



Incidence Of Fire And Safety Awareness Among Households In Tarlac City: A Correlational Study

Cindy A Acosta

College of Public Administration and Governance

Tarlac State University, Romulo Blvd. San Vicente Tarlac City, Tarlac 2300

Abstract: In the last decade alone, fire incidence increased in worldwide report, having four (4) million reports related to fire from 2020. Fire Safety Awareness, on the other hand, remains general knowledge in many residences. In this correlative study, variables level of incidence and level of safety awareness of Tarlac City households are examined, aiming to explore the existence of correlations between the two. Gathered data through surveys shows that out of 72 barangays, 46 respondents from 34 barangays resulted to have high level of fire safety awareness. Level of Fire Incidence from January 2021 to June 2024 are summarized to have most of the fire accidents are low frequency (54.35%), while moderate frequency (32.61%), and intense frequency (13.04%) comes second and third.

As a result, there is no significant correlation between the level of fire safety awareness and level of incidence of fire. However, problems encountered by both households-respondents and BFP personnel are majorly caused by lack of participation on both sides, inaccessibility of firefighting equipment, and lack of fire safety education. It is generally recommended that collaboration between the two respondent groups should be well-implemented to improve the reduce the states of potential fire hazards. This study can be presented as future references for improving fire-awareness-related policies.

Key words: Fire safety awareness, Incidence of fire

1. INTRODUCTION

Fire Safety Awareness is not uncommon in local households, and firefighting is considered an honorable field of work among many countries. However, the last decade showed that fire incidence had increased, having four (4) million calls related to fire in 2020 alone. In the 2024 report by the World Fire Statistics, the second major distribution of fires by types in most countries are from residential buildings (23.1%), a mere three percent difference from grass fires (26.5%). These reported residential conflagrations indicate several causes, and that residents' fire safety knowledge is believed to contribute to said causes.

Annually, thousands of lives are lost, as well as billions-worth of property destroyed by fires, and the cause can be claimed to be rooted from the depths of negligence of people. In a report by the United Kingdom's IFSEC (International Fire and Security Exhibition and Conference), the continuance of these disastrous fires is often regarded not of priority.

As unveiled by the United States Fire Department (USFD), fire in residential areas emerges every 85 seconds. These incidents represent an eighty percent partition of overall fire-related fatalities. Most deaths from accidental fires in London—a grueling 78%-- are related to house fires, claiming that injuries from said fires are one of the leading cause of disability and death. High-income countries (HICs) on the other hand, death caused by fire remain a significant issue despite the decrease in mortality rates. Form 2007-2010, around 39% of fires in China were from house fires. Therefore, given the significant chances of casualties and damages along with the economic losses caused by fire in home, greater focus should be directed to this matter.

World Health Organization (WHO) numbers in the recent decade indicate that over 300,000 deaths and disabilities resulted each year from burns caused by fires, a ninety-five percent of these incidents had happened mostly in low-and- middle-income countries (LMICs). It is thought that building fires indicates threat or risk to the safety of those inside and are primarily triggered by human actions. In extensive residential buildings with many inhabitants, especially, fires can result in a higher risk of injury, deaths and disabilities due to challenges in emergency evacuation. With all these differing causes of fire incidence, the begging question is magnified: What has the world done so far in preventing and resolving these incidences?

As a preemptive response, Country Fire Services across the globe participated in the EU FireStat Project from 2020 to 2022, the projects unite the expertise and struggles of nine (9) distinct global fire safety organization. The initiative outlines the existing fire data gathered and suggest significant data sets to enable choices regarding fire safety at at EU Levels and the Member State. It is being embodied in the following continents: Africa with six cities, Asia with thirty-two, Europe with fifty-one, Oceania with only two, and the USA with twenty-eight cities.

In the Philippines, a news article published by Philstar (2023) reveals that the country's fire commission, Bureau of Fire Protection (BFP), had recorded a growing number on fire outbreaks for the year 2023 in a whopping 21.1% increase or a total of 15,900 cases, a far greater figure compared to the 2022 statistics which tallied fire outbreaks at 13,133. As man-made as fire incidents are, it is considered one of the most rampant hazards in the Philippines up to a certain point when it is considered an economic killer to some of the country's urban areas (Kurata, et al., 2023).

In Davao City alone, a Pph 4 billion of property casualties and damages were recorded from 2011 up to 2019, this figure argues that if not the most, fire incidence is among the top causes of the country's economic and life loss (Villa & Ceballos, 2020). Additionally, in a report released by BFP published via the Philippine News Agency (2020), from the years 2013-2018, there exist an overall 94,399 fire outbreaks have been listed in 5 years with an average of 15,000 on an annual basis. Over the years stated, these incidents managed to leave 5,131 injured with a mortality rate of 1,517.

Due to these, basing from RA 9514 (Fire Code of the Philippines), authority and power over issuing rules and implementing regulations are delegated to personnel of BFP. Likewise, they are mandated in supporting fire professional and volunteers who must complete required fire mitigation training. These duties, however, are mere tasks from BFP's hundreds of responsibilities. Nonetheless, despite the implemented fire safety management strategy, instances of fire accidents remain a complex case of report and underreported cases.

Furthermore, Yoshiki et al. (2023) put forward the hope that the Philippines prepared mitigating procedures for fire outbreaks to an extent, however this is only limited to a certain degree which only focuses on the usage of fire extinguishers and familiarizing residents on seeking assistance to local unites in case of emergency and there is less drills survival tactics or real-life fire simulations on what one must do during a fire incidence to avoid casualties or injuries. Moreover, drills done in offices or academic institutions are vulnerable to execution only as per compliance rather than the application of actual tips on how to survive a fire. Although fire exits, fire alarms, fire escape plans, and other fire relevant functions were invested, if the supposed users have little to no knowledge of the usage of such, these mitigating procedures may even reduce survival chances.

While fire outbreaks continuously prove its detrimental repercussions in a short period of time, it has proven to be an indelible hazard that humanity cannot completely eradicate, hence the existence of certain mitigations which the Philippines has adopted. Considering the above mentioned, the researcher led the creation of this study by recognizing differing fire safety management of the BFP, particularly in preventing or reducing various forms of fire incidents among barangays in Tarlac City, mostly in urban areas. Local fire outbreaks, although lacking in pattern indicators, happen at random but out of the recorded cases, it mostly takes place in places which are highly urbanized hence the sample priority of study.

Additionally, the study aims in determining how effective abovementioned strategies are in suppressing fire through evaluating the safety awareness of the people in the City of Tarlac. Hence, information gathered in this paper is recommended to be considered implemented on other branches of the BFP in the Philippines. With this implementation, evaluation on the current management will lead in knowing the gaps and limitations that can be utilized in enhancing management strategies of BFP employees. Once identified, the researcher correlated the level of fire incidence (LFI) with the level of safety awareness (LFSa) of households in barangays of Tarlac.

Finally, the researcher, as a fire officer, is committed to continuous learning and the search for knowledge to constantly strive to learn more for the betterment of the country's fire service delivery. The researcher has a grounded principle as well, from being and as a public servant, who caters to the welfare of the general public and its stakeholders. Moreover, the study recognized the challenges faced by the

respondents on the community satisfaction on the effective execution of fire prevention projects of BFP in the City of Tarlac, to which measures were proposed.

2. METHODOLOGY

This paper utilized a quantitative-correlational, or more specifically, descriptive-correlational research design, that is defined as the systematic collection and analysis of numerical data. An example of utilizing this methodology is incorporating the identification of patterns and averages, the formulation of predictions, the testing of causal linkages, and the generalization of findings to broader populations (Seeram, 2019). The study's research design described the awareness of household perspective in the City of Tarlac.

Quantitative method is fitted to be used in this kind of study because it collects numerical data, then subjected to statistical analysis guided by statistician. Data collection in quantitative research is typically applied on larger samples, utilized in a structured way, representing the entire population. This approach is valuable in both experimental and social research, since it contributes in creating informed decisions and drawing reliable conclusions based on quantitative data.

On the other hand, descriptive-correlational research is a type of research design that attempts to elaborate the relationship between two or more variables without making any claims about cause and effects. It includes collecting and analyzing data on at least two variables to see if there is a link between them. Instead, they observe and measure the variables of interest, looking at the patterns and relationships that emerge from the data.

The sampling method used is total enumeration because of the reason that all households with experiences of fire incidence totaled up to 46 official reports to the BFP, beginning from the years January 2021 to June 2024. As long as they are reported victims of fire, these 46 households qualify the criteria.

The instrument used in gathering data is dependent on questionnaires. Three questionnaires validated are: General questionnaire on household-respondents' LFSA, check list of problems encountered by respondents from both households and the BFP.

The questionnaire consisted a series of questions proposed by the researcher, modifying survey checklist from programs of the BFP that fitted the aim of this study. Said questionnaires were validated by experts and other fire officers with proven knowledge related to the paper. Before the questionnaire was given, the researcher briefed participating respondents and explained the main purpose of the survey and their importance on answering truthfully.

III. RESULTS AND DISCUSSION

In this chapter, the data collected using an alloy of questionnaire are presented. The research questions and challenges posed are specifically addressed through an organized and systematic representation of the results accompanied by relevant analysis.

The BFP in the national context operates under the mandate of the Department of the Interior and Local Government (DILG), guided by two (2) main provisions to ensure legality of fire safety and provisions. As follows: DILG Act of 1990 (RA 6975) states that BFP is a separate agency under the DILG, focusing on suppressing destructive fire and enforce fire-related laws. On the other hand, 2008 Fire Code of the Philippines (FCP) primarily discuss the specific standards of local fire prevention in the country. It provides regulations, penalties for violations, and importance of fire safety education for public awareness. These two mandates form and mold the officiality of BFP's role in the local community.

1. Level of fire safety awareness (LFSA) among households in Tarlac City

Among the indicators in measuring the LFSA of the respondents were checking in their house conditions, electrical connections, kitchen connections, and house exits and outdoor spaces. The said indicators were among the safety standards set by the BFP Modernization Act. Additionally, such indicators were prescribed as valid basis in terms of measuring civilians' fire safety awareness (American Red Cross, 2022).

