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Master's Thesis

Public perception on cyclone evacuation during COVID-19 pandemic in the southwestern coast of Bangladesh

バングラデシュ南西海岸での COVID-19 パンデミック時のサイクロン避難に関する一般の認識

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ABSTRACT

The frequent cyclone in recent years is a major concern having a huge loss of households' assets with human lives for many disaster-prone areas in the world. Evacuation during disaster is always considered as a possible pre action to minimizes the loss of lives. But it is very common especially in lower economic areas of the world where many people are reluctant to be evacuated taking the refuge in public shelters during disasters. Despite such problem the modern world is facing the vulnerability of COVID-19 pandemic situation. So, there is a high possibility to happen a concurrent condition turning into nightmare situation for the people in frequent disaster-prone regions including the southwestern coast of Bangladesh. It is indispensable to determine the crucial factors influencing making decision for evacuation in such double disaster situation because it is still in its infancy. An empirical study has been performed to understand the southwestern coastal resident's evacuation decision perception during cyclone Fani-2019 comparing with Amphan-2020 under COVID-19 pandemic. To identify more influencing factors for evacuation analyzing the of people's evacuation perception during these two disasters, data was collected through a household questionnaire survey conducted remotely collaborating with the local stakeholders and researchers. Specified decision factors were categorized as socio-economic condition, socio-demographic variation, physical condition of the study area, cyclone warning, significant and influential individuals who can motivate people for evacuation during emergency, and COVID-19 responses of the residents. The analysis was implemented using logistic regression to develop the empirical model to understand the influence of these factors, and to observe the interaction among them the correlation heatmap was developed. For testing and validating the model accuracy, confusion matrices and hosmer-lemeshow tests were performed. To compare the public evacuation perceptions influenced by the factors during both cyclonic situations, a decision tree model was used. This study also identified various independent factors with their importance whose influences on evacuation might interact with the effect of coastal peoples. Since the world is facing difficulties managing disasters while making efforts to slowing the spread of COVID-19, this study also aims to identify the essential elements for effective evacuation ensuring possible controlled environment against the spread of pandemic. Among the twelve factors considered in this study, it has been found four factors with significant influences for evacuation. These are household's income, forecasting wind speed, distances of cyclone shelters from people's houses and the local influencing persons. These are commonly influencing for evacuation decision during Fani-2019 and Amphan-2020.With increasing disaster evacuation strategy the results of this study will also offer some insights of intensify to policymakers managing the concurrent situation of natural disaster under such COVID-19 pandemic situation.

Keywords: Cyclone evacuation, COVID-19, Concurrent situation, Influencing factors, Logit Model, Decision Tree.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Chapter 1 INTRODUCTION

1.1. Study Background

Bangladesh is a disaster-prone South-Asian country. Due to the geographical location and topographical characteristics the coastal belt, almost 716 Km^2 of the country is highly affected by devastating tropical cyclones. Despite passing about fifty years of origin, the socio-economic condition mainly in coastal area is still now highly vulnerable. Most of the people there live under the national poverty line. For socio-economic vulnerability with frequent and severe natural disasters. Fifty-eight major cyclones hit Bangladesh coastal belt from 1584 to 2020 (LBTC, 2021). Among them, the deadliest and devastating cyclonic storm that caused the highest casualty in the history of Bangladesh held on 12-13 November 1970 in the southeastern coast of Bangladesh (Bhola Cyclone, 1970). For the severe suffering from this cyclone, the government of newly independent (1971) Bangladesh initiated some major and specific countermeasures to minimise the impacts of natural disasters as the cyclone preparedness programme (CPP), the constructions of high earthen platforms called as killas for keeping cattle during disastrous emergencies and public cyclone shelters in the coast of Bangladesh (Paul, 2012). Nowadays the frequency of cyclone hit is a major concern for Bangladesh. From 2013 to 2020 eight cyclones hit the coastal belt of Bangladesh where most of them were very devastating especially the super cyclone Amphan in May 2020. Most of these tropical cyclones causes huge damages in various sectors, such as lives, houses, drinking water, fish culture, sanitation, transportation, livelihoods, electricity supplies. in coastal Bangladesh (Hossain, 2008). Most of the cyclone induced storm surges occurred in the Bay of Bengal are disastrous. There are various reasons for the high damages for the disasters in Bangladesh. The storm surges in Bay of Bengal were examined along with the main reasons for the severity of natural calamities in Bangladesh (Ali, 1996). Despite such high vulnerabilities, many people are reluctant to be evacuated during the natural disaster. The people's decision for evacuations depends on many factors mainly the warning for it from authority received by individuals, the well understand the meaning of warning, trust, and comply of warning messages are also influencing to take the decisions for evacuation (Dash & Gladwin, 2007). Because the effectiveness of cyclone warnings is associated with several factors, such as contents of the warning and its features, source authenticity, and the recipient's level of understanding of and past experiences for hazard warnings (Paul et al., 2010). Even people receiving the same content and features of cyclone warning sometimes do not comprehend the original meaning in a unique way. The decision for taking refuge may rely on the trust and understanding of the warnings. Even if people receive the same hazard warning, they may not comprehend the core meaning in the same way. The reaction to a warning depends on how people interpret the content of its message (Wilson & Tiefenbacher, 2012). After receiving the warning and evacuation order, peoples proceed that through the cognitional system governed by their indigenous risk assessment capability and hereafter they opt for taking the decision utilizing their information and experienced knowledge available to them. Among socio-demographic and economic reasons (Sebak and James, 2017) gender discrimination (Haque, 1995) and the presence of older and children induced decision for evacuation is effective in Bangladesh (Ikeda, 1995). But some critical social factors in the coast of Bangladesh like household's condition, age and education of the household head and family sizes as well as number of the family members have not been considered by previous studies to identify their influencing contribution for public evacuation decision. Several studies focused on some factors influencing for evacuation such as distance to the nearest cyclone shelters (Ahsan, 2016), vulnerable road condition (Ikeda, 1995), lack of facilities in cyclone shelters (Ahsan, 2016), but for influencing in making decision for evacuation in Bangladesh another crucial factor-the connecting road condition is not yet focused before. Beside there is an indigenous factor leading the evacuation perception in Bangladesh to being influenced by significant and individuals as religious community and market leaders, school, college or university teachers, local politician, and order from head of the state (prime minister) but there is no previous study where it has been focused.

It is required the more and intensive attention of authorities during evacuation in natural disaster amid Covid-19 pandemics. Because, spread viral infection may accelerate leading high tragedy due to the random mixing of evacuees during natural disasters (Pei et at. 2020) while most of the people in the coast of Bangladesh live under national poverty lines and some very recent studies already showed that evacuation during disaster may exacerbate the infections, especially among the poor (Zambrano et. al., 2021).

1.2. Study Objectives

Since there are many lacking in existing literatures to identify more influencing factors for people's evacuation decision during disaster with the group-based classification of these factors which should be identified to reduces the risks during concurrent of storm surges and pandemic situation. This study was focused on increasing evacuation rate ensuring possible controlled environment against spreading the pandemic during the natural disaster and considering a unique factor as COVID-19 response for evacuation during Amphan two objectives has been specified for this study as follows.

Objective-i): To evaluate the factors for effective evacuation during cyclone 'Fani-2019' comparing with Amphan-2020 under COVID-19 pandemic.

Objective-ii): To compare the people's evacuation perceptions during both cyclones.

1.3. Research Questions

According to the research objectives, two research questions were formulated as follows.

1. Which and what kind of factors have more influences in making the evacuation decision by local households during any disaster itself and concurrent of double disasters such as Amphan-2020 under COVID-19?

2. What were the differences in public evacuation perceptions between the cyclone Fani-2019 and Amphan-2020 in southwestern coast of Bangladesh?

1.4. Significance of Study

Under the COVID-19 pandemic in 2020 there were one hundred forty-one (141) tropical cyclones in the world with a huge fatality of 1,338 total (Tropical Cyclones, 2020). So, the concurrent of natural disaster with human pandemic is a crucial dimension of environmental problem in the modern world (Kanamori, 2021). Among all these storm surges a significant number occurred in many developing countries where peoples are normally reluctant to take refuge in public shelters for many reasons (Sebak and James, 2017). So, the study on evacuation scenario in such co-occurrence situation will improve the risk reduction strategy in many developing countries of the world.

1.5. Literature Review

1.5.1. Disaster evacuation perception in Bangladesh

Despite of getting cyclone warning with evacuation order from government in Bangladesh, a significant number of victims did not evacuate (Sebak and James, 2017). Majority of the evacuees take shelters in places other than buildings recognised as cyclone shelters (Paul et al. 2010) and among them who sought other places to take refuge choose neighbour's strong houses (Chowdhury, et. al., 1993), homes of the relatives in far, orphanages, embankments and higher grounds etc (Ahsan, et. al., 2016). Some previous studies exposed that among the various reasons peoples in many areas are unwilling (Mallick, 2014) to evacuate while shortages of the number of cyclones shelters available (Haque, 1995) and distances between homes and cyclone shelters were main reasons (Roy, et. al., 2015). Some other studies showed that unless a shelter present in 2 kilometres, peoples are reluctant to go, so in the coastal Bangladesh this distance is considered as standard (Amin, 2018). Furthermore, some studies focus that more cyclone shelters should be built up in coastal areas and instead of the bigger and denser network, many small shelters are preferable to reduce the far from victim's houses with alleviation of more concerns for property left behind by the people (Sebak and James, 2017).

Specific groups of peoples such as young children, aged, disables, and women faces major risk during evacuation (Chowdhury, et. al., 1993). Moreover, cyclone shelters are always unhealthy and insufficient for occupying the evacuees (DDM, 2013). Due to insufficiency of separate toilets for women, many of them are not willing to evacuate for the religious reasons especially maintaining the purdah (the curtain) (Ahsan, 2016). With Bangladesh government many international agencies tried to mitigate the insufficiency problems constructing many shelters implementing early warning system since achieving independences in 1971 (Miyaji el. al. 2020). Many people fail to receive the warning or receive it very late, resulting in being unable to evacuate (Mileti, 1990). Sometime the dissemination of warning also varies in case of same cyclone that may lead to confusion for taking the evacuation decision (Roy, 2015). Many of the medium like TV, Radio, Newspaper broadcast the warning during cyclone but there is a very few public trusts on it thus people mostly rely on the local announcement such as voluntary miking where this specialized authority get their information from the national announcement (Paul and Dutt, 2010). Most peoples do not understand the meaning of the cyclone warning and sometime the evacuation order is not also as much strong leading to take decision (Sebak and James 2017). Beside these sometime women also tend to stay in home responding for last evacuation order and may be reluctant to go if the order is not so strong as left behind while others are evacuating to safe places (Ahsan, et. al., 2016). Many studies revealed that the fatalistic attitude of the indigenous peoples is also major reason for non-evacuation perception (Ikeda, 1995). This kind of attitude is driven from indigenous knowledges. Since such kind of knowledges is formed from the very locality but in the fields of disaster risk mitigations that plays a vital roles especially taking the decisions for being evacuated during the cyclone in the developing countries (Flavier et. al., 1995). Indigenous knowledges may contribute to the development of effective and early warning system leading to more evacuation in the coast of Bangladesh.

1.5.2. Factors for evacuation perceptions

During any disaster, a significant portion of the people as mentioned above is always reluctant to evacuate. Peoples willing to go from home are directed by some factors and non-evacuees also guided by some influences. A study revealed that more than 60% peoples from evacuees get the evacuation order from local mosques while about 42% receives from radio announcement. The CPP voluntary miking, TV, news from relatives, mobile phone contact and the siren by local NGOs are some other important motivating factors (Gulsan et. al., 2019). After getting the evacuation order male persons take an average 100 minutes and females requires 125 minutes for getting their preparation. So early warning plays an important role in evacuation behaviour (Raj et. al., 2010). Trust in the sources of evacuation is very important for being motivated to evacuate. A study performed in the coastal belt of Bangladesh where from 200 respondents, 75% peoples trust the radio and TV announcement with 160 and 150 peoples of them respectively required to know the expected hight of inundation and categories of cyclones for their evacuation decisions (Gulsan et. al., 2019).

On the other hands, in some remote coastal areas and waterlogged settlements sometime no means to cross the river (Paul and Routary, 2013) to reach the cyclone shelter act as demotivating causes for evacuation. Incomplete warning messages (Paul and Dutt, 2010) sudden changes in warning signals (K. Ikeda, 1995) and issuance of premature evacuation order (Paul and Dutt, 2010) ruins the interest of taking refuges. The indigenous and previous experienced knowledges also sometime drive the peoples not to be evacuated such as fear of homes being burgled during the evacuation (Haque, 1995), believing a cyclone is ‘Allah's/God's will, cyclone would not occur this time (Haque and Blair, 1992), not realize the danger because house would provide the protection (Bern, et. al., 1992), false sense of security that the embankment would protect and believing cyclones in this season would not be severe (Ikeda, 1995).

1.5.3. Disaster evacuation amid COVID-19

The experiences of co-occurrences of any severe natural disaster and pandemic diseases are not so frequent in our society. Recently, after detection of country’s first Covid-19 patient there have been 70 countries affected by natural disaster especially floods where hundreds of thousands of people have been evacuated from their locality (Slobodan, 2020). Among countries facing this recent nightmare situation there are several researchers paid their scientific attention mostly into developed countries. As for examples, (Han and He, 2021) and (Milman, 2020) focused into ten states of USA to illustrate the urban flash floods are on the rise due to warming climates posing the threats of Covid-19 spreads. (James, 2020) worked on descend risks of Covid-19 resurrection during an active 2020 Atlantic Hurricane season in USA. (Walton, 2020) noted that, during the unprecedented wildfires in western Australia in late 2019 and early 2020, authorities faced a massive concern for evacuating more than 100,000 peoples from the affected areas and in evacuation shelters. (Scott, 2020) highlighted that in Australia, Fort McMurray, Alberta, and Canada the conventional evacuation strategies could now cause a large jump in Covid-19 situation. As the same worse case has been noted by (Dunne, 2020) that the evacuation authority of northern Ontario, Canada during the spring flooding in 2020 had to think alternative to push the evacuees into different evacuation shelter instead of the shelter in Porcupine region-an 'epicentre' of the Corona virus infection in northern Ontario, Canada. Like the case of Ontario (Yourex-West 2020) showed that during the same spring flooding the authorities of Fort McMurray, Alberta, relocated the affected peoples to hotels instead of evacuation shelters where peoples had to face severe difficulty to maintain social distancing leading to take decision returning their home. (Rocca, 2020) claimed that the policy has now been implemented in most Canadian provinces of allowing two family members to associate with each other as evacuation purposes may turn into "double-bubble" situation. (Stephen, et. al., 2020) mentioned the Gulf Coast as vulnerable region for having multiple hurricanes with Covid-19 pandemics in 2020.

A few numbers of study focused to show the coincidental scenario in developing countries but many of them has been affected by natural disasters after detection of first case of respective countries COVID-19 cases. Since, it's very few but some researchers in their recent studies mentioned the severity of concurrent situation of super cyclone Amphan and COVID-19 situation. (B B C, 21 May 2020) expressed that Amphan hit the eastern of India, killing 77 people in West Bengal; side of coastal region of Bangladesh was also severely affected by same cyclone during Covid-19. (Masashi, et. al., 2020) noted that one study could focus on the responses of India and Bangladesh concerning evacuation that were compelled by Amphan in the end of May 2020. (Ishiwatari et. al., 2020) mentioned that "against disasters on the scale of cyclones in Bangladesh, the government should lift requirements of social distancing and encourage people to take shelter to avoid direct threats to human life on a large scale”. Such concurrent situation may always turn into the worst conditions like, after the 2011 Great East Japan Earthquake, many peoples were forced to stay in the evacuation centres under not well sanitary conditions with some pneumonia patients leading to infectious disease outbreaks (Kanamori, 2011). So, authors intended to conduct to analyse the evacuation scenario based on public perception during double disaster crossing of super cyclone Amphan and Covid-19 pandemics in Koyra, Khulna, Bangladesh.

Chapter 2 MATERIALS AND METHODS

2.1. Study Area

Koyra; directly exposed upazila with "Bay of Bengal" of Khulna district in Bangladesh. It is the second largest upazila in the country which got the level as upazila in 1983. Bangladesh has 492 upazilas as of 28 April, 2021. (BNP, 2021). Koyra is located at 22.3417ºN 89.3000ºE. It has 45750 households with a total area 1775.41 km^2. Upazila is an administrative region in Bangladesh. They function as sub-units of districts. Rural upazilas are further administratively divided into several union council areas. There are seven unions in Koyra upazila. Among them, Maheshwaripur, uttor and dakshin bedkashi is situated in the bank of the Bay of Bengal. According to the survey result of this study, the average monthly household's income in Uttar Bedkashi union is the highest and that is 12683 Bangladeshi taka. while the lowest average of that is in Koyra union is 8035 Bangladeshi taka. In terms of education, the average schooling years for the residents in Bagali is the highest with 6.85 years and the lowest average is in Bagali with 4.25 years. Bagali union is situated in the very much remote area with lowest human life facilities.

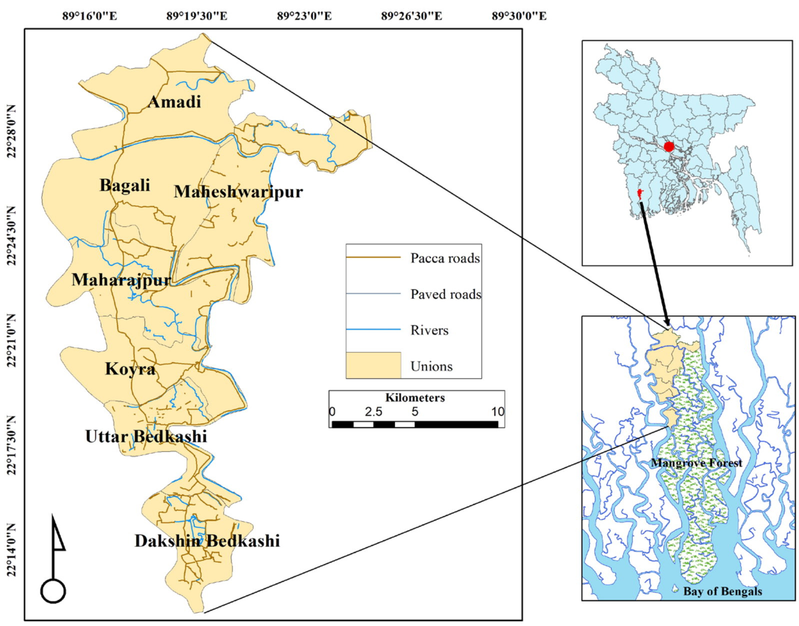

Figure 1: Study area (Koyra); a disaster-prone southwestern coast of Bangladesh

2.2. Study Design

To understand why many people are reluctant to evacuate but they should leave their home to save their lives during the disaster, emphasising to what kind of factors can increase the evacuation rate, the design of this study has been organised. To derive the potential solution for such crucial social problem in southwestern coast of Bangladesh two major disaster cyclone has been considered to study. One of them happened in May 2020 under the pandemic of COVID-19 situation and other happened in May 2019, exactly one year before that. For this purpose, a cumulative questionnaire was designed to fully explain what factors may affect different decisions. The research team consisted of around twenty students as enumerators who was trained in questionnaire technique and were worked under the author's and their collaborators close monitoring. Since the COVID-19 lockdown situation the authors connected virtually always to monitor the household survey. The questionnaire (see Appendix A) was developed beyond any kind of biasness and household survey has been conducted through the peoples of selected study area with the strictly followed systematic random selection collecting the all households information in advance from the union council office who reside and survive in the coastal areas of Koyra, Khulna, Bangladesh to ensure that the questionnaire will subsequently be applicable across all Fani-2019 and Amphan-2020 induced storm surge susceptible geographic area in southwestern coast of the country. The survey was circulated successfully into 410 residents by the research team (The sample size is about 1 percent of the total). The survey participants were selected using a variety of criteria. The respondents were categorized based on age, gender, education, profession, and experience with the mentioned disasters. All respondents were expected to complete the list of questions on the spot, removing any potential of earning information from other people or sources. The total number of respondents was roughly 98 percent, with 410 questionnaires correctly filled out. The main reason for refusal to cooperate (from 23 respondents) appeared to be an insufficient time (Around 20 to 30 minutes were required to complete one questionnaire at all).

2.3. Data Collection

After conceptualisation of the study, it has been performed the primary data collection from the study area. As mentioned above the study site has been divided into seven different unions. So, for ensuring to collect the significant and quality data, authors intended to follow the statistically sound way as systematic random sampling method above. Since this study has been conducted to analyse the public perception on storm surge evacuation during COVID-19 pandemic in the southwestern coast of Bangladesh, so the socio-economic, socio-demographic, and physical condition of environment data were collected to understand the social condition of the victims of disaster. To analyze the perception the public considering and influencing evacuation tools as cyclone warning, significant and influencing individual's data were also collected. To know the situation of evacuation during Amphan amid pandemic, the various dimensional data of COVID-19 as the public perception on it with the list of positive cases were also collected.

2.3.1. Households Survey

Due to COVID-19 pandemic with lockdown situation authors were completely unable to visit their study areas. Hence a research collaboration was made with some local researchers. Several research meetings were held with the local researchers. They appointed enumerators to conduct the survey who were properly trained (Figure 2 (a & b) up by the local researchers and the authors of this study. Following the proper and ordered instruction the enumerators collected the information from the households. The active survey was conducted in total 7 days from February 10^{th} to February 16^{th} of 2021. The number of total household's covered for survey was 410 is mentioning in below Table-1 with the number of total residences.

Table 1: Union basis number of samples mentioning the total residences

Unions	Total Residences	Number of samples
Amadi	7460	70
Bagali	8881	78
Maheswaripur	6911	60
Moharajpur	7156	54
Koyra	7788	71
Uttor Bedkashi	3673	30
Dakhin Bedkashi	3881	47
Total	45750	410

2.3.2. Questionnaire Design

For collecting the data on evacuation scenario during both cyclone Fani-2019 and Amphan-2020 a systemic questionnaire guideline has been followed. For this study the total questions were categorized into seven (Table-2) main groups as socio-economic, socio-demographic, physical condition of the study area, cyclone related warning, significant influential persons, and COVID-19 basis and evacuation.

Table 2: Selected questions from the household's questionnaire survey

Groups	Question description	Response type
Socio-economic	• Monthly household income (BDT/month).	Numeric
	• Household wall and roof materials.	Descriptive
	• How old the present house is (years)?	Numeric
	• How many times the house was repaired?	Numeric
	• How many cattle does your household own?	Numeric
	• Does your family own any vehicle for evacuation?	Yes-No
Socio-demographic	•Family Size (number of the family members).	Numeric
	• Age and sex of the family members (years/M/F).	Numeric +Descript
	• Highest level of education in household members.	Numeric
	• Highest level of education of female members.	Numeric
Physical condition of study area	• Distance to the nearest cyclone shelter (meter)?	Numeric
	• Connectivity with the nearest cyclone shelter?	Descriptive
	• Means of transport to reach the nearest shelters?	Multiple Choice
	• Time requires to reach the nearest cyclone shelter.	Numeric
Cyclone warning	•Do you have any device for getting warning?	Multiple Choice
	• Rate the mobile network strength in your area.	Multiple Choice
	• How do you receive the cyclone warning?	Multiple Choice
	•Which media you prefer to receive the warning?	Multiple Choice
	•Mention the best reliable sources for warning.	Multiple Choice
Influential Persons	•Who takes evacuation decision in your family?	Multiple Choice
	•Who can influence your evacuation decision?	Multiple Choice
COVID-19	•Did you get COVID-19 warning during Amphan?	Yes-No
	•Rate the COVID-19 of Koyra during the Amphan.	Multiple Choice
	•Did you meet/sense the presence of a COVID-19 patient or suspect at the cyclone shelter?	Yes-No
Evacuation	•Did you ever evacuate to any cyclone shelter?	Yes-No
	If only Amphan, then why?	Multiple Choice
	•If yes, then how much time (minute) and distance (meter) was required to the nearest cyclone shelter?	Numeric
	•Number of members evacuated during Amphan?	Numeric
	•If never evacuated, then why?	Multiple Choice

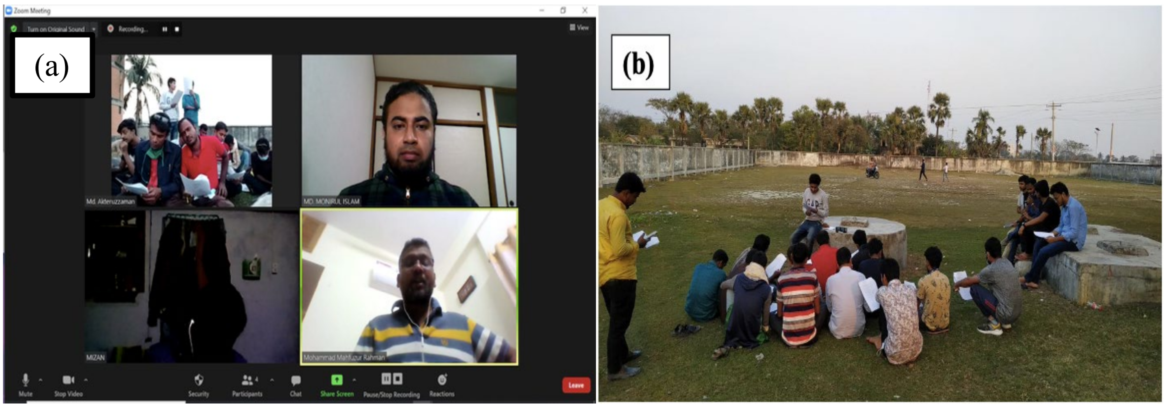

Figure 2: Training for enumerators (a) using zoom platform (b) physical/hands on.

Since the survey was regulated remotely by the authors so enumerators were advised to ensure for collecting the survey photos of all (410) respondents with the household's number provided by the authors selected randomly from the residences list collected from the union council. These photos ware considered as additional information to realize the household's condition of the respondents. Since the number of targeted households had been identified as systematic random process, so these photo in indeed the representation of the house condition of total study area.

2.3.3. Sample Size Determination

Researchers are often faced with challenges of estimating valid sample size. Many researchers frequently use inadequate sample size, and this invariably introduces errors into the final findings (Bolarinwa, 2020). It has been estimated that except if a shelter of cyclone is located within almost 2 kilometers of the residences, it may be too distances for coastal residents to travel during an emergency of disastrous situation. (Amin, 2018). Now since the study area Koyra is divided into seven unoin so these are considered the basic location unit for data collection. The total number of households in Koyra are 45750 which are distributed among seven union (Table 1). In this circumstance, it has been attempted to arrange a systematic random sampling where. It has been used the the equation to calculate the sample size as (n).

$$n = N*X / (X + N - 1)$$

where, $X = Z\alpha/2^2 *p*(1-p) / MOE^2$ and $Z\alpha/2$ is the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. A finite population correction has been applied to the sample size formula (Daniel, 1999). Calculating the total number of samples in Koyra using this equation we found the number as around 400, so for getting the higher accuracy authors decided to cover the households as 410 at all. Now, desecrating the total sample size of whole Koyra into actual number based on seven union it has been used the *"Neymen Allocation Stratified Sampling Method"*. One approach of Neymen Allocation is proportionate stratification. With proportionate stratification, the sample size of each stratum (union) is proportionate to the population size of the stratum. Strata sample sizes are determined by the following equation; $n_h = (N_h / N) * n$, where n_h is the sample size for stratum *h*, N_h is the population size for stratum *h*, N is total population size, and n is total sample size (Stat Trek, 2021). By calculating the sample size with this equation, the number of union basis samples were selected as Table 1.

