

## Social Media Rumors in Bangladesh

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### ABSTRACT

This study analyzes  $N=181$  social media rumors from Bangladesh to find out the most popular themes, sources, and aims. The result shows that social media rumors have seven popular themes: political, health & education, crime & human rights, religious, religiopolitical, entertainment, and other. Also, online media and mainstream media are the two main sources of social media rumors, along with three tentative aims: positive, negative, and unknown. A few major findings of this research are: Political rumors dominate social media, but its percentage is decreasing, while religion-related rumors are increasing; most of the social media rumors are negative and emerge from online media, and social media itself is the dominant online source of social media rumors; and, most of the health-related rumors are negative and surge during a crisis period, such as the COVID-19 pandemic. This paper identifies some of its limitations with the data collection period, data source, and data analysis. Providing a few research directions, this study also elucidates the contributions of its results in academia and policymaking.

**Keywords:** social media, rumors, misinformation, disinformation, fake news, Bangladesh

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## 1. INTRODUCTION

In August 2018, a vigilante mob consisting of more than a hundred people burned two men alive in a small Mexican town. The mob was organized by a WhatsApp rumor claiming that child abductors are collecting human organs (Martínez, 2018). Such online rumor-led mob lynching is becoming commonplace around the world. Studies also show that rumors, coupling with social media, often produce undesirable consequences (Ghosh, 2008). On one hand, social media platforms, such as Facebook, Twitter, WhatsApp, and Instagram, help users to build a communication network or e-community. On the other hand, they may alienate users by creating *filter bubbles* (Zimmer, Scheibe, Stock, & Stock, 2019): Social media rumors, which frequently deceive the information-seekers (Goh et al., 2017; Hashimoto, Kuboyama, & Shiota, 2011; Kwon, Cha, Jung, Chen, & Wang, 2013a, 2013b; Oh, Kwon, & Rao, 2010), could be one of its outcomes. Thanks to social media's surging popularity, understanding the functionalities of social media rumors has become necessary. A few specific areas of social media rumors have already attracted researchers' attention, such as rumor detection across social media platforms (Hashimoto et al., 2011; Shelke & Attar, 2019; Xu & Chen, 2015; Zubiaga, Aker, Bontcheva, Liakata, & Procter, 2018), rumor propagation in social media and its prevention techniques (Ahmed, Monzur, & Palit, 2016; Goh et al., 2017; Kwon et al., 2013b), and impacts and outcomes of social media rumors (Arun, 2019; Avaaz, 2019; Bhavnani, Findley, & Kuklinski, 2009). However, with a growing body of literature, a few basic aspects of social media rumors, such as popular themes, sources, and aims, are still under-researched. Moreover, rumor researches are, as it seems, unevenly concentrated. That means some regions are under-researched, such as South and Central Asia, while some regions are over-researched, such as North America and Europe. For example, using keyword searches (rumor/rumour, fake news, disinformation, misinformation) in the Scopus and Web of Science databases in July 2020, we found around three hundred published papers focusing only on social media rumors in the 2016 US Election. Many of these studies show that rumors are likely to surge before an election or important political events (see Allcott & Gentzkow, 2017; Parkinson, 2016; Serban et al., 2017; Silverman, 2016; Sydell, 2016). Although online rumoring is a global phenomenon, its features and propensities may vary from region to region thanks to their socio-cultural, political, and economic differences. For example, South Asian countries are enjoying a surge of rumors and rumor-led unrest after the 2010s, and religion, unlike in other regions, plays a crucial role in rumor production (Al-Zaman, 2019; Arun, 2019). However,

research outputs on social media rumors focusing on South Asian countries are scant. In this study, we analyze social media rumors of Bangladesh as an attempt to fill the existing gap to some extent.

Bangladesh is a poverty-stricken and rumor-prone South Asian country with a higher rate of social media penetration (22% in April 2019-January 2020). As of 2020, the country has 36 million social media users, and most of them use Facebook (Kemp, 2020). Although India is another rumor-prone neighbor, Bangladesh's situation is somewhat different. In Bangladesh, for example, rumor propagation is mainly based on Facebook (Al-Zaman, 2020a, 2020b), while in India, it is WhatsApp-based (Banaji, Bhat, Agarwal, Passanha, & Sadhana Pravin, 2019). Although Facebook Inc. owns both social media platforms, they have different communication features. Whereas Facebook is a popular social networking site (SNS) that offers flexible communication and networking options, WhatsApp is a standalone app that is mainly used for instant messaging, like Facebook Messenger. Therefore, the information production, processing, and/or distribution in these two platforms should be different, as with the communication patterns and impacts. Interestingly, many insidious rumors in Bangladesh are related to religion and religious politics. In 2012, for instance, the Ramu violence based on communal disinformation shook the country, and the trend has continued in the following years (see Al-Zaman, 2020b). The COVID-19 pandemic has become another new occasion for rumor-producers and rumor-spreaders. As a repercussion, in April 2020 the government of Bangladesh had to request Facebook authorities to close down around 100 Facebook pages that were actively spreading COVID-19-related rumors (Shawki, 2020). Meanwhile, to educate netizens, fact-checking websites such as Jachai.org and BDfactcheck.com have listed more than a hundred coronavirus-related rumors spread between February and July 2020. BBC Media Action is also countering online rumors by creating fact-based social media content in six Asian countries, including Bangladesh ("Communication to," 2020). Such circumstances demonstrate the importance of this study in the context of Bangladesh.

