

# Earthquake and fire hazard risk perception: A study on the emerging Rangpur City of Bangladesh

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# INTRODUCTION

Earthquake and fire hazard risk perception

Rangpur City

Located in earthquake zone-I and zone-2.

3401 Fire Incidents in Last 5 Years

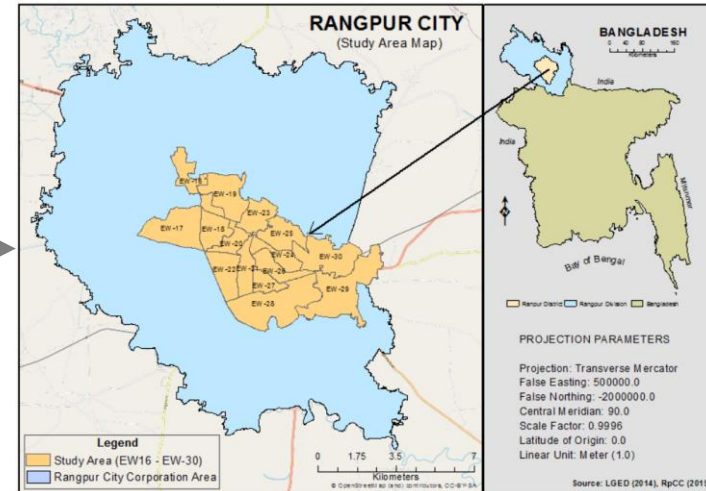


Figure : Study area map (Source: LGED, 2014; RpCC, 2019)

No study has been found on **disaster risk perception** in the context of **Rangpur City**



# RESEARCH OBJECTIVE/S

The overall objective is to assess the risk perception of earthquake hazard and fire hazards in RpCC

## Objective 1

To assess and map the risk perception of earthquake hazard and fire hazard of the residents of RpCC

## Objective 2

To investigate the influence of demographic and socio-economic factors on the risk perception of each hazard.

## Objective 3

To investigate the preparedness on earthquake and fire hazards.

## Objective 4

To propose planning guidelines and policy interventions (to meet SDG goal 11.B) for reducing these two hazards.



# RESEARCH METHODS

Adopted a mixed-method (quantitative and qualitative) approach.

## Risk Perception Index

Questionnaire	Number
Approached	600
Agreed and conducted	558
Error/Problematic	176
Kept for Analysis	382

A total of **nine** key **persons** were interviewed. Most of them are from the Rangpur City Corporation, Fire Service and Civil Defense, and local university.



# EARTHQUAKE RISK PERCEPTION INDEX

Total **eight questions/statements** were formulated/adapted (Kung & Chen, 2012; Paul & Bhuiyan, 2010; Shrestha et al., 2018) to calculate earthquake risk perception.

