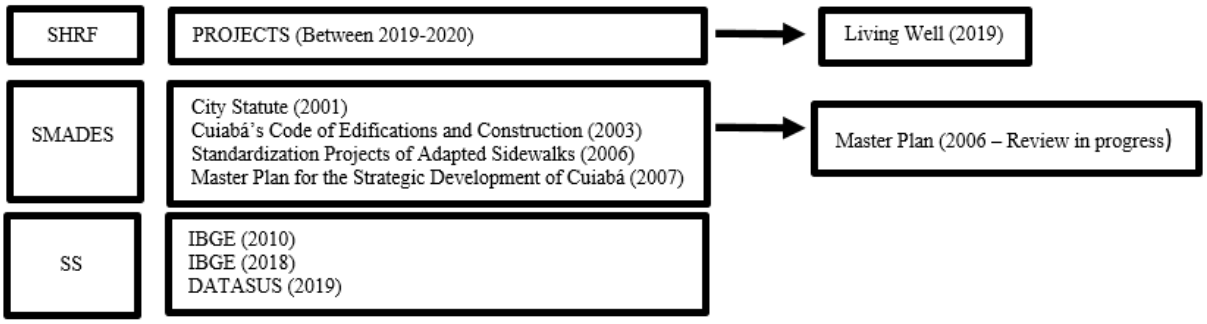

Figure 1. Secretary map / Collected Documents
Source: Prepared by the authors.

The data obtained were analyzed using Content Analysis, by Lawrence Bardin[16]. The steps of Bardin's content analysis involve pre-analysis, material exploration, and data treatment, all described in board 1.

Board 1. Steps for the Content Analysis

Pre-analysis	*Material Exploration*	*Data Treatment*
• Set goals; • Develop the work plan; • Identify data sources; • Devise hypotheses to be confirmed or rejected at the end of the study.	• Locate and obtain research material; • Prepare the material for analysis – classification, and numbering of each unit, according to the criteria defined in the project; • Creation of document files – gather information about the document, such as the relevant content and where it can be found.	• Analyse each unit, • Making inferences – comparing with demonstrably true information, • Perform the interpretation of analyzes and conclusions.

Source: Bardin, 2016.

RESULTS AND DISCUSSIONS

On the last populational census of Cuiabá, the capital city had a population of 551.098 inhabitants. Of this total, 28.492 were elderly people over 60 years old, which totals 5,17% of the individuals in the city. Therefore, it is possible to consider that, in 2030, the capital will have more than 15% of its population over 60 years of age. This means that from the current 28.492 elderly, the city will reach, in 2030, a little bit more than 82 thousand elders, demanding, at least, 3 times its current residential units capacity, this is if its

current capacity is being able to suppress its current population demand[17].

The webpage of the Secretary of Housing and Land Regulation (SHRF), deals with the aspect of housing for all the population of the city of Cuiabá, it was not possible to raise any significant data that are aimed at the housing situation of the elder population, may it be independent senior or that live with their family. Nonetheless, the project "Bem Morar", in translation "Living Well", was identified, it is the result of the partnership between the Federal University of Mato Grosso (UFMT) and the SHRF[18]. The project tried to benefit more elderly people than young families and concerned itself with architectural aspects of housing, like illumination, ventilation unevenness, and sanitation.

Although the aforementioned project had a social nature, it also, had partnerships with local businesses and donations from residents of the neighborhood. The students of the architecture and urbanism courses at UFMT participated in volunteer labor. However, the project benefited only a small part of the poor population of the Planalto neighborhood in Cuiabá, ending in early 2020, because of the pandemic outbreak that began in Brazil. This project was focused on the quality of life of the individuals and their families[18].

On the page of the Municipal Secretariat for the Environment and Sustainable Urban Development (SMADES), it was possible to verify legislation relevant to the management of urban space and the urban evolution of the municipality. Although several documents were available, only a few were examined in this study, among them, the *City Statute*, Law 10,257 of 2001, which aims at the sustainability of urban space, whether for housing or city management. This law sought to promote the equal distribution of improvements and benefits to any individual residing in the municipality, namely: "securing the right to sustainable cities, understood as the right to land, housing, environmental sanitation, urban infrastructure, transport, and public services, work, and leisure, for present and future generations" [19]. As a document that deals with the urban area, the Statute does not focus on the needs of any specific age group, or even on constructive techniques that may improve the quality of life or the promotion of health for the elderly, in terms of home.

The concern of the city hall of the city of Cuiabá in promoting quality of life for the inhabitants can be observed in projects such as the "Standardization of Adapted Sidewalks" [20], aimed at individuals with limited mobility, implemented in 2006 and operating until the present day. Even Though it was a project for public roads, it ended up favoring access to the residences implemented in the municipality. In the case of Praça Bispo Dom José, located in the city center, whose paving, although simple and low cost, focused on both the passerby and the impact on the environment since the material used comes from the recycling of construction materials.