To understand social media rumors in Bangladesh, we designed this study based on a three-variable analysis: popular themes, sources, and aims. The first variable signals about rumors' topics of interest; the second helps to identify the major and minor sources of social media rumors; the third helps to understand rumors' aims by analyzing claims, contents, and/or consequences. The following discussion is divided into four main sections and a few subsections. First, in the literature review, relevant and previous findings are discussed. We divided the previous literature into four thematic subsections:

social media's importance as an information source, studies on rumor typologies, and sources and aims of rumors. Second, the method section contains details of the data collection and data analysis. In this study, a relatively novel source of rumor data for content analysis is introduced, i.e., fact-checking websites. Third, the relevant findings are presented in the result section. Following the research inquiries, this section is divided into three subsections to make the discussion more comprehensible. Fourth, the discussion section includes the necessary arguments and explanations of the findings in the light of previous literature. In this section, the objectives of the research are restated, key findings are thoroughly discussed, and a few limitations of this research are presented along with some practical implications.

## 2. LITERATURE REVIEW

### 2.1. Social Media as an Information Source

Social media's utility as an information source is ever-increasing. Shearer and Gottfried (2017) found that 74% and 68% of users get information from Twitter and Facebook. According to Broersma and Graham (2012), Twitter has an impact on political campaigns and elections. Many Facebook users consider it as a valuable source of information (Lampe, Vitak, Gray, & Ellison, 2012). Bene (2017), for example, found that many young people use Facebook as a primary source of political information. The study also hints that opinion leaders' roles are important in this information-seeking process. While many national media outlets were enjoying shut downs across the Arab world in 2011, Facebook and Twitter, being the primary means of communication and networking, brought a whole new revolution: We call it the Arab Spring (Eltantawy & Wiest, 2011; Khondker, 2011; Wolfsfeld, Segev, & Sheaffer, 2013). Apart from the political domain, social media information is used for healthcare and medical purposes as well. Social media campaigns, for example, were effective in educating US citizens about the dangers of the Zika virus (Southwell, Dolina, Jimenez-Magdaleno, Squiers, & Kelly, 2016). Similar social media campaigns are also seen amid the COVID-19 pandemic. However, rumor propagation in social media amid such pandemics may hinder the campaigns' positive outcomes and provoke mass anxiety. Social media is equally important for medical education. Medical students, for example, produce and share information with their peers in social media for study purposes (Zulfikar, Zaheer, Baloch, & Ahmed, 2018). Social media users often exchange emotional information instead of factual information, which helps them to create a collective emotional state. Such emotional expressiveness is also the fuel that

helps some e-communities to sustain themselves (Chmiel et al., 2011). Further, some users produce provocative and emotional information to attract other users. The lack of gatekeeping often lets users disseminate extreme ideologies to misguide netizens, such as religious fanaticism which could lead to interreligious disharmony (Abouzakhar, 2015; Al-Zaman, 2020b).

### 2.2. Rumors and Their Typologies

Rumors can be both an initiator and an outcome of information pollution. Meel and Vishwakarma (2020) present a taxonomy in their study in which they mention about ten categories of *false* information: rumors, fake news, misinformation, disinformation, clickbait, hoaxes, satire/parody, opinion spam, propaganda, and conspiracy theories. However, they also state that a rumor is only unverified information that may not be false in some cases. In contrast, Seo, Mohapatra, and Abdelzaher (2012) think a rumor means *false* information, and true information is a *non-rumor*. In general, a rumor is "a proposition of belief, is officially unverified when issued, and should deal with either current events or topical issues to express the emotional needs of the community and/or to help people make sense in the context of ambiguity, danger or potential threat" (Kim, Bock, Sabherwal, & Kim, 2019, p. 593). Such commonly arises not only in ambiguous and threatening situations but also when information is scarce and people feel a psychological need for understanding or security (DiFonzo & Bordia, 2007b; Watson & Hill, 2006). When uncertainty and ambiguity are reduced to a certain degree and reliable information is provided, rumors disappear. Thanks to their prominence, rumors are often more difficult to disprove than to prove (Dowd & Davidhizar, 1997). A rumor's strength varies with a story's thematic importance and topical ambiguity (Allport & Postman, 1946). Shibutani (1966) adds that some mental/emotional arousal is required for rumors' production, circulation, and success. This is why a rumor is called an *infection of the mind* (Nekovee, Moreno, Bianconi, & Marsili, 2007).

