Knowledge, Attitude, and Practices towards Lightning in Bangladesh

Md. Mostafizur Rahman 1, Iftifa Alam Nabila 1, Mohammed Sadman Sakib 1, Nusrat Jahan Silvia 1, Muhammad Abdullahil Galib 1, Ifta Alam Shobuj 1, Lamia Hasan 1, Musabber Ali Chisty 2, Farzana Rahman 3, Edris Alam 4,5 and Abu Reza Md Towfiqul Islam 6,*

1 Department of Disaster and Human Security Management, Faculty of Arts and Social Sciences, Bangladesh University of Professionals, Dhaka 1216, Bangladesh; mostafizur@bup.edu.bd (M.M.R.); iftifa.alam@bup.edu.bd (I.A.N.); sakibmhs@gmail.com (M.S.S.); nusratsilvia010@gmail.com (N.J.S.); galibgram114.ag@gmail.com (M.A.G.); iftalamshobuj@gmail.com (I.A.S.); lamiahasan122@gmail.com (L.H.)
2 Institute of Disaster Management and Vulnerability Studies, University of Dhaka, Dhaka 1000, Bangladesh; musabber.chisty@du.ac.bd
3 Department of Computer Science and Engineering, Independent University, Bangladesh, Dhaka 1212, Bangladesh; farzana.rahman@iub.edu.bd
4 Faculty of Resilience, Rabdan Academy, Abu Dhabi 22401, United Arab Emirates; ealam@ra.ac.ae
5 Department of Geography and Environmental Studies, University of Chittagong, Chittagong 4331, Bangladesh
6 Department of Disaster Management, Begum Rokeya University, Rangpur 5400, Bangladesh
* Correspondence: towfiq.dm@brur.ac.bd

Abstract: Despite the significant number of fatalities and injuries, there is currently a lack of data on public knowledge, attitudes, and practices regarding lightning in Bangladesh. This study aims to assess the public’s knowledge, attitude, and practices (KAP) towards lightning in the country. A total of 1641 individuals participated in an online KAP survey. Where appropriate, the Kruskal–Wallis or Mann–Whitney U test, Spearman’s rank correlation, and logistic regression models were performed. About 65% of the survey population reported frequent lightning; most (72.64%) did not receive any warning messages, and small proportions (22.12%) had lightning safety precautions. Individuals with numerous lightning experiences perceived considerably unsafe places against lightning compared to infrequent lightning experiences (p < 0.05). Respondents reported good knowledge (56.06%), positive attitudes (82.27%), and good preventive practices (72.33%). The logistic regression demonstrated that having good knowledge and positive attitudes can help people practice lightning safety. Females demonstrated better lightning attitudes and practices compared to males. In comparison to urban residents, rural residents had poor practices. In addition, individuals’ educational levels might also play a crucial role in preparing them for lightning. Overall, extensive lightning campaign activities combined with effective education are required for the behavioral changes in this lightning-vulnerable society.

Keywords: lightning risk; lightning injury prevention; lightning injury; lightning safety education

1. Introduction

Lightning injury has become a global public health issue [1,2]. It causes numerous wildfires, human casualties, as well as socio-economic devastation [3]. The exact number of global annual deaths and injuries caused by lightning is unknown. However, the documented fatalities exceeded 4000 per year, estimated from 28 countries’ data [4]. The actual figure could be higher since several lightning-related deaths occur solely inside the community and are rarely recorded, especially in rural areas where the lightning risk is significant [3,5]. In most cases, lightning injuries result in high fatality and significant long-term morbidity [1], whereas cardiac injuries, pulmonary injuries, neurologic injuries, burns, eye and ear injuries, musculoskeletal injuries, psychological and neurocognitive problems, other miscellaneous problems (deep muscle damage, compartment syndrome,
rhabdomyolysis, myoglobinuria, renal failure, sexual dysfunction) are also significant consequences [6]. The economic consequences of lightning damage to property are also significant, diverse, and widely distributed throughout society [7].

Bangladesh has already been impacted by cyclones, floods, droughts, salinity intrusion, and other natural hazards due to its geographical location and global climate change [8,9]. It has also experienced frequent lightning-related fatalities [5,10], annually, between 0.5 and 5.0 deaths per million population [11]. In recent years, Bangladesh has been exposed to plenty of lightning strikes and fatalities [10,12,13]. However, like other developing countries, underestimating lightning is common in this country, with fatalities underreported, particularly in rural areas [1,13]. In 2016, 89 lightning-related deaths were reported in just two days (12 and 13 May), totaling more than 350 deaths [14,15]. Following the fatalities, the Bangladesh government declared lightning a disaster in 2016 [14]. However, the number of fatalities caused by lightning has not decreased significantly, and the country continues to experience a high number of fatalities [16]. There have been 1725 lightning-related deaths between 2015 and 2020 [15]. On 4 June 2020, 25 people died in Bangladesh, while 17 wedding members died by lightning on 4 August 2021 [17,18]. In May 2021, 66 people died, and eight were injured across 38 districts of Bangladesh [16]. These are some of the country’s most recent lightning-related fatalities. Figure 1 illustrates a map of lightning fatalities in Bangladesh from 2015 to 2020, highlighting the widespread impact of this disaster.