1.1. House Conditions

House Conditions, as conducted by Rana, I. et al. (2024), may pose risks on fire incidence in terms of orderliness, structure, and fire hazards. Once safety standards are not observed, it may lead to residential fires, thus, its vulnerability points to it as an indicator to observe fire safety awareness.

Table 1. House Conditions

Statement	Mean	Verbal Description
The house is clean and orderly.	4.95	Highly Aware
Items in the house are neatly arranged.	4.95	Highly Aware
Trash or items that could start a fire are disposed of properly.	4.91	Highly Aware
Flammable materials are stored safely.	4.87	Highly Aware
The house is properly ventilated.	4.83	Highly Aware
No clutter is near electrical outlets or appliances.	4.85	Highly Aware
Someone smokes.	3.65	Aware
There is a clear Evacuation Plan in case of fire.	3.63	Aware
Family members know how to “Stop, Drop, and Roll” in case of fire.	3.76	Aware
Mean	4.46	Aware

Table 1 presents the data gathered among the 46 respondents for the indicator 1.1 House Conditions. It is important to note that respondents were selected based on the criterion of having experienced a fire outbreaks. Observe that the general consensus is majority of the respondents think they are most observed on disposing items that could potentially start a fire at a mean of 4.46.

Rated 4.87, the second highest mean recorded for this indicator, shows that safety storage of flammable materials is observed by most of the respondents. Flammable Liquids and Flammable Gasses were rated Class B and Class C by the International Fire and Safety Journal in terms of fire hazards as they occur on most fire outbreaks, commonly at home or in the workplace. Safety standards in relation to flammable materials have been set around the world like COSHH Risk Assessment in the UK which aims to identify hazards and formulate preemptive measures to counter its risks (Umer, 2023). Considering the great risk flammable materials pose, it is natural to a civilian’s common knowledge to be wary of such.

Rated at 4.85 with the second highest mean recorded are the indicators: The House is Clean and Orderly, and The items in the house are neatly arranged. House Cleanliness and Organization can become factors to fire incidence. A set of safety standards published by QBE Asia (2021) suggests that Good Housekeeping keeps fire hazard at a minimal risk, this includes maintaining order and operational tidiness, regulating activities such as aisle storage which can lead to hazardous scenarios, and properly controlling waste. Awareness to such keeps civilians fire safety aware.

Rated at 4.83 is the house is properly ventilated; While at 4.80, is no clutter is near electrical outlets or appliances. Alianto, et al. (2022) suggests that while it is preemptive to prevent fire, the building itself should protect civilians. Proper ventilation and less disturbance on appliances and electrical outlets keep fire incidence at a low probability. In addition, proper ventilation with smoke regulators keep survival at a high chance when fire risk is present.

Rated 3.76 is an indicator that explores the awareness of the respondents when it comes to immediate protocols when caught in the middle or in a close encounter with a fire incidence through the “Stop, Drop, and Roll” Protocol which measures the level of knowledge in which the respondents possess basic education on advocacies concerning BFP’s Fire prevention seminars. According to the data shown in the Philippine Rubber Research Institute (2019), BFP advocates for the Stop, Drop, and Roll drill during Fire Prevention Months may it be in workplaces or schools, the depths to promote the advocacy as a common knowledge is given emphasis or of importance.

Rated lowest were 8. There is a proper evacuation in case of fire outbreak at the mean of 3.63 and Someone smokes at a mean of 3.65. In a study conducted by Fu, et al. (2021), one of the crucial considerations for fire incidence are evacuation routes most especially for indoor fires. These types of fire typically activate civilians’ risk-taking behaviors, thus, the potential of stampedes and mass hysteria. Strategic evacuation plans play a pivotal role on safety awareness practices during fire incidence.

In conclusion, with a total mean 4.46 which is below the threshold for the highest rating which is above 4.50, corresponds to the verbal description “Aware”. The general reception of the respondents shows that their LFSA in terms of House Conditions is in an aware state which indicates that maintenance of

surroundings and environment is properly observed and kempt by the respondents at a minimum level, however maximum observation is not met.

1.2. Electrical Connections

Table 2. Electrical Connections

Statement	Mean	Verbal Description
There is a Circuit Breaker installed.	5.00	Highly Aware
Extension cords are available in the house.	4.98	Highly Aware
Cords are safely unplugged when not in used.	4.83	Highly Aware
Light bulbs are properly connected to fixtures.	4.93	Highly Aware
Extension cords are used safely.	4.91	Highly Aware
Appliances are plugged into the proper outlets.	4.83	Highly Aware
Appliances are directly plugged into outlets, not through extension cords.	4.72	Highly Aware
Properly sized cables are used for electrical connections.	4.89	Highly Aware
Properly sized of cable wires.	4.87	Highly Aware
There is an electrical safety switch.	4.87	Highly Aware
There are no dangling electrical cords.	4.85	Highly Aware
Electrical panels, junction boxes, outlets, and switches are in good condition.	4.83	Highly Aware
Mean	4.88	Highly Aware

Electrical Connections, although often overlooked to overall fire safety inspections can contribute to the intensity of a fire incidence. Hence, materials used, cables, classes, and categories of electrical installations need to be observed (Fangrat, et al., 2021). Table 2 shows Circuit Breaker installation is at a mean of 5.00, the highest for this indicator. Circuit breakers regulate the flow of electricity, especially to residential buildings. These mechanisms regulate the flow of electricity on establishments to avoid fire incidents caused by electrical shortages or failures. In the standard established by the Philippine Electrical Code (PEC), the country has thresholds when it comes to installations concerning wirings and electricity. The standards set by PEC are followed across the country as a legally binding standard for all installations in the country. The result encapsulated the respondents are educated on the latter.

Rated among the highest mean tallied are 12. Extension Cord are available in the house at 4.98; Light bulbs are properly connected to fixtures at 4.93; Extension Cords are used safely at 4.91; Properly sized of cable wires at 4.87; and There is an electrical safety switch at 4.87. Electrical fire is among the top three major causes of flare-ups in the Philippines as claimed by Nocete and Enteria (2020). It is electrical fire which manifests due to faulty wires, short circuits, and electrical overloads. Improper usage and exposure to it, especially for children, puts a high risk of starting fire.

Hence, proper observation and level of awareness should be overall achieved on all its components including installation, usage, and regulation.

Rated lowest at a mean of 4.72 are Appliances are directly plugged into outlets, not through extension cords. A study by Occeño (2016) shows that one of the major causes of fire incidence in Region IV is caused by Electrical Post Fire which refers to any overloaded induction, overheating of equipment, and jamming of electricity. Hence, proper observation on electrical standards is crucial as Electrical system is man made and therefore, chances of failure is unavoidable. This human factor is what makes it a candidate for overall fire safety observance.

Furthermore, for the safety awareness indicator involving Electrical Conditions, at a mean of 4.88, the overall reception of the respondents reaches a "Highly Aware" state which means that fire safety awareness on Electrical Conditions is most frequent to always observed by the 46 households as respondents.

In conclusion, as stated, there should be strong adherence to safety practices, and the responses strongly reflect this belief as it represents high awareness on electrical connections. However, the slightly lower awareness of direct plugging versus usage of extension cords may warrant educational initiatives; an area of improvement the BFP can consider working on.

1.3. Kitchen Conditions

According to the standards set from the Department of Energy, safety protocols at home and in the kitchen are crucial to prevent fire incidence. Kitchen, among all the areas of a residential building, is the most common storage of flammables which is considered its natural habitat. Fire activities and usage of gases which could induce fire is very common in the kitchen area. Thus, it is considered an indicator which could measure how aware civilians are in terms of fire safety (Razon & Ahmad, 2017). Table 3 shows the cumulative response of the 46 participants in terms of safety in kitchen conditions. At the highest are Cooking Activities are supervised; and There are no items near the stove that could catch fire at a mean of 4.98.

Supervised cooking activities include proper measurement of flammable ingredients when cooking such as oil, coal, or even the type of materials used in kitchenware. For example, a study conducted by Spearpoint, et al. (2021) designed a desirable volume of cooking oil for both deep frying and shallow frying to avoid fire incidence in the kitchen, such small practicalities are still possibilities when it comes to fire incidence so it is inevitable to observe fire safety through supervised cooking practices.

Table 3. Kitchen Conditions

Statement	Mean	Verbal Description
Cooking activities are supervised.	4.98	Highly Aware
LPG regulator are always tightly secured.	4.93	Highly Aware
There are no water leaks in the kitchen.	4.91	Highly Aware
LPG (liquefied petroleum gas) is stored properly.	4.91	Highly Aware
There are no items near the stove that could catch fire.	4.98	Highly Aware
Kitchen appliances are regularly inspected.	4.87	Highly Aware
Candles and lighters are stored safely.	4.96	Highly Aware
Smoke is properly vented.	4.96	Highly Aware
Mean	4.94	Highly Aware

Furthermore, table 3 breakdowns the consensus of the respondents in indicating their level of awareness in terms of Kitchen Conditions. Basing from the qualifications from the Department of Energy, safety protocols at home and in the kitchen are crucial to prevent fire incidence. The statements listed on the level of awareness in terms of kitchen were derived from the latter safety protocols. With a grand mean of 9.46, the respondents are highly aware of the fire safety in kitchen conditions.

Rated at a mean of 4.96 were Smoke is properly vented; and Candles and lighters are stored safely. Fire incidence may happen when smoke is not properly vented through external channels which in worst case scenarios, result in accidental gas explosions, these are more fatal when combined with combustibles (Li, et al., 2018).

Rated at 4.87, the lowest mean for this indicator, is Kitchen appliances are regularly inspected. Fire Incidents caused by ignition through appliances is one of the major causes of fire in general. With the resurgence of technology, appliances with the capability to preserve or even operate with mere electricity have risen into the trends. However, one of its downsides is the possibility of fire ignition when usage is not properly observed, hence, it is to be monitored through a fire safety indicator (Beasley, et al., 2018).