Several studies present typologies of rumors from different perspectives. For example, Chua, Aricat, and Goh (2017) classify rumors based on three criteria: the level of its direness, its relationship with unquestionable truths, and its passionate request. They analyze the life-cycle of rumors and find that rumor messaging is mainly of four types: information-related, emotion-related, deliberation, and call-to-action (p. 263). Rumors can also take the form of a hoax, joke, little story, or information leak (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Rosnow, 1991). It can be *breaking news* as well as a form that lacks sufficient proof or supporting evidence (Turenne, 2018). Kapferer (2013) proposes a typology that includes six types of rumors, based on five cross-sectional

factors. For him, two basic categories of rumors are spontaneous and provoked. According to Dowd and Davidhizar (1997), a rumor has four types: wish, fear or bogey, wedge-driving or aggressive, and anticipatory. However, Chua et al. (2017) exclude the *anticipatory* rumor from their modified typology. Wish rumors look for prospects. They can attract the attention of the audience with their irrational and fanciful representation of future benefits and hopes (Chua et al., 2017). Dread rumors usually stir up fear (Rosnow, 1991; Rosnow, Esposito, & Gibney, 1988). Such rumors are relatively higher in number, have longer life spans, and have higher persuasive value compared to wish rumors (Walker & Blaine, 1991). Wedge-driving rumors tend to polarize societies, fueled by stereotypes and hatred (Bhavnani et al., 2009; Sunstein, 2014).

Derczynski et al. (2015) provide a more comprehensive typology of rumors. According to their study, a rumor has four categories: speculation, controversy, misinformation, and disinformation. Speculation is simply the consumption of an asset with the hope that it will become more valuable shortly. For example, despite knowing the risk, someone buys stock market shares. Controversy is a state of public dispute and a matter of conflicting opinions (Derczynski et al., 2015). Misinformation is typically unintentional and inaccurate information mainly arises from knowledge gaps. It includes false datasets, insults, and pranks. Disinformation is also known as false information, but unlike misinformation, it is produced and disseminated deliberately to deceive people (Al-Zaman, 2019). Often, the four terms: rumor, misinformation, disinformation, and fake news, are used interchangeably as they share some common areas (e.g., Duffy, Tandoc, & Ling, 2019; Tandoc, Lim, & Ling, 2020; Wardle & Derakhshan, 2017). For example, as some research defines fake news as *disinformation* (Tandoc et al., 2020), some other studies address it as *misinformation* (as cited in Tandoc, Lim, & Ling, 2018). This means fake news can be both intentional or unintentional false news/information. Also, fake news and rumors are considered two closely-related components in the information ecology (Duffy et al., 2019). In this study, we prefer to use the term *rumor* to avoid conceptual discrepancies.

Apart from the discussed typologies, little research has been conducted so far to understand the theme- or topic-based categorization of rumors. Based on the critical-historical lens of media ecology analysis, Higdon (2020) explores four themes of rumors: nationalism, hate, celebrity gossip, and fear. Bordia, Jones, Gallois, Callan, and DiFonzo (2006) present six themes by analyzing change-related healthcare rumors. They include changes to job and working conditions, the nature of organizational change, poor change management, consequences of the change for organizational performance, gossip-rumors,

and *un*-coded statements. In another study, Wu and Liu (2018) identify four types of rumors in social media: business, science and technology, entertainment, and medical. This study limits its extent within a more technical genre, i.e., computer science, and it also does not explain the categories.

RQ1: What are the most popular themes of social media rumors?

### 2.3. Sources of Rumors

Apart from typology, sources are equally important in the study of rumors. Source identification is common in media and Internet research, such as finding the source of a virus (Shah & Zaman, 2010), sources in social and communication networks (Comin & da Fontoura Costa, 2011), sources in mixed networks (Jiang, Wen, Yu, Xiang, & Zhou, 2017), and sources of misinformation in social networks (Nguyen, Nguyen, & Thai, 2012). However, source identification of social media rumors gets less attention from scholars to date. Kapferer (1992) in his micro-level analysis discusses eight primary sources of rumors from where they were born. These include experts' opinions, confidential information, troubling facts, testimony, fantasies, urban legends, misunderstandings, and manipulation. On the other hand, Jo (2002) categorizes the sources of Internet rumors into two main types: the Internet itself and traditional mass media. The Internet as a form of media, according to the study, includes different online information sources such as websites and social media, and traditional media includes television, newspapers, and radio. The study also shows that rumors from online sources increase with time, while rumors from traditional media decrease. In a more relevant study, Shin, Jian, Driscoll, and Bar (2018) explore the two main sources of rumors by analyzing their Twitter dataset. As most of the rumors on Twitter are from *non*-traditional media, a few are from traditional media. They define *non*-traditional media as websites, social media, and other Internet sources. Similarly, Muigai (2019) finds two sources of social media rumors: online media and mainstream media. The study further suggests that most of the social media rumors originate from online media.