Figure 1. Lightning fatalities in Bangladesh, 2015–2020. The map has been produced adopting data from the Ministry of Disaster Management and Relief of Bangladesh and 2011 census data [19].
According to studies, the rate of fatalities and injuries caused by lightning has reduced in developed countries compared to developing countries [3,5] due to better technology for detecting lightning events, lightning-safe structures, the socio-economic status of the people, and public awareness campaigns aimed at reducing lightning risk [3,6,20,21]. As a developing country, Bangladesh has several challenges in mitigating lightning risk, including increased population density with labor-intensive agriculture, a lack of awareness, a lack of lightning detecting systems and lightning-safe structures [5,10,13]. As a result, the country may have had a large number of casualties of lightning. This country requires multidisciplinary approaches from climatology, engineering, and social sciences. However, a few notable works on Bangladesh lightning have analyzed spatiotemporal variations, meteorological factors influencing lightning, and the association between lightning and fatalities [6,12,22,23]. One study also partially looked at the public perception of lightning in Bangladesh [8], which created further opportunities to work on the public activities regarding lightning based on different factors. Additionally, the high risk and frequent fatalities have led to more research on public perception and activities regarding lightning in Bangladesh. This information is necessary to reduce the lightning risk [20]. It also requires evaluating the associated factors with perception and activities. Studies have found that socio-demographic characteristics, outdoor activities, and lack of knowledge could lead to high lightning fatalities in Mexico, India, and Bangladesh [5,24,25]. In India, a recent survey found that the majority of lightning fatalities were caused by standing beneath tall trees, while in Mexico, individuals were found to be vulnerable due to their lack of knowledge regarding the dangers of standing beneath trees during lightning [24,25]. In Bangladesh, approximately half of all lightning fatalities occurred during farming activities, with the remainder occurring during other activities (returning/walking home, water-related activities, sports, inside the house, or at school) [13]. Figure 1 also shows the lightning fatalities across the countries. Thus, the public (whether farmers or other individuals) should have proper awareness and activities regarding lightning, which is also critical for any disaster risk reduction strategy [26]. Considering all these, this quantitative study intended to conduct an online KAP (knowledge, attitude, and practices) survey regarding lightning activity in Bangladesh. While an online survey may not reach many remote area populations that are also susceptible to lightning, it can get a large number of people. Additionally, this study examined the relationship between socio-demographic information and KAP level to ascertain the community level preparation for lightning. The KAP model, which was developed in the 1950s, has been widely used to analyze respondents’ knowledge, attitudes, and practices on a certain issue [27,28]. This survey model is simple to implement, with obvious interpretations and a succinct presentation [29]. Additionally, it is thought to illustrate the interaction in respondents’ KAP domain [30]. Calculating the KAP level can address the gap in community-based preparation for a public health concern. The information from this type of study may be used to develop strategies focused on behavioral improvements [31]. Individual preparedness and responsiveness to prediction and alarm systems is critical, since individuals and authorities may underestimate the impact of lightning. A fundamental problem for risk management is to identify the reasons that drive precautionary actions [32]. The authority might determine factors of KAP level towards lightning, which could be included into a strategy for reducing lightning risk. They may also assist specific vulnerable sectors that require special attention in order to effectively mitigate lightning risk. Thus, the current study may be useful in developing effective policies and strategies to minimize lightning risk across the country. Furthermore, this study aimed to present vital information to international, national, and local authorities, as well as non-governmental and social groups, to minimize the global lightning risk.
2. Materials and Methods
2.1. Research Design
This cross-sectional study was conducted in May 2021 using an online self-reported survey. The age requirement was 18 years or older and residing in Bangladesh and having access to the internet.

2.2. Survey Instruments
Previous studies were carefully reviewed to adapt and develop the draft questionnaire from a Bangladesh perspective [1,5,15,20,33,34]. Additionally, the questionnaire has been pre-tested through expert consultations and a pilot survey. A final structured self-reported online questionnaire was developed in Google Form in both English and the local Bengali versions. The questionnaire consisted of 04 components: socio-demographic information (age, gender, marital status, living with family, current location, type of residential unit, education level, and current occupation); perception of the safety of their places against lightning, lightning frequency and safety precautions in their places; and the KAP sections. For safety perception, one straightforward inquiry, such as “How safe do you think your current place is from lightning?” was about their assessment of the living place’s lightning safety. This self-reported inquiry included a 5-point scale (very safe = 5, safe = 4, moderately safe = 3, unsafe = 2, and very unsafe = 1). They had three questions on lightning frequency and safety precautions in their places: the frequency of lightning in the area (from their perception), if they received any warning message (siren, sign, or announcement) during lightning, and whether they received any lightning safety precautions or training from the authority or any organizations. This section had binary responses such as frequent/infrequent, and Yes/No. The KAP section had a total of 26 items (statements/questions). All replies in this section were scored on a scale of 0–1 (0 being a negative/unknown response, 0.50 being a neutral response, and 1 being a correct response). 13 closed-ended items were used to assess respondents’ knowledge of lightning (lightning has become a disaster, the month when lightning is most common, the frequency and number of deaths caused by lightning have increased, all thunderstorms produce lightning, it can strike the same location twice, safety precautions during lightning, and the impact of lightning on human health). 04 closed-ended items with a three-point Likert scale (Agree, Neutral, and Disagree) were also included to assess respondents’ attitudes (responsibility for daily weather updates, raising awareness among family members and community members, participation in any lightning-related campaign/training, and activities to reduce lightning exposure). The practice component consisted of six closed-ended items (avoid the open area, high location, tin shed, window and balcony, metal part, and electrical equipment during lightning) with binary responses (Yes/No). For the internal consistency, we estimated Cronbach’s alpha as 0.74, 0.70, and 0.74 for the knowledge, attitude, and practice sections, respectively. Cronbach’s alpha > 0.60 indicates the accepted value to validate the internal consistency of the questionnaire [35,36].

2.3. Data Collection
Non-probability sampling techniques were applied for this study. We recruited a group of trained university students (based on their research experience) to conduct the questionnaire survey via Facebook, WhatsApp, Google Classroom, Microsoft Teams, and email, where applicable. The survey took place during May and June 2021. Thunderstorms and lightning are typically prevalent during this period in Bangladesh [15]. 384 respondents were required (95% Confidence interval (CI)) for this perception-based study following Morgan’s Table [37]. Approximately 2000 participants were approached through the above-mentioned online platforms, resulting in an enormous number of responses. In total, 1641 people were considered. As a result, the final response rate of 82.05% was obtained. However, due to the online pattern of this study, the majority of the samples were young with internet access. The research team conducted routine data checks.
2.4. Data Analysis

Python (version 2.7; Beaverton, OR, USA) and RStudio (version 1.2.5042; Boston, MA, USA) [38,39] were used for data management and statistical analyses. ArcGIS version 10.8 [40] was also used to create the lightning fatalities map. Where appropriate, descriptive statistics (frequency, percentage, mean, and standard deviation) were calculated. Due to the non-normal distribution of the data (as determined by the Shapiro–Wilk and Kolmogorov–Smirnov tests), non-parametric tests such as the Kruskal–Wallis or Mann–Whitney U tests were performed to determine the association between socio-demographic characteristics and lightning frequency and safety precautions, and safety perception about living place against lightning. In a post hoc test (Dunn’s test), the Bonferroni correction was used to adjust \( p \)-value. The association in the KAP domain was also determined using Spearman’s rank correlation and logistic regression analysis. The total score for knowledge, attitude, and practice was calculated by adding the scores for each item. Following that, responses were classified as ‘good’ or ‘poor’ based on an 80% cut-off point [41]. For example, 10.4 was calculated to be 80% of the overall knowledge score (13). 10 and above were considered to have a good level of knowledge. The good and poor levels were coded numerical values of 1 and 0, respectively. A logistic regression analysis was carried out to assess the predictors of knowledge, attitude, and practices. Following screening, multiple logistic regression analysis was performed using only the significant univariate predictors. All statistical analyses took 95% confidence interval (CI) into account.