In conclusion, with a total of 4.94 mean, the general reception of the respondents in terms of Fire Safety Awareness for Kitchen Conditions is on a highly observed state, meaning to say, the respondents are aware of the dangers included in the indicators and received proper education on regulating such. These indicators perceive that the respondents are knowledgeable about the hazards of fire incidence, especially in a place most vulnerable to fire, which is the kitchen.

1.4. House Exits and Outdoor Spaces

House Exits and Outdoor Spaces are common areas when inspecting evacuation plans and routes plotted by the BFP. These are considered basic mitigating practices which are discussed in BFP's Fire Prevention Month Campaign to put importance on making lesser mortality rates, rather than salvaging properties. Table 4 shows questions under the indicators on fire safety awareness in maintaining proper passages for evacuation.

Lamija, et al. (2023) suggests that fire outbreaks can happen anytime, anywhere, even in cramped and high-rise buildings. However, certain places require diverse mitigating plans and escape routes that can cater to people of all ages, hence, the existence of engineered fire exits and fire escape routes.

Table 4. House Exits and Outdoor Spaces

Statement	Mean	Verbal Description
Door and windows are clear of obstructions.	5.00	Highly Aware
No leaves or debris are near the house.	4.83	Highly Aware
It is easy to exit the house in case of fire.	5.00	Highly Aware
The house has adequate lighting.	4.98	Highly Aware
Indoor passageways are clear.	4.98	Highly Aware
The house is near a road for emergency access.	4.78	Highly Aware
Mean	4.93	Highly Aware

Rated at a highest mean with 5.00 is Doors and windows are clear of obstructions and It is easy to exit the house in case of fire. When caught in fire, main entrances may be blocked by black smoke, which is other than fire, is as destructible as it may cause respiratory complications. Aside from the possibility of stampedes and trapped civilians, first responders may even find rescuing extra difficulties once entrances are blocked, hence, the existence of fire exits which mostly, are areas with openings and can be accessed through open rooms (Kodur, et al., 2020). For example, windows with metal stairs, or roofless external staircases which provide direct passage to the rooftop or a building's ground level.

Meanwhile, the following ratings provide a detailed breakdown on the respondents view on house exits and outdoor spaces Indoor passageways are clear, The house has adequate lighting at 4.98; No leaves or debris are near the house at 4.83.

At a mean of 4.78, The house is near a road for emergency access, is the least observed indicator. This shows that some of the respondents gathered either live in apartment complexes or alleyways which is subjective. However, this should not hinder survival chance as the study of Kinatader, et al. (2018) suggests that neighbor behavior and familiarity are among the variables to be considered to determine whether emergency routes and exits are at a maximum effectiveness. In conclusion, at a mean of 4.93, the households in Tarlac City vulnerable to fire outbreaks observes overall supervision and awareness on House Exits and Outdoor Spaces.

Table 5. Grand Mean on Level of Fire Safety Awareness (LFSA)

Indicators	Mean	Verbal Description
House Condition (Kaayusan ng Bahay)	4.46	Aware
Electrical Connections (Koneksyong Elektrikal)	4.88	Highly Aware
Kitchen Condition (Kaayusan sa Kusina)	4.94	Highly Aware
House Exits And Outdoor Spaces (Daanan O Labasan Sa Bahay)	4.93	Highly Aware
TOTAL	4.79	Highly Aware

Lastly, a grand mean totaling at 4.79 indicates that household-respondents are highly aware in three indicators, particularly high on Electrical Connections at 4.88. House Conditions, on the other hand, has a 4.46 total mean, indicating a fair average of awareness.

This emphasis on households having high awareness on fire safety can be interpreted in various ways. Yet what resonates most is that households responded with confidence on their general knowledge on fire safety, especially on the electrical elements.

2. Level of Fire Incidence (LFI) among households in Tarlac City

Fire incidents have two types, namely, natural flare-ups and man-made incidents. Natural fire outbreaks can occur from unintentional geologic or systematic activities whilst man-made induced fires typically result from negligence or accidents caused by humans (Cabañas, et al., 2017). It can range from low, mild, to severe depending on certain considerations and factors. The BFP, provided with a salient provision to regulate fires in the Philippine through the Republic Act no. 11589, is granted the discretion to set standards on Level of incidence with proper assessment on their area of designation. For Tarlac City, the level of incidence set by the BFP is divided into three classifications, namely, Low, Moderate, and Intense. These levels are subdivided based on the number of damages which is measured through the casualties of a fire.

Table 6. Rubrics for Level of Incidence

<i>Rubrics</i>	
<i>Level of Incidence</i>	<i>Amount of Damages</i>
Low	P10,000 and below
Moderate	P10,001.00 to P300,000.00
Intense	More than P300,000.00

2.1 Amount of Damage

Out of 46 cases, 54.35% of the respondents who have experienced Fire Incident experienced Low Level. Meaning to say, 25 of the respondents had faced property and material casualties of Php 10,000.00 below. Table 7 shows a breakdown of the cases with Low LFI:

Table 7. Cases of Low Level of Fire Incidence in Tarlac City

Low (P10, 000-below)		
BARANGAY	<i>f</i>	<i>%</i>
Brgy Balete, Tarlac City	1	4%
Brgy San Sebastian Tarlac City	3	12%
Brgy. San Nicolas Tarlac City	2	8%
Brgy. San Vicente, Tarlac City	1	4%
Brgy. San Manuel Tarlac City	1	4%
Brgy. San Rafael, Tarlac City	2	8%
Brgy. Cut Cut II, Tarlac City	1	4%
Brgy. Tibag, Tarlac City	2	8%
Brgy. San Jose, Tarlac City	1	4%
Brgy Maliwalo, Tarlac City	1	4%
Brgy. Mabini, Tarlac City	1	4%
Brgy. Binauganan, Tarlac City	1	4%
Brgy. Matatalaib, Tarlac City	1	4%
Brgy. San Miguel, Tarlac City	2	8%
Brgy. San Pascual, Tarlac City	1	4%
Brgy. Aguso, Tarlac City	1	4%
Brgy. Tibagan, Tarlac City	1	4%

Brgy. Sto Cristo, Tarlac City	1	4%
Brgy. Ungot, Tarlac City	1	4%
TOTAL	25	100%

The most affected barangay is brgy. San Sebastian, with a frequency of 3 cases at 12%. Moderately affected ones are brgy. San Nicolas and brgy. Tibag with each reported 2 cases, accounting to 8% on both. As previously stated by Shokouhi et al (2019), fires in residential areas have many factors such as cultural, economic, social, and geographical. In the cases of barangays San Sebastian, San Nicolas, and Tibag, factors related to economic and social lean more, since they share similarities of being crowded.

It can be believed that these three barangays should be targeted for call to actions, such as proposed measures on emergency preparedness training. By prioritizing these three that has slightly higher frequencies, Tarlac City can reduce the number and severity of fire outbreaks.

Meanwhile, Table 8 lists down a breakdown among the households which experienced a Moderate LFI.

Table 8. Barangays with Moderate Frequency of Fire Incidence

Moderate (P10,000 – P299,999)		
BARANGAY	<i>f</i>	%
Brgy Balete, Tarlac City	1	6.67%
Brgy. Laoang Tarlac City	1	6.67%
Brgy. San Vicente, Tarlac City	2	13.33%
Brgy. San Isidro, Tarlac City	2	13.33%
Brgy. Tibag, Tarlac City	3	20%
Brgy Maliwalo, Tarlac City	1	6.67%
Brgy. Ligtasan, Tarlac City	2	13.33%
Brgy. Burot, Tarlac City	1	6.67%
Brgy. San Roque, Tarlac City	1	6.67%
Brgy. Baras-Baras, Tarlac City	1	6.67%
TOTAL	15	100%

It shows that 32.61% of the respondents have experienced a Moderate LFI. Meaning to say, a total casualty of Php 10,000.00 – Php 299,999.00 was declared from their case. The most affected ones are brgy. Tibag, totaling at 3 cases, followed by barangays San Vicente and Ligtasan with each 2 reported cases.

Moderate-level flare-ups are typically distinguished from low-level by defining its severity and impact, particularly in terms of property damage, containment efforts, and consequences. As previously mentioned, the amount of damages are the major indicator for this study, hence the Php 10,000-299,999 can be an accurate measuring tool, because these amount can often resolved with minimal intervention.

In an article reported from the National Fire Protection Association (NFPA), they show the common causes of fire. They are, presumably: faulty electrical wiring, electrical wires, improper storing of flammable elements, and light connections. The target areas of action should clearly be prioritized on areas like Tibag, San Vicente and Ligtasan.

Table 9 provides a breakdown on the Intense Level cases of Fire Incidence in Tarlac City.

Table 9. Barangays with Intense Frequency of Fire Incidence

Intense (P300,000 - above)		
BARANGAY	<i>f</i>	%
Brgy. Sepung Calzada, Tarlac City	1	16.67%
Brgy. Ligtasan, Tarlac City	2	33.33%
Brgy. Matatalaib, Tarlac City	1	16.67%
Brgy. Mapalacsiao, Tarlac City	1	16.67%
Brgy. Tibagan, Tarlac City	1	16.67%
TOTAL	6	100%

Lastly, 13.04% among the respondents have experienced the Highest LFI from the years 2021-2024. Meaning to say, a casualty of greater than Php 300,000.00 has been declared from the reported case of Fire Incidence.

Brgy. Ligtasan is the highest percentage of destructive fire incidence with 2 cases in the last 3 years and 6 months. This could indicate that residents in brgy. Ligtasan has increased vulnerability to fires, such as crowded houses, improper usage of electrical equipment, and inadequate fire prevention. Especially as stated by Coppola (2015), urban areas have higher chances on fire incidences.

The remaining barangays all have 1 reported case of intense fire incidence. With each contributing 16.67% of frequency, these cases vary in causes of trigger. It can indicate that an even occurrence of fire in those areas from 2021 up until June of 2024 may seem not extremely widespread and frequent.