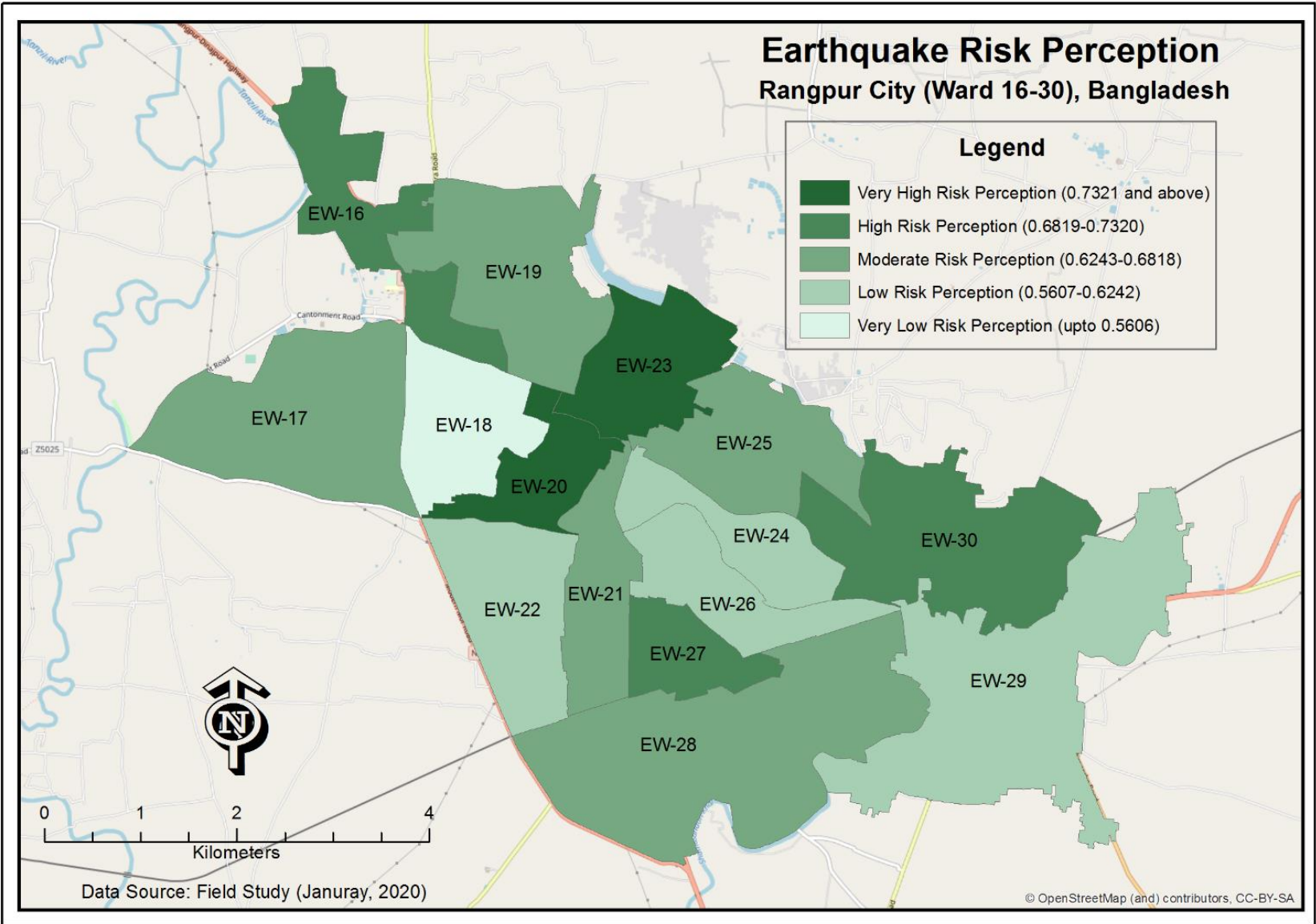
1. Did you witness or experience any earthquake?
2. Do you agree that a severe earthquake may hit your living place?
3. Do you agree that the earthquake will affect you and your family?
4. Do you agree that the earthquake may result in your property damage?
5. Do you agree that the earthquake may result in death and injury?
6. How fearful are you about a possible earthquake?
7. Do you have any first aid kit or any emergency kit to face earthquake occurrence?
8. Do you have any emergency exit for such type of situation?

$$\text{Seismic } RPI = \frac{P1+P2+\dots+Pn}{n} \dots\dots\dots \text{(Equation 4)}$$