3. Results

3.1. Socio-Demographic Profile and Safety Perception

Table 1 presents that the majority of respondents were between the ages of 18 and 25 (83%). The proportion of male respondents (49%) and the female respondents (50%) were about equal. Most of them were unmarried (84%), whereas many of them were living with their families (89%). Numerous respondents resided in the urban area (79%). Moreover, many respondents were living in the high-rise (more than 5-story) residential unit (43%) and the low-rise (5-story or less than that) residents (30%). Some of them also resided in tin shed houses (13%). Due to the online pattern of the survey, most of the respondents reported university-level education (73%). The majority of the individuals were also university students (63%).

The respondents perceived their place to be unsafe (30.50%), followed by moderately safe (30%), and safe (25%) against lightning. The age group showed significant association with the safety perception about their place against lightning (Table 1). Post hoc analysis found that the 26–35 years age group reported significantly safer places than the 18–25 years. Male participants reported significantly safer places than their female counterparts. Similarly, Married persons and individuals living in the urban area reported significantly safer places when compared to the unmarried and the individuals in the rural area. In the case of the residential unit, post hoc analysis determined that the respondents in the low-rise unit reported significantly safer places than the high-rise, tin shed, and other units. The study population having low education levels reported significantly safer places than the individuals with university-level education. Employed respondents also reported significantly safer places against lightning than the university students and unemployed participants.

3.2. Lightning Related Experience and Safety Perception

Table 2 illustrates that the majority of the respondents experienced frequent lightning during the season (66%), whereas most of them did not have any warning message during lightning (72%). Few of them received lightning safety precautions or training (22%). Individuals having frequent lightning reported significantly unsafe places compared to the infrequent lightning experienced individuals. Similarly, participants who received warning messages for lightning reported significantly unsafe areas. Respondents who had lightning safety precautions/training demonstrated significantly better confidence than those without any safety precautions/training.
Table 1. Association of socio-demographic information with the safety perception about living place against lightning.

| Features                        | n (%)         | Perception on Living Place’s Safety against Lightning (Mean ± SD) |
|---------------------------------|---------------|----------------------------------------------------------------|
| 1. Age Group (year)             |               | **                                                              |
| – 18–25                         | 1363 (83.06)  | 3.01 ± 1.04                                                    |
| – 26–35                         | 198 (12.07)   | 3.20 ± 1.09                                                    |
| – 36–45                         | 50 (3.05)     | 3.34 ± 1.04                                                    |
| – More than 45                  | 30 (1.83)     | 2.80 ± 1.16                                                    |
| 2. Gender                       |               | ***                                                             |
| – Male                          | 816 (49.73)   | 3.18 ± 1.03                                                    |
| – Female                        | 825 (50.27)   | 2.90 ± 1.06                                                    |
| 3. Marital Status               |               | ***                                                             |
| – Married                       | 253 (15.42)   | 3.32 ± 1.14                                                    |
| – Unmarried                     | 1388 (84.58)  | 2.99 ± 1.03                                                    |
| 4. Living with Family           |               | **                                                              |
| – Yes                           | 1469 (89.52)  | 3.05 ± 1.05                                                    |
| – No                            | 172 (10.48)   | 2.95 ± 1.13                                                    |
| 5. Location                     |               | ***                                                             |
| – Urban Area                    | 1297 (79.04)  | 3.12 ± 1.05                                                    |
| – Rural Area                    | 344 (20.96)   | 2.73 ± 1.00                                                    |
| 6. Residential Unit             |               | ***                                                             |
| – High-Rise #                   | 711 (43.33)   | 3.01 ± 1.05                                                    |
| – Low-Rise ##                   | 499 (30.41)   | 3.41 ± 1.00                                                    |
| – Tin Shed                      | 225 (13.71)   | 2.50 ± 0.98                                                    |
| – Others                        | 206 (12.55)   | 2.84 ± 0.97                                                    |
| 7. Education Level              |               | **                                                              |
| – Tertiary (University)         | 1205 (73.43)  | 2.99 ± 1.04                                                    |
| – Lower than Tertiary           | 436 (26.57)   | 3.18 ± 1.07                                                    |
| 8. Present Occupation           |               | ***                                                             |
| – University Students           | 1045 (63.68)  | 3.02 ± 1.04                                                    |
| – Employed                      | 247 (15.05)   | 3.27 ± 1.10                                                    |
| – Unemployed                    | 278 (16.94)   | 2.86 ± 1.05                                                    |
| – Business                      | 71 (4.33)     | 3.15 ± 1.02                                                    |

**p < 0.01; ***p < 0.001. # High Rise = More than 5-story residential unit, ## Low Rise = 5-story or less than 5-story residential unit. SD = Standard Deviation.

Table 2. Association of lightning frequency and safety precautions with the safety perception about living place against lightning.

| Features                                      | n (%)         | Perception on Living Place’s Safety against Lightning (Mean ± SD) |
|-----------------------------------------------|---------------|----------------------------------------------------------------|
| 1. Lightning Experience in Living Place during the Season |               | ***                                                             |
| Frequent                                      | 1086 (66.18)  | 2.94 ± 1.03                                                    |
| Infrequent                                    | 555 (33.82)   | 3.23 ± 1.08                                                    |
| 2. Any warning message (siren, sign, or announcement) during lightning in the Locality |               | ***                                                             |
| Yes                                           | 449 (27.36)   | 2.76 ± 1.12                                                    |
| No                                            | 1192 (72.64)  | 3.14 ± 1.01                                                    |
| 3. Lightning Safety Precaution/Training       |               | ***                                                             |
| Yes                                           | 363 (22.12)   | 3.57 ± 1.01                                                    |
| No                                            | 1278 (77.88)  | 2.89 ± 1.02                                                    |

***p < 0.001. SD = Standard Deviation.
3.3. Knowledge Regarding Lightning

Table 3 shows the knowledge-based items regarding lightning with the sources of questions. A large proportion of respondents correctly recognized the lightning as a disaster in Bangladesh. April–June is the period of frequent lightning in the country, and the frequency and deaths due to the lightning have been increased (Table 3). They also correctly demonstrated that during lightning, they should avoid using electronic devices; avoid touching metal parts and taking shelter under a concrete shed might be safer if in the car; stay away from tall trees, electronic poles, metal poles and mobile towers; seek shelter in a building or under a concrete shed; give first aid to a victim; avoid taking a bath; and avoid adverse health effects on the human body. However, many participants did not know that all thunderstorms can produce lightning and strike the same place twice.

3.4. Attitude towards Lightning

Individuals agreed that they should follow the daily weather forecasts before planning outdoor activities, raise lightning awareness for their families and community, and participate in lightning-related campaigns/training (Table 4). More than 60% of individuals believed that they should also wait at least 30 min before resuming outdoor activities after hearing the last thunder.