2.3.4 Sample characteristics

The average age of all respondents (n = 410) was 45 years old, and the number of male respondents was 287 while female was 123. From all these respondents there are 197 evacuees, 213 non evacuees during Fani-2019 and 257 evacuees, 153 non-evacuees during Amphan-2020. The survey team were rejected to get the information from 23 households. The number of household's head was 262 and dependent was 148 with the average schooling year of education 5 years that means most of the peoples in this coast is illiterate or having a little education. 140 respondents of total having the multiple occupation while 270 peoples were occupied by any single source of income. Most of the respondents was farmer practicing the agriculture as their main occupation and the other peoples were belong to business, fishing, day-labor, homemaker, housewife, driver, tailor, ricksha puller, village doctor, woodcutter, honey collector from mangrove forest, raring poultry etc. The average household's monthly income is 9822 bd taka (about 115 US$) with the household's member as five having the number of household's cattle is two. Since this study were conducted to understand the differences in public perception for evacuation under very beginning of COVID-19 pandemic, so respondents were asked either he/she was known about the pandemic situation or not and according to the responses 295 person were know about it, but 115 peoples said they didn't hear anything about it. Figure 3 shows the typical house condition of the respondents.

Figure 3: Typical house condition of study area; no. 01 (Amadi) and no. 271 (Koyra). (*Sources*; households survey).

2.3.5. Procedure of survey

Since the new dimension of the World due to COVID-19 pandemic the researchers of socio-environmental fields are facing the high difficulty to perform the households survey. Despite a proper and unique survey has been conducted associating the cooperation of peoples from three different sides as authors, local collaborators, and consultancy organization. To ensure the quality of data maintaining proper random selection the authors collected the up-to-date union basis residence's information with their list from the seven union councils choosing the households number by random selection with Microsoft excel with ten house intervals. Figure 4 shows the diagram for complete study design.

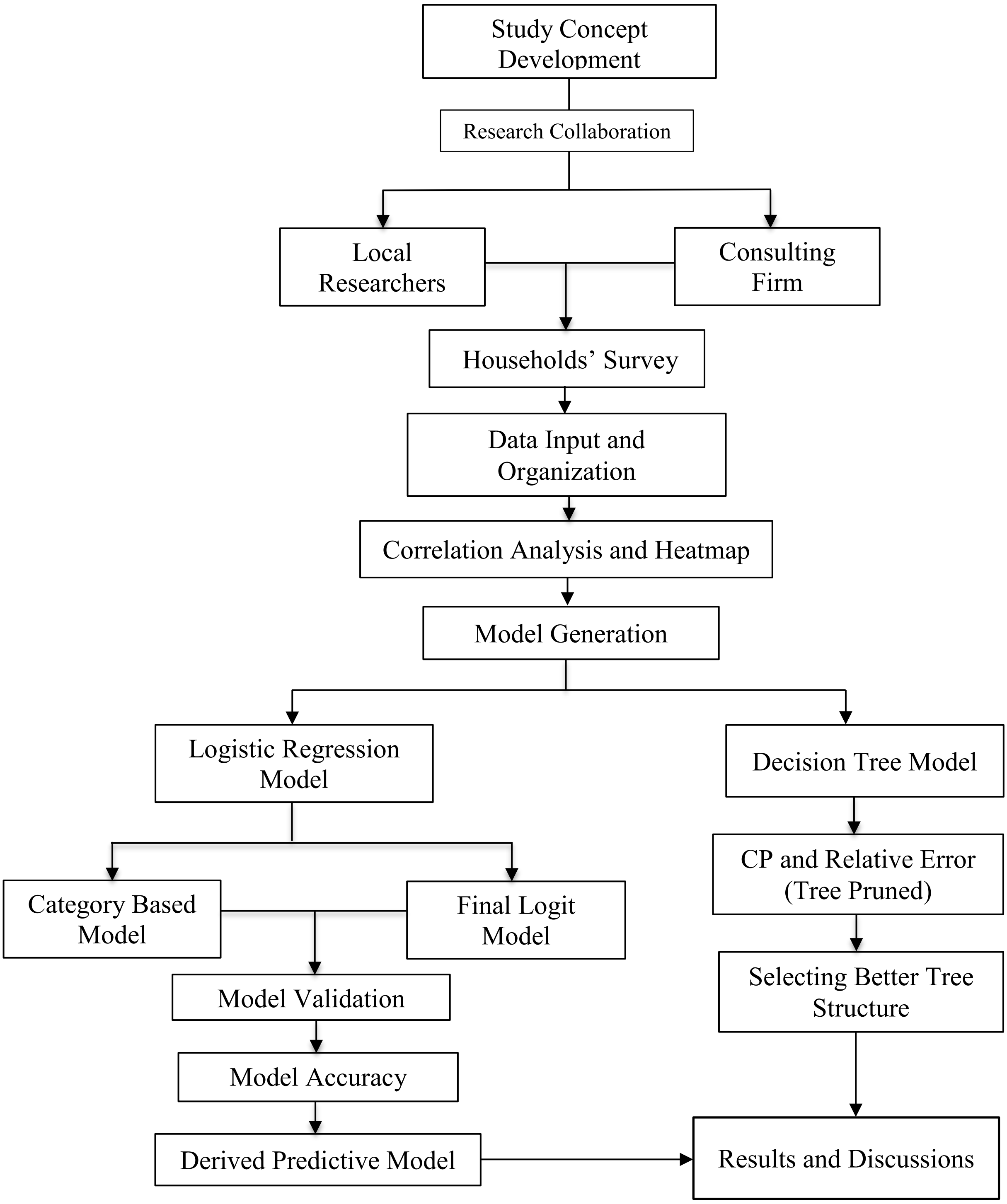

Figure 4: The diagram for complete study design

2.4. Analysing Questionnaire Forms

Simple sorting procedures as well as basic mathematics and statistics methods were used to gather and analyse questionnaire forms. Most of the enumerative calculations were performed with Microsoft Excel software. Statistical tests on a variety of risk-related variables were performed with the significance level set at equals to 0.05.

2.5. The Logistic Regression Analysis

The econometric analysis and simulation software 'EViews 11.0' has been used to perform the Logistic Regression Model as well as machine learning algorithm with visualization and making plot the model results. In enumeration data, the Chi-squared was used and for further investigation the logistic regression multivariate analysis was used. Using the two-tailed test, a p value of 0.05 was tested for significance. Table 3 shows the variables used in the analysis. The factors that influence people to participate in evacuation or not are 'whether they get warning information or not', 'family size', 'family income', 'whether the road condition is earthen or paved', 'distance to the nearest shelter', 'house condition', 'media contents', 'COVID-19 perceptions.

2.5.1 Building of model theory

This study uses "EVACUATED" or "NOT EVACUATED" as an evidential measure to assess the perception of evacuation. The decision of whether to evacuate or not evacuated in advance of Amphan-2020 and Fani-2019 includes considering these two possibilities. Discontinuous outcome models such as logit provide a comprehensive analytical framework for modelling such situations. The logit concept has been extensively used to model such discrete outcomes for several decades. In this analysis, the binary response to the question serves as the predictor variables evacuation (Evacuation = 1, if Not-evacuation = 0).

Participants who evacuated during at least one disaster were asked a series of evacuation-related questions, including evacuation time, transportation, duration, connecting road condition, facilities in shelters etc. Respondents who stayed at home were also asked from how many sources they got warning information, causes of not evacuation in the event of cyclone Amphan and Fani.

(Wenchow et al. 2017) demonstrated that the inhabitant participation in evacuation varies significantly depending on the external environment, personal factors, and so on. The decision to evacuate or not is a complex dynamic process that has been influenced by several interconnected factors including the characteristics of the Amphan and Fani such as warning system and information dissemination, the characteristics of the evacuees and their households' condition, income, risk perception, and the decisions of influential people such as local religious leader, politician, community head and school, college university teacher. Based on the investigation and analysis, these factors are summarized as follows: Socio-economic, Socio-demographic, Physical condition of study area, Cyclone warning, Influences by significant individuals and COVI-19 perceptions. The five (six for Amphan) categories have 11 (12 for Amphan) indicators as models for independent variables (Table 3). In specific resignation time intervals, the individual's decision to evacuate or not is a discrete binary option (evacuate or did not evacuate) with Amphan and Fani characteristics changing from one decision time interval to the next. In this study the variable of interest for evacuation is a dichotomous outcome: evacuation judgement with "1" indicating "Evacuated" and "0" indicating "Did not evacuate." Thus, the odds of evacuation are the ratio of the probability of evacuation to the probability of not evacuation.

The logistic regression model can be summarized as follows: (1) Equation:

$$p_i = \frac{1}{1+e^{-Y}} = 1 \Bigg/ \left\{1+\exp\left[-\left(\beta_0+\sum_{i=1}^{n}\beta_i x_i\right)\right]\right\} \quad \ldots\ldots\ldots\ldots\ (1)$$

Where,

p_i is the i^{th} selection of probability of an evacuee.

i is the choice of mode (evacuate or not evacuate).

Y is the probability function of evacuation.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon \quad \ldots\ldots\ldots\ldots\ (2)$$

Where,

x_i (i = 1,2,3……n) is a value of independent variables that influence evacuation.

β_i represents the coefficient of the model.

β_0 is constant in the model.

ε is the term "error" refers to some unobserved factors that influence mode selection. With the presumption that the distribution of extreme values is generalized. In regression analysis, researchers typically use logistic transformation to simplify the process and obtain the probability function and linear regression model between independent variables, which are shown in Equation (3).

Only when the independent variable is continuous is the dependent variable categorical in a logistic regression model. It is essentially a regression algorithm that performs classification and determines the probability of belonging to a specific class. The logistic regression value ranges from 0 to 1, with a threshold value of 0.50 indicating one of two outcomes; evacaution (1) or not-evcuation (0).

The logistic regression generic equation is written as:

$$Ln\frac{p_i}{1-p_i}=\beta_0+\sum_{i=1}^{n}\beta_i x_i=\beta_0+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_n x_n+\varepsilon \quad \text{........ (3)}$$

The model's independent variables represent the factors that influence whether a respondent will evacuate or not. It is likely that the ways in which these independent variables influence individuals' evacuation choice decisions are not uniform. There are also some techniques to do such kind of analysis such as Random Forest, Support Vector etc. But logistic seems more logical for the output is to be derived by this study. It is possible to predict the decision of evacuation decision through binary based logistic regression algorithm.

Table 3: Description of evacuation model variables

Category	Model Variable	Description	Variable-value
	Dependent variable	Decision of Evacuation	Evacuation-1 Not Evacuation-0
1	Socio-economic	Household's Income (x1)	Raw values are divided by 1000*
		House conditions (x2)	Vulnerable 1, Moderate 2, Strong 3
		Economic damages (x3)	Raw values are divided by 1000*
2	Socio-demographic	Age of the respondent (years) (x4)	Raw value
		Family sizes (x5)	Raw value
		Respondent education (Schooling year) (x6)	Raw value
3	Physical condition of study area	Distance to the nearest cyclone shelter (m) from houses (x7)	Raw values are divided by 1000*
		Road conditions (x8)	Paved 1, Earthen 2
	Cyclone warning	Number of mediums of warning receipt (x9)	Raw value
		Number of contents (considered) of warning (x10)	Raw value
5	Person influence	Significant Individuals (x11)	Religious person 1, Teacher-2, Politician-3, Prime Minster- 4
6	COVID-19 influence	COVID perceptions (x12)	Severe-1, Moderate-2, Little-3, None-0

*Normalization. Here, x1, x2, x3 ………. x12 are used to replace the independent variables identification for analysis purpose.

2.6. Analysis of Variable Correlation

The correlation statistic is also done in this study to evaluate the relation between one variable to the other variables in the datasets. Heatmap visualization method has been simultaneously used to understand the correlation matrix with colour variation. Equation 4 was carried out to calculate the correlation that is given below:

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} \text{ .... (4)}$$

In the equation:

r = Correlation value

x_i = values of the x-variable in a sample

$\bar{x}$ = mean of the values of the x-variable

y_i = values of the y-variable in a sample

$\bar{y}$ = mean of the values of the y-variable

2.7. Model Validation Tools

2.7.1. Test of confusion matrix and accuracy assessment

A confusion matrix of size n x n associated with a classifier shows the predicted and actual classification, where n is the number of different classes. Confusion matrix can show clearly how many peoples are predicted 0 as actually they were 0 and thus the reverse. This is one of the powerful tools to evaluate the model statistics nowadays.

Table 4: Confusion matrix

n = 410	Predicted 0	Predicted 1
Actual 0	p	q
Actual 1	r	s

Table 4 shows a confusion matrix for n = 410 number of households, whose entries have the following meanings:

- p is the number of correct negative predictions.
- q is the number of incorrect positive predictions.
- r is the number of incorrect negative predictions.
- s is the number of correct positive predictions.

The prediction accuracy can be obtained from the above-mentioned matrix as follows:

$$\text{Accuracy} = (p + s) / (p + q + r + s)$$

2.7.2. Test of the model goodness of fit:

The Hosmer-Lemeshow test is used to measure the logistic regression model's quality of fit. It's essentially a chi-square goodness of fit test (as described in Goodness of Fit) for grouped data, with the data typically sorted into ten equal subgroups.

$$\sum_{i=1}^{g} \sum_{j=1}^{2} \frac{(obs_{ij} - exp_{ij})^2}{exp_{ij}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where, g = the number of groups. The test used is chi-square with g – 2 degrees of freedom. A significant test indicates that the model is not a good fit, and a non-significant test indicates a good fit.

2.7.3. Expectation-prediction evaluation for binary specification

This model evaluation method is used to determine the estimated equation specification as well as the constant probability. This method primarily specifies the number of correctly predicted and incorrectly predicted Y values. It clearly displays the model's accuracy percentage.

2.8 Decision Tree

Decision trees are usually used to execute decision-making in an uncertain situation for emergency logistics planning. This leads to better coordination of evacuees during a disaster to select the shelter of refuge considering the overall situation. Furthermore, overall success of evacuation decision depend on the timely availability of warning of cyclone with favor of factors motivating to be evacuated (Yousef, 2014). Regarding this study to fulfill the second objective as comparing the public evacuation perceptions during the cyclone Fani-2019 comparing with Amphan-2020 at households' level Decision Tree Model has been applied. It is an analysis involves making a tree-shaped diagram to chart out a course of evacuation decision with a statistical probability of decision. A typical decision tree has three kinds of nodes: (a) decision (b) chance, and (c) leaf. In case of evacuation during disaster the branches creating from a decision or root node exemplify options as chance to be evacuated (1) or not (0). At every chance node, there is a possibility of evacuation and/or not evacuation that depends on the further condition and characteristics of available variables. Leaf nodes exemplify the probable endpoints of decision with mostly very few portion of total respondent's decision, so some time to get the better performance from the tree structure it is pruning the tree based on the 'cp' and corresponding 'rmse' values of the model.

2.8.1 Decision tree for disater evacuation

Decision tree methodology is normally used as a data mining method for classifying and establishing system based on multivariate and corelated factors for developing prediction algorithms for a target variables (Song, 2015). Suppose a disaster occurs happens in any region and in such situation the time will be very short for taking the decision. So the government and local volunteers have to make decision very fast considering the questions as what is the approximate number of victims? Which shelter may be convenient for the victims? How may peoples respond against the evacuation order etc.? So, using the concept of Decision tree Model they can find an approximate the number of people to start relief operation, choosing the shelters and probability of evacuation and they can modify it to the actual data according to the current situation (Yousef, 2014). Figure 5 shows that the typical framework of decision tree based on the model for Californian earthquake event of Chang et. al. 2009.

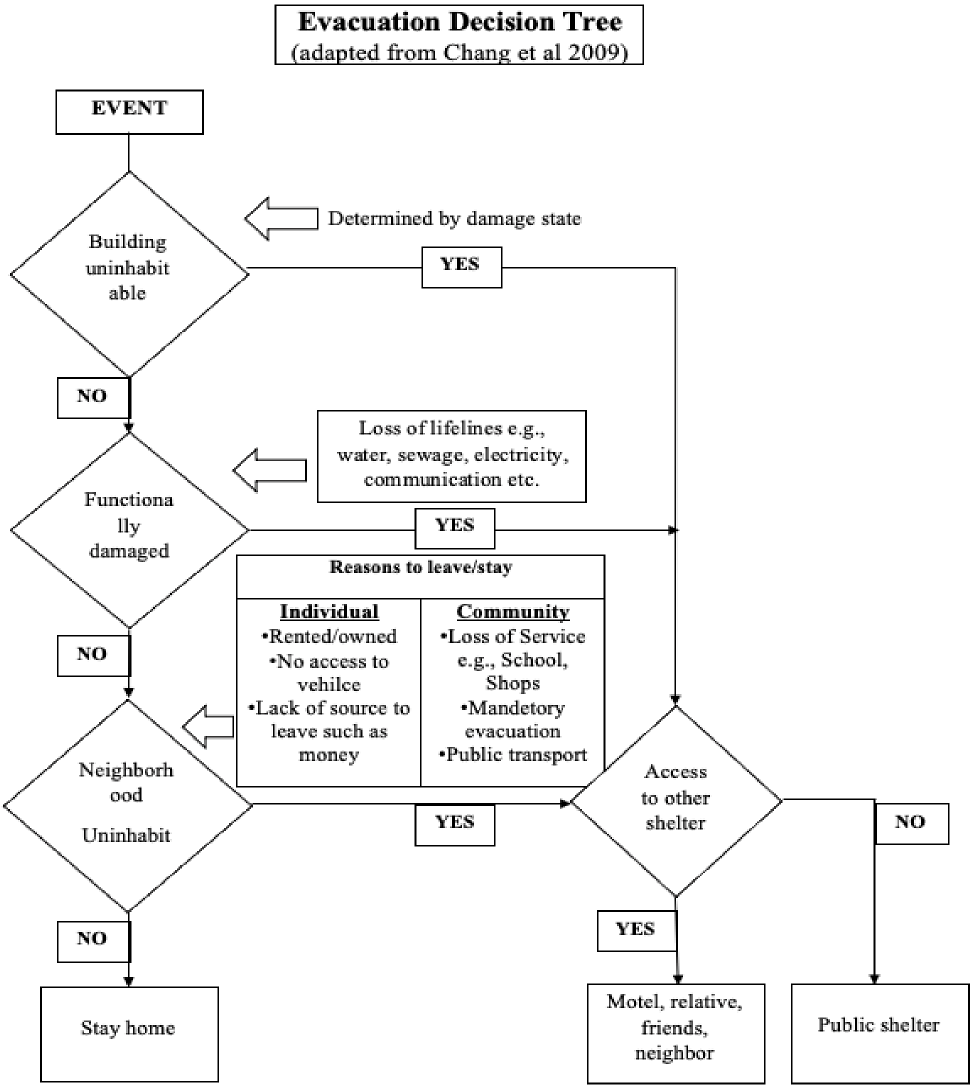

Figure 5: Framework of decision tree for disaster evacuation based on "Chang et. al. 2009" (K.C. Wright et. al. 2010).

The results and values from Decision tree can be used for emergency disaster management response and rescue planning and to identify high needs populations where public education and preparedness resources may be targeted (Vogt & Sorenson, 1992).

2.8.2 Model building procedure

A decision tree typically starts with a single root node branching into optional outcomes. Each of those outcomes may leads into additional child nodes, which branch off into other possibilities as final outcomes (Lucidchart, 2021). A decision tree is a specific type of flow chart used to visualize the decision-making process by mapping out the different factors of decision, as well as their potential results. To develop the decision tree in "R" it is necessary to follow the procedures as:

Step i Dividing dataset into training set, valid set and test set.

Step ii Training decision tree using rpart library in R.

Step iii Evaluation of the model (DTM).

Step iv Visualization and analyzing the results.

2.8.3. CP and RMSE values

'CP' stands for the complexity parameter is used to control the size of the decision tree and to select the optimal tree size. The complexity parameter in 'rpart' is the minimum improvement in the model needed at each node. It's based on the cost complexity of the model defined as;

$$\sum_{Terminal\ Nodes} (Misclass_{\,i} + \lambda * (Splits)$$

The cp value is a stopping parameter. It governs the minimum complexity benefit that must be gained at each step-in order to make a split worthwhile. The default value is 0.01. Setting this to zero will build a tree to its maximum depth perhaps will build a very large tree. Figure 6 shows that how cp controls the size of tree. But it is not possible to select the best performed tree from the cp values, for this it is necessary to consider the “RMSE” values.

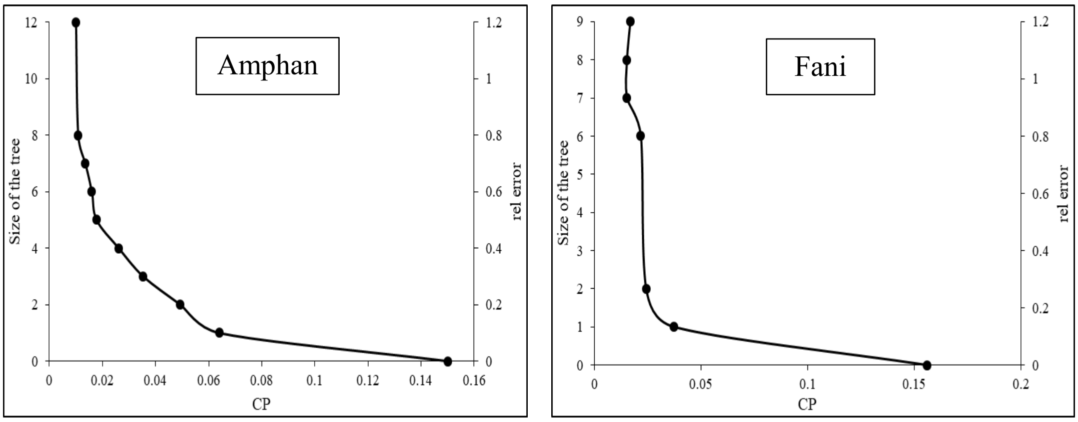

Figure 6: Size of tree (number of splits) based on CP value

‘RMSE’; root mean squared error is the square root of the mean of the square of all the error. It is considered an excellent general-purpose error metric for numerical predictions. RMSE is a good measure of accuracy. The rmse function available in metrics package in R is used to calculate root mean square error between actual values and predicted values.The formula for calculating RMSE is:

$$\text{RMSE} = \sqrt{\frac{\sum_{i=1}^{N}(Predicted_i - Actual_i)^2}{N}}$$

Now, to select the better performance of tree the corresponding CP value with respective RMSE can be used. As for example in cyclone Fani-2019 case when CP value is 0.02 the corresponding RMSE is the lowest. So, the best performed tree from Fani-2019 is Figure 10. In the same case of Amphan-2020 the best one is Figure14.

Table 5: CP corresponding RMSE values in model.

CP	"rmse"	
	Amphan-2020	Fani-2019
0.01	0.4791457	0.4978542
0.02	0.4401296	0.4169023
0.03	0.4279140	0.4586458
0.04	0.4344731	N/A
The Actual "rmse" is 0.5629551 and 0.527575 for Amphan and Fani respectively.		

Chapter 3 RESULTS

3.1. Evacuation Influenced by Different Factors

From 410 household survey data, it has been categorized into 5 total groups for Fani-2019 and Amphan-2020 those have potential impact in decision making of a person during the disaster. Later, this category based individual equation is made thoroughly understand the most influencing factor for decision making during disaster. Later, the final equation considering all independent variables and the decision as dependent as well as outcome for evacuation for both disaster the equations (equation- 5 and 6) has been developed. The McFadden R^2 value for Amphan (Table-6) is 0.17 and for Fani (Table-7) is 0.19 indicate the good model fittings of analysis for both disasters. The model results show that the 'contents of the cyclone warning' possess the most significant likelihood values influencing the evacuation respondent's evacuation decision.

Table 6: Binary logit model of Amphan evacuation likelihood based on socio-economic factors.

variable	coefficient	std-error	z-statistic	prob.
	const: 0.084871	0.398656	0.212893	0.8314
x1	-0.0037	0.011965	-0.309271	0.7571
x2	0.084659	0.156869	0.539679	0.5894
x3	0.004973	0.002537	1.960512	0.0499
McFadden R-squared = 0.02				

Model equation: Y = (0.084871+(-0.0037*x1) + (0.084659*x2) + (0.004973*x3))

Table 7: Binary logit model of Fani evacuation likelihood based on socio-economic factors.

variable	coefficient	std-error	z-statistic	prob.
	const: 0.322914	0.383259	-0.842549	0.3995
x1	-0.011846	0.011271	-1.051062	0.2932
x2	0.060552	0.153997	0.393204	0.6942
x3	0.010999	0.003856	2.852601	0.0043
McFadden R-squared = 0.02				

Model equation: Y = (-0.322914+(-0.011846*x1) + (0.060552*x2) + (0.010999*x3))

In the above tables no 6 and 7, binary logit model has made for Amphan-2020 and Fani-2019 event considering the category-1 factors as the data shows intercept of the model is approximately 0.084 and 0.322. The probability value for x1 (income) factor is 0.767 and 0.30 in Amphan-2020 and Fani-2019 respectively, secondly the probability value of x2 (house condition) factor derived from the model is 0.589 for Amphan-2020 and 0.694 for Fani-2019. The z-statistic and std-error (standard error) are also making sense as these are the important parameters in descriptive statistical data analysis. Then the potential predictive equation has been developed for variables of category-1 based on 410 field observed data.

Since Lower the probabilities provide stronger evidence against the null hypothesis so among the variables of the category- 1 during Fani-2019 the previous experience from the 'economic damages' (X3, p value 0.004) is highly influential for decision making for evacuation.