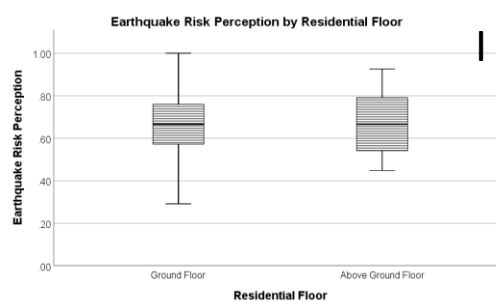
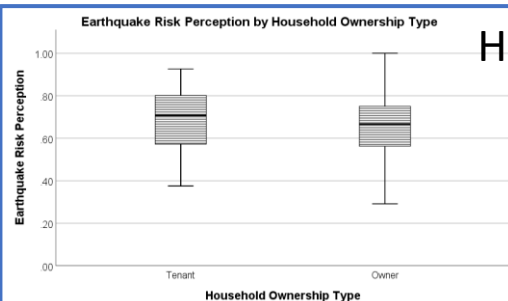
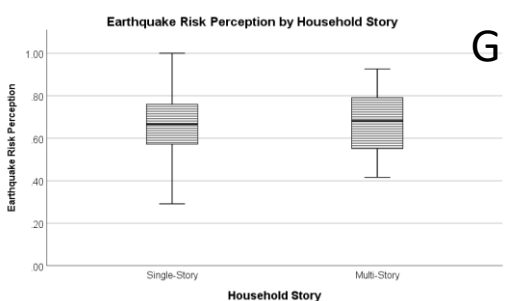
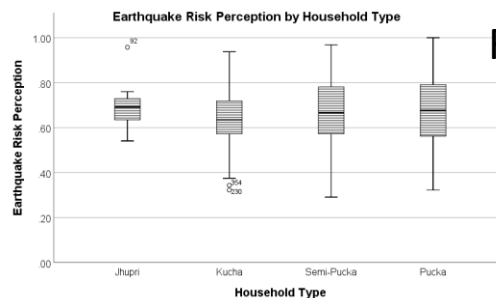
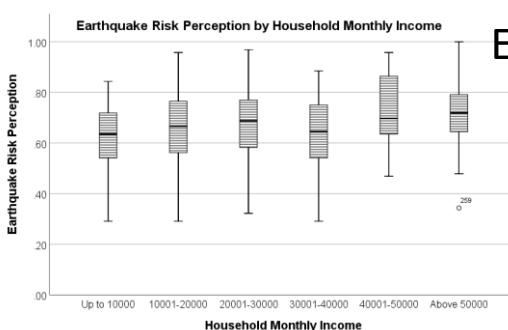
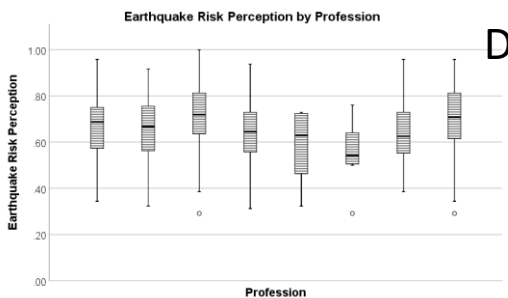
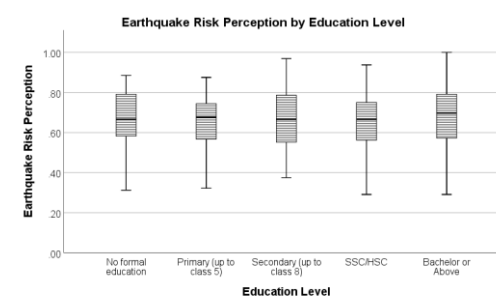
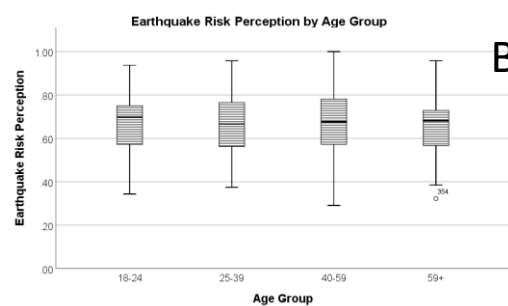
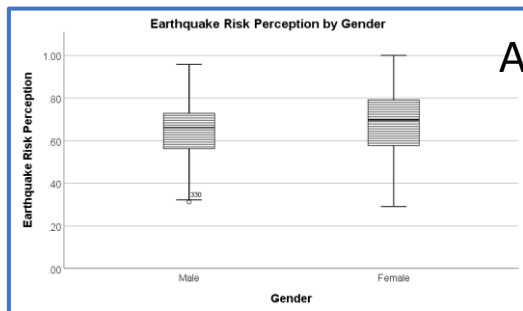
Where,

$P$  = score derived from the question/statement based on Likert scale and  
 $N$  = number of questions/statements.