3.5. Practices towards Lightning

A large number of the study population demonstrated that they followed some activities during lightning, such as avoiding open space or elevated places, avoiding tin sheds for sheltering, staying away from the window and balcony, avoiding touching metal parts, and avoiding using electronic devices (Table 5). Compared to other practices, fewer respondents followed distance (50–100 feet) during lightning when they were in an open space with several people.

3.6. Sources of Lightning Information

Table 6 summarizes that the individuals mostly used social media (28%), electronic media such as TV and radio (27%), and the internet (23%) as the sources of lightning-related information. Besides, 8% recognized national and local authorities as to the most used sources.

3.7. Association in KAP Domain

Table 7 presents the positive correlations between knowledge and attitude, knowledge and practice, and attitude and practice. Univariate logistic regression analyses determine that knowledge is a significant predictor of attitude and practice. It also determines the attitude as a significant predictor of practice. Individuals with good knowledge reported increased odds of having a good attitude and good practice compared to individuals with poor knowledge. Respondents with good attitudes showed good practices.

3.8. Determinants of KAP Level

Respondents reported good knowledge (56%), good attitude (88%), and good practice (63%) level. Table 8 presents the univariate logistic regression results. Age group, living with family, residential unit, education level, and lightning experience during the season were determined as significant predictors of knowledge.

Decreased odds of having good knowledge were found for the individuals of 26–35 years age group (OR: 0.55; 95% CI: 0.40–0.74) compared to the 18–25 years, age group. Participants living without their families reported decreased odds of having a good knowledge (OR: 0.46; 95% CI: 0.33–0.63) than those living with their families. Study population living in the low-rise unit demonstrated decreased odds of having a good knowledge (OR: 0.78; 95% CI: 0.62–0.99) than the high-rise unit participants. Respondents with lower than tertiary level education also reported decreased odds of having a good knowledge (OR: 0.67; 95% CI: 0.54–0.84) than those with university-level education. People experiencing
Infrequent lightning reported lower odds of having a good knowledge (OR: 0.55; 95% CI: 0.45–0.68) compared to those with frequent lightning experience in their living places.

Table 3. Knowledge regarding lightning.

| Items                                                                 | Responses                                      | Correct Response (n (%) | 95% CI       |
|-----------------------------------------------------------------------|-----------------------------------------------|-------------------------|--------------|
| Do you think lightning has become disaster in Bangladesh? [1,5]?       | – Yes                                         | 1321 (80.50)            | 78.58 to 82.42 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| In which month is the thunderstorm usually more in Bangladesh? [15]   | – December–February                            | 1195 (72.82)            | 70.67 to 74.98 |
|                                                                       | – August–December                              |                         |              |
|                                                                       | – April–June                                   |                         |              |
|                                                                       | – All of above                                 |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Has the frequency of lightning been increased over the time in Bangladesh? [5,42] | – Yes                                         | 1317 (80.26)            | 78.33 to 82.18 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Have the deaths related to lightning accidents been increased over the time in Bangladesh? [5,42] | – Yes                                         | 1337 (81.47)            | 79.59 to 83.36 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| All thunderstorms produce lightning [33].                             | – Yes                                         | 798 (48.63)             | 46.21 to 51.05 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Lightning can strike the same place twice [33].                       | – Yes                                         | 879 (53.56)             | 51.15 to 55.98 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Do you think it is safe to use electronic devices when lightning is present? [5,15,33] | – Yes                                         | 1283 (78.18)            | 76.18 to 80.18 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Do you think it is safe to bath when lightning is present? [33,43]    | – Yes                                         | 1039 (63.32)            | 60.98 to 65.65 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| What should you do if you are in car during lightning? [15,33,43]?    | – Avoid touching metal part of the car only    | 1213 (73.92)            | 71.79 to 76.04 |
|                                                                       | – Continue driving                             |                         |              |
|                                                                       | – Avoid touching metal part of the car and take shelter under concrete shed |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Which one you should stay away during lightning? [15,33,43]           | – Tall Trees                                   | 1237 (75.38)            | 73.29 to 77.47 |
|                                                                       | – Electric Poles                               |                         |              |
|                                                                       | – Metal Poles                                  |                         |              |
|                                                                       | – Mobile Tower                                 |                         |              |
|                                                                       | – All of above                                 |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| It’s comparatively safe to seek shelter in a building or under concrete shed during lightning [15,33,43]. | – Yes                                         | 1313 (80.01)            | 78.07 to 81.95 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| It is safe to give first aid to lightning victim if lightning danger is no longer present [5,15]. | – Yes                                         | 1170 (71.30)            | 69.11 to 73.49 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |
| Lightning has adverse effects on human health [1,3,34].               | – Yes                                         | 1280 (78.00)            | 75.99 to 80.00 |
|                                                                       | – No                                          |                         |              |
|                                                                       | – I don’t know                                 |                         |              |

CI = Confidence Interval.
Table 4. Attitude towards lightning.

| Items                                                                 | Positive Response (n (%)) | 95% CI       |
|-----------------------------------------------------------------------|----------------------------|--------------|
| I should listen and follow daily weather forecasts before planning   | 1363 (83.06)               | 81.24 to 84.87|
| outdoor activities [5].                                               |                            |              |
| I should raise lightning prevention awareness to my family and       | 1452 (88.48)               | 86.94 to 90.03|
| community [5].                                                        |                            |              |
| I should participate in any lightning relevant campaign/training      | 1335 (81.35)               | 79.47 to 83.24|
| activities [5].                                                       |                            |              |
| I should wait at least 30 min after I hear the last thunder before   | 1108 (67.52)               | 65.25 to 69.79|
| resuming outdoor activities [5,15,43].                               |                            |              |

CI = Confidence Interval.

Table 5. Practices regarding lightning.

| Items                                                                 | Correct Response (n (%)) | 95% CI       |
|-----------------------------------------------------------------------|--------------------------|--------------|
| I avoid open space or high place during lightning [15,43].            | 1433 (87.32)             | 85.71 to 88.94|
| I avoid tin sheds during lightning for sheltering [15].               | 1198 (73.00)             | 70.85 to 75.15|
| If I am in house during lightning, I stay away from the window        | 1422 (86.65)             | 85.00 to 88.30|
| and balcony [15,33,43].                                               |                            |              |
| I avoid touching metal faucet, Metal railings of stairs, pipe etc.    | 1373 (83.67)             | 81.88 to 85.46|
| during lightning [15,43].                                             |                            |              |
| I avoid using all electronic devices such as mobile, laptop,          | 1308 (79.71)             | 77.76 to 81.65|
| computer, telephone, TV, refrigerator etc. during lightning [15,33,43]|                            |              |
| During lightning, if I am in open space with many people, then I     | 988 (60.21)              | 57.84 to 62.58|
| request all to maintain 50-100 feet space between each other [15].    |                            |              |

CI = Confidence Interval.