However, it can be noted that even though one incident occurs in a barangay in four years, it does not mean that the incidence has low-level affects. This finding exposes how these particular areas have higher exposure. Hence, what should be done is to analyze what possible causes for highest LFI accidentally occur. In the study by Cristobal et al (2016), strategies undertaken so far in mitigating these high-intensity fires are immediate alert to local fire authorities. That alone should be enough as to why updated, more effective strategies should be proposed and considered.

In Table 10, the breakdown of the 46 fire incidents are listed in the province of Tarlac with their corresponding Level of Incidence and Amount of Damage.

Table 10. Level of Incidence in Tarlac City

BARANGAY	LEVEL OF INCIDENCE	<i>f</i>		% (N=46)	R
Brgy. Tibag, Tarlac City	M	3	5	10.87%	1
	L	2			
Brgy. Ligtasan, Tarlac City	I	2	4	8.70%	2
	M	2			
Brgy San Sebastian Tarlac City	L	3	3	6.52%	3
Brgy. San Vicente, Tarlac City	M	2	3	6.52%	4
	L	1			
Brgy Balete, Tarlac City	M	1	2	4.35%	5
	L	1			
Brgy. San Nicolas Tarlac City	L	2	2	4.35%	6
Brgy. San Rafael, Tarlac City	L	2	2	4.35%	7
Brgy. San Isidro, Tarlac City	M	2	2	4.35%	8
Brgy Maliwalo, Tarlac City	M	1	2	4.35%	9
	L	1			
Brgy. Matatalaib, Tarlac City	I	1	2	4.35%	10
	L	1			
Brgy. San Miguel, Tarlac City	L	2	2	4.35%	11
Brgy. Tibagan, Tarlac City	I	1	2	4.35%	12
	L	1			
Brgy. Laoang Tarlac City	M	1	1	2.17%	13
Brgy. San Manuel Tarlac City	L	1	1	2.17%	14
Brgy. Cut Cut II, Tarlac City	L	1	1	2.17%	15
Brgy. San Jose, Tarlac City	L	1	1	2.17%	16
Brgy. Sepung Calzada, Tarlac City	I	1	1	2.17%	17
Brgy. Mabini, Tarlac City	L	1	1	2.17%	18
Brgy. Binauganan, Tarlac City	L	1	1	2.17%	19
Brgy. Burot, Tarlac City	M	1	1	2.17%	20
Brgy. San Pascual, Tarlac City	L	1	1	2.17%	21
Brgy. San Roque, Tarlac City	M	1	1	2.17%	22
Brgy. Mapalacsiao, Tarlac City	I	1	1	2.17%	23
Brgy. Baras-Baras, Tarlac City	M	1	1	2.17%	24
Brgy. Aguso, Tarlac City	L	1	1	2.17%	25
Brgy. Sto Cristo, Tarlac City	L	1	1	2.17%	26
Brgy. Ungot, Tarlac City	L	1	1	2.17%	27
TOTAL		46	46	100%	

Legend: L-low; M-Moderate; I-Intense

Low level of incidence describes fire damages with costs of Php 10,000.00 and below. Meanwhile, as for the Moderate level of incidence, the number of damages can range from Php 10,001.00 to Php 300,000.00. When damages amount from Php 300,000.00 and above, they are considered severe or Intense level of incidence.

By ranking the 46 barangays as summary of frequent reported cases of fire, the table clearly presents that barangays Tibag and Ligtasan have the highest incidences, Tibag with 5 incidents in total while Ligtasan had 4. Moreover, several barangays have equal amount of 2 incidents, each contributing 4.35%. While the lowest incidence with only a single case can be interpreted as having low risks of fire.

It can be interpreted that Brgy. Tibag's urban characteristic contribute to the high fire incidence. As previously mentioned by Shokouhi et al (2019), geography is a major factor of causing fire, and with Brgy. Tibag's geolocation, it can be assumed that there is a dense, populated urbanization, or even high exposure to fire hazards (such as commercial activities near household residences).

Brgy. Ligtasan being second top, however, aligns with Table 9. It reinforces the idea that Brgy. Ligtasan's place is a fire-prone area. Assumptions such as systematic issues (electrical malfunctions) and socioeconomic issues (potential presence of informal settlements or inadequate infrastructure) are two of the major causes why.

2.2 Frequency of Fire Incidence

Starting from the year 2021 up to 2024, 46 cases of Fire Incidence were recorded in Tarlac City. As per the recommendation of BFP, these cases were sought, and the victims became the primary respondents of this study. Collectively, table 11 presents the level of frequency of Fire Incidence in Tarlac City. Ranking from the most frequent, down to the least frequent, with their corresponding Level of Incidence and percentage in the total population.

Table 11. Summary of Level of Fire Incidence (LFI)

LEVEL OF INCIDENCE			
	<i>f</i>	%	<i>R</i>
LOW (10,000 below)	25	54.35%	1
MODERATE (10, 000 -299, 999)	15	32.61%	2
INTENSE (300, 000 above)	6	13.04%	3
	46	100%	

Low Levels of Fire Incidence remain at peak ranking 1st or the most frequent case of Incidence, followed by Moderate LFI, while the least frequent belonged to Intense LFI.

While barangays Tibag and Ligtasan are evident hotspots of fire accidents, it should be duly noted that most areas in Table 10 experience moderate to low fire incidents, and should be recognized as also costly, especially if residents that were victims of fire financially struggles to begin with. Hence, focused interventions should be practiced not only on the most frequent barangays, but to all.

3. Significant correlation between the safety awareness and level of incidence of fire in Tarlac City

As this study centers on providing correlational results, the relationship between LFSA and LFI in Tarlac City becomes the main focal point as it is also the aim. As observed, there are several important observations that limits the study's findings.

Applied is the Pearson product-moment correlation that assessed the relationship between fire safety awareness and fire incidence levels among households in Tarlac City. The findings show that there is no significant relationship between the two variables ($r = .117, p > .05$).

Table 12
Correlation between Level of Awareness of Fire Safety and Level of Fire Incidence

Correlations			
		Level of Awareness of Fire Safety	Level of Incidence
Level of Awareness of Fire Safety	Pearson Correlation	1	.117
	Sig. (2-tailed)		.439
	N	46	46
Level of Incidence	Pearson Correlation	.117	1
	Sig. (2-tailed)	.439	
	N	46	46

The data collected shows that nearly all participants show a high LFSA on the four measured indicators (house conditions, electrical connection, kitchen conditions, and house exits and outdoor spaces). Hence, there is high LFSA, implying not significant results.

4. Problems Encountered by Households and Personnel

In this section, results of frequent encountered problems of both the household-respondents and the BFP personnel, ranked from the most frequent problem to the least.

4.1. Households

Table 8 presents the top 10 ranking of most encountered problem of households, making the majority reported that they do not have access to or are unaware of emergency hotline number for their nearest fire station, which contributes to the delay of emergency response in case of fire (81.82%).

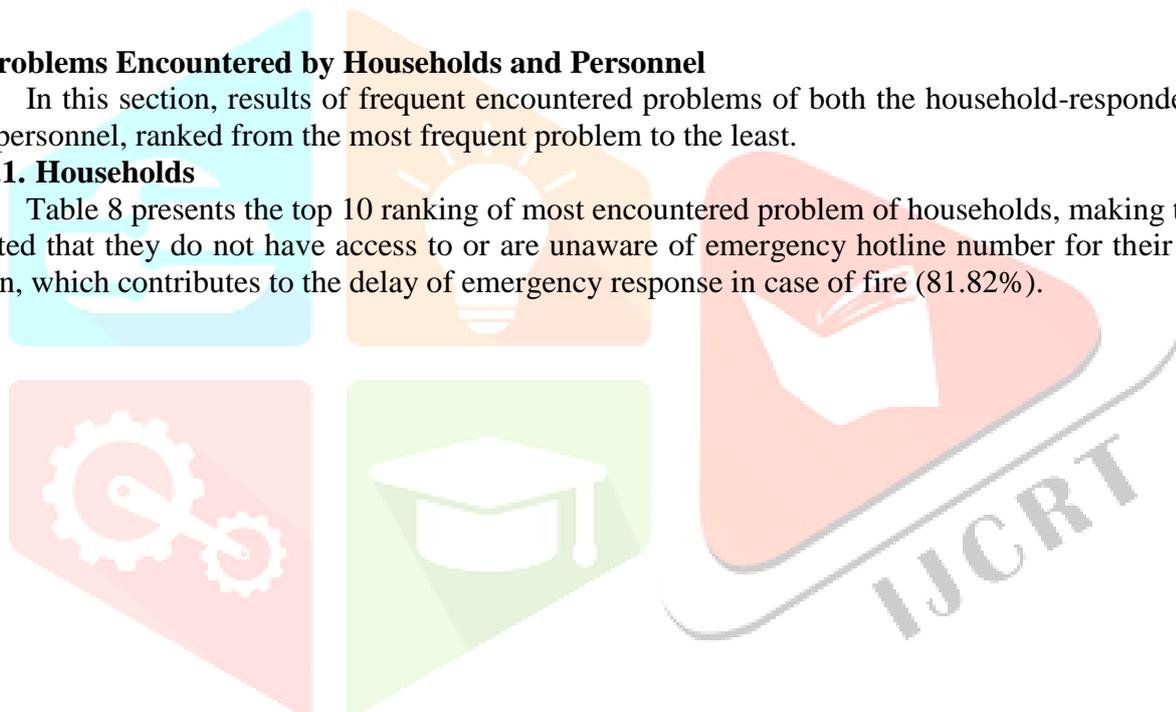


Table 13
Problems Encountered by the Household-Respondents

PROBLEMS	<i>f</i>	%	R
No available emergency hotline number at the nearest fire station.	18	81.82	1
No one in the households practice exit drills in the home.	14	63.64	2
Lack knowledge in using fire extinguisher.	14	63.64	3
Not involving, participating, and joining in activities related to household fire safety	12	54.55	4
No readily firefighting equipment at home	10	45.45	5
Lack of awareness about house fire safety tips	5	22.73	6
Cables and electrical safety outlets are improperly installed	4	18.18	7
No designated area for smoking at home	3	13.64	8
Careless storage of kitchen igniter, matches, candles, and other materials can lead to accidents due to a child's curiosity	3	13.64	9
Disorganized cooking equipment.	2	9.09	10

Ranked as third frequent problem is the unfamiliarity of fire extinguisher usage. With a percentage of 63.64%, there is an equal number of respondents who are both not practicing drills nor proper usage of fire extinguishers, indicating a lack of training in handling firefighting equipment. The unfamiliarity of using fire equipment, lack of awareness of fire safety tips, and no household practices on drill are already looked into by different studies, such as in Diekman's dissertation (2014).

