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Chapter

Mobile Housing as an Initial Proposal to Manage Informal Territories Exposed to Disaster Risks

Yasna Contreras and Beatriz Seguel

Abstract

From the study of informal territories, mobile housing is presented as an initial proposal to manage heterogeneous precarious settlements located in the north of Chile. More than a housing typology with certain construction characteristics, mobile housing contributes to a set of arguments that question housing policies and governmental reactions to urban informality, and its proximity to multiple human and physical hazards. In terms of management, the exposure of informal territories to numerous disaster risks has been a controversial aspect for local and central authorities, where the main actions have focused on eviction without temporary housing solutions, or the construction of supposed transitory neighborhoods, which are configured as territories of permanence. For this reason, mobile housing also raises the need to recognize that any existing and future housing must seek to reduce disaster risks, and must use materials according to the climatic, cultural, and temporal conditions of each territory.

Keywords: informal territories, urban informality, housing policy, disaster risk, disaster risk reduction

1. Introduction

Chilean housing policy has been known as a successful program [1]. Throughout its history, it has positioned itself as a solution to urban informality, being the main problem identified in Chilean cities since the beginning of the twentieth century [2]. From that moment on, the state was characterized by acting reactively to reduce the housing deficit and, in the same way, resolved the precarious living conditions of the people [2, 3]. However, contrary to the housing scheme developed through the first decades of the twentieth century, with the beginning of the military dictatorship in 1973, there was a turn toward a state with neoliberal foundations that understands housing as a commodity and a financial asset [4, 5]. This allowed privatization of social housing production and a consecutive promotion of housing solutions on the private market, meanwhile the state subsidizes the whole process and is responsible for selecting possible inhabitants [6, 7].

Despite this, the current construction of social housing has been reduced, while private housing units have tended to become more expensive, leading to a housing deficit calculated at around 641,000 units in 2022 [8, 9]. Its calculation includes the existence of housing in unlivable structural conditions, overcrowded homes, homeless people, and the growth of informal settlements [9]. The Chilean north is where the construction of informal settlements has had an accelerated and significant growth, concentrating 27% of settlements nationwide [10]. In this region, a complex contradiction is observed, since it is an extractive mining territory that contributes considerably to the economic growth of Chile and its gross domestic product [11]. Mining in connection with unregulated urban planning has promoted unequal and segregated cities, especially reflected in the value of land and access to housing for its population [12, 13]. This is explained by the usual mobility of mining workers, whose origin from different parts of the country has driven processes of urban expansion due to real estate speculation [14, 15]. An example of this is the consolidated construction of high-standard housing in the most expensive areas of cities versus the emergence of informal territories, which includes the informal rental and sublease market in central spaces, in addition to informal settlements [12, 16, 17].

In this context, nearly 22,800 families have taken the action of occupying vacant land for the purpose of self-building homes in northern Chile [10]. Among them, there is Chilean population and immigrants from the Latin American and Caribbean region, who settle in peripheral areas within the cities. Although the informal territories can settle in any sector of the cities, their location in disaster-risk areas is recurrent [18, 19]. However, its informality condition has resulted in authorities excluding them from socio-natural disaster prevention programs, leading to an endless accumulation of exposure on its inhabitants [20, 21]. Bringing housing to the center of the disaster debate as reference [19] suggests, we propose mobile housing as an initial proposal to reduce disaster risks that affect informal territories, contributing with suggestions that go beyond the idea of just evicting. More than a housing typology with certain construction characteristics, mobile housing contributes with a set of arguments that question housing policies, governmental reaction to urban informality, and its view on people's residential trajectories. This proposal is based on long-term development of mixed methodologies, started in 2014, that has allowed us a comprehensive understanding of access to housing. It includes the analysis of quantitative data, such as demography, housing, overcrowding, land prices, purchase and sale prices of homes, and rental and sublet prices. Also includes the application of qualitative methods, such as 200 in-depth interviews with residents of the northern cities of Arica, Iquique, Alto Hospicio, Antofagasta, Calama, and San Pedro de Atacama, the development of housing evaluation sheets designed to investigate the architectonic background of informal housing, and the development of meetings and workshops with communities living in informal settlements to learn about their trajectories, views, and opinions.