RQ2: What are the main sources of social media rumors?

### 2.4. Aims of Rumors

Several studies analyze the aims of rumors. Although the words "aim" or "intention" may sound problematic, a few empirical and experimental studies use these terms to describe the tendencies and claims of rumors. For example, Kamins, Folkes, and Perner (1997), surveying consumers to understand

marketplace rumors, find two types of aims: positive and negative. In the survey, the consumers reported that they are exposed to and transmit more negative rumors than positive rumors. The survey findings were tested in two further experiments to validate the results. Knapp (1944), on the other hand, also finds positive and negative aims of rumors. According to him, a positive rumor usually predicts wishful or positive outcomes, while a negative rumor describes undesirable or harmful outcomes. Bordia, Jones, Gallois, Callan, and DiFonzo (2006) also find similar aims in their study on health-related rumors. They show that negative rumors ( $n=479$ ; 93.92%) are more prevalent than positive rumors ( $n=31$ ; 6.08%) in their sample. Another study shows almost similar results, i.e., negative rumors (91%) are more commonplace in social media than positive rumors (9%) (Avaaz, 2019). Rosnow, Yost, and Esposito (1986) also classify rumors as positive and negative but based on their consequences. Some more studies show almost similar findings that are based on empirical data and experiments (for more, see Ji, Yan, & Yu, 2020).

**RQ3:** What are the most dominant aims of social media rumors?

### 3. METHODS

In this study, we analyze rumors that are prevalent in social media in Bangladesh. Social media, according to Aichner and Jacob (2015, p. 259), is of 13 types: blogs, business networks, collaborative projects, enterprise social networks, forums, microblogs, photo sharing, products renewal, social bookmarking, social gaming, social networks, video sharing, and virtual worlds. The cases of social media rumors were collected from BDFactcheck.com (<http://bdfactcheck.com>), a Bangla fact-checking website. It is an Illinois-based non-profit organization run by a few Bangladeshi journalists and researchers. Information pollution in Bangladesh is a burgeoning issue that helps a few fact-checking websites to flourish, including Jachai.org, BDFactcheck.com, and Boombd.com. However, BDFactcheck.com is the country's most prominent, reliable, and internationally recognized fact-check that was recently awarded by the United Nations Development Programme (UNDP) (UNB, 2020). The website has been debunking Bangladesh's rumors from January 2017 onward. To check a piece of information, the fact-checkers follow a five-step procedure that makes the outputs more reliable and inclusive. First, they check only the information that has a wide impact on society. They measure impacts based on a rumor's popularity

among the masses (sharing, acceptance, and reaction) and effectiveness and influence (policymaking and mass mobilization). Second, their research on debunking a rumor is completely evidence-based. They rely on mainly primary sources of information and opinions from specialists. Third, they follow five strictly maintained rules for writing fact-check articles published on their website: (a) no personal attacks; (b) no personal opinions; (c) avoiding gender-sensitive language; (d) ideological and political neutrality; and (e) maintaining the Fact-checkers' Code of Principles endorsed by the International Fact-Checking Network (IFCN). Fourth, every article must be certified by the editorial board, and they follow the "close observation" editing technique. Fifth, one can complain about any published article through an automated system. If any information published by the website is found incorrect based on strong evidence, they amend it as soon as possible.

The website has several sections, such as Fact-check, Media literacy, Fact-check Request, and About us. In the Fact-check section, a whole subsection titled "Social Media" is devoted to debunking social media rumors. Every article in this section debunks a single rumor, including a few specific items of information: the statement/claim of the rumor accompanied by a detailed background; the sources of the rumor along with links, screenshots, or contents (if any); a description of why it is a rumor; the sources of evidence; and a final decision based on the analysis with a four-point scale (false, half-true, true, ambiguous). This website was used as the data source due to three reasons: (a) The discussed comprehensiveness and reliability of the website makes it a good source for research data; (b) Social media platforms often remove flagged and/or distorted information and rumors (often based on governmental requests; see Shawki, 2020) if it violates the platforms' policies; therefore, many rumors cannot be found through searching the platforms (see Mosseri, 2017); and (c) A few previous rumor-related studies depended on fact-checking websites for research data as these are some good sources of structured data that require less effort to clean and prepare for the final analysis (e.g., Avaaz, 2019; Brennen, Simon, Howard, & Nielsen, 2020).