The renovations in public parks in the city, for the generation of new spaces for leisure, can be observed in the example of Parque das Águas, located in the Paiaguás neighborhood[21]. The park, a tourist attraction in the municipality, is, at the same time, a park and nature reserve, housing wild animals that share space with the population that visits it.

Another document that was crucial for this research was the city's *Master Plan*, which aimed to zone the city through useful spaces for society, covering topics such as housing to promote quality of life. The plan focuses on housing and promoting the residents' quality of life, but does not include construction methods and materials to be used for this purpose[22]. However, it did not indicate construction materials to be used in the dwellings, only pointing out their concern with natural lighting and ventilation, vertical and horizontal circulation spaces, unevenness, and permeable areas. Although the city's Master Plan has been under review since 2016, its term expired at the end of 2020, as it was valid for 10 years, and the city is still waiting for the publication of a new Master Plan[22].

It is possible to notice, by the legislation listed on the SMADES website, the intention, at least related to the documents, of clarity about the content of the documents presented there. However, it was possible to notice the lack of the document Global age-friendly cities: a guide[7]. This document created by the WHO is focused on individuals over 60 years of age, so it should have been considered by all Brazilian municipalities that wish to become elderly-friendly cities.

The problems mentioned in that guide can be found in any housing not prepared for the elderly.

> [...] A blueprint whose layout of rooms prevents mobility is a problem […], […] stair and unleveled floors specifically designed for seniors. […] the need for corridors and doors that are wide enough for a wheelchair to pass through. […] the dwellings are not adequately equipped for local weather conditions. […] the roof design of new homes makes them warmer internally. [7]

Although there are some obstacles related to construction that can be easily identified in Brazilian housing, an adapted renovation can also be easily executed and implemented in projects for new housing. The normative document NBR 9050 on Accessibility to Buildings, Furniture, Spaces, and Urban Equipment[23] is mandatory for every professional in the civil construction profession, engineers, architects, urban planners, or designs, within the Brazilian territory. Although these measures to improve housing for the elderly are mentioned in several Brazilian laws or regulations, they are also applicable to individuals with limited mobility, whether elderly or not. The adjustments must be applied to the architecture of housing and any property in the project planning, according to NBR 9050, and such improvements would be a cheap alternative

to promoting the health of the elderly, if they were implemented, avoiding additional adaptation costs, since aimed at autonomy on the part of the occupants of the property.

The housing adaptations, visible in the Age-Friendly City Guide, avoid future problems for the elderly, such as domestic accidents. Poorly lit environments or environments with uneven floors, with no improvements to air quality, because they do not use natural ventilation, can lead to heating. Still, unplanned furniture influences the increase of ergonomic problems of the elderly, as well as the obstruction of internal circulation and the misuse of spaces. All these conditions significantly increase the risk to the health of the elderly, which can be foreseen from the beginning of the construction of the property.

Associated with health, the data presented in Table 1 show the growing projection of life expectancy and the increase in the number of elderly people in the state of Mato Grosso.

Table 1. Population projection of the state of Mato Grosso, age group-year

	2010	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2025**	**2030**
Total	**3.106,513**	**3.314.540**	**3.356.979**	**3.398.791**	**3.441.998**	**3.484.466**	**3.526.220**	**3.722.274**	**3.893.821**
0-4	266.608	268.296	273.492	278.139	282.700	284.071	283.130	280.712	271.683
5-9	269.588	267.730	262.805	260.762	261.258	263.809	269.338	284.090	281.604
10-14	285.290	269.213	271.163	271.727	271.355	270.750	267.403	269.046	283.809
15-19	288.108	284.630	280.729	275.701	271.273	268.611	268.705	266.956	268.651
20-24	289.771	289.534	289.134	288.948	288.663	287.782	286.015	270.116	268.245
25-29	287.890	293.864	294.204	294.281	294.147	293.845	293.399	289.613	273.502
30-34	269.150	289.892	292.272	293.787	294.665	295.241	295.743	295.184	291.266
35-39	238.568	268.115	273.189	277.866	282.061	285.720	288.797	294.733	294.286
40-44	216.142	236.118	241.494	247.531	253.892	260.013	265.548	286.213	292.301
45-49	187.025	212.076	216.118	219.766	223.344	227.356	232.085	261.367	282.023
50-54	150.713	181.913	187.455	192.743	197.739	202.413	206.765	226.741	255.760
55-59	114.898	144.965	151.241	157.538	163.761	169.764	175.476	199.958	219.769
60-64	84.516	108.345	113.842	119.513	125.334	131.269	137.271	166.765	190.632
65-69	61.260	77.249	81.226	85.471	89.968	94.714	99.697	127.019	155.031
70-74	43.725	53.229	55.701	58.390	61.309	64.465	67.859	88.357	113.372
75-79	27.202	35.164	36.694	38.213	39.796	41.533	43.484	56.182	73.945
80-84	15.248	19.798	20.950	22.221	23.542	24.844	26.085	32.808	43.013
85-89	6.794	9.317	9.867	10.438	11.050	11.719	12.452	16.806	21.604
90+	4.017	5.092	5.403	5.756	6.141	6.547	6.968	9.608	13.325

Source: Mato Grosso state government, 2018.