2. Informal territories and Chilean housing policies

In Ref. [17] we define informal territories as places where different logics of access to land and housing coexist, recognizing a continuous interaction between the formal/informal and legal/illegal sectors. By proposing this concept, our intention is to continue discussions raised by theoreticians from the Latin American region on terms, such as informal settlements and urban informality. These concepts were

widely discussed between the 1970s and 1980s when the welfare state was in crisis and many families could not access housing and land within the consolidated city. The informal settlement or urban informality moved from a legal-normative definition referring to spaces that conflict with current urban regulations, toward the conception of spaces not integrated into the conventional urban system [22–24]. In parallel, in the last 30 years, numerous investigations have exposed a new perspective where urban informality is referred to as a constituent part of the productive and territorial structure of cities [16, 25]. That is why informal territory concatenates the terms of territory and informality, exposing the sense of belonging and community that the population develops while seeking or developing residential alternatives in response to obsolete or limiting proposals provided by the state.

The concept of informal territory arises from urban phenomena seen in northern Chile, where space is dominated by socio-territorial injustice. In the northern cities, it is possible to find informal territories of different types, located in central, pericentral, and peripheral areas. This evidences their configuration as particular places since they have a heterogeneous condition regarding their creation, construction materials, housing purpose, and those who produce and inhabit them [17]. Likewise, informal territories imply the production of place in any geographic context [18]. However, a highly complex aspect lies in its location close to disaster risk areas, exposure to contamination, the presence of household waste, or in the case of informal settlements, its construction on old dumps. For this reason, we also postulate the informal territory as a socio-analytical and political category that recognizes various territorialities of informality in access to housing and land. It also observes the complexity of the households that produce it, as these spaces are not inhabited exclusively by families inserted in the classic notions of poverty, as was stated in the past. Rather, it is produced by households with reduced social mobility, households that have had to prioritize how to use their limited income (e.g., between paying the children's school fees or paying the rent for the home they occupy). Informal territories are also produced by immigrant households that, due to various situations, cannot access formal, well-located housing at a price according to their family income.

Therefore, informal territories also reflect the dynamic and heterogeneous forms of living that occur within the city, which can vary over time and can differ from one city to another [17]. As an exercise based on observations in northern Chile, we postulate four typologies of informal territories according to their level of consolidation, described in **Table 1**. Informal territories are configured in parallel as an alternative production to housing and as a survival mechanism for vulnerable and low-income groups. For this reason, they make visible different forms of agency, which are defined by the type of dwelling inhabited, the agreements they establish with the authorities, and their place of location in the cities. Following **Table 1**, first, we observe that the marginalized informal territories lack internal organization, being criminalized and racialized spaces, where the morphology of the occupied space complicates their possibility of articulating with other groups. Second, those who live in deteriorated informal territories cannot establish a community, since informal subletting avoids any type of political organization that would show the risks to which families are exposed, either inside the buildings or in their surroundings. Finally, in transitional and consolidated informal territories, there is evidence of a greater capacity for organization, whether in housing committees or cooperatives. Most of our interviewees declare that a consolidated informal territory gives them greater freedom to coordinate collectively, an essential factor for negotiating their self-managed urbanization projects.

Typology	Description	Community organization	Political agency	Geography - hazard exposure
Marginalized informal territories	Recently produced spaces. Precarious facilities. Produced by vulnerable homeless groups looking for survival housing.	No internal organization is given recent installation time.	No political agency.	Located in marginal spaces of the city, including the coastline, sloping land, and riverbeds. Exposed to tsunamis, floods, and landslides.
Deteriorated informal territories	Spaces produced by informal speculators who sublease deteriorated homes. Precarious infrastructure with overcrowding, health problems, and insecurity.	Space without internal organization is given the control and rules established by informal landlords.	No political agency.	Located within the consolidated city. Exposed to the fire hazard due to overcrowding and overuse of electricity.
Informal territories in transition	Spaces produced by the state as a solution to informality and a transitory step toward permanent housing.	Housing committees or other similar organizations.	Organized for settlement, or to be relocated to permanent housing.	Located on the peripheries near riverbeds and slope sectors. Exposed to flooding, landslides, and pollution.
Consolidated informal territories	Long-standing spaces with high population density. They incorporate political projects that seek settlement and self-management.		Organizations that actively participate in settlement negotiations.	