After studying each article, two researchers of this study collected and coded the rumor data. They collected  $N=181$  rumors' data from January 2017 to April 2020 as the sample. It is the total number of debunked social media rumors by the website as well. We found rumors from three social media platforms: Facebook, YouTube, and Twitter. The data show that social media rumors were the highest (40.3%) in 2018 and the lowest (33.1%) in 2020 (see Table 1). However, these percentages are unable to show the exact distributions and fluctuations of rumors throughout the time span. In this regard, we prepared



Table 1. Basic information of the data

Serial	Years	Total time	Frequency	Percent
1	Jan-Dec 2017	12 months	23	12.7
2	Jan-Dec 2018	12 months	73	40.3
3	Jan-Dec 2019	12 months	25	13.8
4	Jan-Apr 2020	4 months	60	33.1
Total		40 months	181	100.0

The total time span of the data is 3.4 years. It is broken down into months to make the data more comprehensible as well as consistent with its interpretation/discussion.

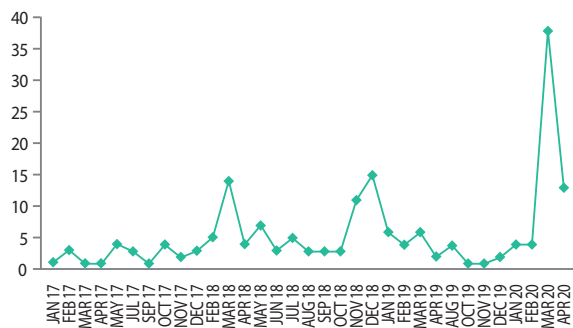


Fig. 1. Timeline of rumors.

Fig. 1 to show the monthly distributions of rumors and their fluctuations. We observed three major sparks in the line in March 2018, December 2018, and March 2020. Notice that the first two surges are almost equal in value, whereas rumor incidents reached to their peak in the third surge. Several reasons made the first surge possible, including the Quota Reform Movement from February to April 2018 (for more, see “Protests,” 2018). Also, the month experienced 11 major nation-wide hazards along with 65 fire incidents; these made it the deadliest month of the year as well (Nirapad, 2019). In December 2018, the rumor incidents surged before the 11th Parliamentary Election of the country. Many political activists from the two major political parties of the country, Awami League (AL) and Bangladesh Nationalist Party (BNP), were active in producing and disseminating rumors in social media. As a result, the government had to set up a monitoring cell for rumor detection (“8 held in Dhaka,” 2018; “Gov’t to set up,” 2018, p. 8). Two more studies are important that show rumors surge during the election periods (see Faris et al., 2017; Posetti & Matthews, 2018). Social media rumors surged again in March 2020 thanks to the pervasiveness of the COVID-19 pandemic in Bangladesh (Jahangir, 2020). These instances suggest that surges in rumors could have a positive correlation with crisis periods, important national or international issues, and most importantly, issues of public interest.

In this study, some codes were newly-generated and some were taken from the previous study to complete the codebook (a similar method is used in Al-Rawi, 2020). Although a few previous studies provide typologies and theme-based categorizations of rumors, after studying the present data carefully, we found that their categories are inadequate for this study because of one or more of the following reasons: Their typologies are field-specific, such as health; their typologies are unrelated to social media; or their data are different in terms of topics and sources. Therefore, the coders conducted an inductive coding (for a similar technique used in content analysis, see Brennen et al., 2020) and obtained the seven following categories for RQ1: political, religiopolitical, religious, health & education, crime & human rights, entertainment, and other. Note that religious and religiopolitical categories are separate from each other. Religious rumors are more associated with spirituality, divinity, rituals, and practices, whereas religiopolitical rumors are more associated with policy, communalism, and mobilization. For example, the “Chinese President went to a mosque to relieve from Corona” is a religious rumor, and “Gulshan attackers were inspired by Zakir Naik” is a religiopolitical rumor.

On the other hand, unlike religiopolitical rumors, political rumors deal with institutional politics, political issues, and political figures. For example, “Beijing will spend USD 1 billion to banish Hasina” is a political rumor. However, they sometimes overlap, making it difficult to differentiate. For instance, “Tareq met the ISI in London” could be both a political and religiopolitical rumor. The coders resolved such issues both by studying the rumors’ context and based on mutual consents. For RQ2 and RQ3, we borrowed our codes from previous studies. For RQ2, we borrowed two categories: online media and mainstream media (Jo, 2002; Muigai, 2019; Shin et al., 2018). Note that rumors prevalent in social media can have diverse sources, and we categorized all sources into these two types. For RQ3, we borrowed two aims of rumors: positive and negative, from the previous studies such as Knapp (1944), Kamins et al. (1997), Bordia et al. (2006), and Ji et al. (2020). However, we added “unknown” as a third category because the tentative aims of some rumors were difficult to determine. It is worth mentioning that unlike a few previous experimental studies, aim detection for this study was more subjective, depending on the coders’ intuitions and understanding of the rumors’ claims. Also, Knapp’s (1944) definitions (i.e., a positive rumor usually predicts wishful or positive outcomes while a negative rumor describes undesirable or harmful outcomes) guided the coding process. The coders at first examined 49.72% (n=90) of the sample. Krippendorff’s alpha ( $\alpha$ ) value was found to be 0.87, which means the agreement was substantial (Krippendorff, 2013).

