SFPE EUROPE

Q2 2022 ISSUE 26 AN OFFICIAL PUBLICATION OF SFPE

Human Behaviour in Informal Settlement Fires in Costa Rica

By: Sara Guevara Arce, York University, Canada

This article is the short version of the published paper "Human behaviour in informal settlement fires in Costa Rica". This is part of a larger project which began at the author's former institution (Tecnológico de Costa Rica) as part of a research exchange facilitated by Global Affairs Canada and is currently continuing with the collaboration of Kindling Fire.

Guevara, S., Jeanneret, C., Gales, J., Antonellis, D., and Vaiciulyte, S. (2021). *"Human behaviour in informal settlement fires in Costa Rica."* Safety Science, Elsevier Ltd, 142:105384. https://doi.org/10.1016/j.ssci.2021.105384

Introduction

The world's population is expected to increase by 2 billion people in the next 30 years, reaching 9.7 billion people by 2050 [1]. This startling growth is a significant concern as it is unequally distributed between developed and developing countries [2], the latter bearing the worst part of it. Currently, nearly one billion people of the world's urban population live in informal dwellings, and around 88% of those live in developing countries [3]. The lack of housing in urban areas is a matter of concern, as it can result in an increase in population living in informal settlements or the establishment of new ones. According to the Organization for Economic Co-operation and Development (OECD), informal settlements are defined as areas where groups of housing units have been constructed with no compliance with current planning and building regulations on lands where the occupants have no legal claim or occupy illegally [4]. Not only can the population growth increase the expansion or creation of informal settlements, but several factors can also contribute to informal settlements such as rural-urban migration, lack of affordable housing, underpaid work, and economic vulnerability, among others [5]. It should be highlighted that informal settlements are mostly located near cities, where employment and education availability is better than in rural areas.

Informal Settlement Fires

One of the main concerns in informal communities is that they are more prone to hazards, such as fires. It has been shown that fires are more likely to occur in poorer economies [6]. The high density

of dwellings, the use of cheap construction materials, the electrical connections in disrepair, the poorly maintained and manipulated gas cylinders, and open flame cooking and light sources within informal settlements can increase the probability of starting fires. This fire concern is increasing as the population is growing, and the settlements are evolving. Nowadays, multistorey dwellings are present in informal settlements, and these can be unsteady and highly flammable as shown in the figure below. Sometimes houses with two or three floors are grouped together, compromising the integrity of the surrounding dwellings.

Figure 1. Multistorey buildings in La Carpio (Author's photo)

In Costa Rica, approximately 220,000 people live in around 418 informal settlements, where the highest concentration of informal settlements is found in San Jose, the capital of the country [7]. The number of fires occurring in informal settlements are under reported, as often the inhabitants suppress the fires without calling the firefighters. However, at times, these fires claim human lives. One of the biggest recent fires occurred in 2019 in El Pochote, an informal settlement located in Barrio Cuba, within the Hospital district of San Jose Province. This fire razed 40 houses, leaving a burned area of 2,400 m^2 and approximately 219 people homeless, including 70 children. Despite the impact that such fires can make on people's lives, their propagation, management, human response and aftermath are extremely under-researched, with very little data for research available in the first place.

It was possible to obtain 71 minutes of real-time video footage from the Costa Rican Fire Corps, through their communication office. This video allowed the researchers to analyze the fire management decisions made by the firefighters and how the community behaved and got involved in the fire. The video allowed the observation of actions carried out by the inhabitants of the community and an attempt was made to categorize the observed behaviors. However, there is a lack of behavioural theories applicable to this context, and the relevance of existing theories cannot yet be evaluated due to limited evidence available on informal settlement fires.

Fire response of the Fire Corps and the community members

In Costa Rica, the reaction of the population living in informal settlements with regards to fires tends to be supportive of firefighters. In informal interviews carried out with Pavas Fire Station, the firefighters stated that they prefer to ally with the community members when fighting a fire in informal settlements, instead of driving them away. However, when firefighters are attending fires in informal settlements, they are accompanied by the police, to avoid vandalism, getting robbed or just to create perimeters between the area they are working in and the population observing the event.

Figure 2. Police giving assistance to firefighters (video footage photo)

There are advantages and disadvantages to community members getting involved. The advantages can include guidance through the settlement – which sometimes resemble labyrinths – assistance carrying tools and hoses, and advice regarding the location of any explosive materials such as gas cylinders, etc. Certain disadvantages however can be that the community members tend to stay after they have provided assistance, putting themselves at risk by approaching the fire without protective equipment. They can sometimes also hinder the rescue and extinguishing process with their belongings as they take them out, as well as other behaviours that vary depend on culture and settlements.

Key Findings

During the fires, the community members showed behaviours such as affiliation to their belongings or properties, which prevented them from evacuating quickly from the fire, and leadership behaviours such as a man telling companions or firefighters what to do to put out the fire, even when they do not have the training. Another example of leadership behavior observed was the creation of bucket brigades composed of males between 20 – 35 years old. This is often created under the guidance of a member of the community, giving instructions on where to direct the water buckets. Additionally, it was observed that during the emergency, there are family roles, where the men attempt to fight the fire and collect their belongings, while the women take care of their belongings, and children try to imitate men, for instance, trying to pull out the hoses to help the firefighters.

Unique behaviours which could endanger community members were also observed, such as: passing calmly through alleys that were on fire; walking over the roof trying to see where the fire

was coming from, unaware that they could be electrocuted by the wires of the electrical connections; men approaching the fire using their shirts as face shields, leaving their chests unprotected from the head; and entering to their houses to take out their belongings even though the immediate house was on fire, etc. The remaining findings can be found in the full paper published, but it should be highlighted that more research must be done to better understand workable and context-specific solutions for fire safety in informal settlements that preserves lives and peoples' livelihoods.

References

1. United Nations (UN) Global Issues Population. https://www.un.org/en/global-issues/population. Accessed 23 Feb 2022
2. United Nations (UN) (2013) World Population Prospects, the 2012 Revision. https://www.un.org/en/development/desa/publications/world-population-prospects-the-2012-revision.html#:~:text=The report%2C World Population Prospects,to 1.8 billion in 2050. Accessed 23 Feb 2022
3. UN-Habitat (2017) Human rights in cities handbook series Volume I. The human rights based approach to housing and slum upgrading. Nairobi
4. OECD (2001) Glossary of statistical terms: Informal settlements. https://stats.oecd.org/glossary/detail.asp?ID=1351. Accessed 23 Feb 2022
5. United Nations (UN) (2015) Habitat III Issue papers, 22-Informal settlements. New York, USA
6. Spinardi G, Bisby L, Torero J (2017) A Review of Sociological Issues in Fire Safety Regulation. Fire Technol 53:1011–1037. https://doi.org/10.1007/s10694-016-0615-1
7. National Institute of Statistics and Censuses (INEC) (2013) Principales Indicadores sobre Asentamientos Informales, Censo 2011. 2013
8. Guevara Arce S, Jeanneret C, Gales J, et al (2021) Human behaviour in informal settlement fires in Costa Rica. Saf Sci 142:105384. https://doi.org/10.1016/j.ssci.2021.105384