Source. Authors.

Table 1.
Typologies of informal territories in northern Chile.

On the link between informal territories and public policies, since the 1990s there has been a gradual redirection toward policies that seek to overcome what is called the problem of informal settlements [26]. The institution in charge of developing these policies has been the Ministry of Housing and Urbanism, together with all its associated services, which have developed various programs to settle or eradicate informal settlements by placing their inhabitants in social housing complexes [26, 27]. Here people must apply for housing subsidies, being an economic aid to finance access to social homes, considered the definitive housing solution for people and their families. Unfortunately, the relationship between inhabitants of informal settlements and housing policies has had some historical and current frictions. When a group

has decided to leave informal settlements and relocate to social housing complexes, people would encounter hostile urban environments, usually marked by violence, leading them to question how owning these houses would grant them the dignity and adequate living conditions assured by the government and its authorities [28, 29]. The peripheral location of the land available to build social housing has registered important consequences in the displaced groups, including lack of connectivity and transportation to access workplaces, education, and health establishments, in addition to the loss of support networks, leading in many cases to people wanting to return to informal settlements [29]. This allows us to reflect on how individual residential trajectories are conceived by the state, and if access to the property would be the last stage of it. Finally, we do not mention subleased dwellings in central spaces, since there is a lack of programs for their inhabitants. A preliminary hypothesis would explain that the occurrence of housing violations within the urban limits and behind formal housing facades, would make it difficult to identify this situation and with that, to develop public policies to solve it.

2.1 Specific housing policies in northern Chile

In addition to evictions due to irregular occupation of land, it is common for northern city authorities to promote the relocation of informal settlements due to their current location in risk areas, such as riverbeds and sloping areas, all of which are susceptible to landslides and floods. There are also informal settlements located in proximity to critical but high-risk infrastructures, such as high-tension electrical towers and sewage processing plants. Considering that there is a high and growing population residing in informal settlements, authorities recognize the impossibility of evicting without having housing solutions. For this reason, five years ago, a program called transitory neighborhoods was developed. These are territorial units promoted by the state located on public land, which maintain the physical infrastructure of informal settlements, characterized by houses made of light material. Public officials fulfill the role of supervising who can access these neighborhoods, organizing the location of houses and equipment, and mediating conflicts between residents, in addition to managing legal access to basic services, such as electricity and drinking water, something impossible in standard informal settlements.

Authorities explain two purposes for the transitory neighborhoods, meanwhile, it is a program still on an exploratory stage. First, there are neighborhoods seeking to establish themselves as formal housing in the future. For this, a possible purchase of the occupied land is being managed, in addition to contemplating the deployment of housing programs. Second, other neighborhoods are installed as temporary residence spaces for people who want to leave informal settlements and access social housing. People grouped in housing committees circulate here, waiting in the temporary neighborhood until their respective housing complex is built. This contemplates the considerable passage of groupings. For example, our findings record the passage of six housing committees in a single transitory neighborhood in the city of Antofagasta. Although it has been proposed at one time as the solution to the “problem” of informal settlements, transitory neighborhoods maintain the same logic of subsidies and historical housing programs, where to resolve informality, one must access home ownership, without considering that residents may want to explore other forms of tenure. Even for authorities, signing up for a housing committee would be a dead end in terms of residential trajectory. “What are you doing within a housing committee? Because with this you will be tied down for the rest of your life,”

declared an authority from the northern regional housing service. Rental subsidies can also be used by those who wish to move out of informal settlements. However, it is a program that does not consider temporary housing infrastructure to await the results of the application. It is necessary to advance toward providing housing solutions from the idea of shelter, specially for those who live in constant precariousness and under the possibility to remain homeless, in addition to those who do not plan to settle in a particular city.