Table 6. Most used sources for lightning-related information.

| Sources                              | n (%) |
|--------------------------------------|-------|
| Social media                         | 462 (28.15) |
| Electronic media (TV, Radio)         | 457 (27.85) |
| Internet                             | 393 (23.95) |
| People (Community, Family Members)   | 103 (6.28) |
| University                           | 88 (5.36) |
| Others (National and Local Authority)| 138 (8.41) |

Table 7. Association in KAP domain.

| Association                  | r-Value | p-Value | OR (95% CI)     | p-Value |
|------------------------------|---------|---------|-----------------|---------|
| Knowledge and Attitude       | 0.401   | <0.001  | 7.54 (5.15–11.37) | <0.001  |
| Knowledge and Practice       | 0.367   | <0.001  | 2.58 (2.10–3.18)  | <0.001  |
| Attitude and Practice        | 0.493   | <0.001  | 4.50 (3.25–6.28)  | <0.001  |

r = correlation coefficient; OR = Odds Ratio; CI = Confidence Interval.

In terms of attitude, age, gender, marital status, living with family, education level, and present occupation were significant predictors. Decreased odds of having a good attitude were observed when compared the individuals of 26–35 years age group (OR: 0.40; 95% CI: 0.27–0.60), 36–45 years age group (OR: 0.41; 95% CI: 0.21–0.88), and more than 45 years old age group (OR: 0.20; 95% CI: 0.09–0.46) with 18–25 years age group. Female participants demonstrated increased odds of having a good attitude (OR: 1.70; 95%
CI: 1.24–2.33) than the male participants. Increased odds of having a good attitude (OR: 2.19; 95% CI: 1.52–3.12) were also found for unmarried participants compared to married. Decreased odds of having a good attitude were found in the case of the individuals living without family (OR: 0.36; 95% CI: 0.25–0.54) vs. living with family, lower than tertiary (OR: 0.47; 95% CI: 0.35–0.65) vs. tertiary, other occupations vs. university students.

Table 8. Univariate predictors of KAP level towards lightning.

| Features                        | Knowledge | Attitude | Practice |
|---------------------------------|-----------|----------|----------|
|                                 | OR (95% CI) | p-Value | OR (95% CI) | p-Value | OR (95% CI) | p-Value |
| 1. Age Group (year)             |           |          |           |          |           |          |
| – 18–25                         | 1         |          | 1         |          | 1         |          |
| – 26–35                         | 0.55 (0.40–0.74) | 0.000 *** | 0.40 (0.27–0.60) | 0.000 *** | 0.41 (0.30–0.56) | 0.000 *** |
| – 36–45                         | 0.77 (0.44–1.37) | 0.374 | 0.41 (0.21–0.88) | 0.014 * | 0.59 (0.34–1.05) | 0.072 |
| – More than 45                  | 0.55 (0.26–1.13) | 0.105 | 0.20 (0.09–0.46) | 0.003 ** | 1.39 (0.64–3.35) | 0.428 |
| 2. Gender                       |           |          |           |          |           |          |
| – Male                          | 1         |          | 1         |          | 1         |          |
| – Female                        | 0.95 (0.78–1.15) | 0.583 | 1.70 (1.24–2.33) | 0.000 *** | 1.34 (1.09–1.64) | 0.005 ** |
| 3. Marital Status               |           |          |           |          |           |          |
| – Married                       | 1         |          | 1         |          | 1         |          |
| – Unmarried                     | 1.30 (0.99–1.70) | 0.057 | 2.19 (1.52–3.12) | 0.000 *** | 1.21 (0.92–1.59) | 0.164 |
| 4. Living with Family           |           |          |           |          |           |          |
| – Yes                           | 1         |          | 1         |          | 1         |          |
| – No                            | 0.46 (0.33–0.63) | 0.000 *** | 0.36 (0.25–0.54) | 0.000 *** | 0.61 (0.44–0.84) | 0.002 ** |
| 5. Location                     |           |          |           |          |           |          |
| – Urban Area                    | 1         |          | 1         |          | 1         |          |
| – Rural Area                    | 0.80 (0.63–1.02) | 0.070 | 0.87 (0.61–1.26) | 0.443 | 0.40 (0.31–0.51) | 0.000 *** |
| 6. Residential Unit             |           |          |           |          |           |          |
| – High-Rise #                   | 1         |          | 1         |          | 1         |          |
| – Low-Rise ##                  | 0.78 (0.62–0.99) | 0.038 * | 0.74 (0.53–1.05) | 0.090 | 1.04 (0.82–1.33) | 0.747 |
| – Tin Shed                     | 0.99 (0.73–1.34) | 0.959 | 1.61 (0.94–2.91) | 0.096 | 0.44 (0.33–0.60) | 0.000 *** |
| – Others                       | 1.14 (0.83–1.57) | 0.419 | 1.08 (0.66–1.85) | 0.752 | 0.91 (0.66–1.26) | 0.564 |
| 7. Education Level              |           |          |           |          |           |          |
| – Tertiary (University)         | 1         |          | 1         |          | 1         |          |
| – Lower than Tertiary           | 0.67 (0.54–0.84) | 0.000 *** | 0.47 (0.35–0.65) | 0.000 *** | 0.45 (0.36–0.56) | 0.000 *** |
| 8. Present Occupation           |           |          |           |          |           |          |
| – University Students           | 1         |          | 1         |          | 1         |          |
| – Employed                     | 1.07 (0.81–1.42) | 0.623 | 0.47 (0.31–0.70) | 0.000 *** | 1.08 (0.79–1.48) | 0.649 |
| – Unemployed                   | 1.01 (0.77–1.32) | 0.928 | 0.54 (0.36–0.81) | 0.002 ** | 1.21 (0.90–1.65) | 0.274 |
| – Business                     | 0.68 (0.42–1.09) | 0.114 | 0.35 (0.19–0.66) | 0.000 *** | 1.09 (0.65–1.93) | 0.250 |
| 9. Lightning Experience in Living Place during the Season |           |          |           |          |           |          |
| – Frequent                      | 1         |          | 1         |          | 1         |          |
| – Infrequent                    | 0.55 (0.45–0.68) | 0.000 *** | 0.89 (0.65–1.24) | 0.501 | 1.16 (0.93–1.43) | 0.184 |

* p < 0.05; ** p < 0.01; *** p < 0.001. OR = Odds Ratio; CI = Confidence Interval. # High Rise = More than 5-story residential unit, ## Low Rise = 5-story or less than 5-story residential unit.