Table 8: Binary logit model of Amphan evacuation likelihood based on socio-demographic factors.

variable	coefficient	std-error	z-statistic	prob.
	const:0.586996	0.097519	6.019324	0
x4	-0.00213	0.001506	-1.414107	0.1581
x5	0.02374	0.012752	1.861711	0.0634
x6	0.00133	0.004953	0.26849	0.7885
McFadden R-squared = 0.01				

Model equation: Y = (0.586996+(-0.00213*x4) +(0.02374*x5) +(0.00133*x6))

Table 9: Binary logit model of Fani evacuation likelihood based on socio-demographic factors.

variable	coefficient	std-error	z-statistic	prob.
	const: -0.22318	0.401251	-0.55621	0.5781
x4	-0.00434	0.006219	-0.697897	0.4852
x5	0.06703	0.053009	1.264504	0.206
x6	0.006706	0.020414	0.328481	0.7425
McFadden R-squared = 0.01				

Model equation: Y = (-0.22318+(-0.00434*x4) +(0.06703*x5) +(0.006706*x6))

Table 10: Binary logit model of Amphan evacuation likelihood based on physical condition of study area.

variable	coefficient	std-rror	z-statistic	prob.
	const:0.562653	0.317522	1.77201	0.0764
x7	-0.000368	0.000101	-3.633528	0.0003
x8	0.240014	0.221006	1.086006	0.2775
McFadden R-squared = 0.03				

Model equation: Y = (0.562653+(-0.0003368*x7) +(0.240014*x8))

Table 11: Binary logit model of Fani evacuation likelihood based on physical condition of study area.

variable	coefficient	std-error	z-statistic	Prob.
	const:0.562653	0.317522	1.77201	0.0764
x7	-0.000368	0.000101	-3.633528	0.0003
x8	0.240014	0.221006	1.086006	0.2775
McFadden R-squared = 0.02				

Model equation: Y = (0.562653+(-0.000368*x7) +(0.240014*x8))

Table 12: Binary logit model of Amphan evacuation likelihood based on cyclone warnings

variable	coefficient	std-error	z-statistic	prob.
	const: -0.260247	0.321272	-0.810051	0.4179
x9	-0.102011	0.115389	-0.884067	0.3767
x10	0.674076	0.095232	7.078249	0
McFadden R-squared = 0.10				

Model equation: Y = (-0.260247+(-0.102011*x9) +(0.674076*x10))

Table 13: Binary logit model of Fani evacuation likelihood based on cyclone warnings

variable	coefficient	std-error	z-statistic	prob.
	const: -1.44555	0.341003	-4.239119	0
x9	0.039787	0.11716	0.339592	0.7342
x10	0.83348	0.098544	8.457912	0
McFadden R-squared = 0.15				

Model equation Y = (-1.44555+(0.039787*x9) +(0.83348*x10))

Table 14: Binary logit model of Amphan evacuation likelihood based on significant individuals Influences

variable	coefficient	std-error	z-statistic	prob.
	-0.031721	0.143112	-0.221648	0.8246
x11	0.694251	0.150357	4.617338	0
McFadden R-squared = 0.04				

Model equation: Y = (-0.031721+(0.694251*x11))

Table 15: Binary logit model of Fani evacuation likelihood based on significant individuals Influences

variable	coefficient	std-error	z-statistic	prob.
	const: -0.536522	0.145855	-3.67847	0.0002
x11	0.637469	0.141072	4.518752	0
McFadden R-squared = 0.04				

Model equation: Y = (-0.536522+(0.637469*x11))

Table 16: Binary logit model of Amphan evacuation likelihood based on COVID-19 perception

variable	coefficient	std-error	z-statistic	prob.
	const: 0.530038	0.129428	4.095229	0
x12	-0.090435	0.097731	-0.925347	0.3548
McFadden R-squared = 0.01				

Model equation: Y = (0.530038+(-0.090435*x12))

Now, the final equation will be drawn based all the dependent variable. Below the intercept and coefficient table for Amphan-2020 and Fani-2019 are given in the Table 17 and 18. The explanatory regression results for the development of a logistic model-based predictive equation are shown in the below of each table. Amphan-2020 and Fani-2019 have intercept values of -3.446 and -1.165, respectively. The coefficient for each factor is calculated in the second column of the above table using the Newton-Raphson optimization method and the Hessian matrix. The other columns constitute significant statistical results such as standard error, z-statistics, and probability value. For both Amphan-2020 and Fani-2019, the p-value result was zero for the x10 parameter. In the data table, the scalar range was minimized for x1, x3 and x7 factor by dividing these column value by 1000 but it has no effect ultimately on the model results. The finally developed logistic model equation is derived using the respected coefficients from all factors that is given in the mentioned table. The model was correct 174 times out of 256. In case of Amphan-2020, the overall success rate as calculated by the lower McFadden R^2 of 0.20 and the derived model value is 0.17 indicating the good of model fitting, the root means squared error of 0.43, and absolute root error of 0.37, respectively. And in case of Fani-2019, the overall success rate is also calculated by the lower McFadden R^2 of 0.20 and the derived model value is 0.19 indicating also the good of model fitting, the root means squared error of 0.44, and absolute root error of 0.38, respectively. The model had a 30.52 percent false positive rate. This was the rate at which the model predicted the event would occur, but it did not. The rate of false negatives was 48.19 percent. This was the rate at which the model predicted that the event would not occur, but it did. Moreover, both estimated models have similar log likelihood value of -230. This means no such significance different has been inspected in likelihood calculation between two model.

Table 17: Cyclone Amphan-2020 based multivariate logistic regression model for individual' willingness for evacuation.

Variable	coefficient/Y	std-error	z-statistic	Prob (p).	exp. (Y)
	const: -0.344671	0.773707	-0.44548	0.656	0.708453
X1	-0.016693	0.01394	-1.197528	0.2311	0.983446
X2	0.01593	0.175673	0.090682	0.9277	1.016058
X3	0.004654	0.002654	1.753396	0.0495	1.004665
X4	-0.010968	0.007146	-1.534983	0.1248	0.989092
X5	0.074825	0.069047	1.083678	0.2785	1.077696
X6	0.015475	0.024003	0.644711	0.5191	1.015595
X7	-0.039596	0.011008	-3.596927	0.0003	0.961178
X8	0.307358	0.24647	1.24704	0.2124	1.359828
X9	-0.203058	0.128097	-1.585196	0.1129	0.816231
X10	0.597771	0.102185	5.849919	0.0001	1.818062
X11	0.517458	0.165818	3.120644	0.0018	1.677757
X12	0.090136	0.113821	0.791916	0.4284	1.094323
Root mean squared error = 0.43 Absolute root error = 0.37 McFadden R-squared = 0.17					

Estimated equation for Amphan-2020

Y = (-0.344671+(-0.016693*x1) + (0.01593*x2) + (0.004654*x3) +(-0.010968*x4) + (0.074825*x5) + (0.016674*x6) + (-0.039596*x7) +(0.307358*x8) + (-0.203058*x9) + (0.597771*x10) + (0.517458*x11) +(0.090136*x12)) ……………… (5)

Table 18: Cyclone Fani-2019 based multivariate logistic regression model for individual' willingness for evacuation.

variable	coefficient/Y	std-error	z-statistic	Prob (p).	exp. (Y)
	const: -1.165019	0.756423	-1.540168	0.1235	0.311917
X1	-0.021416	0.013754	-1.55705	0.1195	0.978812
X2	-0.006761	0.177858	-0.038013	0.9697	0.993262
X3	0.007889	0.004187	1.88415	0.0495	1.00792
X4	-0.005736	0.007131	-0.804397	0.4212	0.99428
X5	0.023854	0.065943	0.361743	0.7175	1.024141
X6	0.005094	0.023828	0.213778	0.8307	1.005107
X7	-0.031694	0.0112	-2.829799	0.0047	0.968803
X8	0.148923	0.240179	0.620051	0.5352	1.160584
X9	-0.035487	0.126487	-0.280556	0.7791	0.965135
X10	0.756641	0.104477	7.242187	0.0001	2.131106
X11	0.420312	0.158825	2.646378	0.0081	1.522436
Root Mean Squared Error = 0.44 Absolute root error = 0.38 McFadden R-squared = 0.19					

Estimated equation for Fani-2019

Y = (-1.165019+(-0.021416*x1) + (-0.006761*x2) + (0.007889*x3) + (-0.005736*x4) + (0.023854*x5) + (0.005094*x6) + (-0.031694*x7) +(0.148923*x8) + (-0.035487*x9) + (0.756641*x10) + (0.420312*x11)) …...…………… (6)

3.2. Correlation Analysis

To find out any feasible relationship with one variable to another, Pearson correlation coefficient was analysed as per the equation no. 3 mentioned above. From the Figure 7, the correlation value (0.29) achieved highest between income factor (x1) and family size (x5) in consideration of Amphan-2020 situation. On the other hand, the commensurate score achieved from Fani-2019 cyclone though highest correlation value comes from the relation of x10 (Number of contents) with x11 (Significant and individual) is 0.26 (Figure 8). These correlation heatmap highlighted the correlation coefficient value with colour gradient scale (attached at right side) where deep maroon colour representing highest relation value and deep-black colour representing highest negative correlation value for both Amphan-2020 and Fani-2019 Cyclone.

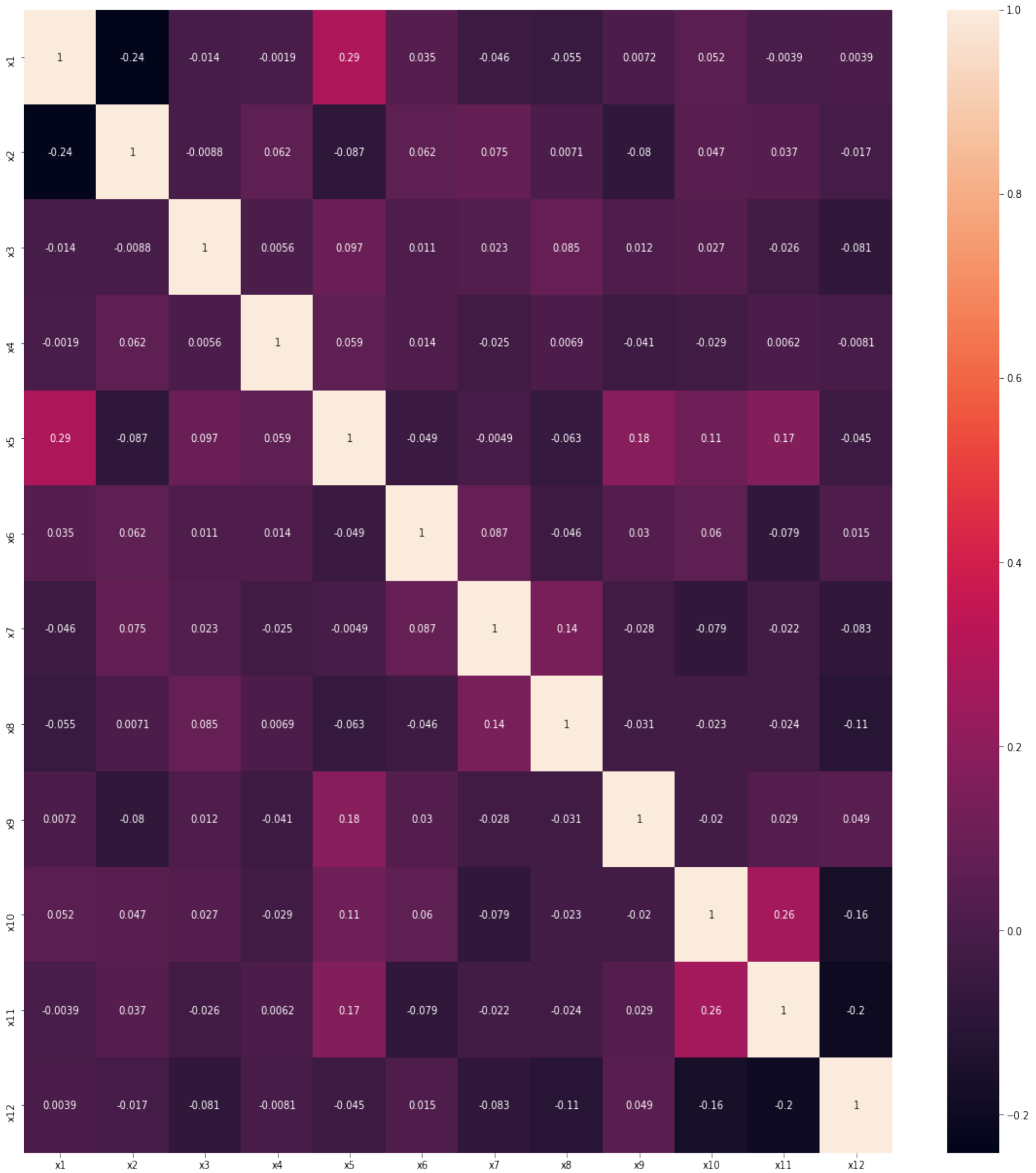

Figure 7: Correlation heatmap among variables during Amphan-2020

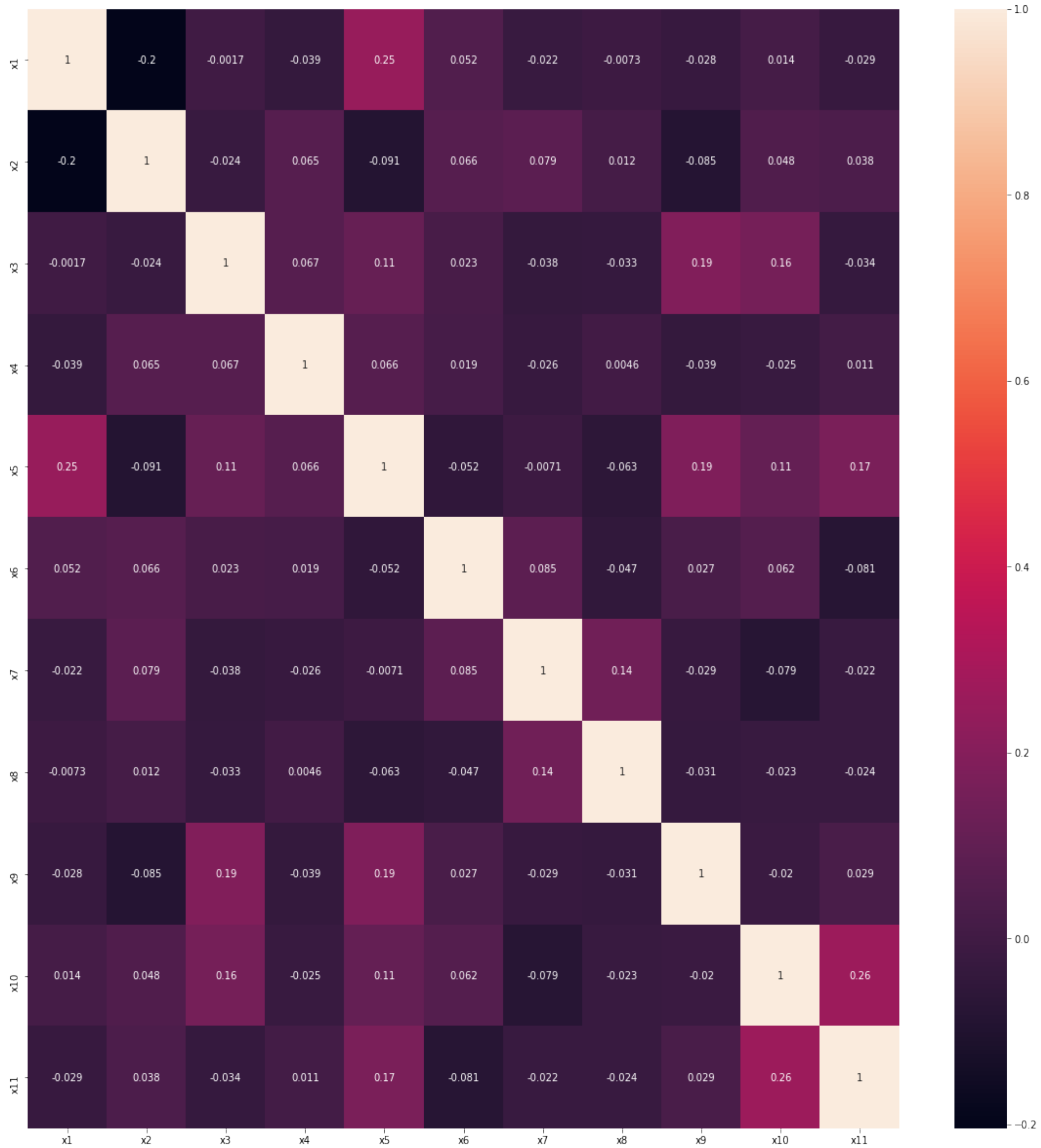

Figure 8: Correlation heatmap among variables during Fani-2019

3.3. Test of confusion matrix and accuracy assessment

To get more insight in model accuracy and results, test of confusion matrix should be considered. From the Table-19, it is decidable that the accuracy of the model is relatively high as the actual vs predicted matched cases for non-evacuation found 92 numbers and vice versa the actual vs predicted non-matched cases found 67 numbers. Evacuation numbers found 210 matched cases between actual vs predicted and the non-matched cases it is 41. Hence, the calculation of model success can derive from the equation no.3.

Table 19: Test of Confusion matrix for Amphan-2020

n=410	Predicted 0	Predicted 1
Actual 0	92	67
Actual 1	41	210

Accuracy = (92+210) / (92+67+41+210)

= 302 / 410 = 0.7365 = 73.65%

Table 20: Test of Confusion matrix for Fani-2019

n=410	Predicted 0	Predicted 1
Actual 0	148	63
Actual 1	51	148

Accuracy = (148+148) / (148+63+51+148)

= 296 / 410 = 0.7219 = 72.20%

3.4. Model validation based on category of variables

Table-21 shows the complete comparison for both events based on several categories. The table shows that the model has higher accuracy when using category-4 data, which is 73.66 percent for the Amphan event and 70.49 percent for the Fani-2019 event (Table-22), regardless of the fact that the p-value for the Amphan event is meaningful, trying to imply that the null hypothesis is true and thus the model will not fit the data correctly and should be rejected, whereas in the case of the Fani-2019 event, the null hypothesis is true and thus the model will not fit the data correctly and therefore should be rejected. The model's second most influential category for Y is category-5 (significant of particulars), which has an accuracy of 65.12 percent and 63.66 percent, respectively, because the p-value for both events is 0.05, and thus the model would not fit the data accurately, rejecting the model's affirmation. The H-L statistic test results for Amphan category-4 and category-5 are 22.8321 and 20.4054, respectively, and for Fani-2019 are 12.6456 and 17.3613. In Table 23 and 24 below, the detailed of Hosmer-Lemeshow test for final model is given below.

Table 21: Category-wise model validation and accuracy result (Amphan-2020)

Category	Accuracy Statistics (No/Yes)	Accuracy score	H-L test (10 grp.)	Prob. Chi(8)	Prob. Chi(10)
1	2/250	61.46%	8.2344	0.4109	0.5285
2	6/246	61.46%	4.3556	0.8237	0.7444
3	27/231	62.93%	10.5015	0.2316	0.3342
4	86/216	73.66%	22.8321	0.0036	0.0047
5	95/172	65.12%	20.4054	0.0089	0.0171
6	0/251	61.22%	25.6042	0.0012	0.0044

Table 22: Category-wise model validation and accuracy result (Fani-2019)

Category	Accuracy Statistics (No/Yes)	Accuracy score	H-L test (10 grp.)	Prob. Chi(8)	Prob. Chi(10)
1	160/58	53.17%	3.1647	0.9236	0.9610
2	156/68	54.63%	9.3835	0.3110	0.2738
3	104/130	57.07%	7.5974	0.4738	0.3812
4	141/148	70.49%	12.6456	0.1246	0.2032
5	118/143	63.66%	17.3613	0.0266	0.0616

3.5. Test of the model goodness of fit

The Table 23 and 24 summarizes the results of the goodness of fit test for the Amphan data predictive logistic equation. To test the goodness of fit of the model data to the real data, 410 data points were distributed across 10 possible subgroups. The second and third columns refer to the data's risk quintile statistics. According to the above table, the model derived from Amphan data is a good fit because the p-value for the test of Prob. Chi (10) and within degree of freedom Prob. Chi (8) is greater than 0.05. The model's output is evaluated using the Hosmer-Lemeshow test, which yield statistically significant result and the value is 10.7921 (Table 23). The generated results are summarized in Table 24 of Hosmer-Lemeshow statistics for Fani-2019 event.

Table 23: Hosmer-Lemeshow test for goodness of fit of estimated model for Amphan.

Group	quantile of risk		dep=0		dep=1		total	H-L
	low	high	actual	expect	actual	expect	obs	value
1	0.0492	0.2897	34	32.2682	7	8.73181	41	0.43642
2	0.2897	0.3775	29	27.2597	12	13.7403	41	0.33153
3	0.3777	0.4676	24	23.8702	17	17.1298	41	0.00169
4	0.4685	0.5656	19	19.4502	22	21.5498	41	0.01983
5	0.575	0.6601	11	15.5959	30	25.4041	41	2.18579
6	0.6628	0.7306	10	12.5402	31	28.4598	41	0.74128
7	0.7314	0.7777	13	9.96465	28	31.0354	41	1.22147
8	0.7786	0.8266	4	8.0481	37	32.9519	41	2.53345
9	0.8268	0.873	10	6.0591	31	34.9409	41	3.00768
10	0.8741	0.9999	5	3.9438	36	37.0562	41	0.31297
Total			159	159	251	251	410	10.7921
H-L Statistic		10.7921		Prob. Chi-Sq(8)		0.2138		
				Prob. Chi-Sq(10)		0.2078		

Table 24: Hosmer-Lemeshow test for goodness of fit of estimated model for Fani-2019.

Group	quantile of risk		dep=0		dep=1		total obs	H-L value
	low	high	actual	expect	actual	expect		
1	0.0161	0.1548	38	36.1149	3	4.88507	41	0.82581
2	0.1551	0.2091	35	33.7126	6	7.28737	41	0.27658
3	0.2094	0.2864	32	31.0712	9	9.9288	41	0.11465
4	0.2871	0.4059	25	26.883	16	14.117	41	0.38307
5	0.409	0.515	20	22.2893	21	18.7107	41	0.51525
6	0.5164	0.6034	14	18.1539	27	22.8461	41	1.70573
7	0.6054	0.6643	15	14.9187	26	26.0813	41	0.0007
8	0.6664	0.7459	9	11.9465	32	29.0535	41	1.02557
9	0.7484	0.7977	16	9.14515	25	31.8548	41	6.61322
10	0.7981	0.9274	7	6.76461	34	34.2354	41	0.00981
Total			211	211	199	199	410	11.4704

H-L Statistic	11.4704	Prob. Chi-Sq(8)	0.1764
		Prob. Chi-Sq(10)	0.4056

3.6. Decision tree structures for Fani-2019

A decision tree is a graphical depiction of a decision and every potential outcome or result of making that decision. There are three components in the decision tree: the decision itself (or “node”) representing a "test" on an attribute, the potential decisions (or “branch”) representing outcome of test, and the potential outcomes of each decision (or “leaves") indicating a class label. The paths from root to leaf represent classification rules. Starting from the root node, the total dataset will split into several leaves according to decision rules generated based on the measurement of the homogeneity of the target variable within the subset. In a typical decision tree, each node shows the ratio of the subset in this node to the total dataset and what percentage of data meets the decision rule of this node. The "true" subset will be put into left chance node while the "false" subset will be in right, until there are no more significant decision rules can be extracted. The decision progress can be tracked easily so that the model is simple to understand and interpret.

Initially, the total dataset is used for input of decision tree, the root node contains 100% of the dataset with the probability of 0.48 portion of the datasets is from evacuated people. Then a decision rule, "Forecasting wind speeds = 0", is generated based on the measurement of the homogeneity of the target variable. 39% of the total dataset, which contains 0.24 probability from non-evacuated people satisfies this decision rule and therefore is placed into the left chance node, while the other 61% data will be put into the right chance node. In decision tree leaf nodes are the outcome but the chance as well as intermittent nodes hold both kinds of possibilities. From the left first chance node having 39% of all datasets with 24% of possibility for not to be evacuated among them 29% of all datasets having inside 15% of possibility of evacuation will make decision finally for it if they belong to Amadi, Bagali, Koyra and Maheshwaripur union. But residents (10%) of the rest three unions will be further influenced by their house condition. If their house condition is moderate in terms of building materials 5% of total respondents will be evacuated as their final decision and rest will not do so. Now, from the right side first chance node possesses 61% of total dataset among with 64% possibility of evacuation, if they had been informed about the possible cyclone category have a chance to be evacuated of 46% of total respondents with 69% of probability but they had to be convinced by more than one influential person before making their final decision. If they motivated by more than one person and be residents of Amadi, Bagali and Mahashwaripur then 18% of total respondent with 85% of possibility they will be evacuated into shelters. But from the right chance node, if they don’t receive any waring on category of cyclone with elder than 32 years will make decision for evacuation with a probability of 66% and 10% of total respondents.

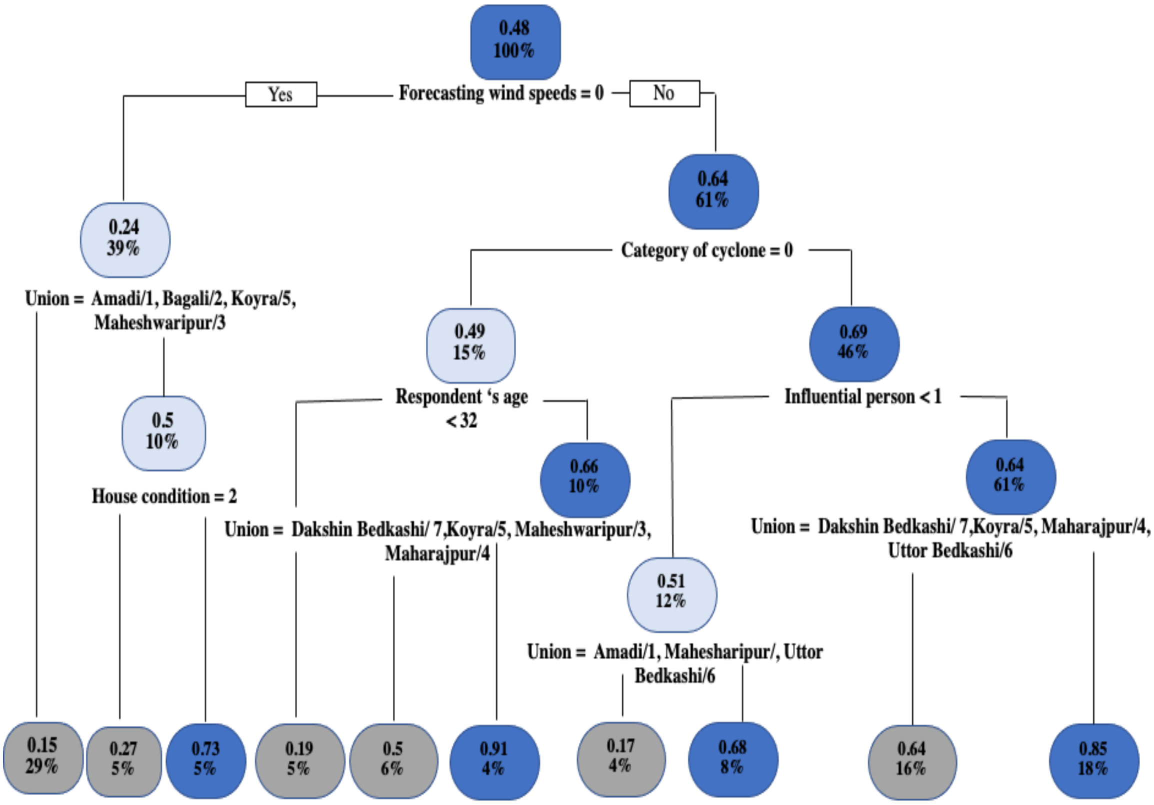

Figure 9: Decision tree structure for Fani-2019 (when cp is 0.01)

The decision tree of Figure 10 is the pruned version Figure 9 having almost same decision structure and characteristics. But it is the better performed one from all the trees of decision structure during the cyclone Fani-2019. So, to clarify the significant status of decision for the evacuation, it will not be exaggeration to say that the victims must have to be informed about the upcoming wind speeds first for making their decision if they fail to receive it 39% of the respondent will may not be evacuated with a possibility of 24%. But if the receive then 61% peoples with 64% probability will make evacuation decision. Among them receiving the category of cyclone and being informed about that 46% of total victims will be evacuated with a high probability of 69%. But after being informed by the first factor as wind speed with the failure to know about the category of cyclone 15% of respondent will be decided with a high probability of 49% for not evacuation but if the victims are elder than

32 years old a few portions (4%) of respondent will be evacuated. So, receiving the information about the probable category of cyclone and being motivated by more than one influential person a significant number (33%) of victims will make their decision for evacuation as outcome. But satisfying all the above requirements, if they are the respondents of the union Amadi, Maheshwaripur and Uttot Bedkashi they have a little possibility for not evacuation.