# SPATIAL DISTRIBUTION OF EARTHQUAKE RISK PERCEPTION



# EARTHQUAKE RISK PERCEPTION & SOCIO-DEMOGRAPHIC FACTORS



**Women** have anticipated a **higher risk** of earthquake hazard as they are more **vulnerable** to this hazard.

**Tenants** have anticipated **more risk** of earthquake hazard than the house owners.



# FIRE RISK PERCEPTION INDEX

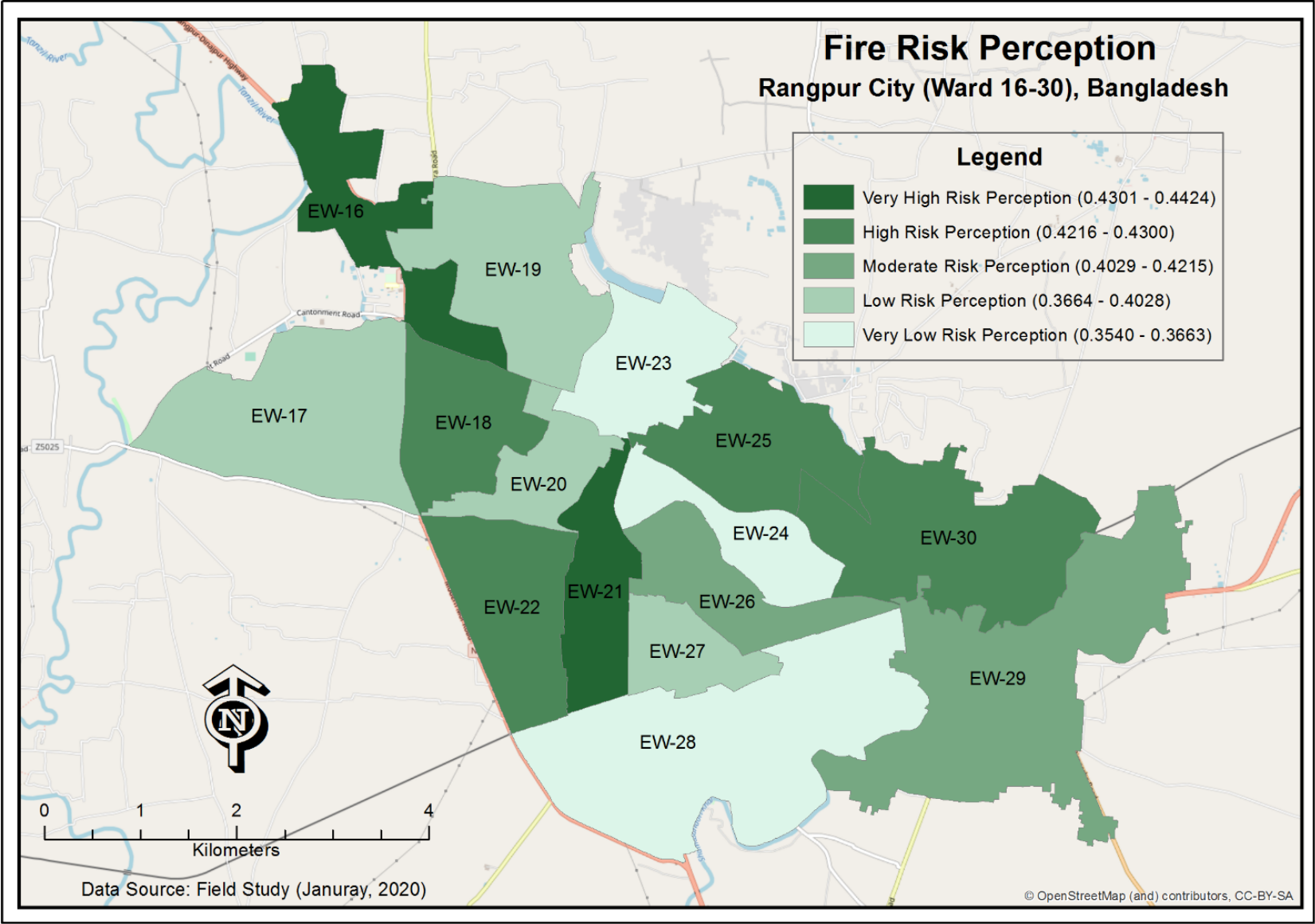
Total twelve questions/statements were formulated/adapted (Chan et al., 2018) to calculate fire risk perception.