## 4. RESULTS

### 4.1. Categories of Social Media Rumors

The analysis of rumors produces seven theme-based categories (see Table 2). Political ( $n=62$ ; 34.3%) is the most prominent category, followed by health & education ( $n=29$ ; 16.0%), crime & human rights ( $n=20$ ; 11.0%), and religious ( $n=20$ ; 11.0%) categories. Political rumors are mainly related to elections, political parties, national and international political issues, important political events, development initiatives, and political figures. Health & education rumors are mainly related to the healthcare system, accidents and deaths, diseases, primary and higher education, and academic corruption and dishonesty. Homicides, rapes, abductions, ethnic cleansing, and violence are the important focuses of crime-related rumors. Religious rumors include mainly religious conversations, religion's significance, religious laws and regulations, and

historical religious incidents. It should be noted that religious and religiopolitical rumors together comprise 20.99% ( $n=38$ ) of the total share, which could be the second-highest after political rumors. This suggests that religion is a convenient topic for rumor propagation in Bangladesh.

Of seven categories, political rumors seem more dominant than others throughout the timeline. In 2017, political rumors was the highest, which was 43.5% of the total rumors (see Table 3). In 2018 and 2019, its share was 56.2% and 32.0%, respectively. Political rumors within its category reached its peak (66.1%) in 2018. The surge of political rumors in that year was due to the 11th Parliamentary Elections. However, the share of political rumors dropped to only 5.0% in 2020; the percentage decreases every consecutive year. More interestingly, health-related rumors surged from 0% in 2019 to 41.7% in 2020, and most of the rumors are related to the COVID-19 pandemic, such as "Hot weather prevents the spread of coronavirus" and "Vaccine is made for coronavirus." In the same year, health & education, religion, and crime & human rights rumors reached their highest numbers within their categories, which are 86.2%, 40.0%, and 55.0%, respectively. On the other hand, religiopolitical, entertainment, and other rumors reached their peaks in 2018 with 50.0%, 47.4%, and 30.8%, respectively. Religious rumors are increasing in every consecutive year, from 5.0% in 2017 to 40.0% in 2020, while others fluctuate.

Table 2. Categories of rumors

Rank	Categories	Frequency	Percent
1	Political	62	34.3
2	Health & Education	29	16.0
3	Crime & Human Rights	20	11.0
4	Religious	20	11.0
5	Other	19	10.5
6	Religiopolitical	18	9.9
7	Entertainment	13	7.2
Total		181	100.0

### 4.2. Sources of Social Media Rumors

Social media rumors have two main sources: mainstream media and online media (see Table 4). The mainstream sources,

Table 3. Different categories of rumors in 2017-2020

		Category							
		Crime & Human Rights	Entertainment	Health & Education	Other	Political	Religiopolitical	Religious	
Years	2017	Count	2	3	2	2	10	3	1
		% within years	8.7%	13.0%	8.7%	8.7%	43.5%	13.0%	4.3%
		% within category	10.0%	23.1%	6.9%	10.5%	16.1%	16.7%	5.0%
	2018	Count	4	4	2	9	41	9	4
		% within years	5.5%	5.5%	2.7%	12.3%	56.2%	12.3%	5.5%
		% within category	20.0%	30.8%	6.9%	47.4%	66.1%	50.0%	20.0%
	2019	Count	3	3	0	2	8	2	7
		% within years	12.0%	12.0%	0.0%	8.0%	32.0%	8.0%	28.0%
		% within category	15.0%	23.1%	0.0%	10.5%	12.9%	11.1%	35.0%
	2020	Count	11	3	25	6	3	4	8
		% within years	18.3%	5.0%	41.7%	10.0%	5.0%	6.7%	13.3%
		% within category	55.0%	23.1%	86.2%	31.6%	4.8%	22.2%	40.0%

including television channels, newspapers, and radio channels, are mostly national media outlets. On the other hand, online sources include online versions of mainstream television channels and newspapers, online news portals, blogs and websites, and social media. Most of the social media rumors we