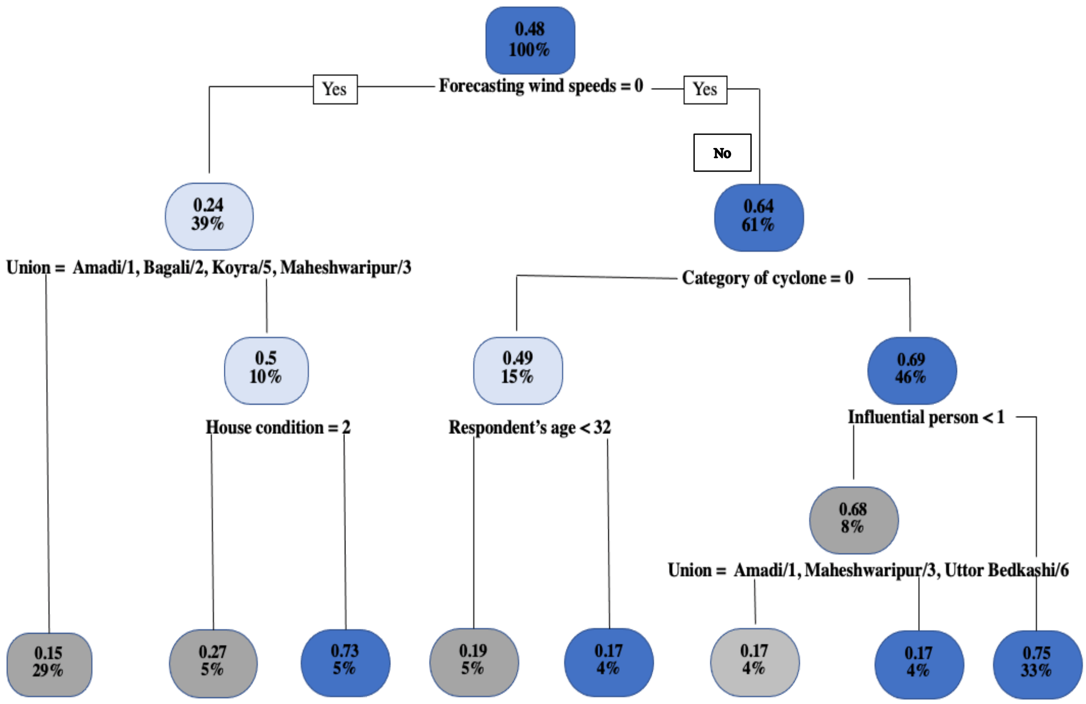

Figure 10: Decision tree structure for Fani-2019 (when cp is 0.02)

The Figure 11 as the highly pruned decision tree of Fani while CP value is 0.03. It's consisted of first main two variables as the 'forecasting wind speed' and 'location'. So, for making the decision by victims in the study area providing the proper warning system is the vital factor. Among many of the information related to the warning broadcasting frequently about the probable wind speed is the most important. Because in the model it is showing that peoples from 100% of respondents receiving the alert about wind speed will be evacuated the maximum portion as 61% having the probability of 68% and the victims not receiving the wind speed information also may be evacuated as of 10% from total if they live in the southernmost area as both Bedkashi union along with the Bay of Bengal.

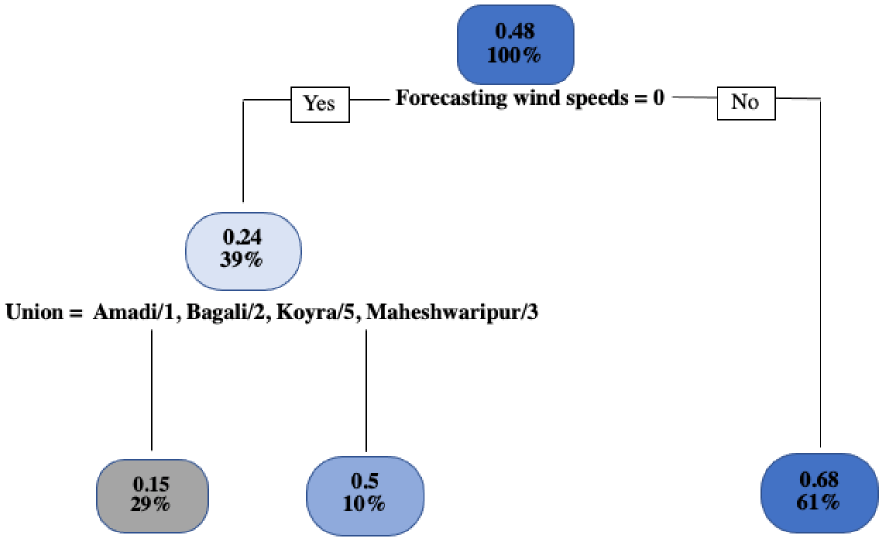

Figure 11: Decision tree structure for Fani-2019 (when cp is 0.03)

3.7. Decision tree structures for Amphan-2020

Initially, the total dataset of the respondents is used for input of decision tree, the root node contains 100% of the dataset with the probability of 0.62 portion of the datasets is from evacuated people. Then a decision rule as same to Fani-2019 "Forecasting wind speeds = 0", is generated here based on the measurement of the homogeneity of the target variable. 40% of the total dataset, which contains the probability of 0.39 from not-evacuated people satisfies this decision rule and therefore is placed into the left chance node, while the other 60% data will be put into the right chance node with probability of 0.78. From the left first chance node this 40% of all datasets with the mentioned possibility of 0.39 will not be evacuated but in spite of missing the further waring information on category of cyclone they will use their indigenous knowledge for being evacuated because according to the findings of the decision tree some peoples older than 62 years has been evacuated in such situation and also some educated persons having the average schooling years of 12 years also has been evacuated in same situation. So, age and education are vital for evacuation decision for the local peoples. From the right side first chance node an almost half (47%) of the victims will take their decision to be evacuated if they are not the residents of Amadi and Uttor Bdkashi but if they live in these two unions, they will consider their house condition before making their final decision.

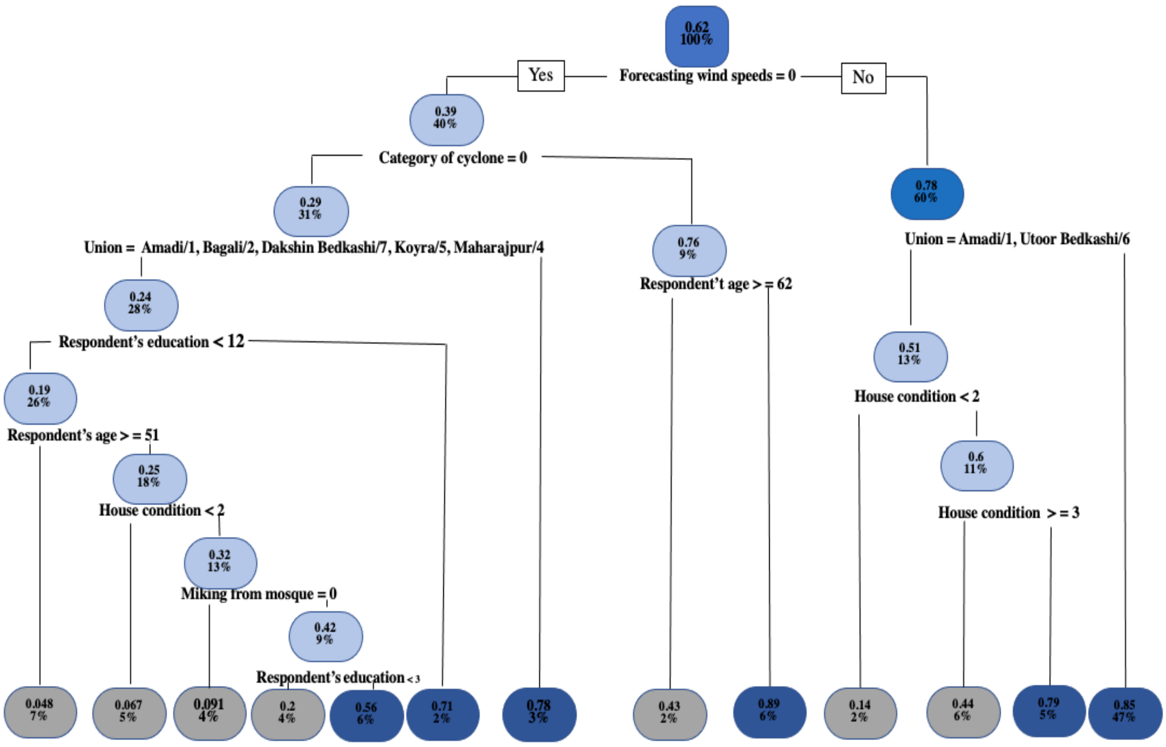

Figure 12: Decision tree structure for Amphan-2020 (when cp is 0.01)

From the Figure 13 it is shown that, the root node is consisted by 100% of dataset with a probability of evacuation 0.62. From which by 60% of victims with a probability of 0.78 created the right side as well as the chance of evacuation node among which 47% of the total respondents will make the decision for evacuation with a high possibility of 0.85 if they belong to Maharajpur, Maheshwaripur and Koyra and Dakshin Bedkashi unions. On the other hand, 40% of peoples with a probability of 0.39 will may be decided for not evacuation if they don't receive the wind speed information. From this chance node with a probability of 0.29, 31% people will be decided for not to be evacuated. Finally, the peoples having lower the average schooling year of 12 years they will take their final decision for not evacuation.

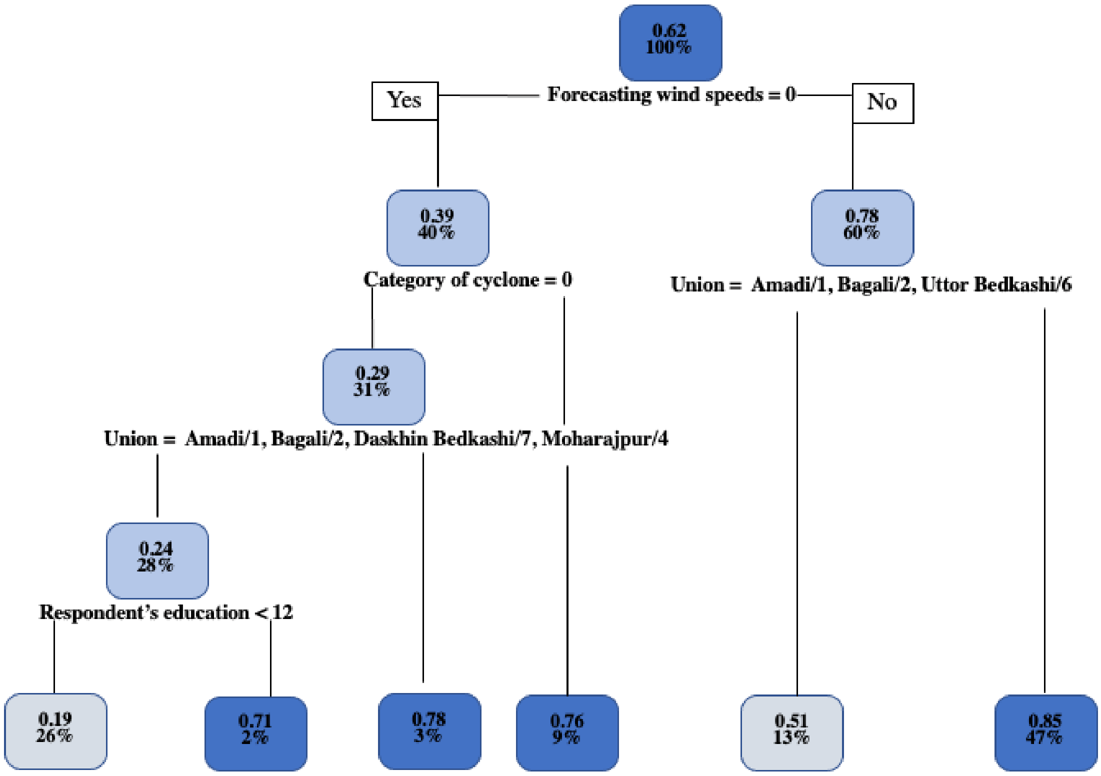

Figure 13: Decision tree structure for Amphan-2020 (when cp is 0.02)

From the Figure 14, it is the highly pruned and better performed tree structure for Amphan because the corresponding rmse value is the lowest for this tree with CP value 0.03. According to this tree structure with a probability of 0.62 the whole dataset made the root node. 60% of total victim with a probability of 0.78 made their decision for decision for evacuation if they receive warning on wind speeds among which 47% of total victims will be evacuated finally with a high probability of 0.85 if they are the residents of Maharajpur, Maheshwaripur and Koyra. If they live out of this tree union, 13% of victim will not be evacuated with their non-evacuating probability of 0.51. On the other hand, peoples not receiving the alarm on wind speeds 40% of total will respond as non-evacuee with a probability of 0.39 among them a little number (9%) will be evacuated with a high probability of 0.76 if they will be informed about the category of cyclone and missing this information 31% of people will possess the probability for not evacuation. As another outcome 26% peoples will not be evacuated if their schooling of year is below average of 12 years. `

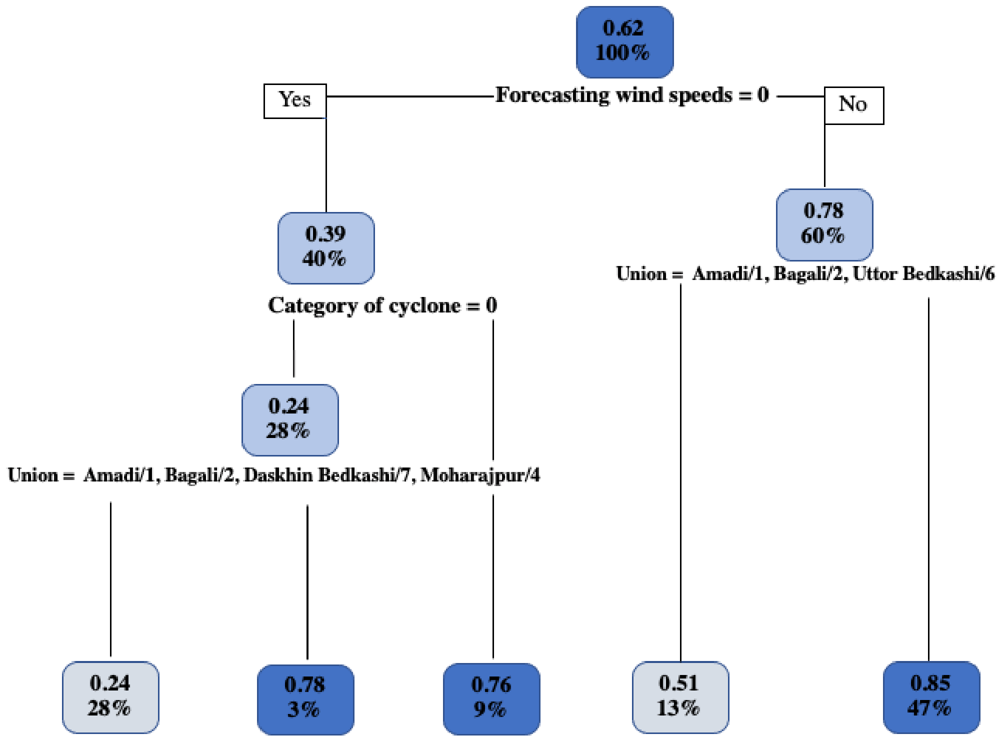

Figure 14: Decision tree structure for Amphan-2020 (when cp is 0.03)

From the Figure 15 satisfying the rule of tree structure as "Forecasing wind speeds = 0" 100% of dataset with the probability of 0.62 developed the root node. Among the whole dataset, 40% of respondent will maybe not evacuated with a probability for that is 0.39. But in this dataset 31% of total respondent will make their final non-evacuating decision with a probability of 0.29 if they don't receive any warning about category of cyclone. On the other hand, from the whole dataset 60% of the victims with a high probability of 0.78 will be evacuated if they receive waring about upcoming wind speeds but if these victims are the resident of Amadi and Uttor Bedkashi, they will be decided for not evacuation with 13% of total dataset with a probability of 0.51 but 47% of the peoples will be evacuated with a high probability of 0.85 if they live in rest five unions.

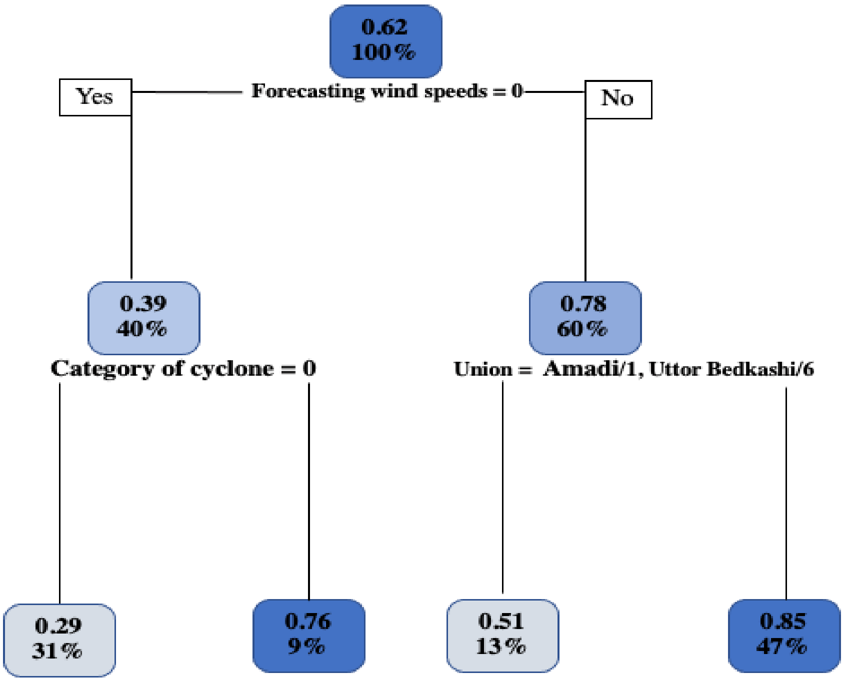

Figure 15: Decision tree structure for Amphan-2020 (when cp is 0.04)

3.8. Variable importance

A Decision Tree always crawls through dataset, one variable at a time, and attempts to determine how it can split the data into smaller, more homogeneous buckets. It can be used for either numeric or categorical prediction. Vairable Importance represents the statistical significance of each variable in the data with respect to its effect on the generated model. It is a measurement of how often a randomly chosen respondent of evacuees based on the decision influencing factors for evacuation would be incorrectly labeled if it was randomly labeled according to the distribution of respondents in seven union of the study area (Koyra). That most important variable is then put at the top of the tree. For both case of during Fani-2019 and Amphan-2020, it is showing that “Forecasting wind speeds” is the most important factor for victim to make the decision. In case of Fani, 'location' is more the second most influencing variable while during Amphan waring about 'category of cyclone' play such role. Location as well as union is also important as third reason for during Amphan. So, among all variables these three can be categorized as top for making the public decision for evacuation. In both cases, influencing by significant individuals, respondent's age and education, condition of houses, friends and family and announcement from mosque as the sources for getting the cyclone warning news acts as the medium grade factors for evacuation motivation. As the less important but there are many influences of some factors like the physical condition of connecting roads, household's condition, respondent's income and distance between shelters and houses and online warning receiving sources as TV, Radio, Facebook news portal or others social media for evacuation decision. Table 25 shows that the variable importance with their respective values.

Table 25: "Variable importance" in Decision for Fani and Amphan.

Variables	Fani-2019	Amphan-2020
Forecasting wind speeds	11.77	10.03
Union	9.63	7.21
Forecasting storm surge	5.53	5.28
Category of cyclone	5.41	8.54
Influential person	3.74	2.11
Respondent's age	3.10	2.05
House condition	2.91	2.81
Respondent's education	1.44	3.04
Friends and Family	1.13	0.20
Miking from mosque	1.07	0.85
Road Condition	0.74	0.16
Household's income	0.29	0.21
Online Media	0.07	*
Distances of CS	*	0.87

* No importance in model result

Chapter 4 DISCUSSION

4.1. Economy and Evacuation

Socio-economic condition of the victims plays a significant role in making the evacuation decision. Through calculation, we find that the household income factor is positive, which indicates that higher the income of residents comparatively the stronger willingness to take evacuation (Figure 16). Since Koyra is one of the more economic vulnerable zones in coastal Bangladesh, so evacuation was supposed to be more for the poor people but from this study it is a core finding that richer possess more willingness than poor in the southwestern coast of Bangladesh. Such an evacuation perception is seen in some developed countries of the world, but it is a new example in underdeveloped countries. (Anping, 2020) shows that in Zhejiang; one of the most economically developed coastal provinces in China, higher the income of peoples, the stronger the trends to take refuse in cyclone shelters for evacuation during disaster because of their cherish life with good transport facility. (Takahiro et. al., 2020) also showed that during the Hurricane Irma (September 10, 2017) in Florida, evacuees of higher income with less damages on housing and infrastructure were more likely to take refuge into shelters from affected areas. The reason behind the unwillingness for evacuation of the poor is they are afraid to loss the households' asset and cattle. In contrast, the family property is well secured for the richer in their strong and safe houses.

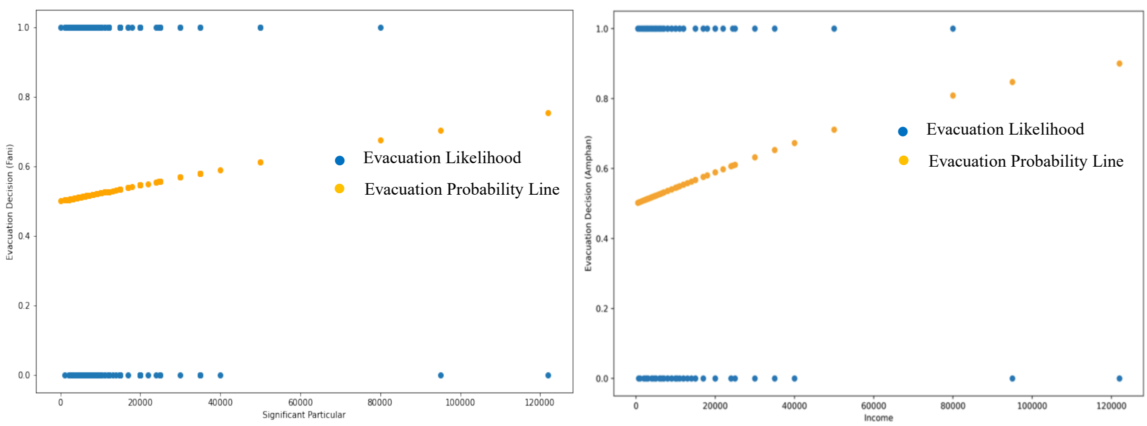

Figure 16: Evacuation behavior based on respondent's income (x1)

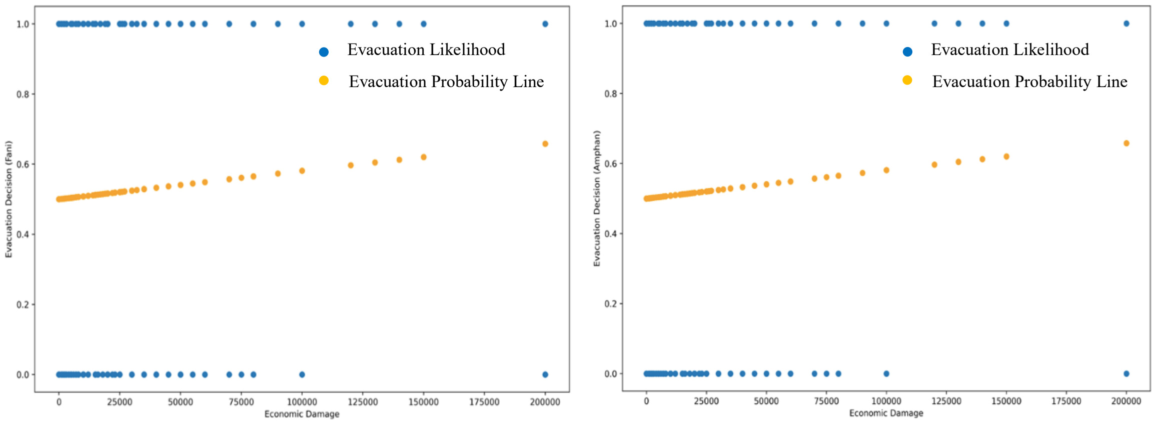

Figure 17: Evacuation behavior and respondent's economic damages (x3)

Experience on previous economic damages during Fani-2019 has positive effect on evacuation decision for Amphan-2020, as the coefficients of both are positive. These impacts have been characterized as death or serious injury to an individual, damage, or destruction to household property. The willingness of people who are from the areas that have been affected by Fani-2019 storm surges in the past and those involved in an evacuation in the past show a greater propensity to evacuate during Amphan-2020. Evacuation during Amphan-2020 also shows that (Figure 17) experienced during Fani-2019 impacts more likely to evacuate than those without experience with it in the past. The target of an evacuation is to reduce risk of damages. So, previous cyclone Fani-2019 experience helped the victims to understand their physical risk and motivate them to evacuate during Amphan-2020. People often use previous situations as an anchor in the decision making in the new situation they face. Hence, experience for Amphan-2020 and Fani-2019 storm surges are vital factors in explaining future evacuation decisions.

4.2. Indigenous Factors for Evacuation

Respondent's age, family size and education are three influencing factors for making the rational decision of evacuation during disaster. In this study it is considered the respondents' age more than forty while face to face interview was conducted. The model result has derived age with positive action of non-evacuation. From Table 9 and Figure 18, evacuation response based on age has been inversely affected the positive and expected outcome. Elder people were not likely intended to evacuate rather the child and young people do. This is because the peoples of more ages gathered experience from the repeating cyclone hits from many years, they are likely to be more coped with it and take the responsibility to look after the household's assets.

Another important factor for evacuation decision is victim's family size. In the model, family size has positive effect on evacuation during disaster meaning the most cognitive action on the expected outcome. Bigger the family size more intended to take refuse in cyclone shelter because they receive more information than the small sizes family receive and wish to get the reliefs (Figure 19). As the family members are large, they are susceptible to be attached more socially, so that they might have chances to get more influence by their neighbour, friends, and surrounding peoples.