It is visible that there will be an estimated growth in the elderly population between the years 2010 and 2030 in the state of Mato Grosso. In this sense, the public sector should be responsible for speeding up the fulfillment of the housing needs of this age group. However, even with this growth, the capital is still unprepared and with no record of single-family residential projects, aimed at this age group, so far.

The state of Mato Grosso had an elderly populational growth of 393,816 in 2020. If compared to the 2010 Demographic Census, which had 242,762 elderly people, there was a growth of 61.65% in 10 years (151,054 elderly people). This growth overloaded nursing homes for old aged people in Mato Grosso, especially those located in the capital Cuiabá[25]. The municipality had 8 residential units for elderly care, two of which were deactivated, three public and three private, during the survey process of this study, the latter had monthly fees ranging from 3 to 5 thousand reais, and all with capacities from 30 to 80 individuals per unit[26,27,28].

With the growing demand for homes to accommodate the elderly in Cuiabá, the current Master Plan, developed by the Instituto de Planejamento e Desenvolvimento Urbano (Institute of Urban Planning and Development) [22], no longer serves as a guideline for the good development of the residential urban grid, even if the right to a safe and secure home that provides for the improvement and maintenance of health is guaranteed by the Estatuto do Idoso (Elderly Statute) [11]. However, suitable houses for these individuals are not yet available in the capital.

Private and public residential condominiums are constantly growing in the various cities and states of the Federative Republic of Brazil. Among the residential condominiums for the elderly, the Cidade Nova (New City) Condominium, located in the municipality of Maringá in the state of Paraná, was taken as an example for this study. Built on the year of 2010, the condominium was created to meet the accessibility needs of residents. It has access ramps, wide doors, support bars, both in external and internal spaces, a gym designed for the elderly, a common patio, as well as spaces for a vegetable garden with medicinal plants. With a capacity of 40 individual apartments of 47 square meters each, all are adapted to provide comfort and safety to residents, giving them a decent quality of life[29].

Other examples are the condominiums for the elderly, in the cities of Prudentópolis and Irati, both in the countryside of the state of Paraná, which are being built exclusively for the elderly, meeting a demand for 40 residences in each municipality. Their distinction from other condominiums is that they focus on the care of elderly individuals, this project involves private and public partnerships, preparing to meet the needs of accessibility in different situations, as well as spaces for coexistence

and leisure, granting health promotion and quality of life for the elderly[30].

ARCHITECTURE, AND HEALTH PROMOTION IN CUIABÁ AS AN ELDERLY-FRIENDLY CITY?

The current Master Plan of Cuiabá defines and classifies the urban space of the municipality into three large groups or areas, commercial, mixed, and residential, and, in such a way, indicate spaces for the construction of housing[22]. Residential areas include spaces for multi and single-family housing, owned by the public or private sector, while in mixed areas there is a definition of spaces intended for housing and commerce, in addition to commercial housing, such as nursing homes, hotels, inns, and other dwellings used for temporary housing.

In the Plano Diretor de Desenvolvimento Estratégico de Cuiabá (Master Plan for strategic Development of Cuiabá) (150th Complementary Law of January 2007), it is possible to highlight several principles identified by the municipal public power that need to be considered in buildings that still do not exist, as read in the 5 th article:

> I – the promotion of the population's quality of life; [...] IV – right to the City for all, including the right to urban land, housing, environmental sanitation, urban infrastructure, transport, public services, work, and leisure; [...] VII – universal Right to decent housing; VIII – universalization of mobility and accessibility; [...][31].

This Master Plan is governed by the principles mentioned in the 26th article of the aforementioned law, in which some specific guidelines for strategic development related to the Elderly Pearson are cited, item II: "promote at all levels of Public Administration activities aimed at defending the rights of the elderly, […]". This article makes clear the importance of keeping the rights of the elderly always present in programs developed for society[21].

The Cuiabá Construction and Buildings Code (Complementary Law number 102 of December 2003) presents guidelines that directly influence housing and its structure. In this law, the importance of ventilation and natural lighting is characterized, highlighting the minimum opening for frames for each type of environment, and guiding the minimum ceiling height limit of residential spaces. The law explores distinct types of calculations for different situations of spaces for circulation, both horizontally and vertically, walkways, and even garages in homes. The code addresses the importance of proper planning of these architectural elements in housing to promote the quality of life of its inhabitants, regardless of gender and age[32].