For practices against lightning, age group, gender, living with family, location, residential unit, and education level were determined as significant predictors. Decreased odds of having good practice were found in the case of the participants with 26–35 years age group vs. 18–25 years age group, living with family vs. living without family, rural area vs. urban area, tin shed vs. high-rise residents, and lower than tertiary vs. tertiary (Table 8). Similar to attitude, female participants also reported increased odds of having a good practice.
Multiple logistic regression analysis presents that age, living with the family, residential unit, education level, and lightning experience in living place remained significant predictors of knowledge (Table 9). Decreased odds of having a good knowledge were found when compared 26–35 years age group (aOR: 0.54; 95% CI: 0.40–0.74) with 18–25 years age group, living without family (aOR: 0.50; 95% CI: 0.36–0.70) vs. living with family, low rise (aOR: 0.67; 95% CI: 0.53–0.86) vs. high rise unit, lower than tertiary (aOR: 0.68; 95% CI: 0.54–0.86) vs. tertiary level education, infrequent (aOR: 0.51; 95% CI: 0.41–0.63) vs. frequent lightning experience. Similarly, age group, gender, marital status, living with family, and education level remained significant predictors of attitude. In the case of practice, age group, gender, living with family, location, and education level were found as significant predictors.

Table 9. Multiple logistic analysis to identify the predictors of KAP level towards lightning.

| Features                                      | Knowledge aOR (95% CI) | p-Value | Attitude aOR (95% CI) | p-Value | Practice aOR (95% CI) | p-Value |
|-----------------------------------------------|------------------------|---------|-----------------------|---------|-----------------------|---------|
| 1. Age Group (year)                           |                        |         |                       |         |                       |         |
| 18–25                                         |                        |         |                       |         |                       |         |
| 26–35                                         | 0.54 (0.40–0.74)       | 0.000 ***| 0.60 (0.37–0.97)      | 0.033 * | 0.48 (0.35–0.65)      | 0.000 ***|
| 36–45                                         | 0.81 (0.45–1.47)       | 0.484   | 0.74 (0.34–1.72)      | 0.462   | 0.91 (0.50–1.67)      | 0.759   |
| More than 45                                   | 0.58 (0.27–1.23)       | 0.155   | 0.35 (0.15–0.86)      | 0.018 * | 2.53 (1.11–6.36)      | 0.035 * |
| 2. Gender                                      |                        |         |                       |         |                       |         |
| Male                                           |                        |         |                       |         |                       |         |
| Female                                         | 1.74 (1.26–2.41)       | 0.000 ***| 1.35 (1.09–1.67)      | 0.005 **|                       |         |
| 3. Marital Status                              |                        |         |                       |         |                       |         |
| Married                                        |                        |         |                       |         |                       |         |
| Unmarried                                      | 1.47 (0.92–2.33)       | 0.101   |                       |         |                       |         |
| 4. Living with Family                          |                        |         |                       |         |                       |         |
| Yes                                            |                        |         |                       |         |                       |         |
| No                                             | 0.50 (0.36–0.70)       | 0.000 ***| 0.37 (0.24–0.56)      | 0.000 ***| 0.67 (0.48–0.93)      | 0.018 * |
| 5. Location                                    |                        |         |                       |         |                       |         |
| Urban Area                                     |                        |         |                       |         |                       |         |
| Rural Area                                     | 0.45 (0.35–0.58)       | 0.000 ***|                       |         |                       |         |
| 6. Residential Unit                            |                        |         |                       |         |                       |         |
| High–Rise #                                    |                        |         |                       |         |                       |         |
| Low–Rise ##                                   | 0.67 (0.53–0.86)       | 0.001 **|                       |         |                       |         |
| Tin Shed                                       | 0.94 (0.69–1.31)       | 0.745   |                       |         |                       |         |
| Others                                         | 0.98 (0.71–1.37)       | 0.929   |                       |         |                       |         |
| 7. Education Level                             |                        |         |                       |         |                       |         |
| Tertiary (University)                          |                        |         |                       |         |                       |         |
| Lower than Tertiary                            | 0.68 (0.54–0.86)       | 0.001 **| 0.59 (0.42–0.83)      | 0.002 **| 0.51 (0.40–0.65)      | 0.000 ***|
| 8. Present Occupation                          |                        |         |                       |         |                       |         |
| University Students                            |                        |         |                       |         |                       |         |
| Employed                                       | 0.86 (0.52–1.43)       | 0.556   |                       |         |                       |         |
| Unemployed                                     | 0.76 (0.49–1.18)       | 0.215   |                       |         |                       |         |
| Business                                       | 0.67 (0.34–1.39)       | 0.265   |                       |         |                       |         |
| 9. Lightning Experience in Living Place during the Season |            |         |                       |         |                       |         |
| Frequent                                       |                        |         |                       |         |                       |         |
| Infrequent                                     | 0.51 (0.41–0.63)       | 0.000 ***|                       |         |                       |         |

* p < 0.05; ** p < 0.01; *** p < 0.001. aOR = Adjusted Odds Ratio; CI = Confidence Interval.
4. Discussion

Our study summarizes the findings of the KAP study on lightning in Bangladesh through an online survey. To our knowledge, this is the country’s first KAP study on lightning. Despite the country’s significant lightning risk and safety concern, insufficient knowledge was found compared to attitudes and practices. People might also rely solely on authorities to carry out lightning risk reduction efforts, such as providing lightning-safe structures, lightning detection systems, and enhancing public awareness. Our findings indicate that regular awareness campaigns combined with intensified educational programs can improve the level of public knowledge, attitude, and practices regarding lightning.

4.1. Lightning Safety Perception

The study population expressed concern regarding lightning safety, as several respondents reported frequent lightning in their area. This finding is consistent with earlier research indicating a high risk of lightning in the country [1,5,13]. This research reveals that the study population’s youngest adults were exposed to unsafe conditions. According to previous studies, this age group has the highest rate of lightning-related fatalities due to outdoor activities such as going to school, university, and participating in sports [24,44]. The study also found lightning fatalities inside the school in Bangladesh due to the minimal or no lightning protection [13,45]. Female populations reported unsafe surroundings from lightning than male populations. The study also found that females are more cautious about lightning risk [5]. The probable argument is that females are sometimes perceived as insecure in the face of disasters in Bangladeshi society, as they lack the social support that males do. Additionally, an increased number of females working outside has been observed in Bangladesh, suggesting that they might be exposed to lightning as a result of their outdoor activities [46].