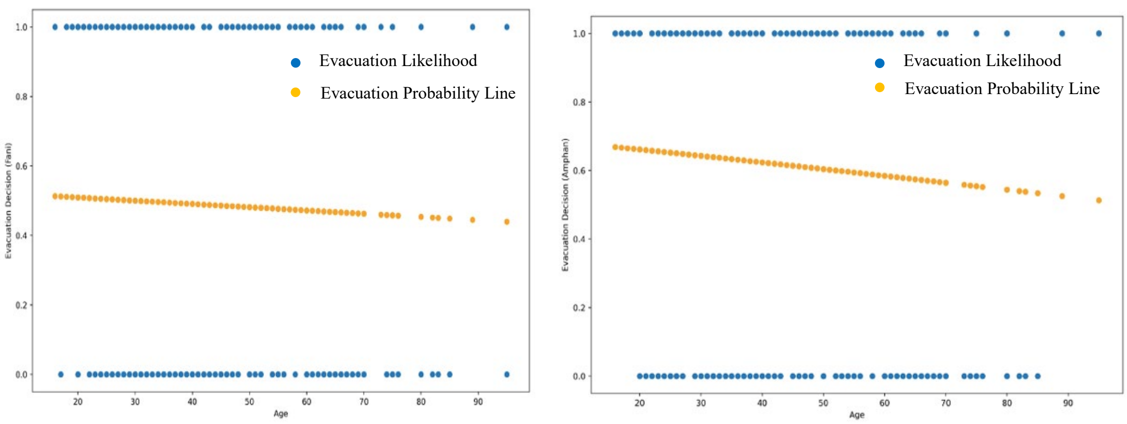

Figure 18: Evacuation perception based on respondent's age (x4)

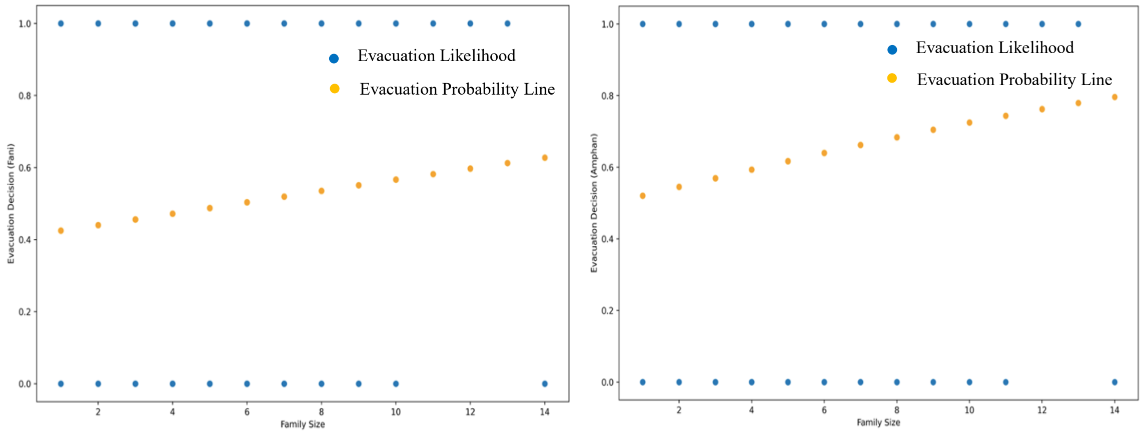

Figure 19: Evacuation behavior based on respondent's family sizes (x5)

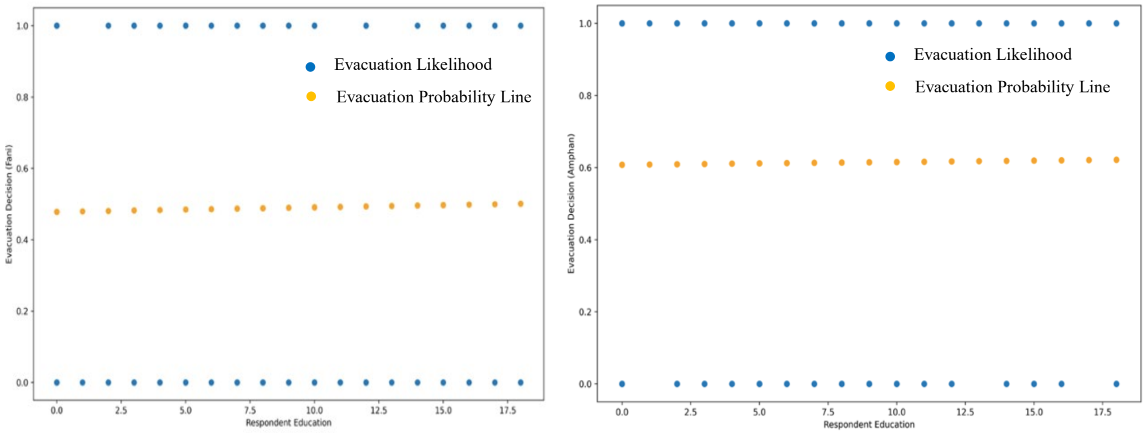

Figure 20: Evacuation responses based on respondent's education (x6)

Another important parameter is years of schooling (Figure 20) meaning the level of education of the respondents. Logically it is true that higher the education level, better the consciousness in a personal life and it seems like the model derived outcome has also revealed the positive effect on the deciding factor of evacuation. A wise person usually belongs educated family so that their carefulness about their lives is more important than their properties and resources. However, the effect of education level on the decision of respondent evacuation or non-evacuation is not much as generally expected but a bit more influencing during Amphan-2020 than Fani-2019.

4.3. Cyclone Shelters for Evacuation

The availability and accessibility to cyclone shelters from the victim's house is essential for evacuation. It is well recognized that the inadequate maintenance, insufficiency of sheltering places, lack of security always hinders the willingness for evacuation in Bangladesh (Miyaji, 2020). But during most of the disaster, many victims have no alternate but evocation. In these circumstances 'the distance of cyclone shelters' is highly significant. The result of model analysis showing that people facilitate with the 'shelters within two kilometres' from home having higher probability of evacuation (Figure 21). Evacuation process is necessary to push large numbers of endangered population into safer areas.

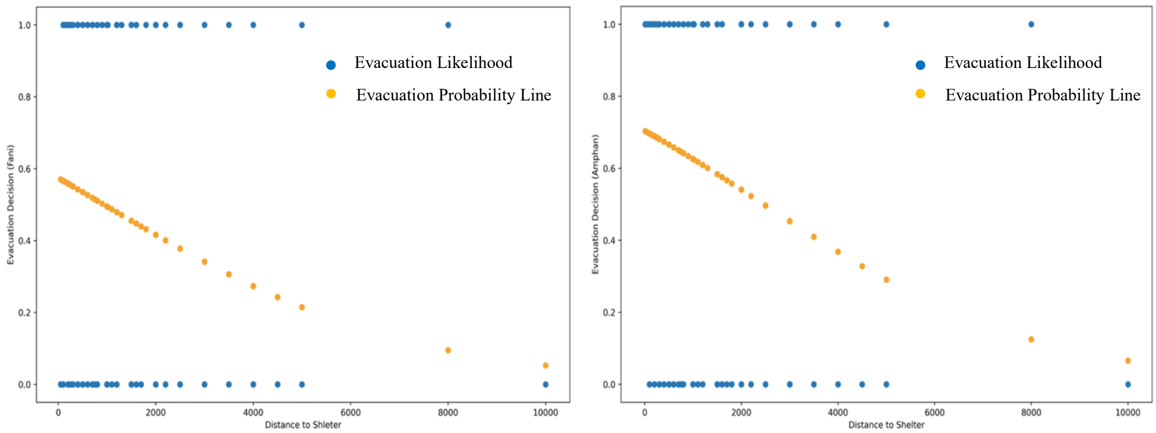

Figure 21: Evacuation influenced by disatance to shelter from respondent's houses (x7)

It is well known that connective road condition in two union as Daskhin and Uttor Bedkashi near the Bay of Bengal is mostly earthen made by soil, resulting muddy and somewhere waterways unable to use for evacuation purposes. Hence, if the shelter is not safe enough and not available within two kilometres with better road condition, people may be afraid to take refuge there. It is necessary to evaluate potential shelters and conduct a drill to see whether shelter space can hold all evacuees and the connecting road condition is good before they get the official labels for cyclone shelters. Models shows that, households are more likely to choose the shelter destination having the better road condition constructed by the bricks instead of muddy roads.

4.4. Cyclone Warning for Evacuation

Amongst all the variables the model has been used ‘the contents of cyclone warning’ and ‘the mediums’ through which warnings are forecasted has shown highest positive response value on individual’s evacuation decision but a major portion of people do not consider the government announcement enough only for making their evacuation decision because many time it does not happen what they broadcast. The local cyclone preparedness program (CPP) which ensures the dissemination of warnings among coastal communities has major acceptances to the local peoples.

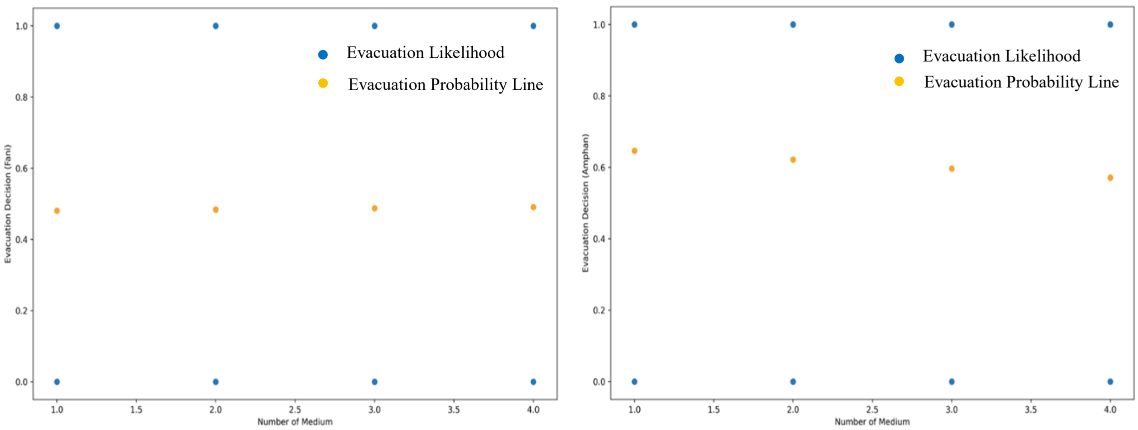

Figure 22: Evacuation behavior based on number of mediums of warning receipt (x9)

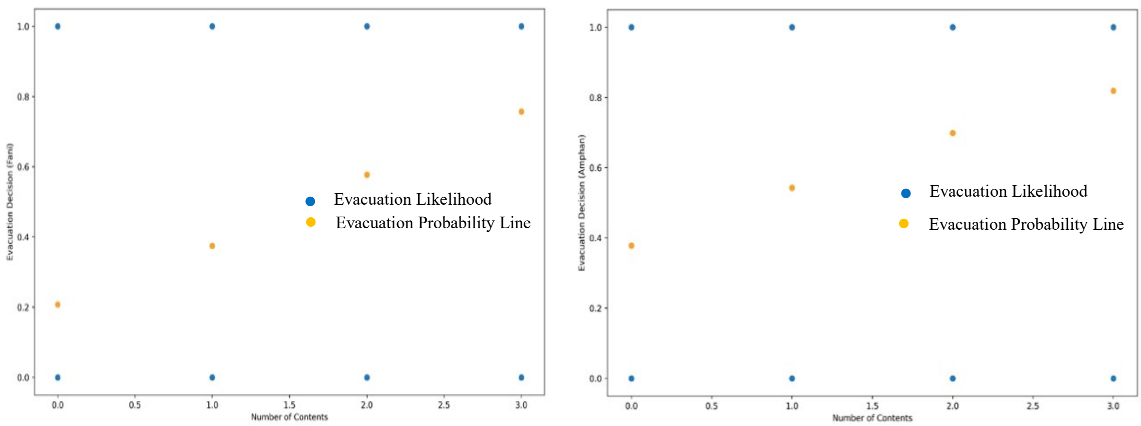

Figure 23: Evacuation behavior considering number of contents of warning (x10)

During Fani-2019 and Amphan-2020, respondents has majorly considered the local sources of announcement for diverse type cyclone warning for their evacuation decision. The *p* value for the 'cyclone warning' is the most significant among all variables. The Figure 23 shows that peoples receiving the more information regarding the warning, the more willing to be evacuated. So, increasing the evacuation rate it is integral to develop the local announcement system for cyclone warnings.

4.5. Significant Individuals for Evacuation

"Whether the influence by any significant person or not" also has positive effect on victim's evacuation decision, as the coefficients of it are positive. The result of this study showed that the victim who were influenced by such significant individuals are more likely agree to evacuate than the peoples are not motivated by them because in local area people tend to do what others around them are doing (Figure 24). But it is true that the nature of this motivating persons is also significant as most of the peoples are influenced by local "imam of the mosque" (religious leader) then by the local politician for evacuation. It is sometime a matter of psychological response because local politicians always rely on information from central government for their personal announcement while peoples receiving the warning from central government mostly don't treat enough for making the evacuation decision. Some people emphasis the announcement from the local market community people is good for making the decision.

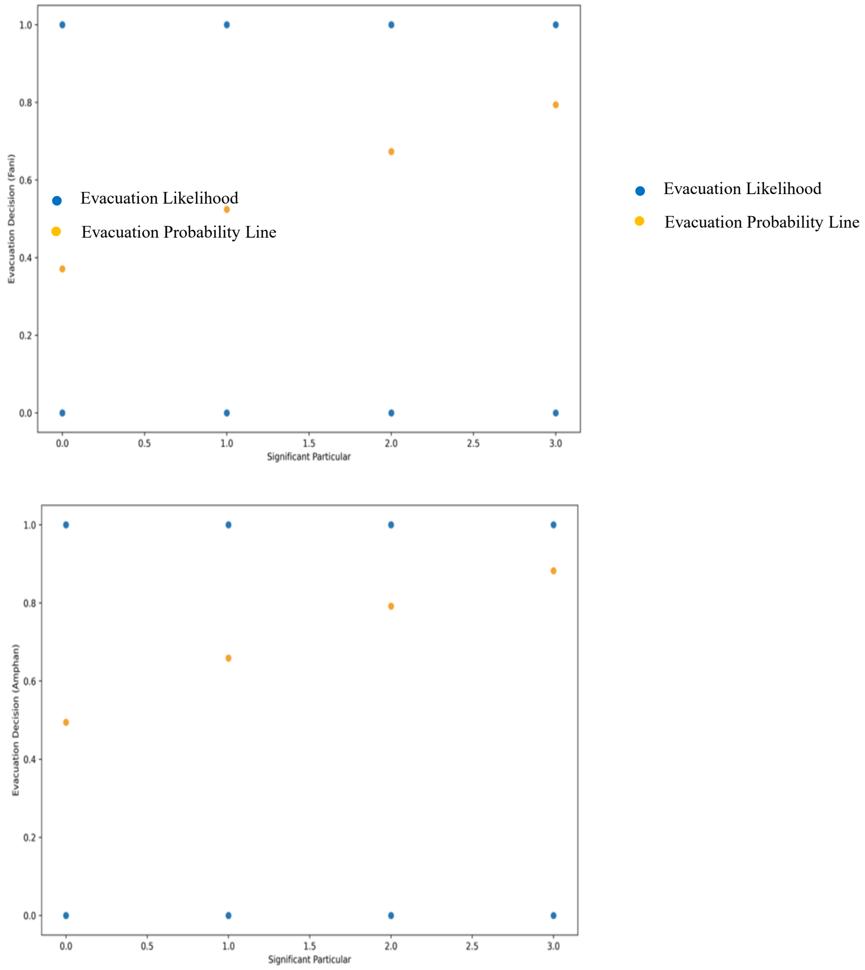

Figure 24: Evacuation behavior influencing by significant individuals (x11)

4.6. Evacuation and COVID-19

After detection of first case of COVID-19 in December 2019, the victims of storm surge have been facing the new dimension of environmental tragedy ensuring safe evacuation and taking the refuge in shelters. The gathering of peoples coming from different arena into a common shelter pose the risk of virus spread during the COVID-19 pandemic (Ishiwatari M. 2020). As an example, in the Ontario, Canada during the spring flooding in 2020 the authorities relocated the affected peoples to hotels instead of regular evacuation shelters where peoples had to face severe difficulty to maintain social distancing leading to take decision returning their home (Yourex-West 2020). But in case of developing country like this study it is very hard to discuss on the impacts of pandemics on evacuation perception of common peoples. This study shows that there are hardly significant influences of COVID-19 pandemic on public evacuation decision during Amphan-2020 (Figure 25). Among the all respondents a significant number were informed about COVID-19 during the cyclone but the result of calculation of this study is showing that there is no significant relation of the perception on COVID-19 with their evacuation behaviour while it’s supposed to have the significant relation. From analysing the responses of COVID-19 oriented questions it is possible to discuss on the reason why victims didn’t consider it. Since the COVID-19 was very new shape of upcoming pandemic, so victims didn’t feel necessary enough to consider it, but it posed the major threat to turn this situation into worse. Since the measure to reduce the damages of cyclone amid COVID-19 may become fail and expensive compared to single cyclone, resulting in delays. Hence, the balance is urgent to successfully manage concurrent disasters, a new holistic approach is crucial to produce efficient response for evacuation during such COVID-19 outbreak is discussed below.

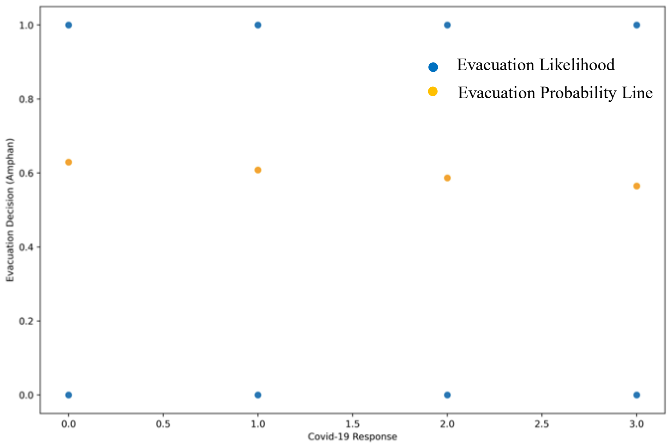

Figure 25: Evacuation responses based on COVID-19 parceptions (x12)

4.7. Evacuation amid COVID-19

It is quite impossible for a single agency to manage the dual risks of any natural disaster under pandemic. The lack of proper response for disaster under pandemic may increase the outbreak of it. As one relevant example is not maintaining the social distancing properly may causes the infection of mass people, the volunteers, and others, resulting into probable collapse of local disaster management system. On the other hand, response may be inadequate for disaster if the rules of pandemic must follow strictly. Hence, an in-depth assessment for evacuation during disaster amid COVID-19 and experience from it is needed to create an effective evacuation system helping for striking disaster with minimization of pandemic outbreaks (Ashraf A. 2021). Evacuation is always considered as an effective pre-measure for reducing the damages of disaster, but a few studies has been revealed in this regard for managing safe evacuation amid COVID-19 (Simonovic et. al., 2021). Instead of overall the focus for evacuation should be priority based on the forecasting of early warnings (Amarnath, 2020). So, the pre-identification of disaster vulnerable areas from previous disaster experiences and updating the local pandemic such as COVID-19 scenario is a possible measure for ensuring the evacuation for victims. Local authority should focus on preventive measures for successful evacuation ensuring the safety first for pandemic staff who are working against it and disaster volunteers from the infection (CWSJ, 2020). The technical support that suits to the corresponding affected area with financial support of local government can play the vital role increasing the evacuation rate (Ishiwatari, 2012). For ensuring the community based and improved implementation of technical knowledge for safe evacuation under pandemic there is no alternative but increasing the public disaster risk awareness (Quigley et. al., 2019). Ensuring the multi-sector engagement such as WASH (water, sanitation, hygiene) experts, local disaster volunteers is crucial for increasing the safe evacuation under pandemic situation (Htoon et. al., 2020). A balance coordination of these aspects would help for increasing the safe evacuation with lowest infection of disease during the concurrent of pandemic like COVID-19 and Amphan-2020. So, ensuring the elements mentioned in Figure 26 would aim to increase the safe evacuation protecting the victims, pandemic stuffs, disaster volunteers and other stakeholders from further infection of pandemic.

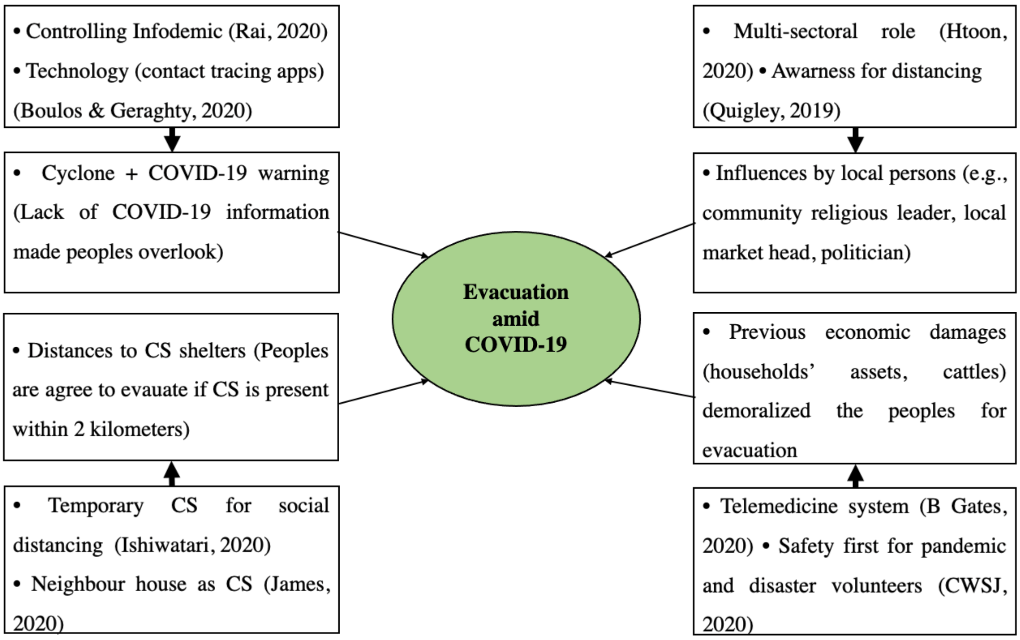

Figure 26: Essential elements for evacuation amid COVID-19

4.8. Differences in evacuation perceptions

In almost every year evacuation during disaster is an integral part of life for the southwestern coast's people of Bangladesh. They have been accustomed for doing this for generations. Yet a large portion of people do not want to evacuate in times of danger. However, this study found that depending on the nature of the cyclone, there may be some considerable changes in the behaviour of evacuation. So, if it is focused on those special aspects, it is possible to increase the amount of human evacuation in times of disaster. As the people has been evacuated more during Amphan-2020 than Fani-2019, the intensity of Amphan can be estimated as the reason because since both case they considered the 'wind speeds' as their first influencing factor but for the second influencing factor; during Fani, they given more importance to their location and during Amphan they focused on the information of 'category of cyclone'. When they were asked about COVID-19 they expressed concern but many of the respondents said that they did not know it at all when it came to evacuation decisions. So, the story of evacuation in the time of Amphan could have been more different than Fani if they had known about COVID-19 timely. Again, since many people do not have much faith in government information while the information about COVID-19 could not be obtained from other source but government. So, if the warning information could be posted in time through the local and reliable sources such as local mosque, CPP, market committee, local politician it can increase the evacuation rate. But the education level of the people has played a more important role for evacuation in Amphan. Where the variable importance for education during Fani was 1.45 but the time of Amphan it was 3.34. So, it is easy to assume that the more educated a person was, the more he was concerned about the COVID-19. So, it is therefore the responsibility of the authorities to properly convey the information of pandemic like COVID-19 to the illiterate people from the sources in which they believe. Although the indigenous knowledge of local people always plays an important role in making the evacuation decisions, it was less influencing in Amphan than water because the great massacre misled the people during it. Thus, to increase the evacuation rate effectively, there is no alternative but to develop the local disaster response system (LDRS) as well as the national focus. The LDRS includes union council, local volunteers, connecting road condition between public homes and cyclone shelters, facility in shelters, local announcement, public technical knowledge and awareness, social security during evacuation etc. The most important thing in this system which needs to be given more emphasis is to develop the cyclone warning system considering the very local sources of announcement.

Chapter 5 CONCLUSIONS AND RECOMMENDATION

This study was carried out in southwestern coast of Bangladesh where cyclone induced storm surge occurs frequently. We obtained the basic information of coastal residents under disaster Fani-2019 and Amphan-2020 happened with a year-round distances. This study has been conducted through questionnaire and interview of victims and analyzed their risk perception during these different periods. The situation of Amphan-2020 was under the COVID-19 pandemic. A binary logistic regression analysis was performed, which resulted in an effective empirical model for evacuation behavior of victims of this coast. By doing this now, our study will help us understand the relationship between environment and human life in and around the coastal region to a finer degree and provide evidence of important factors used by respondents in deciding to evacuate or not. The main conclusions are as follows:

Socioeconomic and demographic factors associated with evacuation decision: There is a significant relationship between evacuation decision and the demographic characteristics of respondents. For example, the factors of "Households' income","House condition" "Economic damages" have positive effect on evacuation decision.

Cyclone warning and evacuation decision: The dissemination of evacuation orders is an important factor in the evacuation decision. The contents of cyclone warning and 'the mediums through which warnings are forecasted has highest positive response value on individual's evacuation decision but since many peoples want to get local announcement for valuing the national warning so when a typhoon approach the local miking and announcement by the religious persons is a possible solution for increasing the evacuation rate.

Disaster vulnerable area: Living in high-risk areas or evacuation zones is one of the factors influencing evacuation behavior. The connecting road condition and distances between cyclone shelters and respondents house has significant relationship. The peoples living in the near to the Bay of Bengal must face difficulty to take refuge during disaster resulted into more reluctant to evacuate. Increasing the number of shelters within maximum 2 kilometers round is a possible solution to maximize the evacuation rate in this area.

During the concurrent of such natural disaster amid pandemic while the evacuation of residents living in high-risk area is essential, the practice of keeping them concentrated within evacuation centers needs to be revised such as involving an active medical team always for considering the victims health and safety with social distancing. If authority, ensure the availability medical team there is a high possibility for increasing the evacuation rate. So, the inter-disciplinary participation such as WASH (water, sanitation, hygiene) committee, medical team, experienced disaster volunteers, pandemic stuff, social and government authorities is a possible and effective way to maximize the evacuation rate ensuring the lowest spread of viral infection during disaster amid pandemic like COVID-19.