2.2 Housing policies and real estate as drivers of disaster risk

While we have referred to hazard exposure in informal territories, our findings in northern cities show that there is formal housing for high-income groups also settled in areas with tsunamis, floods, or landslides hazards. However, contrary to the situation of the informal territories, it is common for the exposure of high-income groups to be accepted, as they would have sufficient resources to face and overcome a disaster. This would explain the constant construction of private housing in contraindicated urban sectors, although it is worth wondering if people with lower incomes are actually living in safe areas. Some authors have identified the tendency in northern Chile to build social housing near risk areas [12, 30, 31]. Yet we would like to expose a particular example observed in the city of Antofagasta where informal territories, the construction of social housing, and the risk of disaster overlap.

After Santiago, Antofagasta is the second most expensive city to reside in Chile. On its surface, there are different types of housing with differentiated values according to square meters and number of rooms. Given the difficulties of buying a home due to its high value, renting is consolidated as one of the main forms of tenure, however, its monthly values can reach USD \$630 for a 45 m² apartment, meanwhile, renting a 3-bedroom house can cost USD \$1056. This is also exacerbated by the social geography of the city, where rental values change according to location and accessibility to goods and services. As a result of these restrictions on access to housing for ownership, rent, or even sublease, some families see in peripheries an opportunity to self-build their houses. In terms of disaster risk, peripheral informal settlements are exposed to countless hazards given their location in the western part of the coastal mountain range, an area determined by a steep slope that is highly susceptible to floods and landslides [32]. Furthermore, any house that is built in this area must consider historical disaster events. The last significant episode was a mudflow that affected the whole city of Antofagasta in 1991, triggered by an intense rainfall that activated dry creeks, registering 92 fatalities and 16 missing people [32]. Despite this, these are areas where, in addition to informal settlements, the state has built social housing for vulnerable groups. There is a remarkable example of Altos del Arenal building, a social housing project developed in 2018.

Located in the northern area of the city of Antofagasta, Altos del Arenal is a social housing complex evaluated and approved by the regional housing and urbanization service (known as SERVIU), which allowed the construction of 50 apartments of 62 m², producing a six-floor tall building. Prior to its construction, it was defined that its residents would be some families living in Los Arenales, one of the largest informal settlements in the city. Candidates for relocation had to register in the overcoming camps program of the Ministry of Housing and Urbanism and apply for a housing subsidy to buy the apartments. However, as **Figures 1** and **2** show, the social housing complex was placed in the rear sector of Los Arenales, an informal settlement under



Figure 1.
Altos del Arenal social housing complex, Antofagasta. Source. Authors.