Previously conducted studies found a high rate of lightning-related deaths and injuries in rural areas of Bangladesh, particularly among those engaged in agricultural activities [5,10,13]. Likewise, the present study examines rural communities’ perceptions of unsafe areas. Lightning-related fatalities among rural populations have also been documented in China and Colombia [47,48]. Our findings reveal that residents of low-rise buildings felt safer than those in high-rise and tin shed dwellings. Studies found lightning-caused fatalities in dwellings due to improper knowledge and safety structures [13,20,49]. Frequent lightning in the current place caused the inhabitants to sense an unsafe situation. Some participants reported that they had warnings during the lightning season. However, lightning warning and detection systems must be installed and improved in all vulnerable areas to reduce the risk. Furthermore, the outcomes of this study revealed a communication gap regarding lightning safety information. Few participants received safety precautions from the authorities regarding lightning. Earlier research showed the same result [5].

4.2. Public Knowledge, Attitudes, and Practices

Individuals exhibited excellent attitudes and practices about lightning risk reduction. People believed that lightning would become a disaster for the country, increasing mortality and morbidity [1,5]. According to Bangladesh’s Ministry of Disaster Management and Relief, thunderstorms are common between April and June [15]. However, the study found that lightning-related deaths and injuries are more prevalent during the pre-monsoon interval in Bangladesh than during the monsoon and post-monsoon periods [10,42].

This research reveals that almost half of the study population believed many lightning myths, including the misconception that all thunderstorms cannot generate lightning and that lightning cannot strike the same location twice. It corroborates earlier research performed in Bangladesh and the United States on how individuals perceive myths and misconceptions [5,33]. In reality, all thunderstorms have the potential to generate lightning, which can strike the same location twice [34]. Over 35% of the sample population was unaware that bathing is unsafe during lightning. When lightning is present, people should
avoid water-related activities in the house, as lightning can travel via plumbing [50]. One study also found lightning-caused fatalities in water-related activities in Bangladesh [13].

Numerous people believed that lightning had become a health risk in Bangladesh. According to the study, lightning’s health consequences might range from moderate adverse effects to deaths [6]. People were aware that certain behaviors, including avoiding electronic gadgets and staying away from tall objects, such as tall trees and electric poles, might help minimize their risk of lightning strikes. If there is no lightning shelter, they may seek shelter in the concrete building during lightning strikes. However, the building should be sufficiently protected from lightning [51]. Another lightning safety place could be a fully enclosed metal-topped vehicle [51]. Many of them disagreed with the instruction to wait at least 30 min before engaging in outdoor activities following the last thunder. It is consistent with prior research performed in Bangladesh and other countries [5,33].

Numerous individuals were interested in participating in the lightning-related campaign/training to mitigate the lightning risk effectively. Around 40% of them did not keep their distance when they gathered in an open area during lightning. However, seeking lightning-safe structures must be the first place to reduce the risk. Many of them also avoid open space and elevated locations, tin sheds, windows and balconies, metal components, and electrical equipment during lightning, which are essential to reducing the lightning risk [20]. The practices section’s findings are similarly compatible with their attitude and knowledge sections. This study reveals that having a solid understanding of lightning might result in a positive attitude and practices. A comprehensive lightning safety awareness program where everyone can participate and learn may enhance public knowledge and attitude towards lightning safety.

4.3. Socio-Demographic Determinants of KAP Level

Our online study found that the majority of the study population were young university students. In Bangladesh, people engaging in agricultural activities are most vulnerable to lightning [13]. However, other people doing outdoor activities and even inside houses or schools also have high lightning risk [10,13]. Thus, the public has high exposure to the frequently occurring lightning in the country [10,12].

Lightning-related mortality and morbidity can be decreased by early intervention based on socio-demographic information about the individuals [24,25]. Lightning risk assessments should include socio-demographic data to identify high exposure and vulnerability groups. Suppose that the disaster management facilitator and organizations (such as local governments) working on lightning risk mitigation have access to expedited information, such as an individual’s socio-demographic status as a predictor of lightning reactions; they can then intervene and assist in the implementation of appropriate lightning risk mitigation activities. We found that a better socio-demographic situation might improve knowledge, attitudes, and practices towards lightning risk. Additionally, it correlates to earlier studies in which the researchers emphasized the need for increased public awareness [5,20]. This study found that the female participants had more positive attitudes and practices regarding lightning. According to studies, males in Bangladesh, India, and China suffer disproportionate lightning-related fatalities and injuries [10,48,52]. In Bangladesh, males are primarily outgoing, and many are active in farming occupations that expose them to high levels of lightning [10]. They require specific education and training to reduce these tragedies. The authority may integrate a policy to reach out to vulnerable males and prepare them for lightning risk. This study found that education programs can effectively prepare people for lightning, confirming prior research indicating that literacy rates significantly influence lightning-related deaths and injuries [10,20]. Individuals with a lower level of education may be less conscious of the lightning risk than those with a higher level of education, which was also found in another study [5]. Conducting lightning-related education programs is critical for lowering the risk of being struck by lightning. However, developing countries face significant challenges in obtaining current knowledge and training on lightning safety measures [20]. As a result, they might be
unaware of their surroundings’ lightning risk. University students’ curricula could include lightning education. They fared better than the employed and business-oriented group in this regard. As with other studies, this found a dearth of lightning-related activities among rural residents, making them vulnerable [5]. Due to a lack of awareness efforts, this population may become exposed to lightning. Comprehensive awareness campaigns and ensuring rural residents’ participation might result in successful lightning risk reduction.

4.4. Lightning Risk Mitigation Strategies

Following the discussion above, it appears that the following recommendations are critical for lightning risk mitigation strategies:

- The government and stakeholders must develop a strategic plan to mitigate the danger of lightning strikes. They should prioritize lightning as a significant hazard alongside other common hazards in the nation, such as cyclones and floods. The Ministry of Disaster Management and Relief must have a lightning protection plan. They can include it into the country’s disaster management strategy, which must be updated on a regular basis. The plan should detail the duties of all parties. To further understand the disparity between these realms, it is necessary to examine the elements affecting one’s knowledge, attitude, and practices about lightning. Additionally, the authority must identify susceptible individuals in order to allow quick preventive steps. They can accomplish this through conducting research to detect high-risk areas, sensitive populations, and the identification of tools and approaches for reducing lightning risk.

- Authorities must take into account the scientific agencies’ relations to the political/administrative structure [53]. Political and scientific disagreements impede disaster management and may even result in the emergence of additional crises. Strong ties between scientific institutes and the political/administrative structure at the top of the political hierarchy are essential to ensure the credibility of both scientific guidance and political decision-making.

- The country’s disaster mitigation and preparedness sectors should be equipped with lightning detecting systems. They also need to establish lightning safe locations with protective structures [13]. As a developing country, the authority may require external funds to guarantee compliance with these requirements. On the other side, the public ought to be aware of lightning events, regularly occurring lightning places, and public acts that can assist in mitigating the risk of being hit by lightning. Consideration of lightning as a disaster may necessitate significant multidisciplinary research. Studies indicated that some lightning-affected countries have already improved their lightning detection systems [54]. Many countries around the world also have national ground-based networks detecting lightning [55]. In addition to the public awareness campaign, the authorities should provide lightning safety education in formal and informal settlements [33,56].