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Appendix-A: Questionnaires for household's survey

Date (dd/mm/yy): ------/02/21	Time (24h format):	Name of the surveyor:
Upazila: Koyra; Union: ---------------------	Polder No.--------------	Household No.---- ----------
Household ID: -------------	Latitude: ------------------------	Longitude: -----------------

As-salamu-alaikum. We are collecting some household information for academic research purposes. This study is being done by Mr. Monirul Islam from the Estuarine and Coastal Environment Jun SASAKI Laboratory, Department of Socio-Cultural Environmental Studies, Graduate School of Frontier Sciences, University of Tokyo, Japan. The aim of the study is to assess the evacuation behavior during the cyclone Amphan-2020 and the cyclone Fani-2019. We would like to know information related to socio-economic and responses during the last two major cyclones. All the information will be used for academic purposes and kept confidential. The questionnaire would take about an hour. Would you please agree to cooperate with us for completing the questionnaire?

				Yes	No
1.	Respondent information				
	1.1 Name of the Respondent:			1.2 Age: ------(y)------(m)	
	1.3 Gender:		Male		Female
	1.4 Role in the household:		Household head		Dependent
	1.5 Education (years of schooling):				
	1.6 Occupation:		Farming (agriculture)		Farming (aquaculture)
			Business		Fishing
			Labor		Home maker
			Student		Service
			Retired		Others
	1.7 Respondent agreed to take a photo and take			Yes	No
2.	Household information				
	2.1 Household photo taken			Yes	No
	2.2 Family size:				
		1.		2.	3.

2.3 Age and sex of the family members (years/M/F)	4.			5.			6.
	7.			8.			9.
i.e. 13(F)	10.			11			12.

2.4 Highest level of education among the household members (years of schooling):

2.5 Highest level of education among the female household members (years of schooling):

2.6 Rate the impact of any cyclonic event on your household income:

		Extremely negative (<40%)		Moderately negative (40-70 %)
		Little negative (70-99) %		Little positive (101-140) %
		Moderately positive (140-170 %)		Extremely positive (>170%)
		No impact (neutral)		

2.7 Monthly household income (BDT/month):

2.8 Household wall material		Bick/concrete		CIS/Wood
		Mud/Brick/Wood		Fence/Straw/Bamboo /Leaves
		Others		
2.9 Household roof material		Concrete		CIS/Wood
		Mud/Tile/Wood		Straw/ Leaves/Bamboo
		Others		

2.10 How old the present house is (years):

2.11 How many times the house was repaired:

2.12 Time since the latest household repairment (months):

2.13 Rate your present household condition:

		Rainwater can enter the house		Vulnerable to stronger winds
		Moderate surge can inundate		None of the above
		Others		

2.14 How many years since you and your family have been living in this area?

2.15 How many cattle does your household own?

2.16 Name of the nearest cyclone shelter:

2.17 Distance to the nearest cyclone shelter (meter):					
2.18 Connectivity with the nearest cyclone shelter:					
			Paved road		Herringboned road
			Earthen road		Waterway
			Others		
2.19 Means of transport can be used to reach the nearest cyclone shelter:					
			Any		Only small vehicle
			Walk		Others
2.20 Time requires to reach the nearest cyclone shelter (minute):					
			Any:		Only small vehicle:
			Walk:		Others:

2.21 Does your family own any vehicle?		Yes		No
2.22 Does your family have an electricity connection?		Yes		No
2.23 Does your family have a solar power system?		Yes		No
2.24 Does your family own any device that provides you cyclone warnings?		Yes		No

2.24.1 If yes, then which type?		Radio		TV		Mobile		Others

2.24.1.1 If mobile, type of phone		Smart		Non-smart

2.25 Rate the mobile network strength in your area:					
			Strong		Medium
			Weak		No coverage
2.26 Select the social media that you or any of the family member connected with					
			Facebook		Twitter
			LinkedIn		Instagram
			Snapchat		YouTube
			Tik Tok		Not connected
2.27 Rate the frequency of social media connectivity					
			Always		Frequently
			Often		Rarely

2.28 Instant messaging/calling app that you or any of the family member connected with					
			Facebook messenger		Viber
			Emo		WhatsApp
			WeChat		Not connected
	2.29 Rate the frequency of using instant messaging/calling app				
			Always		Frequently
			Often		Rarely
	2.30 How do you receive the cyclone warning?				
			Facebook messenger		Viber
			Mobile message		Friends and Family
			Radio		TV
			Newspaper		Miking from the mosque
			Voluntary Miking		Others:
	2.31 Which of the media you prefer to receive the cyclone warning?				
			Facebook messenger		Viber
			Emo		WhatsApp
			WeChat		Mobile message
			TV		Newspaper
			Radio		Voluntary Miking
			Miking from the mosque		Others:

3. <u>Event related information</u>

3.1 Who takes evacuation decisions?		Only myself		Together all
		Parents		Community
		Others:		
3.2 Did you/your family ever evacuate to any cyclone shelter?		Yes		No

3.2.1 If yes, then when?		During Amphan		During Fani	Both

3.2.2 If yes, then which cyclone shelter?		During Amphan:	During Fani:
		Always:	
3.2.3 If yes, then the time needed to reach the cyclone shelter (minute).		During Amphan:	During Fani:
		Always:	
3.2.3 If yes, then the distance traveled during evacuation (meter).		During Amphan:	During Fani:
		Always:	

3.2.4 If yes, then how did you reach there?			
		Followed regular path		Followed shortcut path

3.2.1.1 If only Amphan, then why?		Only this time I/we heard the warnings
		Only this time I/we believed the warnings
		I/We had bad experience during the last cyclone
		Newly built cyclone shelter motivated me/us
		Cyclone shelter's facility has been improved
		Access road/connectivity become easier
		Improved social security motivated me/us
		I/we become poorer and expected relief
		Authority forcefully evacuated us
		Others: ....

3.2.1.2 If only Amphan, then when did you start evacuating?		1 day before		Between sunrise and 12.0
		Between 12.0 and 15.0		Between 15.0 and sunset
		Between sunset and 20.0		Between 20.0 and 22.0
		After and 22.0		

3.3 Did you receive any COVID-19 related warning during the Amphan?				
		Yes		No

3.4 Which extra precaution did you adopt?		Bought extra mask and wore all time
		Used soap/hand sanitizer
		Avoid free/common drink and foods
		Stayed completely isolated/avoided gathering
		Did nothing
		Others

3.5 Rate the COVID-19 situation of Koyra area during the Amphan								
		Severe		Moderate		Little		Not at all

3.6 Did you meet/sense the presence of a COVID-19 patient or suspect at the cyclone shelter?				
		Yes		No

3.6.1 If yes, then what was your response?		Complaint to the authority
		Maintained distance and cautioned my family members
		Returned to home
		Did nothing

		Others
3.7 How many family members evacuated during Amphan?		All Part
3.7.1 If part, they why had part of your family evacuated during the Amphan?		Somebody needs to stay to take care of our resources
		Elderly/disabled/wounded people difficult to evacuate
		Reluctant to evacuate
		Due to COVID-19 associated fear
		Others
3.7.2 If part, how many of your family members stayed at home:		
3.7.3 If part, how many of your female family members stayed at home:		
3.8 Evacuated during Fani but didn't during the Amphan. Why?		I/We had bad experience in the cyclone shelter
		Less damage during Fani demotivated during the Amphan
		I/We lost our wealth due to evacuation during the Fani
		I/We built better houses that gave us sense of security
		Newly built embankment gave us sense of security
		Due to COVID-19 associated fear
		I/We became wealthier and did not expect relief
		I/We misunderstood the cyclone warnings
		Others: ....

3.9 If only the Fani, then when did you start evacuating?		1 day before		Between sunrise and 12.0
		Between 12.0 and 15.0		Between 15.0 and sunset
		Between sunset and 20.0		Between 20.0 and 22.0
		After and 22.0		
3.10 How many family members evacuated during the Fani?		All		Part
		Somebody needs to stay to take care of our resources		

3.10.1 If part, they why had part of your family evacuated during the Amphan?		Elderly/disabled/wounded people difficult to evacuate
		Reluctant to evacuate
		Others
3.10.2 If part, how many of your family members stayed at home:		
3.10.3 If part, how many of your female family members stayed at home:		
3.11 If never evacuated, then why?		I/we never heard the warnings
		I/we never understood the warnings
		I/we never believed the warnings
		I/We feel safe in our house
		Access road/connectivity is not easy
		Cyclone shelter is far away, difficult to evacuate
		Cyclone shelter is crowdy and i nadequate facilities
		Requires assistance to evacuate, never got any
		Fear of being looted/stolen of households' assets
		Due to the religious faith
		Difficulty to manage the domestic animals
		Others:
3.12 Rate the factors that affect your evacuation decision		Strength of the cyclone warning/scale
		Forecasted wind speed
		Forecasted storm surge height
		Forecasted direction of landfall
		Forecasted time of landfall
		Projected path of cyclone
		Facilities of the cyclone shelter
		Accessibility of the cyclone shelter
		Distance from the cyclone shelter
		Sources of evacuation order
		Experiences during the last cyclonic event
		Others:
3.13 Who can influence your evacuation decision?		Religious leader (Imam)
		School/College teachers
		Local politician
		Celebrities
		Head of the state (president/prime minister)
		Others:
3.14 Mention the best reliable sources of cyclone related information.		

			Facebook messenger		Viber
			Emo		WhatsApp
			WeChat		Mobile message
			TV		Newspaper
			Radio		Voluntary Miking
			Miking from the mosque		Others:

3.15 Please mention some more facilities you expect in the cyclone shelter.	1	
	2	
	3	
	4	
	5	
	6	

3.16 Please assess the overall damages of your household caused by the cyclone Amphan and the cyclone Fani.

		During Amphan		During Fani
3.16.1 Damages on the house		Severely (all the houses collapsed)		Severely (all the houses collapsed)
		Moderately (major part of the house/houses =damaged)		Moderately (major part of the house/houses damaged)
		Somehow (small part of the hose/houses damaged)		Somehow (small part of the hose/ houses damaged)
		No notable damage		No notable damage
3.16.2 Damages to t he agriculture		Severely (all the crops lost)		Severely (all the crops lost)
		Moderately (>50% crops lost)		Moderately (>50% crops lost)
		Somehow (0-50% crops lost)		Somehow (0-50% crops lost)
		Not applicable		Not applicable

3.16.3 Damages on the aquaculture		Severely (all the fisheries lost)		Severely (all the fisheries lost)
		Moderately (>50% fisheries lost)		Moderately (>50% fisheries lost)
		Somehow (0-50% fisheries lost)		Somehow (0-50% fisheries lost)
		Not applicable		Not applicable
3.16.4 Damages on cattle		Severely (at least 50% cattle lost)		Severely (at least 50% cattle lost)
		Moderately (20-50% cattle lost)		Moderately (20-50% cattle lost)
		Somehow (0-20% cattle lost)		Somehow (0-20% cattle lost)
		Not applicable		Not applicable
3.16.5 Damages on poultry		Severely (at least 50% poultry lost)		Severely (at least 50% poultry lost)
		Moderately (20-50% poultry lost)		Moderately (20-50% poultry lost)
		Somehow		Somehow

		(0-20% poultry lost)		(0-20% poultry lost)
		Not applicable		Not applicable

3.16.6 Damages on human lives		Severely (at least 1 person died)		Severely (at least 1 person died)
		Moderately (at least 1 person severely injured)		Moderately (at least 1 person severely injured)
		Somehow (at least 1 person minor injured)		Somehow (at least 1 person minor injured)
		Not applicable		Not applicable
3.16.7 Damages on business		Severely (Complete capital lost)		Severely (Complete capital lost)
		Moderately (>50% capital lost)		Moderately (>50% capital lost)
		Somehow (0-50% capital lost)		Somehow (0-50% capital lost)
		Not applicable		Not applicable
3.16.8 Loss of opportunity		Severely (>7 days no job/no business)		Severely (>7 days no job/ no business)
		Moderately (3-7 days no job/no business)		Moderately (3-7 days no job/ no business)
		Somehow (0-3 days no job/no business)		Somehow (0-3 days no job/ no business)
		Not applicable		Not applicable
3.16.9 Damage to the property		Severely (tubewell, toilet, food/rice stock, animal fodder s tock etc. totally lost)		Severely (tubewell, toilet, food/rice stock, animal fodder stock etc. totally lost)
		Moderately (tubewell, toilet, food/rice stock, fodder stock etc. partly damaged)		Moderately (tubewell, toilet, food/rice stock, fodder stock etc. partly damaged)
		Somehow (tubewell, toilet, f ood/rice stock,		Somehow (tubewell, toilet, food/rice stock, f

		fodder stock etc. somehow damaged)		odder stock etc. somehow damaged)
		Not applicable		Not applicable
3.16.10 Finally, could you please try to assess the monetary equivalent of your losses (in BDT)?	:	During Amphan	:	During Fani

Appendix-B: Some selected photos of households' questionnaire survey

Appendix-C: Evacuation data during Fani-2019 and Amphan-2020 with influencing variables for Logit Model

Union/ Location	Rspnd Sl	Evacuation in Fani	Evacuation in Apmhan	(X1) Household's Inco	(x2) House conditions	(x3) Economic damg.	(x4) Age of the respondent	(x5) Fam. sizes	(x6) Rspnd edu	(x7) Dist. Of CS	(x8) Road cond.	(x9) Num of med.	(x10) Number of wr.	(x11) Sig. ind.	(x12) COVID per cp.
Amadi/1	1	0	0	7	1	10	40	4	0	15	2	2	0	0	1
Amadi/1	2	1	0	8	3	20	21	5	0	10	1	3	2	1	2
Amadi/1	3	1	1	9	3	10	50	6	9	1	1	3	1	3	0
Amadi/1	4	1	1	6	3	6	50	4	0	5	1	3	0	1	3
Amadi/1	5	0	1	7	3	7	30	4	3	5	1	2	2	2	2
Amadi/1	6	0	0	10	1	100	45	5	0	5	1	2	0	0	2
Amadi/1	7	0	0	2	1	15	42	3	15	17	2	2	0	0	1
Amadi/1	8	0	0	3	3	0	63	2	5	10	1	1	0	0	0
Amadi/1	9	0	0	12	1	100	60	4	5	15	2	4	0	0	1
Amadi/1	10	0	0	0.7	3	30	50	3	10	7.5	1	4	0	0	2
Amadi/1	11	0	0	11	1	15	35	5	9	10	1	4	0	0	3
Amadi/1	12	0	0	12	3	1	66	8	7	12	1	4	0	0	1
Amadi/1	13	1	1	11	3	40	30	6	0	5	1	4	2	0	3
Amadi/1	14	0	0	6	1	4	25	3	2	10	1	3	0	0	3
Amadi/1	15	0	0	10	2	5	45	5	2	15	1	3	0	0	3
Amadi/1	16	0	1	6	2	100	25	6	5	5	1	3	0	1	2

Amadi/1	17	0	1	6	2	100	25	6	0	5	2	3	0	1	2
Amadi/1	18	1	1	6.5	2	15	45	4	0	16	1	4	1	0	3
Amadi/1	19	1	0	9	1	3	35	4	5	7	1	2	0	0	2
Amadi/1	20	1	1	3	2	7	70	6	2	5	2	2	1	1	3
Amadi/1	21	1	1	11	1	100	40	3	3	6	1	2	1	1	3
Amadi/1	22	1	1	4.5	2	25	45	4	0	5	1	2	2	2	2
Amadi/1	23	1	1	10	1	50	36	3	10	5	1	3	2	1	2
Amadi/1	24	1	0	7	1	20	43	3	9	10	1	2	0	1	3
Amadi/1	25	0	1	4	3	4	17	4	0	25	1	1	1	1	2
Amadi/1	26	0	0	14	2	40	40	5	4	20	1	1	0	0	2
Amadi/1	27	0	0	5	2	20	82	2	6	50	2	1	0	2	0
Amadi/1	28	0	0	7	3	130	47	5	7	30	2	1	0	0	0
Amadi/1	29	0	0	10	2	70	41	5	0	20	1	3	0	3	0
Amadi/1	30	0	0	7	2	10	37	4	0	2	1	3	0	2	0
Amadi/1	31	0	0	7	2	40	50	3	0	20	2	3	0	1	0
Amadi/1	32	0	0	5	2	20	26	4	0	30	1	1	0	2	0
Amadi/1	33	0	1	7	2	20	55	5	3	5	1	2	1	0	3
Amadi/1	34	0	0	8	2	150	47	4	3	5	1	2	1	2	0
Amadi/1	35	0	0	8	3	100	29	7	3	5	1	3	2	2	0
Amadi/1	36	1	0	24	2	145	70	11	9	6	2	3	2	0	0
Amadi/1	37	0	1	6	3	90	30	3	6	7	2	3	2	0	3
Amadi/1	38	1	1	7	2	20	55	3	12	1.5	1	3	3	2	0

Amadi/1	39	0	1	6	1	0	42	5	17	10	1	2	0	0	0
Amadi/1	40	0	0	12	3	7	43	8	0	15	1	2	3	0	0
Amadi/1	41	0	0	40	2	10	25	6	10	20	1	3	2	0	0
Amadi/1	42	0	0	5	3	7	56	5	9	15	1	3	2	1	0
Amadi/1	43	0	0	7	1	20	60	4	0	15	1	2	2	0	0
Amadi/1	44	0	1	3	2	100	50	4	10	5	1	4	1	1	0
Amadi/1	45	0	0	5	3	30	82	4	0	2	1	2	0	1	0
Amadi/1	46	1	1	2.5	2	10	25	4	0	7	2	2	1	1	0
Amadi/1	47	0	1	10	1	25	38	4	0	5	2	2	0	2	0
Amadi/1	48	1	1	8	2	10	50	4	0	1	2	2	1	2	0
Amadi/1	49	1	1	3	2	15	80	4	10	10	2	3	2	2	0
Amadi/1	50	1	1	80	3	20	65	7	18	10	1	1	3	2	0
Amadi/1	51	0	1	12	2	20	35	5	10	12	1	1	3	1	2
Amadi/1	52	1	0	5	1	6	46	4	10	2	1	1	3	1	1
Amadi/1	53	1	1	30	2	40	25	3	0	1	1	2	3	1	1
Amadi/1	54	1	1	9	2	40	38	6	5	80	1	1	3	2	0
Amadi/1	55	1	1	5.5	1	15	25	5	5	5	1	2	3	1	0
Amadi/1	56	1	1	6	2	50	35	1	16	2	1	2	3	1	0
Amadi/1	57	0	0	7	2	45	85	5	8	25	2	3	0	0	0
Amadi/1	58	0	0	24	1	30	41	6	10	25	1	4	0	1	0
Amadi/1	59	0	0	10	2	45	42	6	8	45	1	3	0	0	0
Amadi/1	60	1	0	10	1	70	27	5	5	4	1	3	0	0	0

Amadi/1	61	0	1	7	3	80	46	5	5	7	1	2	0	0	0
Amadi/1	62	0	0	25	2	5	70	14	0	10	1	3	1	2	3
Amadi/1	63	0	0	5	1	5	68	1	5	5	1	2	0	0	3
Amadi/1	64	0	0	6	3	10	52	3	0	15	1	3	2	0	3
Amadi/1	65	0	0	5	1	5	68	1	6	5	1	2	0	0	3
Amadi/1	66	0	0	6	3	10	52	3	18	15	1	3	2	0	3
Amadi/1	67	0	0	7	2	70	34	6	6	30	2	2	1	0	1
Amadi/1	68	0	0	35	1	50	50	5	18	20	1	2	0	0	2
Amadi/1	69	0	0	7	2	70	34	6	5	30	2	2	2	0	1
Amadi/1	70	0	0	35	1	50	50	5	16	20	1	2	0	0	2
Bagali/2	71	0	0	7	2	10	25	3	0	4	2	1	0	0	3
Bagali/2	72	0	0	15	1	0	36	5	0	5	1	2	0	0	0
Bagali/2	73	0	0	20	2	10	76	5	8	1	1	3	1	0	2
Bagali/2	74	0	1	7	2	150	60	4	4	30	1	2	0	0	2
Bagali/2	75	1	0	3	2	20	42	3	9	10	1	1	1	0	0
Bagali/2	76	0	0	8	3	20	67	5	18	3	1	2	1	1	3
Bagali/2	77	1	1	12	2	20	27	4	0	3	1	2	1	0	3
Bagali/2	78	0	1	25	2	25	44	9	0	5	1	2	0	0	3
Bagali/2	79	0	1	25	2	10	65	8	0	10	1	2	0	0	3
Bagali/2	80	0	0	8	3	0	30	5	0	15	2	2	0	0	3
Bagali/2	81	0	0	13	3	5	60	3	16	100	2	2	2	0	3
Bagali/2	82	0	0	20	3	15	65	6	9	30	2	2	0	1	2

Bagali/2	83	0	0	3	3	30	26	2	0	5	1	2	0	0	3
Bagali/2	84	0	1	4.5	3	20	48	4	2	5	1	2	1	0	3
Bagali/2	85	1	0	2	3	0	80	2	5	7	2	1	0	0	2
Bagali/2	86	0	0	10	2	30	45	4	0	30	1	3	0	1	2
Bagali/2	87	0	1	10	3	5	65	5	10	20	2	3	0	0	0
Bagali/2	88	0	0	15	2	20	52	9	11	25	1	3	2	1	0
Bagali/2	89	0	1	15	2	20	35	4	12	15	1	2	1	1	2
Bagali/2	90	0	0	10	1	13	58	2	10	15	1	2	0	0	2
Bagali/2	91	0	1	22	2	33	56	4	2	4	1	3	1	2	1
Bagali/2	92	1	1	15	1	20	30	5	6	8	2	3	2	2	2
Bagali/2	93	1	1	8	2	50	28	4	10	2	2	2	1	1	3
Bagali/2	94	1	1	3	2	50	35	2	12	2	1	1	0	1	2
Bagali/2	95	0	1	10	1	2	45	5	12	4	1	3	1	0	2
Bagali/2	96	0	0	12	2	2	23	5	10	20	2	1	0	0	0
Bagali/2	97	0	1	4	3	30	22	4	18	30	1	1	0	1	0
Bagali/2	98	1	0	6	3	8	42	5	8	1	1	4	0	0	0
Bagali/2	99	1	1	12	1	150	45	9	10	4	1	3	3	2	2
Bagali/2	100	1	0	4	1	220	30	4	5	5	1	4	0	0	0
Bagali/2	101	0	1	9	3	120	42	5	8	2	1	4	0	0	0
Bagali/2	102	0	1	5	2	40	40	4	5	30	2	4	0	0	0
Bagali/2	103	1	1	8	2	25	32	6	10	10	1	4	2	1	0
Bagali/2	104	1	1	7	2	20	33	5	2	20	1	4	2	1	1

Bagali/2	105	1	1	2	2	120	70	6	0	7	1	4	2	1	1
Bagali/2	106	0	0	6	3	30	52	4	8	2	1	3	0	0	0
Bagali/2	107	1	0	7	2	40	50	1	9	30	1	4	0	0	0
Bagali/2	108	1	1	5	2	40	50	4	8	5	1	1	2	0	1
Bagali/2	109	0	1	5	2	70	65	6	10	2	1	2	0	0	0
Bagali/2	110	0	0	4	2	200	66	7	0	2	1	4	0	0	0
Bagali/2	111	0	1	3	2	4	50	5	12	50	1	4	0	0	0
Bagali/2	112	0	0	6	2	40	40	4	0	15	1	4	0	0	0
Bagali/2	113	0	0	7	1	20	42	4	10	10	2	4	0	0	0
Bagali/2	114	0	0	3	1	40	40	3	0	3	2	4	0	0	0
Bagali/2	115	0	1	15	1	20	61	6	5	2	2	4	1	0	1
Bagali/2	116	0	1	7	2	85	75	4	8	10	1	4	1	2	1
Bagali/2	117	1	1	6	2	120	50	5	5	4	2	4	1	2	1
Bagali/2	118	1	1	1.5	3	60	25	5	10	3	1	4	1	1	1
Bagali/2	119	1	1	7	2	70	35	4	0	2	2	4	1	2	1
Bagali/2	120	1	1	5	3	120	47	3	0	2	1	4	1	2	1
Bagali/2	121	1	1	2	2	50	55	7	10	10.2	2	4	1	1	1
Bagali/2	122	1	1	7	2	80	50	7	6	15	2	4	0	0	0
Bagali/2	123	1	0	9	2	20	34	6	8	1	2	4	3	1	1
Bagali/2	124	1	1	8	2	100	45	6	5	3	2	4	3	1	1
Bagali/2	125	0	0	6	2	80	34	5	8	5	2	4	0	1	0
Bagali/2	126	1	1	7	1	20	38	4	0	2	2	4	3	2	1

Bagali/2	127	0	1	12	2	30	51	9	6	4	2	4	2	2	0
Bagali/2	128	0	0	8	2	10	65	5	5	15	1	2	0	0	0
Bagali/2	129	0	1	3	2	80	30	4	16	12	1	3	1	0	0
Bagali/2	130	1	1	12	3	40	35	6	7	20	2	3	2	1	0
Bagali/2	131	1	1	6	2	50	18	3	12	10	2	3	2	1	0
Bagali/2	132	0	1	20	2	40	26	4	9	2	2	1	1	1	0
Bagali/2	133	1	1	30	1	40	60	5	6	5	2	1	2	1	0
Bagali/2	134	0	1	6	2	150	48	6	8	5	1	2	2	1	0
Bagali/2	135	1	1	0.8	2	4	39	6	8	5	2	3	3	1	1
Bagali/2	136	1	1	50	1	100	20	12	2	1.2	1	4	3	0	0
Bagali/2	137	1	1	5	2	50	64	3	9	5	2	2	3	1	0
Bagali/2	138	1	1	6	3	50	55	4	16	15	1	2	3	1	0
Bagali/2	139	1	1	8	2	50	16	4	7	15	2	3	3	1	1
Bagali/2	140	0	0	6	2	60	70	6	0	30	2	3	3	1	0
Bagali/2	141	0	1	6	2	60	28	4	9	8	2	3	2	0	1
Bagali/2	142	1	1	7	2	20	40	4	10	8	2	3	3	1	0
Bagali/2	143	1	1	4	3	200	61	2	9	10	2	4	3	0	0
Bagali/2	144	0	0	9	2	50	20	3	8	45	1	3	3	0	0
Bagali/2	145	1	0	6	2	30	29	4	10	40	1	2	3	1	1
Bagali/2	146	1	1	12	3	10	48	5	5	20	1	2	3	1	2
Mahe*/3	147	1	1	25	1	200	60	10	8	20	1	3	1	1	2
Mahe*/3	148	0	1	20	2	30	45	5	9	4	1	2	1	0	1