1. Did you witness or experience any fire accident?
2. What is the level of risk of fire at your house do you think?
3. Do you think the fire can occur from cooker/stove at your home?
4. Do you go somewhere else or do other jobs while cooking?
5. How frequently you check the condition/status of your stove/cooker?
6. Do you think an electric short circuit can cause fire at your home?
7. How frequently you check the electricity line of your house?
8. Do you know where the electric main switch of your house is?
9. Do you use multi-plug at your home?
10. Do you have a fire extinguisher (e.g. fireball, fire blanket etc.) at your home?
11. Do you have a smoke detector and/or fire alarm at your home?
12. Have you ever participated in any fire drill?

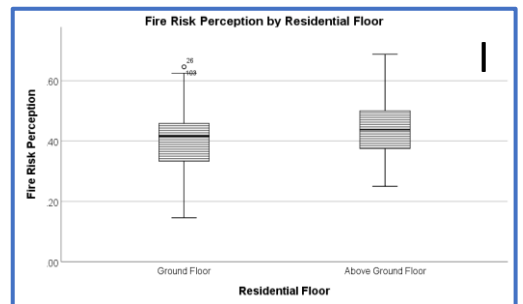
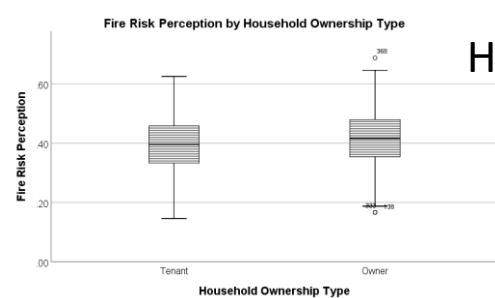