found in our sample emerge from online media ( $n=148$ ; 81.8%) and a smaller amount from mainstream media ( $n=33$ ; 18.2%). In 2017, online media was responsible for 65.2% of social media rumors, whereas mainstream media was responsible for 34.8% of rumors (see Table 5). The gap widens in 2020 with 93.3% online media-based rumors and only 6.7% mainstream media-based rumors. However, this gap was not widening constantly, rather it fluctuated. In 2018, for example, rumors from online and mainstream media were 80.8% and 19.2%, respectively. In 2019, online rumors decreased to 72.0% and mainstream media increased to 28.0%. The percentages changed again and moved in the opposite direction in the next year. Also, the percentages of online rumors ebbed and flowed in every consecutive year, which are 10.1%, 39.9%, 12.2%, and 37.8% in 2017, 2018, 2019, and 2020, respectively. Although the numbers fluctuate, the last two years show an upward tendency. Conversely, the percentages of mainstream media rumors decrease with a slight fluctuation: 24.2%, 42.4%, 21.2%, and 12.1% in 2017, 2018, 2019, and 2020, respectively. Unlike online media, the last three years of mainstream media show a downward tendency. Both mainstream (27.3%) and online media sources (35.8%) produce political rumors in the highest numbers (see Table 6). From mainstream and online media, the least produced rumors are crime & human rights (3.0%) and entertainment (4.7%) rumors. The sources of entertainment rumors seem balanced with 46.2% of mainstream media and 53.8% of online media, whereas mainstream (5.0%) and online (95.0%) media have a huge gap in terms of crime & human rights rumors. Most interestingly, of online media most of the rumors ( $n=94$ ; 63.51% of online sources and 51.94% of all sources) are produced in three social media platforms: Facebook ( $n=83$ ), YouTube ( $n=7$ ), and Twitter ( $n=4$ ).

Table 4. Sources of rumors

Rank	Source	Frequency	Percent
1	Online media	148	81.8
2	Mainstream media	33	18.2
Total		181	100.0

Table 5. Sources of rumors in 2017-2020

		Source type		
		Mainstream media	Online media	
Years	2017	Count	8	15
		% within years	34.8%	65.2%
		% within source type	24.2%	10.1%
	2018	Count	14	59
		% within years	19.2%	80.8%
		% within source type	42.4%	39.9%
	2019	Count	7	18
		% within years	28.0%	72.0%
		% within source type	21.2%	12.2%
	2020	Count	4	56
		% within years	6.7%	93.3%
		% within source type	12.1%	37.8%

Table 6. Sources of different categories of rumors

		Category							
		Crime & Human Rights	Entertainment	Health & Education	Other	Political	Religiopolitical	Religious	
Source type	Mainstream media	Count	1	6	5	4	9	4	4
		% within source type	3.0%	18.2%	15.2%	12.1%	27.3%	12.1%	12.1%
		% within category	5.0%	46.2%	17.2%	21.1%	14.5%	22.2%	20.0%
	Online media	Count	19	7	24	15	53	14	16
		% within source type	12.8%	4.7%	16.2%	10.1%	35.8%	9.5%	10.8%
		% within category	95.0%	53.8%	82.8%	78.9%	85.5%	77.8%	80.0%



### 4.3. Aims of Social Media Rumors

The dataset contains  $n=132$  negative rumors, which is 72.9% of the total cases (see Table 7). In contrast, positive rumors are only  $n=41$ , which is 22.7% of the total. The leftover  $n=8$  (4.4%) rumors show seemingly no inclination; thus they are included in the unknown category. Among the rumor categories, health & education-related rumors (86.2%) are mostly negative over other counterparts: political 75.8%, religious 75.0%, religiopolitical 72.2%, crime & human rights 70.0%, other 57.9%, and entertainment 53.8% (see Table 8). Also, of negative rumors, political rumors are on the top of the list. Although a large share of political rumors (35.6%) are negative, the aims of the most political rumors (37.5%) cannot be identified. Negative aims are found less in entertainment rumors (5.3%) compared to others, but most of the entertainment rumors are negative (53.8%) rather than positive (38.5%). Positive aims are found more in political rumors (29.3%) and less in health & education rumors (9.8%) and religiopolitical rumors (9.8%). Also, online media is a more influential source for negative rumors (86.4%) over mainstream media (13.6%), where online rumors are almost sevenfold of mainstream rumors (see Table 9). This huge gap suggests online media produces a higher

number of perilous rumors in contrast to mainstream sources. Online media produces more negative rumors (77.0%) than positive rumors (18.9%). In this case, mainstream media is comparatively better than online media as it produces 54.5% of negative rumors and 39.4% of positive rumors. Like the negative rumors, the gap between online media (68.3%) and mainstream media (31.7%) for positive rumors is relatively lower, i.e., online rumors are more than twice in number of mainstream rumors. Rumors with unknown aims have both online (75.0%) and mainstream sources (25.0%). Interestingly, the gap (that is 58.1) between negative (77.0%) and positive (18.9%) rumors from online media is more than the gap (that is 15.1) between negative (54.5%) and positive (39.4%) rumors from mainstream media. It further shows how intensively online media produces negative rumors as opposed to mainstream media.