Diekman's paper evaluated six fire safety educations by public fire educators from fire brigades. Through interviewing fire educators, observing each program in action, and conducting focus group discussions with older adults-respondents, it revealed that there were three factors and three challenges that contribute to the effectiveness and success of facilitating educational programs. Three factors are: 1) established relationships between educators and respondents, 2) rapport with older adult audience, and 3) presentation relevance. While challenges include: 1) lack of standardized curriculum and implementation strategies, 2) attendance difficulties, and 3) physical limitations due to age.

In Diekman's, fire safety education is argued to be developed for certain audiences and in this case, older adult populations. This argument can reflect the ways of which BFP's fire safety education is taught in different age range: schools with students from kinder to high school, residential areas with mostly older people, and workplace settings with working adults. It can be recommended in the later pages that public fire educators should address the specific needs of their local community, so as participation can increase.

Additional less frequent issues include unsafe exits, improper storage of flammable materials, unregistered electrical appliances, lack of kitchen ventilation, obstructed exit doors, and unfamiliarity with circuit breaker locations. None of the respondents reported having blocked exits or not knowing the circuit breaker's location, indicating these are not common issues.

To summarize, the most prominent issues are related to lack of fire preparedness (not practicing exit drills, not knowing how to use fire extinguisher, no ready emergency hotline information). With these presented, findings suggest a need for increased fire safety education and accessible firefighting resources in households.

4.2. BFP Personnel

To supply a perspective from BFP personnel, Table 9 presents challenges faced personally by respondents from BFP employees. The most frequent issue reported by BFP personnel is the households' unfamiliarity with TPASS acronym (73.91%) followed by improper garbage segregation of households (71.74%), and flammable materials unsafely stored (63.04%).

Many households claim they are not familiar with the TPASS (Twist, Pull, Aim, Squeeze, Sweep) technique for using fire extinguishers, which indicates a lack of training on fire safety equipment. This particular statement mirrors the households' point-of-view mentioned in Table 11. Improper garbage segregation, particularly in areas with open and flammable spaces such as farm lots, pose several fire risks and hinder firefighting efforts. Same goes with cluttered or obstructed spaces that are frequently seen at informal settlers' residences. Furthermore, disorganization and lack of cleanliness in homes are common, especially for those with cramped residences (e.g. informal settlers).

Table 14
Problems Encountered by the BFP personnel

PROBLEMS	<i>f</i>	%	R
The households are not familiar with the acronym TPASS while using fire extinguishers.	34	73.91	1
No proper segregation of garbage of the households.	33	71.74	2
Flammable materials are unsafely stored.	29	63.04	3
Unrecognized by the households as a member of firefighting teams.	26	56.52	4
No available firefighting equipment.	20	43.48	5
Uncooperative households in conduction of inspections, discussions, and drills.	10	21.74	6
No proper electrical wirings and connections.	9	19.56	7
Outlets are not well maintained.	7	15.22	8
No available main circuit breaker.	6	13.40	9
Liquified Petroleum Gas (LPG) is not properly stored.	6	13.40	10

In 2019, Walls et al presented an overview of various interventions that can improve fire safety in informal settlements. The study examined how different interventions serve to different settlement areas (under bridges, side of roads, etc.). Walls et al argued that it must be understood by public servants that holistic approach is required, and participation on both sides (the settlers and the agencies) can make the interventions more effectively applied. Similarly, a paper examining the roles of community actors was presented by Ngau in 2020. It showed that despite the frequency of fire outbreaks in informal settlements that leads to large-scale devastations, they remain undocumented, and it shows that different stakeholders contribute to this unfortunate.

Reflecting on this study, it can be said that disorganized residences or cramped spaces are potential fire hazards that makes it challenging for BFP personnel to navigate during emergencies.

Moreover, BFP note being recognized as firefighting teams ranked 4th, which is alarmingly high. Going back to Ngau's study, city fire stations and other agencies that can respond to calls of fire outbreaks are minimal. Some city fire stations face operational challenges in serving rescue operations (particularly in informal settlements), due to this delay, people slowly lose confidence in turning to these kinds of agencies for fire-related incidences. To add, statements made by BFP personnel upon informally interviewing reveals that people often stereotype them as "just firefighters", officers that do not concern with other risks as well unlike other agencies (e.g., the City Risk Reduction and Management). Little to no available firefighting

equipment ranks fifth, followed by uncooperative households, no proper electrical wirings, poorly maintained outlets, no available main circuit breakers, and LPGs improper storage.

These issues suggest the need for greater public awareness on BFP's role, mandate, and public education on fire safety to contribute in reducing risks and unnecessary hazardous areas. In a study conducted by Kurata et al (2022), it showed how the Philippines' fire safety measures are limited in only education on fire extinguisher usage, fire escape planning, flammable materials storage requirements, and electrical wirings and appliances inspection compliance, yet some of the most effective measures include trainings on drills, emergency exits, and establishing escape plans. However, based on the findings, this are not enough.

It can be strongly stated that it is not a matter of what training should be done but the matter of frequency and participation. The BFP have high regards towards knowledge transfer programs to barangays and yet, participation is low as shown in the 6th most frequent problem encountered.

5. Proposed Measures

In this section, proposed solutions are aimed at mitigating the challenges faced by both household-respondents and BFP officers not only centering on fire safety education. through leveraging analysis by experts and practices proven effective by other fire-related agencies abovementioned.

Households in Tarlac City have similar problems in fire safety awareness. Basing on the findings, these issues are centered on lack of participation and willingness to be educated on fire safety measures, creating an effect-after-effect of emerging problems. As such, the emphasis on knowledge transfer should be magnified and recognized by both parties: households and BFP officers.

Table 15. Proposed Measures to Mitigate the Problems Encountered by Household-Respondents

Problems	Measures	Objectives	Strategies	Expected Outcomes
No Available Emergency Hotline Number	Twist, Pull, Aim, Squeeze (TPASS) Education Campaign	To ensure households have quick access to emergency services during fire outbreaks.	Distribute printed materials and posters with updated emergency hotline numbers to every household.	Faster response times from the nearest fire station, reducing fire damage and casualties.
No Practice of Exit Drills at Home	Implementing proper disposal policies	To train families in the area on how to evacuate safely and effectively during a fire	Conduct community-led fire evacuation drill workshops for households	Increased preparedness and reduced panic during real fire emergencies
Lack of Knowledge on How to Use Fire Extinguishers	Organize hands-on training sessions to teach proper fire extinguisher use.	To equip household members skills on effectively handling small fires	Offer subsidized safety cabinets for households, inspect storage areas with local government units, create video campaigns for storage practices	Enhanced ability to contain fires at the source, preventing escalation
Lack of Participation in Fire Safety Activities	BFP establishing proper introduction and wearing of proper work suit	To promote active involvement in fire safety awareness and education	Encourage barangay-wide participation by offering incentives (e.g., certificates or raffles) for attending fire safety programs	Increased community engagement and improved overall fire safety practices

No Readily Available Firefighting Equipment at home	Partnerships with local government units (LGUs) in subsidizing and donating cost-effective firefighting equipment	To ensure every household has basic tools to respond to fire emergencies	Collaborate with local government units (LGUs) to provide subsidized or donated firefighting equipment (e.g., fire extinguishers and fire blankets)	Quicker fire suppression, reducing damage and casualties
Lack of Awareness About Fire Safety Tips	Awareness Campaigns both traditional and digital prints, such as distribution of flyers and use of social media	To educate households on common fire hazards and preventive measures	Launch a multimedia awareness campaign (flyers, social media, local radio) sharing fire prevention tips	Improved fire prevention habits and reduced occurrence of household fires
Improper Installation of Electrical Outlets and Cables	Provide free or subsidized electrical safety inspections by licensed electricians	To identify and correct unsafe electrical installations in households	Partnering with electric cooperatives in dealing with proper and safe inspection and installation of outlets	Reduced risk of electrical fires caused by faulty wiring or overloaded circuits

Problems	Measures	Objectives	Strategies	Expected Outcomes
No Designated Area for Smoking at home	Usage of sand buckets and installing outdoor ashtrays and cigarette receptacles	To prevent fires caused by improperly discarded cigarette butts indoors	Encourage households to establish a designated outdoor smoking area equipped with a sand bucket for cigarette disposal	Decreased risk of accidental fires due to smoking
Careless storage of kitchen igniter, matches, candles, and other materials can lead to accidents due to a child's curiosity	Provision of emergency kits and proper storage in lockable cabinets or spaces	To minimize the risk of flare-ups caused by children's access to flammable items	Distribute storage safety kits (e.g., lockable containers) for flammable materials and provide guidance on proper storage	Safer storage practices and reduced fire hazards in households
Disorganized Cooking Equipment	Cooking seminars and games in local barangays with households' participation	To prevent kitchen fires caused by clutter or malfunctioning equipment	Conduct cooking safety workshops focusing on kitchen organization and proper equipment maintenance	Safer cooking environments with reduced fire risks

In addressing fire safety control in local households, specifically in communities where incidents are frequent (such as Brgy. Tibag and Brgy. Ligasan), one must be critical and detailed in providing measures fitted to resolve the issue. Based on the challenges respondents encountered, several proposals can be considered to improve fire safety preparedness.

The absence of readily available emergency hotline numbers already delays the response times of BFP during fire outbreaks. As such, a way to address this is to actively disseminating hotlines through social media

and traditional prints. The objective is to ensure every household can quickly contact emergency services when needed.