Mahe*/3	149	1	1	15	1	17	16	5	2	5	2	2	3	1	1
Mahe*/3	150	1	1	8	2	25	48	5	10	4	2	2	3	1	0
Mahe*/3	151	1	1	20	2	20	70	6	8	3	1	2	3	1	0
Mahe*/3	152	1	1	3	2	15	25	4	0	20	2	2	3	1	0
Mahe*/3	153	0	1	5	2	26	48	6	5	30	2	1	0	0	0
Mahe*/3	154	0	1	10	2	20	61	7	0	1	1	2	1	0	2
Mahe*/3	155	0	1	5	2	20	50	5	0	15	2	1	1	0	2
Mahe*/3	156	1	1	5	2	100	42	5	12	5	1	3	2	1	2
Mahe*/3	157	0	0	10	3	100	48	4	12	5	1	2	0	0	2
Mahe*/3	158	1	0	10	1	50	60	3	9	5	1	3	1	0	2
Mahe*/3	159	0	1	9	1	50	63	5	1	2	1	2	0	0	2
Mahe*/3	160	1	1	35	2	500	35	8	0	7	1	2	1	0	0
Mahe*/3	161	1	1	7	3	20	75	6	0	10	1	4	3	2	0
Mahe*/3	162	1	1	25	2	0	40	7	0	1	1	2	3	2	0
Mahe*/3	163	1	1	15	1	40	45	5	2	5	1	3	3	2	0
Mahe*/3	164	1	1	5	2	10	50	5	3	15	1	2	3	1	0
Mahe*/3	165	0	0	20	1	50	45	7	8	22	1	2	1	2	0
Mahe*/3	166	1	1	12	1	75	45	6	0	30	1	2	3	1	0
Mahe*/3	167	1	1	10	1	50	95	5	0	20	1	1	3	1	0
Mahe*/3	168	1	1	10	2	210	70	8	5	10	2	4	3	1	1
Mahe*/3	169	1	1	9	2	100	45	9	9	10	1	3	3	2	1
Mahe*/3	170	0	1	9	2	120	63	4	10	20	2	2	0	0	1

Mahe*/3	171	1	1	10	2	120	55	9	12	10	2	3	3	1	1
Mahe*/3	172	1	1	20	1	20	70	7	4	1	1	4	3	1	2
Mahe*/3	173	1	1	3	2	50	19	6	0	4	1	4	3	1	1
Mahe*/3	174	0	1	8	1	20	50	4	8	5	2	4	0	1	0
Mahe*/3	175	1	1	12	2	30	65	13	5	10	1	4	3	1	1
Mahe*/3	176	0	0	7	2	50	45	5	6	30	1	4	0	0	0
Mahe*/3	177	0	1	15	2	50	61	7	2	2	2	2	1	2	1
Mahe*/3	178	0	0	6	2	10	40	4	10	15	1	3	1	1	2
Mahe*/3	179	0	1	10	2	100	75	4	10	8	1	3	3	1	0
Mahe*/3	180	1	0	8	1	20	32	3	6	5	1	3	3	1	0
Mahe*/3	181	0	1	8	3	80	37	4	7	20	2	4	3	1	1
Mahe*/3	182	1	1	6	1	50	48	3	5	4	1	3	3	1	0
Mahe*/3	183	0	0	5	3	100	47	4	10	30	2	3	3	1	1
Mahe*/3	184	1	0	5	3	100	25	4	5	10	1	3	3	1	1
Mahe*/3	185	0	1	6	3	70	20	6	13	30	2	3	0	2	0
Mahe*/3	186	0	1	7	2	20	95	5	0	10	2	2	0	1	0
Mahe*/3	187	1	1	5	2	40	29	3	3	20	2	2	0	2	0
Mahe*/3	188	0	0	9	2	5	52	3	8	10	1	1	2	1	2
Mahe*/3	189	1	1	25	1	10	50	11	5	1.5	1	1	2	2	2
Mahe*/3	190	0	0	9	3	2	80	5	3	4	2	2	2	0	3
Mahe*/3	191	0	1	5	3	2	36	5	10	30	2	1	0	1	0
Mahe*/3	192	0	0	3	2	15	42	4	0	50	2	1	0	1	0

Mahe*/3	193	1	1	15	2	100	27	4	0	10	2	1	2	2	0
Mahe*/3	194	0	0	15	2	0	40	3	14	3	2	1	2	0	3
Mahe*/3	195	1	1	9	1	1	40	4	0	0.3	1	2	2	0	2
Mahe*/3	196	1	1	5	2	15	40	6	7	6	2	3	1	2	0
Mahe*/3	197	1	1	15	2	20	66	7	8	12	2	2	1	1	0
Mahe*/3	198	1	1	2.5	2	20	20	6	0	25	2	3	1	1	0
Mahe*/3	199	1	1	15	1	17	16	5	0	5	2	2	3	1	1
Mahe*/3	200	1	1	5	3	10	55	2	12	10	2	2	3	1	0
Mahe*/3	201	1	1	7	3	20	46	5	0	20	2	3	2	1	0
Mahe*/3	202	0	1	20	1	20	42	5	5	8	1	1	2	0	0
Mahe*/3	203	1	1	2.5	3	80	65	2	0	5	2	1	2	1	0
Mahe*/3	204	1	1	8	3	60	35	4	5	10	2	1	1	1	0
Mahe*/3	205	0	1	12	1	10	35	6	11	30	2	3	1	1	0
Mahe*/3	206	1	1	5	3	8	32	5	5	5	1	3	2	1	1
Moha*/4	207	0	1	10	2	12	20	4	7	5	2	2	2	1	3
Moha*/4	208	1	0	5	1	5	75	3	10	15	1	1	0	0	0
Moha*/4	209	0	0	10	2	20	65	5	8	15	1	3	3	1	1
Moha*/4	210	1	0	4	1	150	65	10	2	18	1	3	3	1	0
Moha*/4	211	0	0	6	1	100	45	4	6	20	1	3	3	1	0
Moha*/4	212	0	1	3	2	50	45	3	0	30	2	3	3	0	0
Moha*/4	213	0	1	6	2	100	35	5	13	35	1	4	3	1	0
Moha*/4	214	1	1	8	3	60	60	6	12	25	2	2	3	0	1

Moha*/4	215	0	0	6	3	50	22	3	3	5	2	1	0	0	0
Moha*/4	216	1	0	8	1	25	21	8	16	10	2	2	2	1	0
Moha*/4	217	1	1	10	3	20	45	4	7	10	2	1	3	1	0
Moha*/4	218	0	0	6	2	25	25	7	0	30	2	3	0	0	0
Moha*/4	219	0	1	6	3	55	24	3	3	10	2	4	0	0	1
Moha*/4	220	1	1	6	2	50	42	3	4	7	1	3	3	1	1
Moha*/4	221	1	1	6	2	35	80	3	10	1	1	3	3	1	2
Moha*/4	222	1	1	6	1	50	26	3	12	10	2	4	3	1	1
Moha*/4	223	0	1	5	2	40	23	3	10	4	1	3	0	0	0
Moha*/4	224	1	1	5	2	40	25	3	5	20	1	4	3	2	2
Moha*/4	225	1	1	6	2	110	60	7	5	9	2	3	2	0	2
Moha*/4	226	0	1	8	2	115	45	5	7	8	2	3	2	0	2
Moha*/4	227	0	0	9	3	20	60	6	18	35	2	2	1	1	0
Moha*/4	228	0	1	12	2	50	25	4	4	40	1	2	1	0	1
Moha*/4	229	0	0	2.8	3	8	31	4	0	20	2	1	1	0	0
Moha*/4	230	1	1	9	2	30	26	5	7	25	2	1	1	2	0
Moha*/4	231	0	1	6	2	40	50	5	7	10	1	3	0	0	0
Moha*/4	232	1	0	9	2	70	26	6	6	20	2	3	2	2	0
Moha*/4	233	0	1	7	2	10	35	5	0	8	1	2	0	0	3
Moha*/4	234	0	1	11	2	10	30	3	7	5	1	2	1	1	2
Moha*/4	235	1	1	7	1	30	70	2	0	4	2	2	1	0	3
Moha*/4	236	1	1	20	2	150	20	9	6	10	2	2	1	0	3

Moha*/4	237	1	0	15	3	20	70	5	7	4	1	2	2	0	2
Moha*/4	238	0	0	10	3	5	22	4	12	5	1	1	2	1	3
Moha*/4	239	0	1	9	1	3	28	4	8	3	1	1	1	1	1
Moha*/4	240	0	0	3	2	150	32	3	0	25	1	1	1	0	3
Moha*/4	241		0	9	3	25	22	5	7	10	1	3	2	1	2
Moha*/4	242	1	1	8	2	98	57	6	5	10	2	3	2	0	2
Moha*/4	243	0	0	5	2	100	26	4	0	10	2	4	0	1	0
Moha*/4	244	0	0	9	2	20	26	6	0	25	1	2	1	2	0
Moha*/4	245	1	1	3.5	2	5	59	8	8	25	1	2	2	1	0
Moha*/4	246	1	1	12	2	50	58	6	0	1	1	2	1	1	2
Moha*/4	247	1	1	8	2	150	65	5	5	3	2	3	1	0	2
Moha*/4	248	1	1	2	2	10	40	4	0	10	1	3	2	1	0
Moha*/4	249	0	0	15	3	50	50	5	8	10	1	3	0	0	2
Moha*/4	250	1	1	20	1	20	55	7	0	25	2	2	1	1	2
Moha*/4	251	1	1	8	1	50	37	4	8	35	2	2	1	0	2
Moha*/4	252	0	0	7	2	60	62	9	2	20	1	3	1	0	2
Moha*/4	253	0	0	15	2	50	37	5	0	40	2	3	0	0	2
Moha*/4	254	0	0	15	2	100	35	3	10	1	1	3	0	0	2
Moha*/4	255	1	1	10	2	30	37	5	0	5	1	2	2	0	0
Moha*/4	256	0	0	9	2	20	24	7	0	5	2	2	0	0	1
Moha*/4	257	1	1	15	2	15	38	4	5	5	1	3	3	0	0
Moha*/4	258	1	1	10	3	0.5	40	5	8	0.3	1	2	0	2	1

Moha*/4	259	0	0	8	3	5	80	3	0	10	1	2	0	2	0
Koyra/5	260	0	0	10	1	150	46	7	8	40	1	3	0	2	0
Koyra/5	261	1	1	8	2	95	57	6	6	10	1	3	1	0	2
Koyra/5	262	0	1	35	2	50	56	4	12	6	1	3	0	1	2
Koyra/5	263	1	1	9	3	40	40	4	3	15	1	1	0	1	1
Koyra/5	264	1	1	8	2	100	31	6	0	5	1	3	2	1	1
Koyra/5	265	0	0	20	1	10	36	4	0	10	1	3	0	2	1
Koyra/5	266	1	1	5	2	100	28	12	4	5	1	3	3	2	0
Koyra/5	267	1	1	2	2	60	55	1	9	3	1	3	3	1	0
Koyra/5	268	1	1	6	2	70	40	8	0	5	1	3	3	1	0
Koyra/5	269	1	1	2	2	100	38	7	0	2	1	3	3	2	0
Koyra/5	270	1	1	2.5	2	80	48	6	3	10	2	2	2	1	0
Koyra/5	271	1	1	4	2	50	25	5	0	2	2	2	3	1	0
Koyra/5	272	1	0	6	2	100	53	6	0	25	1	2	3	1	0
Koyra/5	273	1	1	2	2	15	35	4	9	12	1	2	3	0	0
Koyra/5	274	0	0	6	2	80	39	5	12	15	1	2	0	0	0
Koyra/5	275	0	0	8	2	40	60	4	7	10	1	2	0	1	0
Koyra/5	276	0	0	4	2	70	54	4	8	2	1	2	0	0	1
Koyra/5	277	1	1	6	2	25	30	6	16	7	1	2	3	1	1
Koyra/5	278	0	0	10	1	10	55	5	0	5	1	2	0	0	1
Koyra/5	279	0	0	17	2	10	42	3	3	5	1	3	0	0	0
Koyra/5	280	0	0	3	3	50	67	3	9	25	2	2	3	2	1

Koyra/5	281	0	0	20	1	40	35	3	2	3	1	2	0	0	0
Koyra/5	282	0	0	6	1	20	27	4	9	15	1	2	0	0	0
Koyra/5	283	1	1	1.5	3	20	23	3	5	0.1	1	2	3	0	0
Koyra/5	284	1	1	8	2	10	27	3	5	10	1	2	3	0	1
Koyra/5	285	0	0	15	1	45	27	5	9	10	1	2	0	0	0
Koyra/5	286	0	0	15	2	10	63	3	0	7	2	2	3	0	0
Koyra/5	287	1	1	17	2	15	69	5	0	5	2	2	3	0	0
Koyra/5	288	0	0	2.5	2	8	69	3	9	10	1	1	0	0	0
Koyra/5	289	1	1	2.5	2	15	48	2	9	15	2	1	3	0	0
Koyra/5	290	1	1	4	2	10	30	3	4	10	1	1	1	0	0
Koyra/5	291	0	1	10	2	20	45	5	4	10	1	1	0	0	0
Koyra/5	292	1	1	5	2	50	55	3	16	2	2	1	3	1	0
Koyra/5	293	0	1	10	2	10	35	5	6	10	2	1	3	1	0
Koyra/5	294	1	1	7	3	70	48	4	5	4	1	1	3	1	0
Koyra/5	295	1	1	1	3	40	40	4	0	15	1	1	3	0	1
Koyra/5	296	0	0	7	2	100	40	6	0	3	1	1	3	1	0
Koyra/5	297	0	0	5	2	20	74	5	5	3	1	1	3	0	0
Koyra/5	298	0	1	9	3	100	60	5	5	7	2	1	3	2	0
Koyra/5	299	0	0	9	2	90	40	7	9	6	1	2	3	1	0
Koyra/5	300	1	1	7	3	35	40	4	5	7	1	1	3	1	0
Koyra/5	301	0	1	7	2	80	35	10	5	3	1	1	3	0	0
Koyra/5	302	1	1	0.5	2	50	80	6	0	0.1	2	1	3	1	0

Koyra/5	303	1	1	5	2	15	30	4	0	5	1	1	3	1	0
Koyra/5	304	0	1	9	2	50	42	4	0	5	1	3	1	1	0
Koyra/5	305	0	0	10	3	12	50	4	0	5	1	4	0	0	0
Koyra/5	306	0	0	9	3	40	64	5	0	5	1	2	0	1	0
Koyra/5	307	0	1	9	2	50	42	4	0	5	1	2	1	1	0
Koyra/5	308	0	0	15	2	10	40	5	0	2	2	2	0	0	0
Koyra/5	309	0	0	2.5	3	30	80	1	8	15	2	1	0	0	0
Koyra/5	310	0	0	15	1	45	40	5	7	5	2	3	0	0	0
Koyra/5	311	0	0	10	2	30	45	5	2	1	1	4	0	0	0
Koyra/5	312	1	1	12	2	40	47	6	9	4	1	2	3	1	0
Koyra/5	313	0	1	5	2	35	46	6	5	10	1	3	3	1	2
Koyra/5	314	1	0	7	3	80	48	4	10	5	1	3	0	0	2
Koyra/5	315	1	0	8	2	35	22	2	3	5	1	2	2	2	2
Koyra/5	316	0	1	6	2	30	38	5	9	0.5	1	3	0	2	0
Koyra/5	317	1	1	6	2	40	52	5	12	8	1	3	3	2	2
Koyra/5	318	0	0	9	2	85	38	7	15	20	1	3	0	0	2
Koyra/5	319	0	0	6	2	12	46	5	6	10	1	3	3	1	2
Koyra/5	320	0	1	12	2	50	38	4	9	4	1	2	3	1	2
Koyra/5	321	1	1	4.5	3	45	89	2	9	1.5	1	1	2	1	2
Koyra/5	322	0	0	10	2	50	80	8	5	5	1	3	1	1	1
Koyra/5	323	0	1	3	2	75	24	4	2	5	1	2	1	1	2
Koyra/5	324	1	1	7	3	35	35	5	9	1.5	1	3	2	2	2

Koyra/5	325	1	1	11	2	65	26	6	2	8	1	4	2	2	2
Koyra/5	326	1	0	7	3	120	25	3	9	20	1	3	2	0	0
Koyra/5	327	1	1	5	2	100	55	4	0	13	1	3	2	0	2
Koyra/5	328	1	1	4	2	95	63	3	3	4	1	1	2	0	2
Koyra/5	329	0	0	8	3	75	65	6	7	7	1	3	2	1	0
Koyra/5	330	0	1	8	2	0	60	5	5	2	1	2	1	0	3
Koyra/5	331	1	1	6	2	50	45	5	9	2	1	3	2	0	1
U.Bed*/6	332	1	1	15	2	15	25	4	15	10	1	2	3	2	0
U.Bed*/6	333	1	0	10	1	12	35	5	15	6	1	3	2	1	3
U.Bed*/6	334	1	1	50	1	60	60	4	4	5	1	2	2	0	0
U.Bed*/6	335	0	0	4.5	2	0	45	4	0	2	2	1	0	0	0
U.Bed*/6	336	1	1	3	3	60	30	6	2	25	1	1	2	2	0
U.Bed*/6	337	1	1	8	3	90	46	4	5	15	1	1	3	1	0
U.Bed*/6	338	0	0	95	1	0	33	5	0	15	2	3	3	0	0
U.Bed*/6	339	1	1	6	3	20	70	8	15	20	1	3	3	2	0
U.Bed*/6	340	0	0	6.5	3	15	60	5	0	20	1	3	3	1	0
U.Bed*/6	341	0	0	30	1	20	48	3	10	5	2	1	3	0	0
U.Bed*/6	342	0	0	8	2	120	65	5	12	20	1	2	2	0	0
U.Bed*/6	343	1	1	9	2	45	36	4	4	16	1	2	2	1	0
U.Bed*/6	344	1	1	8	3	75	55	2	5	20	1	2	2	1	0
U.Bed*/6	345	1	1	3	2	8	70	4	18	16	1	3	2	0	0
U.Bed*/6	346	0	1	8	2	50	35	4	12	3	1	2	3	1	0

U.Bed*/6	347	1	1	6	2	65	35	4	9	2	1	2	2	1	0
U.Bed*/6	348	1	1	8	2	45	35	5	10	5	1	1	2	1	0
U.Bed*/6	349	0	0	10	3	100	31	4	0	5	1	1	2	1	0
U.Bed*/6	350	0	1	8	2	200	29	3	0	5	2	2	3	0	1
U.Bed*/6	351	1	1	5	2	100	65	2	2	10	1	2	3	0	0
U.Bed*/6	352		0	3	3	70	58	5	0	10	2	2	2	1	0
U.Bed*/6	353	1	1	5	3	35	33	5	17	5	2	3	2	0	1
U.Bed*/6	354	1	0	2.5	3	50	73	3	10	15	2	3	2	0	1
U.Bed*/6	355	0	0	6	3	50	37	5	5	8	1	3	3	0	1
U.Bed*/6	356	0	1	10	1	100	47	5	0	5	2	3	3	0	0
U.Bed*/6	357	0	1	2.5	3	25	54	1	12	5	2	3	2	0	1
U.Bed*/6	358	1	1	3.5	3	50	46	5	7	15	1	3	2	0	1
U.Bed*/6	359	0	0	10	2	50	20	4	16	5	2	3	2	0	1
U.Bed*/6	360	1	1	10	2	15	24	8	10	10	1	3	3	0	0
U.Bed*/6	361	0	0	15	1	20	31	3	5	10	1	3	3	0	1
D.Bed*/7	362	0	0	20	2	30	27	5	8	5	2	3	2	0	0
D.Bed*/7	363	1	1	17	2	85	38	5	0	5	1	1	2	1	0
D.Bed*/7	364	1	1	8	1	75	54	6	0	5	1	2	3	2	1
D.Bed*/7	365	1	1	12	2	30	35	5	0	20	2	2	2	1	0
D.Bed*/7	366	1	1	25	1	50	55	8	4	15	2	1	3	1	0
D.Bed*/7	367	1	1	5	3	70	50	7	14	10	2	1	2	1	0
D.Bed*/7	368	0	0	6	2	10	45	6	5	15	2	2	0	0	0

D.Bed*/7	369	1	1	8	2	45	20	5	0	8	1	2	3	0	0
D.Bed*/7	370	0	0	6	2	20	63	8	0	10	2	2	3	1	0
D.Bed*/7	371	1	1	8	2	30	60	4	0	10	2	1	2	1	0
D.Bed*/7	372	1	1	5	3	50	55	3	0	30	2	1	2	1	0
D.Bed*/7	373	1	1	2	2	20	65	4	0	20	2	3	3	1	3
D.Bed*/7	374	1	1	4	2	30	60	2	12	22	2	1	2	1	0
D.Bed*/7	375	0	0	4	2	35	45	5	0	3	2	3	2	2	0
D.Bed*/7	376	1	1	6	3	15	58	2	0	2	2	1	2	1	0
D.Bed*/7	377	0	0	1	2	10	40	3	0	20	2	2	0	1	0
D.Bed*/7	378	0	0	7	2	12	70	3	0	10	2	2	0	2	0
D.Bed*/7	379	1	0	5	1	25	65	4	0	2	2	2	0	2	0
D.Bed*/7	380	0	0	8	2	40	32	5	0	35	2	2	0	1	0
D.Bed*/7	381	0	0	12	2	12	83	6	2	16	1	4	3	2	0
D.Bed*/7	382	1	1	18	3	70	65	9	5	10	1	4	2	1	0
D.Bed*/7	383	0	0	12	2	70	60	5	0	5	1	3	2	2	0
D.Bed*/7	384	1	1	35	2	40	45	8	10	3	1	3	2	2	0
D.Bed*/7	385	1	1	15	2	5	65	12	8	15	1	2	1	2	0
D.Bed*/7	386	0	1	12	1	40	40	5	3	3	1	3	3	2	0
D.Bed*/7	387	1	1	10	3	50	42	5	0	5	1	2	3	2	0
D.Bed*/7	388	0	1	7	3	60	28	4	2	40	1	2	3	2	0
D.Bed*/7	389	1	1	6	2	50	40	3	5	50	1	3	3	1	0
D.Bed*/7	390	0	1	9	2	100	60	6	2	1	1	1	1	2	0

D.Bed*/7	391	0	1	6	2	30	70	5	2	4	1	1	2	2	1
D.Bed*/7	392	1	1	10	2	60	43	4	16	2.5	1	2	3	1	0
D.Bed*/7	393	0	1	6	2	20	37	7	0	15	1	2	2	1	0
D.Bed*/7	394	1	1	24.4	1	15	51	6	0	1	1	3	2	0	0
D.Bed*/7	395	1	1	4	2	20	45	5	5	5	1	1	2	1	0
D.Bed*/7	396	1	1	5	3	20	49	4	9	3	1	2	2	2	0
D.Bed*/7	397	0	1	3	1	25	40	5	9	2.5	1	1	2	0	2
D.Bed*/7	398	1	1	1.5	3	25	65	2	9	5	1	1	2	0	0
D.Bed*/7	399	0	1	5	3	55	40	3	6	10	2	1	2	0	0
D.Bed*/7	400	1	1	3	3	20	40	4	0	5	1	1	0	0	1
D.Bed*/7	401	1	0	5	3	10	32	4	5	5	1	2	1	0	1
D.Bed*/7	402	0	0	5	3	10	61	7	11	11	1	1	0	0	3
D.Bed*/7	403	1	0	4	3	50	45	4	4	20	1	2	0	0	2
D.Bed*/7	404	1	1	7	3	40	25	6	18	2.5	1	2	3	0	1
D.Bed*/7	405	0	1	10	3	55	45	5	5	2	1	2	2	1	0
D.Bed*/7	406	0	1	6	2	20	38	4	0	10	1	2	3	1	0
D.Bed*/7	407	0	1	10	1	35	63	4	3	2	1	1	1	1	0
D.Bed*/7	408	1	1	7	3	30	60	7	2	4	1	2	1	1	0
D.Bed*/7	409	0	1	8	2	60	45	6	12	5	1	2	3	1	0
D.Bed*/7	410	1	1	9	2	40	50	4	12	2	1	1	3	1	0

Appendix-D: Various factor-influencing evacuation data during Amphan-2020 and Fani-2019 for decision tree.