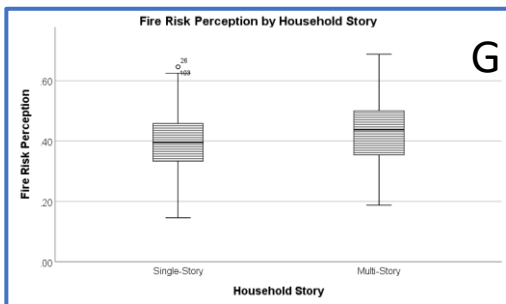
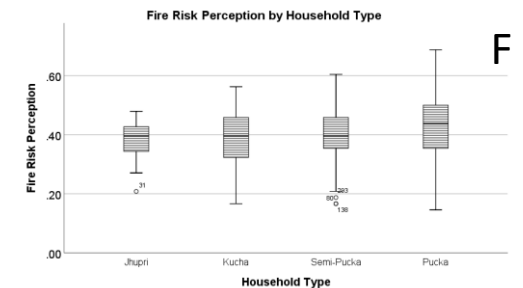
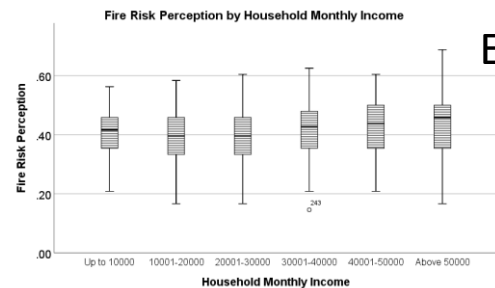
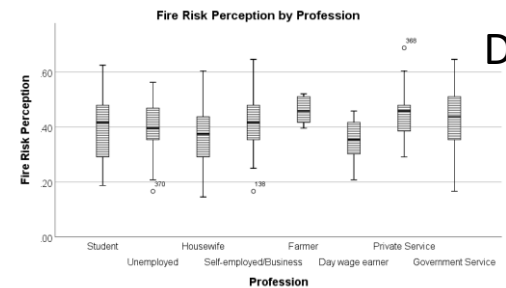
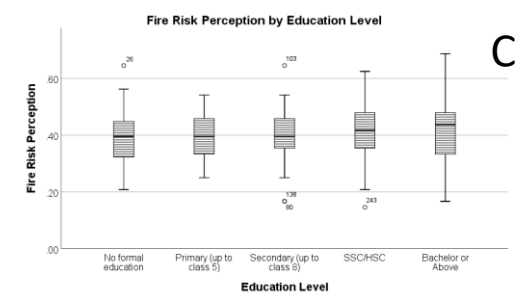
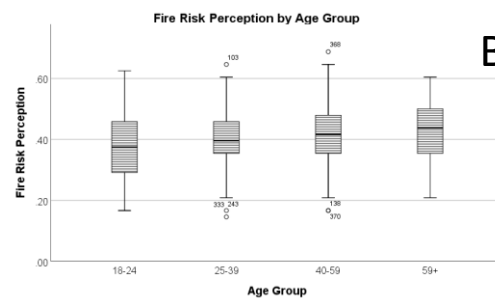
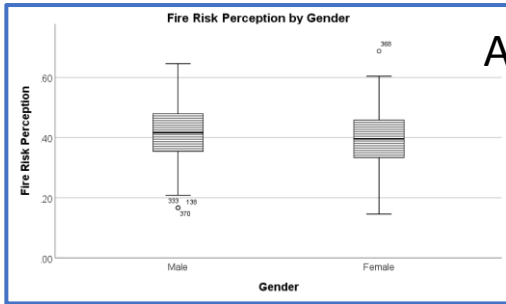
$\text{Fire } RPI = \frac{P_1 + P_2 + \dots + P_n}{n} \dots\dots\dots (\text{Equation 5})$
Here,
$RPI$ = Risk perception index
$P_1, P_2, \dots, P_n$ = scores derived from the question/statement
$n$ = number of questions/statements



# SPATIAL DISTRIBUTION OF FIRE RISK PERCEPTION



# FIRE RISK PERCEPTION & SOCIO-DEMOGRAPHIC FACTORS



Men have anticipated **higher risk of fire hazard**. Because they are more concern about the **immediate financial loss**.

Residents from **higher household-story** and **higher residential floor** anticipated more risk of fire hazard.