Second, the lack of exit drills practiced in households can be caused by both parties, hence willingness to teach (BFP) and learn (households) is a crucial step in order for this proposed measure to be implemented well: promoting workshops to teach families how to conduct fire evacuation drills. By doing so, confidence in local residences can be urged.

Third problem is the significant proportion of households not knowing the use of fire extinguisher. To address this, hands on training must simply be conducted. Demonstrations of proper techniques like TPASS can easily be spoon-fed. By conducting said measure, it can be expected that enhancement on their ability to control fire can be seen. Not only that, but encouraging participation in fire safety activities can also be an impactful way of raising awareness in homes. It can be done so by offering incentives, organizing raffles, and mixing entertainment in discussions and seminars.

Collaborating with local government units (LGUs) to provide subsidized or donated firefighting equipment is another proposed measure to combat against the problem of having little to no readily equipment available. In actively seeking households to have such equipment can result in quicker fire suppression and reduction of property damage and injuries. Another collaboration would be with electrical cooperatives. By partnering with them, they can provide proper and subsidized inspections on electrical outlets at households. This is to address the potential electrical issues especially in areas where electrical wirings are looking outdated.

Smoking indoors are also a problem needed to be compromised, as a realistic take on this is that many smokers cannot be told to simply quit. As such, compromising with installing outdoor cigarette disposals near vicinities of each house can be conducted. This aims to prevent accidental fires caused by discarded cigarette butts and contribute in mitigating waste disposal. By doing this, it can be expected that there will be a decrease in fire outbreaks related to smoking.

Careless storage of flammable materials and disorganized cooking equipment are the two last challenges faced by the respondents, especially in households with children. Measures that can be recommended in combating against these are distributing lockable storage containers and inviting households in cooking sessions and kitchen safety workshops. The goal here is to reduce fire risks caused by clutter and hazardous materials.

By addressing these ten problems encountered by the household-respondents, significant improvement in their overall preparedness can be a great outcome. With the cooperation of households, local government units, BFP personnel, and other community organizations. These interventions can create a more fire-resilient communities.

Moreover, struggles by BFP officers are another can of worms opened, and it must not be taken lightly. By being detailed in separating BFP officer-respondents from household-respondents, proposed measures fitted to resolve each issue are created, shown in Table 16.

Table 16. Proposed Measures to Mitigate the Problems Encountered by BFP Officers

Problems	Measures	Objectives	Strategies	Expected Outcomes
Households unfamiliar with TPASS while using fire extinguishers	Twist, Pull, Aim, Squeeze (TPASS) Education Campaign	To improve awareness on different fire safety techniques	Training workshops and seminars on different sitios and barangays and creative social media marketing promoting the TPASS technique	Reduction in fire-related damages and improvement on fire response swiftness
No proper segregation of garbage	Implementing proper disposal policies	To ensure proper disposal of potential flammable materials and reduce risks by promoting cleaner areas	Replacing old trashcans with color-coded ones, inspecting waste audits, conducting workshops on proper waste segregation practices	Reduced risks of fires caused by combustible mixed waste, "rubbish fire", and cleaner environment.
Flammable materials not safely stored	Guiding households on how to properly store flammable materials	To minimize fire hazards of flammable substances in waste	Offer subsidized safety cabinets for households, inspect storage areas with local government units, create video campaigns for storage practices	Lower likelihood of accidental fires and improved safety in residential spaces
Unrecognized as member of firefighting team	BFP establishing proper introduction and wearing of proper work suit	To establish a clear and recognized system of firefighting individuals and mitigate looming stereotypes	Awareness campaigns promoting the role of BFP and other related agencies, conduct ocular visits on vulnerable communities	Clear identification of authorized firefighting team members, improved coordination with households during emergency response, and established trust in firefighting teams
No available firefighting equipment	Providing accessible and low-cost firefighting equipment to households with LGUs	To equip residences with necessary tools to combat fire while being cost-friendly	Partner with Local Government Units on procuring and distributing firefighting equipment, offer other low-cost alternatives, recruit volunteers and donations from private sectors	Increased capability to respond swiftly and minimizing damage and fatality.
Uncooperative households on inspections, seminars, and drills	Engaging residences in creative community programs	To educate and engage residences in active fire prevention measures and emergency preparedness	Creative community programs on Fire Safety Education such as drill simulations, literary competitions, quizzes and motivate participants with tokens	Well-informed households, increased participation in fire safety education programs, and overall preparedness for emergencies.

No proper electrical wirings and connections	Weekly and Monthly Routine Inspections of Electrical systems and wirings	To comply and enhance routine inspections of potential faulty wiring in households	Coordinate with Electrical Cooperations on monthly or frequent conduction of inspections	Reduced risks of electrical fires, strengthened electrical safety, and improved reliability of power systems
Outlets not well maintained		To prevent electrical fires by maintaining and changing damaged outlets and wirings		Decrease in fire hazards caused by faulty outlets and well-maintained wirings

Problems	Measures	Objectives	Strategies	Expected Outcomes
No available main circuit breaker	Inspecting and Installing circuit breakers by house-to-house method	To protect electrical systems against short circuits and overloading	Spreading awareness on importance of circuit breakers by conducting public forums, coordinate with LGUs in installing circuit breakers	Amplified protection against electrical surges, reducing the risk of fire and damage to electrical appliances
Liquified Petroleum Gas (LPG) not properly stored	Distributing materials about LPG Storage Guidelines	To prevent accidents caused by improper and mishandling of LPG tanks	Conduct house-to-house visits to inspect LPG storage along with inspection of circuit breakers, distribute posters, post guidelines on social media platforms	Improved learning, fewer accidents or explosions caused by mishandling LPGs within households

Each encountered problem is leveraged by measures to undertake, its objective, proposed strategies, and expected outcomes if measures are implemented effectively. First, to address the issue of households' unfamiliarity on the Twist, Pull, Aim, Squeeze (TPASS) technique, a comprehensive TPASS education campaign is proposed as overall measure. Under this are strategies such as training and workshop conduction in various barangays in the city and utilizing creative social media marketing to promote the method. This aims to improve the awareness of not just TPASS but other techniques as well, reducing fire-related damages and improve the urgency of fire response.

Secondly, implementing proper disposal policies is recommended to mitigate the improper segregation of garbage. The goal is to ensure that safe disposal of potentially flammable materials and reduce related risks (fire and health), hence promoting cleaner spaces. Strategies include: replacing and color-coding trash bins, inspecting waste audits, and organizing workshops on proper waste segregation. By doing so, it can be anticipated that risk of fire, particularly rubbish fires, caused by mixed chemical waste is reduced.

Thirdly, improper storing of flammable materials can be mitigated by recommending BFP to guide households in every barangay proper storage technique, so that hazard exposure can be minimized. For this measure to happen, programs such as inspections of storage areas, subsidizing safety cabinets, and partnering with local government units should be conducted. The expected outcome of this is lower likelihood of accidental fires.

Based on the problem encountered by BFP personnel, majority answered that they experienced not being recognized by households as official team members of fire brigades. In order for residents to recognize them better, the BFP should establish proper introductions and ensure the proper wearing of working uniform. This proposed solution aims to create a clear and recognized system of firefighting personnel and stop the

stigma that firefighters exist just for fire emergencies. Awareness campaigns will promote the role of BFP, outreach activities can also be conducted in vulnerable communities. By doing these, it can be expected that there is better identification and recognition of authority, leading to residents trusting and understanding them more.

For the sixth encountered problem, it is strongly suggested that the BFP should establish a good collaboration with different local government units. With this partnership comes with mutual benefits of providing accessible firefighting equipment to households, solving the gaps and achieving affordability and accessibility of resources to combat fires first-hand. Seventh problem faces the resistance of households on participating on inspections, seminars, and drills. It can be proposed that programs fitted to the needs and entertainment of each community should be proposed. Strategies such as knowing how a community is entertained while being educated is a creative way for them to be piqued with interest and participation. Other strategies can also be creative programs such as drill simulations, literary competitions, quiz bees, and other where there are motivators or incentives. If implemented well, these can result to well-informed residents, greater participation, an overall preparedness for emergencies.

For issues of improper electrical wirings and outlets not well-maintained, the active implementation of weekly and monthly routine inspections is a fitting solution. The objective is to ensure compliance and detect faulty wirings, easily eliminating and replacing them. Strategies involve BFP coordinating with electric cooperative, leading to reduced risk of electrical fires. Especially that majority of fire incidence is caused by faulty electrical systems.

To resolve the non-existence of main circuit breakers at home, the main measure is to inspect and install circuit breakers through house-to-house approach. This will be achieved by coordinating with LGUs, raising awareness on public forums, and literally installing circuit breakers. The expected outcome is an amplified protection against electrical surges and kitchen fires.

Lastly, the problem on improper storage of Liquefied Petroleum Gas (LPG) usage in households can be easily mitigated by way of distributing educational materials. This measure aims to prevent fires, or even explosions caused by mishandling LPG tanks. Strategies to achieve this is to make house-to-house visits and inspections, distributing printed materials and clear instructions, and using social media platforms to post awareness.

6. Implications of the Study to Public Administration

In studies such as this—definitive role of the BFP in mitigating and suppressing fire risks all over Tarlac City—public administration only emphasizes the crucial role of BFP as public servants. The existence of the BFP as a response team centering on fire brigades. In a study by Rankin et al (2015), they mentioned that resilience and flexibility are two major key factors in many crisis management teams, and that a response team's performance can be enforced through developing formal routines that aim in enhancing said factors. This is based on the common characteristic of crisis situation: ambiguous and unpredictable.

As mentioned by Walls (2019), the existence of a response team provides a frontline for incidents to be reported, as many previous devastations remained underreported when response teams were underdeveloped. Hence, the establishment and creation of differing agencies cater to different catastrophes, especially natural disasters, not just decentralize authority but also focus on a specialized area of kind.