Guiding in these eminently structural areas, the 3rd article, XXXII of the Cuiabá Construction and Buildings Code, deals with the basic spaces for housing as a space to be more environmentally sustainable, not worrying about the type of

resident or their specificities, making the dwellings standardized, although with environments that can provide a decent quality of life for their occupants[32].

Nursing homes, which already existed at the time of the implementation of the document, had to adapt to the new legislation, and future homes for this public must follow these new guidelines. Therefore, in the light of new construction techniques, which may lead to new modifications contemplated by legislation, as well as the emergence of discoveries focused on health and well-being.

To truly become an "age-friendly city", Cuiabá will need the creation of new projects that focus on the elderly residing in the municipality, since its regulations in force, so far, do not exclusively contemplate this group. Therefore, projects that are designed for the well-being and quality of life of the elderly, with sustainable housing and suitable for health promotion, are urgent for the municipality.

The creation of housing models that promote quality of life for the elderly, providing good ventilation and lighting, free from obstacles and with good circulation, can be used by other groups of individuals, such as those with mobility restrictions or who have disabling health problems.

Houses that are not designed for elderly individuals, but are adapted to them, tend to have a suppression in their structures to meet the demand of their usesage[33]. Thus, for the dwelling to be harmonious, to the point of promoting the health of the individual who will enjoy its facilities, it must respect the demands required by its occupants. That is, houses should be designed to meet people's needs, and not the opposite, in which users must adapt to buildings.

The *Healthy Building* movement, created in the USA, uses the concepts suggested by the WHO. Although these concepts seem new, they have been discussed for some time, namely: high ceilings, good lighting, good ventilation, accessible horizontal and vertical circulation, unobstructed floors and plans, and accessible furniture. Such concepts make the movement well regarded in the interdisciplinary area of health promotion and gained strength in civil construction, due to the COVID-19 pandemic that afflicts society[34].

Another delicate situation that the pandemic state brought to the discussion concerns the social isolation of the elderly and the need for the elderly to remain in their homes. The concern to meet the daily needs of these individuals, may they be accessibility, health, or safety, has only increased since 2019.

Although the Bem Morar (Living Well) project, created in partnership between the Public Power and an educational institution in Cuiabá, has generated satisfactory results for the community of the Planalto Neighborhood in Cuiabá, it was also possible to glimpse the interest of local businesses. With this, the partnership between public power and the private sector can benefit the elderly,

through housing projects that meet their needs for condominiums or nursing homes.

This interaction between civil construction and health could evolve, based on the concept of promoting the health of the elderly, as recommended by the Estatuto do Idoso (Elderly Statute). As an example, the municipality of Marcelândia, in the countryside of Mato Grosso, has advanced in the approval of the Bill, which aims, exclusively, to promote quality of life for the elderly, with the creation of Municipal Law number 1.043 of 03/23/2021 – Fundo Municipal do Idoso e outras Providências (Municipal fund for the Elderly and other Measures), recently approved[35].

Although the study has demonstrated the concern with health promotion, some documents analyzed are limited to an urban context, especially when approaching accessibility as means of integrating individuals with some type of mobility restriction; others addressed the sustainability of the city (sanitation, landscaping, furniture, river water collection, among others). Thus, creating healthier spaces for the general population ended up serving the elderly, which does not exclude the responsibility of new public policies specifically aimed at this age group.

Despite the restrictions covering the norms related to the subject in question, it was possible to notice the existence, although incipient, of some partnership projects between professionals in the civil construction, health, and public authorities to meet the demand of the existing elderly. It is worth noting that, by appropriating the concept of *The Healthy Buildings* movement created recently, architects are beginning to see buildings aimed at the elderly with different eyes. Even though this movement is still very recent, it urgently needs to be inserted into the school curricula of Brazilian higher education institutions.

CONCLUSION

The study showed that the municipality of Cuiabá urgently needs to establish a new Master Plan that better explains the need for homes exclusively for the elderly, based on the precepts of the WHO Global Guide: Elderly Friendly City.

Although there is a great demand for affordable housing for the elderly in the city of Cuiabá and, by law, the government must serve its citizens, it is worth noting that this demand could be extended to the private sector through partnerships. In this way, this demand could be met through projects or incentives, concerning the specific needs of the elderly public regarding adaptations or the creation of single or multifamily homes.

Thus, by way of conclusion, it is considered that this study fostered a more accurate look at accessibility in architecture as an incentive for the quality of life of the elderly. It also allowed for interdisciplinary articulation on ways to promote the health of the elderly. Therefore, as practical implications of the study, we suggest that surveys about the architectural and *layout* needs for houses designed and built for the

elderly should be made, as part of the actions for health promotion in the target municipality of the research.

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