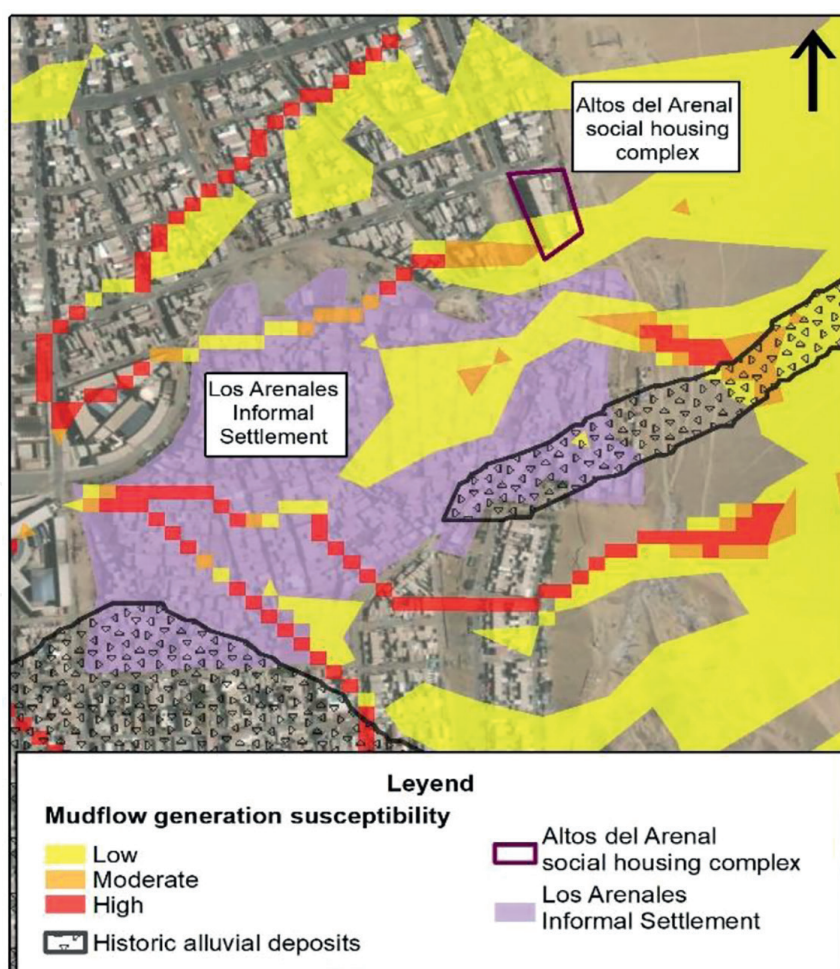


Figure 2.
Susceptibility to mass removal, altos del Arenal social housing complex, Antofagasta. Source. Authors.

constant risk of eviction. Likewise, it is an area under high susceptibility to landslides, in addition to historical mudflow records.

From this, state's decision to build social housing in risk areas, **Figures 1 and 2** above, expose some challenges to face. First, it is necessary to rethink the scale of disaster risk and its link with territorial planning instruments. In Antofagasta, the current urban regulatory plan was created 20 years ago, requiring it to be updated especially in risk issues, since zoning depends on hazard exposure studies, which have not been properly developed. And second, it is also necessary to investigate the exposure to anthropic hazards, such as proximity to dumps, the presence of pests, and pollutants, among others, as an exercise to begin unraveling the sociopolitical construction of risk in informal territories.

3. Mobile housing as an initial proposal and strategy to reduce risk

From the analysis of northern informal territories and the experiences of their inhabitants, the mobile housing proposal arises. More than a housing typology with certain construction characteristics, we propose mobile housing as a government housing program for cases of residential vulnerability, including those who have been evicted or displaced, to leave informality given their situation of helplessness that can directly lead to homelessness. Specifically, mobile housing would answer an intermediate stage of the residential trajectories of individuals, located between the complete housing precariousness, common in some informal territories, and access to permanent housing.

This program also would allow access to formal housing under a provisional scheme that recognizes their possibility of choosing where to reside for a certain time without leading directly to own a property, in addition to being able to decide how to continue their residential trajectory. The most explicit example of this situation would be the residential choices of immigrants, who could be temporarily living in a northern city, and then continue their journey to other latitudes if they wish so. In this sense, mobile housing would also make it possible to avoid highly detrimental conditions for well-being, such as overcrowding, lack of privacy, exposure to precarious living conditions, including construction with inappropriate materials that generates concentration of humidity and lack of natural light, and the experience of various types of violence or aggression, all especially present in the sublease of rooms in central spaces.

In practical terms, mobile housing would allow renting available housing in the built environment of urban or rural areas, considering the extensive difficulties exposed by the state to build social housing. This housing program should have more flexible beneficiary selection criteria than the current rental subsidy, contemplating a reduced time to be applied, while it seeks to avoid homelessness. Likewise, the program should consider that the beneficiaries reside in rented houses for a range between 6 months and 1 year. In terms of management, the program could contemplate a monitoring and orientation process by public officials that allow individuals and their families to make the best decisions about their residential trajectories and their future actions. With this, the mobile housing program would incorporate nomadism as a process of constant re-territorialization, as it allows negotiation between the new context where people are about to settle residentially and their previous experience in other places where they have lived [33].