- Authority should also include the lightning safety action plan for the people. This safety action plan must include when and where to reach a lightning-safe location. Other components of planning include being aware of accessible weather predictions for the location and intended time of action, altering plans if thunderstorms are predicted, and being actively aware of their surroundings for the threat of sudden thunderstorms [51,57]. The two safe locations against lightning are substantial buildings with conducting material within or around it that conduct a direct or nearby lightning strike away from persons within, and a totally enclosed metal-topped vehicle [51,57]. In the workplace, at home, and during lightning warnings, lightning-safe buildings and vehicles must be recognized in advance.

- Ministry of Disaster Management and Relief has developed certain public safety guidelines for minimizing lightning risk [15]. However, the safety tips must be updated to reflect other authentic sources [6,10,13,20,45,49,51].

- Where multi-sectoral actions are necessary, the authority should include them. Government agencies, local governments, educational institutions, government and private
offices, health professionals, disaster management practitioners, lightning experts, and community leaders can all contribute to a sufficient distribution of knowledge about lightning, as well as positive attitudes and preventive practices.

- Along with regular weather monitoring, authorities must organize campaigns, social mobilization, and communication to educate and train their people on lightning risk reduction strategies.

- The authority and public should have access to the recent lightning-related education and training. Campaigns/training sessions can be scheduled on a regular basis (once a month) prior to lightning season. The authority can include a diverse group of individuals to demonstrate the training. They must first train their personnel. Appropriate planning must be carried out on the basis of credible data. The training materials should include the necessary knowledge, attitude, and practices related to lightning following authentic sources [6,10,13,20,45,49,51]. Additionally, this study provides some KAP information that might be used in training materials. For instance, they could arrange a training where vulnerable people can participate and access information on what they need to know during lightning season. Online campaigns utilizing a web-based application and mobile applications may also be viable options to reach people. Developing countries, on the other hand, such as Bangladesh, need to ensure internet connectivity throughout the country, even in remote areas, in order to reach all segments of the population. Television and social media channels may be used to deliver education programs, such as short films, case studies, and early warnings on lightning mitigation strategies at the community level. One study also suggested these media as effective warning tools for lightning [54]. This research reveals that the most frequently used sources of lightning-related information are social media, electronic media, and the internet. These platforms have developed into a vital and often utilized source of information for the public in Bangladesh. However, education levels and cognitive comprehension must also be taken into account while developing and executing solutions. These platforms might potentially be used by disaster management authorities and agencies to include information on lightning.

- The authorities must equip and train their personnel and stakeholders to combat this disaster effectively. Collaboration between researchers, industry, and communities is also necessary to develop successful lightning risk reduction strategies.

- Since Bangladesh is a hazard-prone country, lightning may be underestimated as a disaster. To fight cyclones, the government has previously implemented an effective cyclone preparedness program (CPP) [58]. Additionally, this country has numerous flood management measures [59,60]. However, lightning management may not receive the same level of attention as cyclone and flood management. Thus, a multi-hazard strategy is necessary to successfully mitigate multiple risks in the country [32,53]. The authority must establish a distinctive, comprehensive, and unanimous disaster management framework at the central/national level, while also ensuring continuous information and feedback from and to regional and local authorities, as well as independent specialists [53]. Multi-hazard training can be initiated, with a focus on lightning safety. The government is already adequately prepared for cyclones and floods compared to lightning [61]. Training for earthquake preparedness has also been conducted [62]. They may use the same approach to develop multi-hazard training. Several sessions can be included based on the hazard type and community perspective.

4.5. Limitation of the Study

Due to the online pattern and ongoing COVID-19 pandemic, this study has certain limitations that should be considered when interpreting the findings. First, it used non-probability sampling approaches using a self-reported online questionnaire survey. While anonymous respondents may participate in the online survey, where the authors have limitations in tracking them, there may exhibit some bias in their attitude and practice
responses. Certain individuals may choose socially acceptable responses. Internet connection was also a significant criterion for participation in the study. Additionally, the majority of respondents possessed tertiary education; respondents may thus suggest that they have enough knowledge, attitudes, and practices. Second, the study evaluated only the population inside the boundary conditions, which means that the study population may not fully portray its enormous population. Due to the online pattern, the study population might exclude some rural people who face a high risk of lightning. Third, the findings are based entirely on self-reported information. For instance, participants perceived an unsafe location in the presence of lightning, but this was not confirmed by actual observation of a single response. Furthermore, the authors recognized this restriction due to ethical issues and the online survey’s design. Despite these limitations, this exploratory study has the potential to give critical information to authorities. Finally, it can aid other impacted communities in incorporating lightning risk reduction strategies.

5. Conclusions

The primary objective of this study has been to examine the KAP data and the factors that influence the KAP level regarding lightning in Bangladesh. It can, however, be used in other locations at risk of lightning. Lightning has been responsible for a large number of fatalities and injuries across the world. Many communities, on the other hand, seem unconcerned about this disaster. As a result, it has become critical to evaluate the KAP level for lightning. According to the study’s summary of findings, more than half of the population reported frequent lightning during the season, and many of them perceived unsafe areas against this disaster. Individuals who experienced numerous lightning occurrences described significantly more dangerous places than those who had only a few lightning occurrences. Over 70% of people received no warning messages, and only a small percentage received lightning safety precautions or training. Many of the study population had good knowledge, positive attitudes, and good preventive practices. However, the knowledge level could be more compared to the attitudes and practices in overall KAP level. The findings have also demonstrated that having an appropriate understanding and a positive view can assist an individual in practicing lightning safety. Females had better lightning attitudes and practices compared to males. In comparison to urban residents, rural residents had poor practices. In addition, individuals’ educational levels might also play a crucial role in preparing them for lightning. Overall, extensive lightning campaign activities combined with effective education are required for the behavioral changes in this lightning-vulnerable society. It also entails adhering to community standards and incorporating appropriate traditional knowledge, national legislation, and international standards with the proper authority. Authorities responsible for disaster management must bolster their lightning risk monitoring efforts. The findings emphasize the need to disseminate accurate knowledge (and refute myths and misconceptions), engage the community, and evaluate lightning risk mitigation activities regularly to ensure lightning risk reduction. Additionally, the findings indicate that lightning risk reduction may be possible by ensuring people’s quality of life through well-built homes, improved work environments, lightning safety shelters, and accurate information updates.

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Informed Consent Statement: Consent was obtained from respondents, who remained anonymous.

Data Availability Statement: All information can be found in the analysis part. The data presented in this study are available on request from the corresponding author.

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