The non-significant correlation between fire awareness and fire incidence levels are not, if utmost, alarming in some way, since it should be a push to know more, to study, criticize, and scratch more of curiosity as to why the fire incidence remain moderate to intense. Questions that should loom now, more than ever, is fire awareness education really do not relate to frequent fire accidents? If not, then what causes it to remain this way? The study's findings now present a potential match stick to spark policymakers in forming and improving fire awareness-related policies.

Conclusions

The following conclusions were based on the findings of the study:

1. A high LFSA of respondents exists, yet their awareness still is irrelevant with the frequency of fire incidence within their residences.
2. There is a lack of correlation between the two variables. It can be concluded that variables a) awareness and b) fire incidence have little to no significant correlation.
3. Major issues such as inadequate Emergency resources and household practices - Basing from the results shown in difficulties experienced, households are majorly lacking in knowledge on fire safety practices, contrasting to the high level of awareness.

4. Households have limited knowledge in fire safety measures – respondents have a general idea on defining a fire extinguisher, but not its functions. Some respondents are also admittedly smoking despite the prohibitions in flammable areas.
5. Emergency preparedness is lacking in many households – despite the high level of awareness, households lack sense of preparation when emergency arises, based on findings such as the inadequacy of exit drills and firefighting equipment.
6. Despite the average results on house conditions (a 4.52 indicator of awareness), structural and household layout issues can still contribute to fire risks, especially with poor organization of indoor spaces and flammable materials.
7. Electrical and Kitchen Safety are the most common concerns – most fire hazards are from substandard electrical wiring, overloading outlets, and improper use and storage of kitchen equipment in households.
8. Problems encountered by BFP personnel reflect the working environment's gaps - The ranked issues by BFP personnel are clearly a call for the community to determine the causes and assess the gaps needed to improve, such as dissemination of information.
9. BFP Personnel face challenges due to improper practices of households – findings such as lack of cooperation, improper garbage disposal, and unfamiliarity on fire safety protocols are recurring problems face by BFP officers.
10. Collaboration is key for improvement - It should be duly noted that collaborative efforts between the two are required to improve the practices of both BFP and households
11. Implementation Gaps – While there may be fire safety protocols taught and learnt, their implementation is lacking at residential levels. Most programs are conducted in schools and workplace setups.
12. BFP personnel are stereotyped as only fire-response team, even though their mandate expands to other natural disaster risks. Due to this, people often categorize them as only firefighters and not as risk-reduction response teams.
13. Allocation Gaps – Limited access to firefighting equipment further heighten fire hazards.
14. False Sense of Security – Due to high levels of awareness, households can potentially underestimate the importance of proactive measures such as drills, proper storage, and usage of firefighting equipment.
15. Negative behavioral patterns are fire risks – Behaviors like careless handling of kitchen igniters, smoking, and improper storage of LPG at home can contribute to increasing potential fire incidence.
16. Proper Waste Disposal is not just an environmental practice – Waste disposal is often associated with caring for the environment, yet one of its important practices is to also prevent fire hazards.
17. Proper Waste Disposal is crucial in fire safety – combustible items (e.g. oily rags, batteries, papers, and plastics) in the households, when thrown, can have chemical reactions that may cause sparks or even explosions, triggering fire and spontaneous combustion.
18. Seminars and Workshops are not enough - Upon discussions of results, there is a distinct gap between the BFP officers and the residents from barangays in Tarlac, particularly in education on fire safety awareness. Simply having seminars are not enough to prevent fire incidents.
19. Community Engagement is essential - There is a need for more active engagement between the BFP and the households, as well as prioritizing or even subsidizing accessible equipment and emergency resources.
20. The role of Public Administration in promoting fire safety possess the need for initiatives such as community education is insurmountable as effectiveness of such policies can support and contribute to mitigate fire risks within Tarlac City.

Recommendations

Based on the conclusions of the study the following recommendations were drawn.

Using the provided data and results shown as reference, it can be majorly recommended that the BFP should prioritize strengthening their knowledge transfer seminars, such as expanding it from student and employee population to residents of barangays in Tarlac City. Other recommendations are:

1. TPASS training on residential areas - Trainings and public simulations on how to use fire extinguishers, especially on households that are not familiar with the method can be of help. To add, alternatives to fire extinguishers can also be shared as well.
2. Educational materials on Proper Waste Segregation - Because of waste segregation being the most frequent problem encountered by BFP personnel, it is important to establish and provide educational materials on safe and proper segregation practices, such as social media posting and additional learning in schools.

3. Frequency of Fire and Safety Drills in barangays – Encouragements for residents is to participate in the of fire and safety drills are frequently being conducted. By increasing the frequency of doing drills, not only do people can potentially be more interested in participating, but the coordination and partnership between officers of BFP and several barangays can be strengthened.
4. Active Fire Safety Inspections and Maintenance programs - Alongside fire and safety drills, fire inspections should also be active as well. Monthly checks such as electrical inspections, LPG and Kitchen Safety Checks, particularly on areas not ventilated well, should be conducted actively by BFP personnel. Additionally, promoting low-cost or Do-It-Yourself (DIY) methods can be options for residents as well.
5. Digitalization of Advisories - Enhancing accessibility of emergency hotlines not only by distribution through printed materials, but digitizing them by being active on social media platforms (Facebook, where most people have access to), have the power to be one call away from incidents.
6. Subsidizing Firefighting Equipment - Working with barangay officials, the city government, or even Non-Governmental Organizations (NGOs) that can provide low-cost or subsidized fire extinguishers to households that have no capacity to afford them can be a great way for residents to be more cautious of potential fire hazards.
7. Support for Vulnerable Households - It is a truth that should be acknowledged that the most prone households are informal settlers or houses built largely by wood. By identifying these certain minorities, the BFP can prioritize them by lending support, education, free inspections, and equipment provision.
8. Fire Safety Committees – formations of local fire safety committees in barangays that consists of trained volunteers can also be an option. They can assist in monitoring fire risks, guiding household inspections, and are frontline with the BFP in cases of emergencies.
9. Strengthen Public-Private Partnerships – the BFP can collaborate with private organizations and businesses on sponsoring firefighting equipment that can be distributed and easily accessed by residents among barangays.
10. Monitoring and Evaluating of Implemented policies – assessing regularity of fire safety awareness campaigns should be a necessity, so that the BFP can determine and measure if conducted programs are effective and if there are areas needed to be improved.

In summary, in the field of public administration, one of the best ways to resolve issues is to first determine the causes before providing recommended solutions. With these recommendations presented, it can be strongly stated that these will only be potentially effective if it is decentralized down to the most vulnerable local areas.

REFERENCES

- Aguilar, C. (2020). March is Fire Prevention Month. Retrieved from <https://pia.gov.ph/features/articles/1019379#:~:text=March%20is%20being%20observed%20as%20hazards%20and%20dangers%20of%20fire.&text=By%20virtue%20of%20Proclamation%20No.20, Marcos%20and%20Proclamation%20No.>
- Aquino, M. R., Quilan, G. P., and Avila, T. B. (2017). Capability of the Bureau of Fire Protection of Ilocos Sur in Responding to Emergencies. *IJERES*, Volume 30, Issue 6, ISSN (Online): 23459- 5219.
- Atienza, C. (2014) - Philippines sentences over 1996 Ozone Disco fire. <https://www.bbc.com/news/world-asia-30125553>
- Bajera, K. (2023). 5 reasons to get a fire detection and alarm system in the Philippines. *Industrial PH*. <https://industrial.ph/blog/reasons-to-get-a-fire-detection-and-alarm-system-in-the-philippines/>
- Balić, L., Sayed, A. E., Džidić, S., & Novalić, A. (2023). Evaluation of reality and standards for fire evacuation routes in buildings – case study. *IOP Conference Series Materials Science and Engineering*, 1298(1), 012029. <https://doi.org/10.1088/1757-899x/1298/1/012029>
- Beasley, M., Holborn, P., Ingram, J., & Maidment, G. (2018). Causes, consequences and prevention of refrigeration fires in residential dwellings. *Fire Safety Journal*, 102, 66–76. <https://doi.org/10.1016/j.firesaf.2018.11.001>