At the same time, recognizing the significant amount of population that currently resides in informal territories, the mobile housing program would also consider

Dimension	Proposals	Change's agents
Education and risk governance	Workshops to raise awareness about the types of hazards to which each informal territory is exposed. Training to deal with emergencies. Define protocols and evacuation routes. Activation of emergency protocols from state services.	Communities Regional and/or local government. Emergency office and related institutions.
Control of habitability conditions	Regulation and inspection of central subleased properties. Evaluation of building conditions in informal settlements. Requirement to build firewalls. Check availability and maintenance status of fire hydrants. Garbage cleaning in creeks. Control of informal settlement expansion.	Regional and/or local government.
Mitigation infrastructure	Hillside afforestation. Construction of tree-lined furrows around houses and on edges of creeks. Transverse orchards in valley and foothill areas.	Communities. Regional and/or local government. Emergency office and related institutions. Environment and planning offices.

Source. Authors.

Table 2.
Proposals to reduce risk in informal territories.

improving the risk exposure conditions of these spaces. This line of intervention in informal territories does not necessarily seek the formalization or immediate regulation of informal settlements and deteriorated housing, but instead acknowledges that their inhabitants live at imminent risk and a planning response must be given. As a result, we suggest a series of proposals that cover various dimensions of living, reacting, and preventing risk, as shown in **Table 2**.

Finally, with these preventive steps, the constant absence of the state in informal territories would be compensated, since the condition of informality should not exclude its population from receiving adequate protection against risks. Likewise, historical disasters registered in northern cities show that any event affects formal and informal spaces transversally. Consequently, it is time for a territorial planning that projects adequate and safe conditions for all inhabitants.

4. Conclusion

From our research experience in informal territories, we propose a housing program for the Chilean government system that collects differentiated residential demands and allows vulnerable population to leave housing informality. In its range of areas, mobile housing recognizes the factors that drive the creation of informal territories, including the restrictive prices to access the private housing market, the difficulties faced by the state in producing social housing, in addition to the diversity

of households that cannot afford none of the above options. From the geographical conditions where massive informal territories are settled, mobile housing seeks for inhabitants to live in safe conditions against disaster risks, even temporarily. This implies rethinking how the risk of disaster is reduced in homes located under certain climatic, edaphic, and arboreal conditions. It is crucial to propose how to build houses resistant to intense rains and humidity conditions, and to water scarcity and intense solar exposure. With this, mobile housing requires generating soil mechanics in seismic risk areas, while in areas with tsunami risk, establish the obligation to build high-rise homes where the habitable sections begin on the second floors. As noted above, about the risk of mudflow, mobile housing proposes the construction of furrows that surround the houses and water sinks, in addition to afforestation to stabilize the soil on slopes. Therefore, mobile housing and its proposals seek to configure a housing typology that can be replicated in any territory where institutions are expected to reduce disaster risk. Consequently, mobile housing also requires the Chilean state to stop actions that perpetuate the exposure to risks of vulnerable families, who after experiencing disasters are moved to new homes exposed to other hazards¹.

To conclude, in addition to being a housing program, mobile housing is also a theoretical-methodological concept that conceives housing as an object and subject, but which is inserted in territories with particular conditions. This multi-scale perspective highlights that inhabiting a space is not limited to housing as a productive and reproductive place, but also involves its surroundings. That explains the multiple proposals presented, which, above all, would favor living under the basic conditions of comfort that adequate housing requires. With this, we consider the future potential of mobile housing to reduce the housing deficit in all its stages, for example, allowing the state to effectively have land reserves, proposing resilient and adaptable housing models, in addition to the existence of risk mitigation subsidies that improve constructions without discriminating informal settlements or slums. Finally, mobile housing is an initial and exploratory exercise that also challenges the development of housing policies from an interdisciplinary perspective with the purpose of finding integral solutions.

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¹ For example, this situation was seen during the reconstruction after the 8.8 Mw earthquake that hit central-southern Chile in February 2010. The population affected by the subsequent tsunami was relocated to social housing built in areas at risk of forest fires and mudflow. [34].

American and Caribbean immigrants: Exploring new socio-spatial phenomena in cities of northern Chile.”

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Conflict of interest


The authors declare no conflict of interest.

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