# PREPAREDNESS ON EARTHQUAKE & FIRE HAZARD

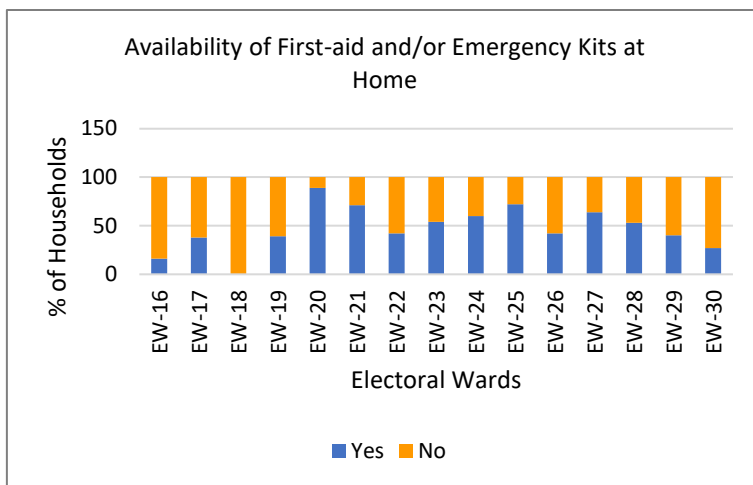


Figure: Availability of first-aid and emergency kits at home

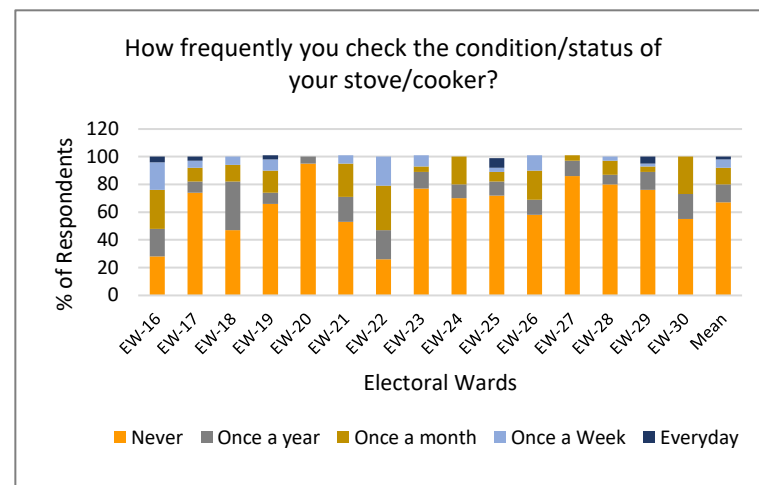


Figure: Frequency of checking stove/cooker

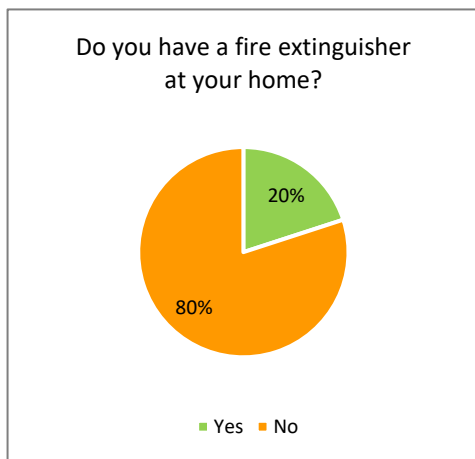


Figure: Presence of fire extinguisher

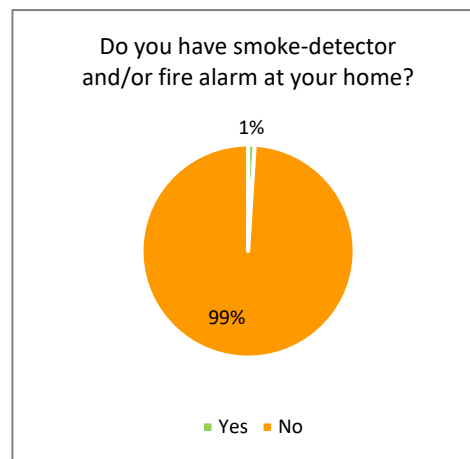


Figure: Presence of fire extinguisher



Figure: Participation in fire drill

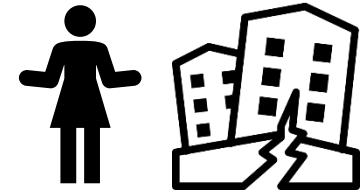
## SUMMARY OF KEY FINDINGS

❑ Earthquake risk perception (**ERP**) has significant relations with **gender** and **household ownership**.