- Bonander, C. M., Jonsson, A. P., & Nilson, F. T. (2015). Investigating the effect of banning non-reduced ignition propensity cigarettes on fatal residential fires in Sweden. *The European Journal of Public Health*, 26(2), 334–338. doi:10.1093/eurpub/ckv180
- Burge, S. (2023, November 10). What are the 6 Classes of Fire? *International Fire & Safety Journal*. <https://internationalfireandsafetyjournal.com/classes-of-fire/>
- Burke, K. (2007). *Fire Protection Systems and Response*. CRC Press, Boca Raton, London New York.
- Byrne, D. (2016). *Fire Prevention. Prevention Problems and Solutions*. Retrieved from https://www.firehouse.com/preventioninvestigation/article/12233686/fireprevention-prevention-problems-solutions?fbclid=IwAR3Ws7X1Kt_20ohO11VQXSkGTP8ycsszLyLffsJpohcwjELAiGccp32c8Tg
- Cabrera, R., and Galupo, R. (2020). Quezon City Partners with BFP to Promote Fire Safety Measures. <https://www.philstar.com/nation/2020/02/11/1992080/quezon-city-partners-bfp-promote-fire-safety-measures>
- Calata, (2024). NV office is optimistic on BFP modernization - Nueva Vizcaya, Philippines. Nueva Vizcaya, Philippines - Naturally Vibrant and Watershed Haven of the Cagayan Valley. <https://nuevavizcaya.gov.ph/nv-office-is-optimistic-on-bfp-modernization/#:~:text=11589%2C%20otherwise%20known%20as%20the,firefighting%20and%20emergency%20response%20infrastructure.>
- Cariaso, B. (2023, December 31). BFP records 21.1 percent increase in fires in 2023. *Philstar.com*. <https://www.philstar.com/nation/2024/01/01/2322698/bfp-records-211-percent-increase-fires-2023>
- Chien, S.-W., & Wu, G.-Y. (2008). The strategies of fire prevention on residential fire in Taipei. *Fire Safety Journal*, 43(1), 71–76. doi:10.1016/j.firesaf.2007.04.004
- CNN Philippines Staff (2016). Fire Prevention Month: BFP to Carry Out House-To-House, Storytelling of Fire Safety. <https://cnnphilippines.com/news/2016/03/01/BFP-fire-preventionmonth.html?fbclid=IwAR1nOdo2g3GfWGALSAsMrHnusvKSPG3oI4gjmBAYXD8wiVKeH5iFi7z4PnY>
- Comediero and Faculty of College of Arts and Sciences, Batangas State University- Pablo Borbon Main I, Batangas City. Gandia, E. F. (2008). *Fire Prevention Program (FPP) of the Bureau of Fire Protection (BFP) in Urdaneta City*.
- Commission on Audit (2018). *Performance Audit Report PAO-2018-01, Bureau of Fire Protection Modernization Program*.
- Cote, A. E. (2003). *Operation of Fire Protection Systems*. National Fire Protection Association, Quincy, Massachusetts.
- Diamantes, D. (2016). *Principles of Fire Prevention*. CRC Press, Boca Raton, London New York.
- Diekman, S. T., Stewart, T. A., Teh, S. L., & Ballesteros, M. F. (2008). A qualitative evaluation of fire safety education programs for older adults. *Health Promotion Practice*, 11(2), 216–225. <https://doi.org/10.1177/1524839908318169>
- Faculty of College of Arts and Sciences, Batangas State University- Pablo Borbon Main I, Batangas City. Mata, K. E., and Bermudez, J. D. (2017). *Factors Affecting Front-Line Services of the Bureau of Fire Protection in the National Capital Region*.
- Faculty of Graduate School, Pangasinan State University, Urdaneta City, Pangasinan. Miller, D. M. (1973). *Effective Planning and Allocation of Fire Prevention Manpower*. De La Salle University, Manila, Philippines.
- Fransson, A. (2020). Reaching Those ‘Out-of-Reach’: An Explorative Case-Study of Fire Prevention in vulnerable urban communities within Copenhagen. Division of Risk Management and Societal Safety, Faculty of Engineering Lund University. <https://lup.lub.lu.se/luur/download?func=downloadFile&recordId=9036165&fileId=9036168>
- Food and Agriculture Organization of the United Nations (2020). *Fire management strategy*. <http://www.fao.org/forestry/firemanagement/strategy/en/>
- Friedson, S. (2024, May 10). *Understanding Fire Mitigation: Practices and benefits | Insurance Claim Recovery Support-Public Insurance*. Insurance Claim Recovery Support.

- Fu, M., Liu, R., & Zhang, Y. (2021). Why do people make risky decisions during a fire evacuation? Study on the effect of smoke level, individual risk preference, and neighbor behavior. *Safety Science*, 140, 105245. <https://doi.org/10.1016/j.ssci.2021.105245>
- IFSEC, (2020). The Leading Security, Fire and Safety Event in the Philippines. <https://www.ifsec.events/philippines/visit/news-and-updates/tragedy-fires-deathanddestructionphilippines#:~:text=FROM%202013%20to%202017%2C%20the,65%20billion%20every%20year.>
- Independent Fire and Safety Training, (2020). The Common Causes of Fire in the Workplace. <https://ifast-online.co.uk/the-common-causesof-fire-in-the-workplace/>
- International Association of Fire and Rescue Services. (2024). World Fire statistics. In [ctif.org](https://ctif.org/sites/default/files/2024-06/CTIF_Report29_ERG.pdf). https://ctif.org/sites/default/files/2024-06/CTIF_Report29_ERG.pdf
- Kim, Y., Cho, Y., Heo, H. K., & Lim, L. (2024). Estimating Casualties from Urban Fires: A Focus on Building and Urban Environment Information. *Sustainable Cities and*
- Kinateder, M., Comunale, B., & Warren, W. H. (2018). Exit choice in an emergency evacuation scenario is influenced by exit familiarity and neighbor behavior. *Safety Science*, 106, 170–175. <https://doi.org/10.1016/j.ssci.2018.03.015> Society, 105839. <https://doi.org/10.1016/j.scs.2024.105839>
- Kodur, V. K. R., Venkatachari, S., & Naser, M. Z. (2020). Egress parameters influencing emergency evacuation in High-Rise buildings. *Fire Technology*, 56(5), 2035–2057. <https://doi.org/10.1007/s10694-020-00965-3>
- Kurata, Y. B., Ong, A. K. S., Prasetyo, Y. T., Dizon, R. M., Persada, S. F., & Nadlifatin, R. (2022). Determining factors affecting perceived effectiveness among Filipinos for fire prevention preparedness in the National Capital Region, Philippines: Integrating Protection Motivation Theory and extended Theory of Planned Behavior. *International Journal of Disaster Risk Reduction*, 85, 103497. <https://doi.org/10.1016/j.ijdr.2022.103497>
- Lagata, L. S., Andujar, C. J., Lantaco, E. L. S., Manuales, K. C. A., Allanic, E. A., & Cuevas, J. F., Jr. (2022). Challenges encountered and insights of the Bureau of Fire Protection personnel towards responding fire incident. *Mediterranean Journal of Basic and Applied Sciences*, 06(02), 103–117. <https://doi.org/10.46382/mjbas.2022.6211>
- Li, R., Malalasekera, W., Ibrahim, S., & Liu, B. (2018). On the mechanism of pressure rise in vented explosions: A numerical study. *Process Safety and Environmental Protection*, 117, 551–564. <https://doi.org/10.1016/j.psep.2018.05.026>
- Longa, M., & Perena, E. (2024). Capability of Bureau of Fire Protection Personnel in Responding to Emergencies in the Province of Sorsogon. *Multidisciplinary International Journal of Research and Development*, 3(5), 2583–0406. <https://www.mijrd.com/papers/v3/i5/MIJRDV3I50010.pdf>
- Markowitz, S. (2010). Where There's Smoking, There's Fire: The Effects of Smoking Policies on the Incidence of Fires in the United States. doi:10.3386/w16625
- Messerschmidt. (2022). <https://www.nfpa.org/news-blogs-and-articles/blogs/2022/05/04/new-fire-in-the-us-report-highlights-factors-that-have-reduced-loss-in-the-days>
- Marquez, B. (2019). Fire hits 21-story Manila building; 1 dead and 5 injured. <https://abcnews.go.com/International/wireStory/fire-hits-21-story-manila-building-reports-injuries-62696383>
- Ngau, P. M., & Boit, S. J. (2020). Community fire response in Nairobi's informal settlements. *Environment and Urbanization*, 095624782092493. doi:10.1177/0956247820924939
- Open University (2020). Seminar on Fire Prevention and Fire Drill. <https://networks.upou.edu.ph/4759/seminar-on-fire-prevention-and-fire-drill-2/>
- Planet Fire and Security (2015). The Importance of Fire Safety Training. Retrieved from <https://www.planetfiresecurity.co.uk/blog/2015/11/9/the-importance-of->

fire-safety-training?fbclid=IwAR0MJZYwFcZHUaScZNfvgduXLkXBJcPyRWng70j4OGm-EeJvatlIKPoLRo

- Prri-Admin. (2022, March 11). Fire Prevention Month. Philippine Rubber Research Institute. <https://prri.da.gov.ph/fire-prevention-month/>
- Rankin, A., Dahlbäck, N., & Lundberg, J. (2011). A case study of factor influencing role improvisation in crisis response teams. *Cognition, Technology & Work*, 15(1), 79–93. doi:10.1007/s10111-011-0186-3
- Republic Act No. 9514 (2008). Fire Code of the Philippines of 2008.
- Republic Act No. 6975 (1990). Department of the Interior and Local Government Act of 1990.
- Rosales, L. G. (2019). BFP Calls for Fire Safety. https://car.bfp.gov.ph/bfp-calls-for-fire-safety/?fbclid=IwAR0HHG-oq8dwdal1dSFowBv00-_Q1_5kqNVKbpZSrQ2SxBANq-l0szjtYiUUP
- Seeram, E. (2019). An overview of correlational research. *Radiologic Technology*, 176–179. <http://www.radiologictechnology.org/content/91/2/176.short>
- Shokouhi, M., et al (2018). Preventive measures for fire-related injuries and their risk factors in residential buildings: a systematic review. *Journal of Injury and Violence Research*, 11(1).
- Spearpoint, M., & Hopkin, C. (2021). Household cooking oil use and its bearing on fire safety. *Journal of Fire Sciences*, 39(4), 265–284. <https://doi.org/10.1177/073490412111012994>
- S. R., Bais, P. C., and Gepaya, M. C. (2017). Efficiency of BFP Personnel in Responding to Fire Incidents as Perceived by Select Community Members in Batangas, City.
- Tafhim, K. (2024) - Can Candles be left burning overnight? Angel Lights Co. https://www.angellights.com.au/blogs/news/can-candles-be-left-burning-overnight?srsId=AfmBOor8Z5IO_IzflNmzGz4YU2J5ozvw9F5XXiqJGh0bPN-pcLMJ4nc5
- Umer, R. (2024, September 24). COSHH Risk Assessment: What it is and How to Do it. Occupational Health and Safety Blog. https://www.hseblog.com/how-to-carry-out-a-coshh-risk-assessment/#google_vignette
- Villa, M., & Ceballos, R. (2020). Analysis and Forecasting of Fire Incidence in Davao City. *Recoletos Multidisciplinary Research Journal*, 8(2), 35–50. <https://doi.org/10.32871/rmrj2008.02.03>
- Walls, R. S., Eksteen, R., Kahanji, C., & Cicione, A. (2019). Appraisal of fire safety interventions and strategies for informal settlements in South Africa. *Disaster Prevention and Management: An International Journal*, 28(3), 343–358. doi:10.1108/dpm-10-2018-0350
- Wong K. H., and Xie, D. Y. (2014). Fire Safety Management Strategy of Complex Developments. *ScienceDirect, Procedia Engineering* 71 (2014) 410 – 420