Rspnd. Sl.	**Evacuadurduring Fani**	**EvacuadurIng Amphan**	Union/ Location	Households' in.	House condition	Rspnd* age	Rspnd* education	Online media	CPP miking	Friendand family	Miking mosque	Category of cy.	Forecasting wind speeds	Forecasting stome surge	Distances of CS	Road condition	Influential Persons	COVID-19 Perceptions
1	0	0	Amadi/1	2	1	40	0	1	0	1	0	0	0	0	1	2	0	3
2	1	0	Amadi/1	2	3	21	0	1	0	1	1	0	1	1	1	1	1	2
3	1	1	Amadi/1	3	3	50	9	0	1	1	1	0	1	0	1	1	3	0
4	1	1	Amadi/1	2	3	50	0	0	1	1	1	0	0	0	1	1	1	1
5	1	0	Amadi/1	2	3	30	3	0	0	1	1	1	1	0	1	1	2	2
6	0	0	Amadi/1	3	1	45	0	0	1	1	0	0	0	0	1	1	0	2
7	0	0	Amadi/1	2	1	42	15	1	1	0	0	0	0	0	1	2	0	3
8	0	0	Amadi/1	4	3	63	5	0	1	0	0	0	0	0	1	1	0	0
9	0	0	Amadi/1	4	1	60	5	1	1	1	1	0	0	0	1	2	0	3
10	0	0	Amadi/1	2	3	50	10	1	1	1	1	0	0	0	1	1	0	2
11	0	0	Amadi/1	3	1	35	9	1	1	1	1	0	0	0	1	1	0	1
12	0	0	Amadi/1	2	3	66	7	1	1	1	1	0	0	0	1	1	0	3
13	1	1	Amadi/1	2	3	30	0	1	1	1	1	1	1	0	1	1	0	1
14	0	0	Amadi/1	2	1	25	2	0	1	1	1	0	0	0	1	1	0	1
15	0	0	Amadi/1	3	2	45	2	1	1	0	1	0	0	0	1	1	0	1
16	1	0	Amadi/1	2	2	25	5	1	1	0	1	0	0	0	1	1	1	2

17	1	0	Amadi/1	3	2	25	0	1	1	0	1	0	0	0	1	2	1	2
18	1	1	Amadi/1	3	2	45	0	1	1	1	1	0	1	0	1	1	0	1
19	0	1	Amadi/1	3	1	35	5	1	1	0	0	0	0	0	1	1	0	2
20	1	1	Amadi/1	2	2	70	2	0	0	1	1	0	1	0	1	2	1	1
21	1	1	Amadi/1	4	1	40	3	1	1	0	0	0	1	0	1	1	1	1
22	1	1	Amadi/1	2	2	45	0	1	0	1	0	1	1	0	1	1	2	2
23	1	1	Amadi/1	3	1	36	10	0	1	0	0	1	1	0	1	1	1	2
24	0	1	Amadi/1	2	1	43	9	0	1	10	1	0	0	0	1	1	1	1
25	1	0	Amadi/1	3	3	17	0	0	1	0	0	0	0	1	2	1	1	2
26	0	0	Amadi/1	3	2	40	4	0	0	0	1	0	0	0	1	1	0	2
27	0	0	Amadi/1	2	2	82	6	0	1	0	0	0	0	0	2	2	2	0
28	0	0	Amadi/1	3	3	47	7	0	1	0	0	0	0	0	2	2	0	0
29	0	0	Amadi/1	3	2	41	0	1	1	1	0	0	0	0	1	1	3	0
30	0	0	Amadi/1	2	2	37	0	0	1	1	1	0	0	0	1	1	2	0
31	0	0	Amadi/1	3	2	50	0	1	1	1	0	0	0	0	1	2	1	0
32	0	0	Amadi/1	3	2	26	0	0	1	0	0	0	0	0	2	1	2	0
33	1	0	Amadi/1	3	2	55	3	1	1	0	0	0	1	0	1	1	0	1
34	0	0	Amadi/1	3	2	47	3	1	1	0	0	0	1	0	1	1	2	0
35	0	0	Amadi/1	2	3	29	3	0	1	1	1	0	1	1	1	1	2	0
36	0	1	Amadi/1	2	2	70	9	0	1	1	1	0	1	1	1	2	0	0
37	1	0	Amadi/1	1	3	30	6	0	1	1	1	1	1	0	1	2	0	1
38	1	1	Amadi/1	3	2	55	12	1	1	1	0	1	1	1	1	1	2	0
39	1	0	Amadi/1	3	1	42	17	1	1	0	0	0	0	0	1	1	0	0
40	0	0	Amadi/1	3	3	43	0	0	1	1	0	1	1	1	1	1	0	0
41	0	0	Amadi/1	2	2	25	10	1	1	1	0	1	1	0	1	1	0	0
42	0	0	Amadi/1	1	3	56	9	1	1	0	1	1	1	0	1	1	1	0

43	0	0	Amadi/1	3	1	60	0	1	1	0	0	1	1	0	1	1	0	0
44	1	0	Amadi/1	3	2	50	10	1	1	1	1	1	0	0	1	1	1	0
45	0	0	Amadi/1	4	3	82	0	0	0	1	1	0	0	1	1	1	1	0
46	1	1	Amadi/1	2	2	25	0	0	1	1	0	1	0	0	1	2	1	0
47	1	0	Amadi/1	4	1	38	0	0	0	1	1	0	0	0	1	2	2	0
48	1	1	Amadi/1	2	2	50	0	0	1	1	0	1	0	0	1	2	2	0
49	1	1	Amadi/1	2	2	80	10	0	1	1	1	1	1	0	1	2	2	0
50	1	1	Amadi/1	4	3	65	18	0	1	0	0	1	1	1	1	1	2	0
51	1	0	Amadi/1	2	2	35	10	0	1	0	0	1	1	1	1	1	1	2
52	0	1	Amadi/1	3	1	46	10	0	0	0	1	1	1	1	1	1	1	3
53	1	1	Amadi/1	3	2	25	0	1	1	0	0	1	1	1	1	1	1	3
54	1	1	Amadi/1	1	2	38	5	0	1	0	0	1	1	1	2	1	2	0
55	1	1	Amadi/1	2	1	25	5	0	1	0	0	1	1	1	1	1	1	0
56	1	1	Amadi/1	3	2	35	16	0	1	0	0	1	1	1	1	1	1	0
57	0	0	Amadi/1	3	2	85	8	0	1	1	1	0	0	0	2	2	0	0
58	0	0	Amadi/1	3	1	41	10	1	1	1	1	0	0	0	2	1	1	0
59	0	0	Amadi/1	1	2	42	8	1	1	1	1	0	0	0	2	1	0	0
60	0	1	Amadi/1	1	1	27	5	1	0	1	1	0	0	0	1	1	0	0
61	1	0	Amadi/1	2	3	46	5	1	0	1	0	0	0	0	1	1	0	0
62	0	0	Amadi/1	3	2	70	0	1	1	0	1	1	0	0	1	1	2	1
63	0	0	Amadi/1	1	1	68	5	1	1	0	0	0	0	0	2	1	0	1
64	0	0	Amadi/1	3	3	52	0	1	1	1	0	1	1	0	1	1	0	1
65	0	0	Amadi/1	3	1	68	6	1	1	0	0	0	0	0	2	1	0	1
66	0	0	Amadi/1	3	3	52	18	1	1	1	0	1	1	0	1	1	0	1
67	0	0	Amadi/1	3	2	34	6	0	0	1	1	1	0	0	2	2	0	3
68	0	0	Amadi/1	3	1	50	18	1	1	0	0	0	0	0	1	1	0	2

69	0	0	Amadi/1	1	2	34	5	0	0	1	1	1	0	1	2	2	0	3
70	0	0	Amadi/1	3	1	50	16	1	1	0	0	0	0	0	1	1	0	2
71	0	0	Bagali/2	1	2	25	0	0	1	0	0	0	0	0	1	2	0	1
72	0	0	Bagali/2	3	1	36	0	1	1	0	0	0	0	0	1	1	0	0
73	0	0	Bagali/2	2	2	76	8	1	1	0	1	1	0	0	1	1	0	2
74	1	0	Bagali/2	1	2	60	4	0	1	0	1	0	0	0	2	1	0	2
75	0	1	Bagali/2	3	2	42	9	0	1	0	0	1	0	0	1	1	0	0
76	0	0	Bagali/2	4	3	67	18	0	1	0	1	1	0	0	1	1	1	1
77	1	1	Bagali/2	2	2	27	0	0	1	0	1	1	0	0	1	1	0	1
78	1	0	Bagali/2	2	2	44	0	1	1	0	0	0	0	0	1	1	0	1
79	1	0	Bagali/2	1	2	65	0	1	1	0	0	0	0	0	1	1	0	1
80	0	0	Bagali/2	1	3	30	0	0	1	0	1	0	0	0	1	2	0	1
81	0	0	Bagali/2	2	3	60	16	0	1	0	1	1	1	0	1	2	0	1
82	0	0	Bagali/2	2	3	65	9	0	1	1	0	0	0	0	2	2	1	2
83	0	0	Bagali/2	1	3	26	0	1	1	0	0	0	0	0	1	1	0	1
84	1	0	Bagali/2	4	3	48	2	1	1	0	0	1	0	0	1	1	0	1
85	0	1	Bagali/2	3	3	80	5	0	1	0	0	0	0	0	1	2	0	2
86	0	0	Bagali/2	4	2	45	0	1	1	0	1	0	0	0	2	1	1	2
87	1	0	Bagali/2	2	3	65	10	1	1	0	1	0	0	0	2	2	0	0
88	0	0	Bagali/2	2	2	52	11	1	1	0	1	1	1	0	2	1	1	0
89	1	0	Bagali/2	2	2	35	12	0	1	0	1	1	0	0	1	1	1	2
90	0	0	Bagali/2	3	1	58	10	0	0	1	0	0	0	0	1	1	0	2
91	1	0	Bagali/2	2	2	56	2	1	1	0	1	1	0	0	1	1	2	3
92	1	1	Bagali/2	1	1	30	6	1	1	0	1	1	0	1	1	2	2	2
93	1	1	Bagali/2	1	2	28	10	0	1	0	1	1	0	0	1	2	1	1
94	1	1	Bagali/2	2	2	35	12	0	0	0	0	0	0	0	1	1	1	2

95	1	0	Bagali/2	4	1	45	12	1	1	0	1	1	0	0	1	1	0	2
96	0	0	Bagali/2	2	2	23	10	1	0	0	0	0	0	0	1	2	0	0
97	1	0	Bagali/2	1	3	22	18	0	1	0	0	0	0	0	2	1	1	0
98	0	1	Bagali/2	3	3	42	8	1	1	1	1	0	0	0	1	1	0	0
99	1	1	Bagali/2	3	1	45	10	1	0	1	1	1	1	1	1	1	2	2
100	0	1	Bagali/2	2	1	30	5	1	1	1	1	0	0	0	1	1	0	0
101	1	0	Bagali/2	3	3	42	8	1	1	1	1	0	0	0	1	1	0	0
102	1	0	Bagali/2	2	2	40	5	1	1	1	1	0	0	0	1	2	0	0
103	1	1	Bagali/2	3	2	32	10	1	1	1	1	1	1	0	1	1	1	0
104	1	1	Bagali/2	2	2	33	2	1	1	1	1	1	1	0	1	1	1	3
105	1	1	Bagali/2	3	2	70	0	1	1	1	1	1	1	0	1	1	1	3
106	0	0	Bagali/2	4	3	52	8	0	1	1	1	0	0	0	1	1	0	0
107	0	1	Bagali/2	3	2	50	9	0	1	1	1	0	0	0	2	1	0	0
108	1	1	Bagali/2	3	2	50	8	0	0	0	1	1	1	0	1	1	0	3
109	1	0	Bagali/2	3	2	65	10	1	1	0	0	0	0	0	1	1	0	0
110	0	0	Bagali/2	3	2	66	0	1	1	1	1	0	0	0	1	1	0	0
111	1	0	Bagali/2	3	2	50	12	1	1	1	1	0	0	0	2	1	0	0
112	0	0	Bagali/2	4	2	40	0	1	1	1	1	0	0	0	1	1	0	0
113	0	0	Bagali/2	3	1	42	10	1	1	1	1	0	0	0	1	2	0	0
114	0	0	Bagali/2	3	1	40	0	1	1	1	1	0	0	0	1	2	0	0
115	1	0	Bagali/2	4	1	61	5	1	1	1	1	1	1	1	1	2	0	3
116	1	0	Bagali/2	4	2	75	8	1	1	1	1	1	1	1	1	1	2	3
117	1	1	Bagali/2	3	2	50	5	1	1	1	1	1	1	1	1	2	2	3
118	1	1	Bagali/2	3	3	25	10	1	1	1	1	1	1	1	1	1	1	3
119	1	1	Bagali/2	4	2	35	0	1	1	1	1	1	1	1	1	2	2	3

120	1	1	Bagali/2	3	3	47	0	1	1	1	1	1	1	1	1	1	2	3
121	1	1	Bagali/2	3	2	55	10	1	1	1	1	1	1	1	1	2	1	3
122	1	1	Bagali/2	4	2	50	6	1	1	1	1	0	0	0	2	2	0	0
123	0	1	Bagali/2	3	2	34	8	0	1	1	1	1	1	1	1	2	1	3
124	1	1	Bagali/2	2	2	45	5	1	1	1	1	1	1	1	1	2	1	3
125	0	0	Bagali/2	2	2	34	8	1	1	1	1	0	0	0	1	2	1	0
126	1	1	Bagali/2	3	1	38	0	1	1	1	1	1	1	1	1	2	2	3
127	1	0	Bagali/2	3	2	51	6	1	1	1	1	1	1	0	1	2	2	0
128	0	0	Bagali/2	2	2	65	5	0	1	1	0	0	0	0	2	1	0	0
129	1	0	Bagali/2	2	2	30	16	1	1	0	1	0	1	0	2	1	0	0
130	1	1	Bagali/2	2	3	35	7	1	1	0	1	1	1	0	1	2	1	0
131	1	1	Bagali/2	2	2	18	12	1	1	0	1	0	1	1	1	2	1	0
132	1	0	Bagali/2	3	2	26	9	0	1	0	0	0	1	0	1	2	1	0
133	1	1	Bagali/2	1	1	60	6	0	1	0	0	1	1	0	1	2	1	0
134	1	0	Bagali/2	1	2	48	8	0	1	0	0	1	1	0	1	1	1	0
135	1	1	Bagali/2	3	2	39	8	1	0	1	1	1	1	1	1	2	1	3
136	1	1	Bagali/2	2	1	20	2	1	1	1	1	1	1	1	1	1	0	0
137	1	1	Bagali/2	1	2	64	9	0	0	1	1	1	1	1	1	2	1	0
138	1	1	Bagali/2	3	3	55	16	0	0	1	1	1	1	1	1	1	1	0
139	1	1	Bagali/2	3	2	16	7	1	0	1	1	1	1	1	1	2	1	3
140	0	0	Bagali/2	2	2	70	0	0	1	1	1	1	1	1	2	2	1	0
141	1	0	Bagali/2	3	2	28	9	0	1	1	1	0	1	1	1	2	0	3
142	1	1	Bagali/2	3	2	40	10	0	1	1	1	1	1	1	1	2	1	0
143	1	1	Bagali/2	3	3	61	9	1	1	1	1	1	1	1	1	2	0	0
144	0	0	Bagali/2	3	2	20	8	1	1	1	0	1	1	1	2	1	0	0
145	0	1	Bagali/2	2	2	29	10	0	1	0	1	1	1	1	2	1	1	3

146	1	1	Bagali/2	3	3	48	5	0	1	0	1	1	1	1	1	1	1	2
147	1	1	Mahe*/3	2	1	60	8	1	1	0	1	1	1	0	1	1	1	2
148	1	0	Mahe*/3	1	2	45	9	0	1	1	0	1	1	1	1	1	0	3
149	1	1	Mahe*/3	1	1	16	2	0	1	1	0	1	1	1	1	2	1	3
150	1	1	Mahe*/3	2	2	48	10	0	1	1	0	1	1	1	1	2	1	0
151	1	1	Mahe*/3	2	2	70	8	0	1	1	0	1	1	1	1	1	1	0
152	1	1	Mahe*/3	1	2	25	0	0	1	0	1	1	1	1	1	2	1	0
153	1	0	Mahe*/3	3	2	48	5	0	0	1	0	0	0	1	2	2	0	0
154	1	0	Mahe*/3	3	2	61	0	1	0	0	1	1	0	1	1	1	0	2
155	1	0	Mahe*/3	2	2	50	0	0	0	0	1	1	0	0	1	2	0	2
156	1	1	Mahe*/3	3	2	42	12	1	1	0	1	1	1	0	1	1	1	2
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159	1	0	Mahe*/3	2	1	63	1	1	0	0	1	0	0	0	1	1	0	2
160	1	1	Mahe*/3	2	2	35	0	1	0	0	1	1	0	0	1	1	0	0
161	1	1	Mahe*/3	1	3	75	0	1	1	1	1	1	1	1	1	1	2	0
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165	0	0	Mahe*/3	3	1	45	8	0	1	0	1	0	1	0	2	1	2	0
166	1	1	Mahe*/3	1	1	45	0	1	1	0	0	1	1	1	1	1	1	0
167	1	1	Mahe*/3	2	1	95	0	0	1	0	0	1	1	1	1	1	1	0
168	1	1	Mahe*/3	2	2	70	5	1	1	1	1	1	1	1	1	2	1	3
169	1	1	Mahe*/3	2	2	65	9	1	0	1	1	1	1	1	1	1	2	3
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171	1	1	Mahe*/3	2	2	55	12	0	1	1	1	1	1	1	1	2	1	3
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174	1	0	Mahe*/3	4	1	50	8	1	1	1	1	0	0	0	1	2	1	0
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176	0	0	Mahe*/3	2	2	45	6	1	1	1	1	0	0	0	2	1	0	0
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178	0	0	Mahe*/3	2	2	40	10	1	1	0	1	1	0	0	1	1	1	2
179	1	0	Mahe*/3	3	2	75	10	0	1	1	1	1	1	1	1	1	1	0
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182	1	1	Mahe*/3	2	1	48	5	0	1	1	1	1	1	1	1	1	1	0
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191	1	0	Mahe*/3	2	3	36	10	0	1	0	0	0	0	0	2	2	1	0
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200	1	1	Mahe*/3	1	3	55	12	0	0	1	1	1	1	1	1	2	1	0
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202	1	0	Mahe*/3	3	1	42	5	1	0	0	0	0	1	1	1	1	0	0
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207	1	0	Moha*/4	3	2	20	7	1	1	0	0	0	1	1	1	2	1	1
208	0	1	Moha*/4	2	1	75	10	0	1	0	0	0	0	0	1	1	0	0
209	0	0	Moha*/4	4	2	65	8	0	1	1	1	1	1	1	1	1	1	3
210	0	1	Moha*/4	2	1	65	2	0	1	1	1	1	1	1	1	1	1	0
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213	1	0	Moha*/4	4	2	35	13	1	1	1	1	1	1	1	2	1	1	0
214	1	1	Moha*/4	3	3	60	12	0	1	1	0	1	1	1	2	2	0	3
215	0	0	Moha*/4	2	3	22	3	0	1	0	0	0	0	0	1	2	0	0
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217	1	1	Moha*/4	2	3	45	7	0	1	0	0	1	1	1	1	2	1	0
218	0	0	Moha*/4	2	2	25	0	0	1	1	1	0	0	0	2	2	0	0
219	1	0	Moha*/4	3	3	24	3	1	1	1	1	0	0	0	1	2	0	3
220	1	1	Moha*/4	3	2	42	4	0	1	1	1	1	1	1	1	1	1	3
221	1	1	Moha*/4	3	2	80	10	1	1	0	1	1	1	1	1	1	1	2

222	1	1	Moha*/4	3	1	26	12	1	1	1	1	1	1	1	1	2	1	3
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225	1	1	Moha*/4	3	2	60	5	0	1	1	1	1	1	0	1	2	0	2
226	1	0	Moha*/4	3	2	45	7	1	1	0	1	1	1	0	1	2	0	2
227	0	0	Moha*/4	2	3	60	18	0	1	0	1	0	1	0	2	2	1	0
228	1	0	Moha*/4	2	2	25	4	0	1	0	1	0	1	0	2	1	0	3
229	0	0	Moha*/4	2	3	31	0	1	0	0	0	0	1	0	1	2	0	0
230	1	1	Moha*/4	4	2	26	7	0	0	0	1	0	1	0	2	2	2	0
231	1	0	Moha*/4	2	2	50	7	0	1	1	1	0	0	0	1	1	0	0
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233	1	0	Moha*/4	2	2	35	0	0	0	1	1	0	0	0	1	1	0	1
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235	1	1	Moha*/4	2	1	70	0	1	1	0	0	1	0	0	1	2	0	1
236	1	1	Moha*/4	3	2	20	6	1	1	0	0	1	0	0	1	2	0	1
237	0	1	Moha*/4	1	3	70	7	0	1	0	1	1	1	0	1	1	0	2
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241	0		Moha*/4	4	3	22	7	1	1	0	1	1	1	0	1	1	1	2
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243	0	0	Moha*/4	2	2	26	0	1	1	1	1	0	0	1	1	2	1	0
244	0	0	Moha*/4	3	2	26	0	0	1	0	1	0	1	0	1	1	2	0
245	1	1	Moha*/4	2	2	59	8	0	1	1	0	1	1	0	2	1	1	0
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247	1	1	Moha*/4	2	2	65	5	1	1	0	1	1	0	0	1	2	0	2

248	1	1	Moha*/4	2	2	40	0	1	1	0	1	0	1	1	1	1	1	0
249	0	0	Moha*/4	4	3	50	8	1	1	0	1	0	0	0	1	1	0	2
250	1	1	Moha*/4	1	1	55	0	1	0	0	1	1	0	0	2	2	1	2
251	1	1	Moha*/4	1	1	37	8	0	1	0	1	1	0	0	2	2	0	2
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255	1	1	Moha*/4	1	2	37	0	0	1	1	0	1	1	0	1	1	0	0
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257	1	1	Moha*/4	2	2	38	5	1	1	0	1	1	1	1	1	1	0	0
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259	0	0	Moha*/4	2	3	80	0	0	1	1	0	0	0	0	1	1	2	0
260	0	0	Koyra/5	2	1	46	8	1	1	1	0	0	0	0	2	1	2	0
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266	1	1	Koyra/5	1	2	28	4	1	1	0	1	1	1	1	1	1	2	0
267	1	1	Koyra/5	3	2	55	9	0	1	1	1	1	1	1	1	1	1	0
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274	0	0	Koyra/5	4	2	39	12	0	1	0	1	0	0	0	1	1	0	0
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277	1	1	Koyra/5	3	2	30	16	0	1	0	1	1	1	1	1	1	1	3
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279	0	0	Koyra/5	2	2	42	3	1	1	0	1	0	0	0	1	1	0	0
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281	0	0	Koyra/5	4	1	35	2	0	1	0	1	0	0	0	1	1	0	0
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296	0	0	Koyra/5	4	2	40	0	0	0	0	1	1	1	1	1	1	1	0
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307	1	0	Koyra/5	2	2	42	0	0	1	0	1	1	1	0	1	1	1	0
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313	1	0	Koyra/5	2	2	46	5	1	1	0	1	1	1	1	1	1	1	2
314	0	1	Koyra/5	3	3	48	10	1	1	0	1	0	0	0	1	1	0	2
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316	1	0	Koyra/5	2	2	38	9	0	1	0	1	0	0	0	1	1	2	0
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329	0	0	Koyra/5	3	3	65	7	1	1	0	1	0	1	1	1	1	1	0
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332	1	1	U.Be*/6	3	2	25	15	0	1	0	1	1	1	1	1	1	2	0
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345	1	1	U.Be*/6	2	2	70	18	0	1	0	0	0	1	1	1	1	0	0
346	1	0	U.Be*/6	4	2	35	12	0	1	1	0	1	1	1	1	1	1	0
347	1	1	U.Be*/6	2	2	35	9	1	1	0	0	0	1	1	1	1	1	0
348	1	1	U.Be*/6	3	2	35	10	0	1	0	0	0	1	1	1	1	1	0
349	0	0	U.Be*/6	2	3	31	0	0	1	0	0	0	1	1	1	1	1	0
350	1	0	U.Be*/6	2	2	29	0	1	1	0	0	1	1	1	1	2	0	3
351	1	1	U.Be*/6	2	2	65	2	0	1	1	1	1	1	1	1	1	0	0

352	0		U.Be*/6	2	3	58	0	0	1	0	1	0	1	1	1	2	1	0
353	1	1	U.Be*/6	4	3	33	17	0	1	1	1	0	1	1	1	2	0	3
354	0	1	U.Be*/6	3	3	73	10	0	1	0	1	0	1	1	1	2	0	3
355	0	0	U.Be*/6	4	3	37	5	1	1	1	0	1	1	1	1	1	0	3
356	1	0	U.Be*/6	3	1	47	0	1	1	1	0	1	1	1	1	2	0	0
357	1	0	U.Be*/6	2	3	54	12	0	1	1	1	0	1	1	1	2	0	3
358	1	1	U.Be*/6	4	3	46	7	1	1	1	0	0	1	1	1	1	0	3
359	0	0	U.Be*/6	2	2	20	16	1	1	1	0	0	1	1	1	2	0	3
360	1	1	U.Be*/6	2	2	24	10	1	1	1	0	1	1	1	1	1	0	0
361	0	0	U.Be*/6	2	1	31	5	1	1	1	0	1	1	1	1	1	0	3
362	0	0	D.Be*/7	1	2	27	8	0	1	1	1	0	1	1	1	2	0	0
363	1	1	D.Be*/7	1	2	38	0	0	1	0	0	0	1	1	1	1	1	0
364	1	1	D.Be*/7	1	1	54	0	1	1	0	0	1	1	1	1	1	2	3
365	1	1	D.Be*/7	2	2	35	0	0	0	1	1	0	1	1	1	2	1	0
366	1	1	D.Be*/7	2	1	55	4	0	1	0	0	1	1	1	1	2	1	0
367	1	1	D.Be*/7	1	3	50	14	0	0	0	1	0	1	1	1	2	1	0
368	0	0	D.Be*/7	3	2	45	5	0	1	0	0	0	0	0	1	2	0	0
369	1	1	D.Be*/7	3	2	20	0	0	1	1	0	1	1	1	1	1	0	0
370	0	0	D.Be*/7	2	2	63	0	0	1	1	0	1	1	1	1	2	1	0
371	1	1	D.Be*/7	3	2	60	0	0	1	0	0	0	1	1	1	2	1	0
372	1	1	D.Be*/7	2	3	55	0	0	0	0	1	0	1	1	1	2	1	0
373	1	1	D.Be*/7	3	2	65	0	0	0	1	1	1	1	1	1	2	1	1
374	1	1	D.Be*/7	4	3	60	12	0	0	0	1	0	1	1	2	2	1	0
375	0	0	D.Be*/7	3	2	45	0	1	1	1	0	0	1	1	1	2	2	0
376	1	1	D.Be*/7	3	3	58	0	0	1	0	0	0	1	1	1	2	1	0
377	0	0	D.Be*/7	3	2	40	0	0	1	0	1	0	0	0	1	2	1	0

378	0	0	D.Be*/7	2	2	70	0	1	1	0	0	0	0	0	1	2	2	0
379	0	1	D.Be*/7	2	1	65	0	1	1	0	0	0	0	0	1	2	2	0
380	0	0	D.Be*/7	3	2	32	0	0	1	1	0	0	0	0	2	2	1	0
381	0	0	D.Be*/7	2	2	83	2	1	1	1	1	1	1	1	1	1	2	0
382	1	1	D.Be*/7	2	3	65	5	1	1	1	1	1	1	0	1	1	1	0
383	0	0	D.Be*/7	2	2	60	0	1	1	0	1	1	1	0	1	1	2	0
384	1	1	D.Be*/7	2	2	45	10	1	1	0	1	1	1	0	1	1	2	0
385	1	1	D.Be*/7	1	2	65	8	0	1	0	1	0	1	0	1	1	2	0
386	1	0	D.Be*/7	1	1	40	3	1	1	0	1	1	1	1	1	1	2	0
387	1	1	D.Be*/7	1	3	42	0	0	1	1	0	1	1	1	1	1	2	0
388	1	0	D.Be*/7	2	3	28	2	0	1	0	1	1	1	1	2	1	2	0
389	1	1	D.Be*/7	3	2	40	5	0	1	0	1	1	1	1	2	1	1	0
390	1	0	D.Be*/7	3	2	60	2	0	1	0	0	0	1	0	1	1	2	0
391	1	0	D.Be*/7	2	2	70	2	0	1	0	0	0	1	1	1	1	2	3
392	1	1	D.Be*/7	3	2	43	16	0	1	0	1	1	1	1	1	1	1	0
393	1	0	D.Be*/7	2	2	37	0	0	1	0	1	0	1	1	1	1	1	0
394	1	1	D.Be*/7	3	1	51	0	1	1	1	0	0	1	1	1	1	0	0
395	1	1	D.Be*/7	1	2	45	5	1	0	0	0	1	0	1	1	1	1	0
396	1	1	D.Be*/7	3	3	49	9	0	1	1	0	1	1	0	1	1	2	0
397	1	0	D.Be*/7	3	1	40	9	1	0	0	0	1	0	1	1	1	0	2
398	1	1	D.Be*/7	4	3	65	9	0	1	0	0	1	0	1	1	1	0	0
399	1	0	D.Be*/7	1	3	40	6	0	1	0	0	0	1	1	1	2	0	0
400	1	1	D.Be*/7	3	3	40	0	0	1	0	0	0	0	0	1	1	0	3
401	0	1	D.Be*/7	4	3	32	5	0	1	0	1	1	0	0	1	1	0	3
402	0	0	D.Be*/7	3	3	61	11	0	1	0	0	0	0	0	1	1	0	1
403	0	1	D.Be*/7	3	3	45	4	1	1	0	0	0	0	0	1	1	0	2

404	1	1	D.Be*/7	3	3	25	18	1	0	1	0	1	1	1	1	1	0	3
405	1	0	D.Be*/7	2	3	45	5	0	1	0	1	0	1	1	1	1	1	0
406	1	0	D.Be*/7	2	2	38	0	0	1	0	1	1	1	1	1	1	1	0
407	1	0	D.Be*/7	3	1	63	3	1	0	0	0	1	0	0	2	1	1	0
408	1	1	D.Be*/7	2	3	60	2	0	1	1	0	1	0	0	1	1	1	0
409	1	0	D.Be*/7	3	2	45	12	0	1	0	1	1	1	1	1	1	1	0
410	1	1	D.Be*/7	2	2	50	12	1	0	0	0	1	1	1	1	1	0	3