❑ Fire risk perception (**FRP**) has significant relations with **gender**, **household-story**, and **residential floor**.

❑ Moreover, **ERP** is **higher in women**, and **FRP** is **higher in men**. So, awareness programs could be initiated considering the above facts. At the same time, **EW-18** needs much **attention in preparedness** measures.

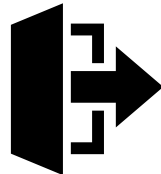
❑ **EW-16** could be a **model EW**.



# PLANNING GUIDELINES AND POLICY INTERVENTIONS

To reduce disaster risk-

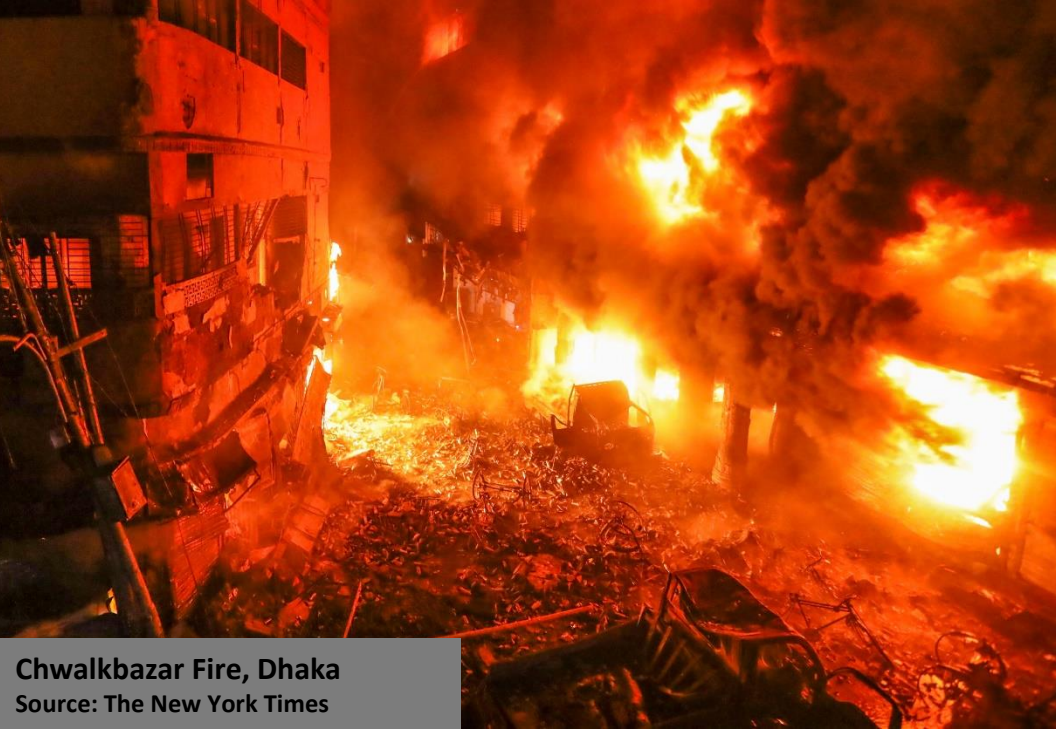
- Widening the roads**
- Ensuring availability of **water/fire hydrants**
- Maintaining the **building codes**
- Increasing the **capacity** of **Fire Service** and Civil Defence (FSCD) **immediately (250 high-rise buildings under construction).**
- Not giving permission** of new high-rise buildings until the FSCD achieves the ability.
- Emergency exit, fire alarm, and smoke detected** should be **obligatory** at every households.



**Rana Plaza Collapse**  
Source: The Guardian



**Rana Plaza Collapse**  
Source: <https://medium.com>



**Chwalkbazar Fire, Dhaka**  
Source: The New York Times



**Nimtoli Fire, Dhaka**  
Source: The Daily Star