Table 7. Aims of rumors

Rank	Aim	Frequency	Percent
1	Negative	132	72.9
2	Positive	41	22.7
3	Unknown	8	4.4
Total		181	100.0

Table 9. Aims of rumors from different sources

		Source type		
		Mainstream media	Online media	
Aim	Negative	Count	18	114
		% within aim	13.6%	86.4%
		% within source type	54.5%	77.0%
	Positive	Count	13	28
		% within aim	31.7%	68.3%
		% within source type	39.4%	18.9%
	Unknown	Count	2	6
		% within aim	25.0%	75.0%
		% within source type	6.1%	4.1%

Table 8. Aims of the different categories of rumors

		Category							
		Crime & Human Rights	Entertainment	Health & Education	Other	Political	Religiopolitical	Religious	
Aim	Negative	Count	14	7	25	11	47	13	15
		% within aim	10.6%	5.3%	18.9%	8.3%	35.6%	9.8%	11.4%
		% within category	70.0%	53.8%	86.2%	57.9%	75.8%	72.2%	75.0%
	Positive	Count	5	5	4	6	12	4	5
		% within aim	12.2%	12.2%	9.8%	14.6%	29.3%	9.8%	12.2%
		% within category	25.0%	38.5%	13.8%	31.6%	19.4%	22.2%	25.0%
	Unknown	Count	1	1	0	2	3	1	0
		% within aim	12.5%	12.5%	0.0%	25.0%	37.5%	12.5%	0.0%
		% within category	5.0%	7.7%	0.0%	10.5%	4.8%	5.6%	0.0%

## 5. DISCUSSION AND CONCLUSION

### 5.1. Main Objectives

The primary aim of this study was to analyze social media rumors. Three specific focuses were to identify the theme-based categories, tentative aims, and prime sources of social media rumors. First,  $N=181$  social media rumors' data between 2017 to 2020 in Bangladesh, a rumor-prone South Asian country, were collected. Second, the collected data were analyzed following the content analysis method. The results show that the seven theme-based categories of social media rumors are political, health & education, crime & human rights, religious, religiopolitical, entertainment, and other; the two main sources of social media rumors are mainstream media and online media; the three tentative aims of social media rumors are positive, negative, and unknown.

### 5.2. Key Findings

The study has a few key findings. *First*, of seven theme-based categories, political rumors are the highest-produced social media rumors, while entertainment rumors are the lowest-produced rumors. Production of political rumors in social media is influenced by a few factors, such as election and political events. It is more likely to surge before and during an election period. Studies such as Faris et al. (2017), Posetti and Matthews (2018), Silverman (2016), Parkinson (2016), and Serban et al. (2017) also suggest the production and distribution of social media rumors ahead of and during an election. In the absence of significant political events, political rumors follow a moderate trend. Interestingly, the percentages of political rumors in social media were found to be decreasing every consecutive year. This could be a consequence of the country's increasing political stability through a hybrid political system (Riaz, 2019). *Second*, health-related crises stir up mass anxiety that further expedite the production and distribution of health-related rumors in social media. This may support the thesis of Allport and Postman (1946), Difonzo and Bordia (2007a), and Watson and Hill (2006), i.e., rumors are produced amid ambiguity, uncertainty, scarcity of information, and psychological insecurity. With the prevalence of the coronavirus, recent rumors are mostly pandemic-related that either tend to satisfy the emotional needs of the community or make sense of health-related issues, according to Kim et al. (2019). However, in many countries like Bangladesh, health and education rumors may not be so commonplace. *Third*, religion-related rumors are increasing in social media. In Bangladesh, rumors related to Islam, the dominant religion in the country, are increasing. Religious rumors are not so harmful like religiopolitical rumors,

but they may work as an ideology- and identity-shaper.

*Fourth*, of the two sources of social media rumors, online media produces more rumors than mainstream media does. More specifically, online media is the prime source of social media rumors, which supports the findings of Jo (2002), Muigai (2019), and Shin et al. (2018). Moreover, social media itself contributes to rumor production to a large extent. Several studies also deal with social media's rumor production and circulation capacity (Goh et al., 2017; Hashimoto et al., 2011; Kwon et al., 2013a, 2013b; Oh et al., 2010). However, these studies either do not specify social media's contribution in rumor production, or do not present a comparative analysis of mainstream and online sources of rumors, or do not position social media rumors in the broader context of online media. *Fifth*, online media produces a lower amount of entertainment rumors, while mainstream media produce a lower amount of crime rumors. However, both sources have two similarities. One, online and mainstream media tend to produce a higher number of political rumors than other types of rumors. Two, the percentages of online and mainstream rumors fluctuate over the years, making it difficult to predict their future trend.

*Sixth*, most of the social media rumors have negative aims that outnumber positive aims. This finding is consistent with the finding of Avaaz (2019) and Bordia et al. (2006). However, the second study is health-related and does not take social media into account. It may be inferred, therefore, that the proportions of aims remain almost constant irrespective of media or context. Both positive and negative aims are higher in political rumors than other types of rumors. However, negative aims are more evident in political rumors than positive aims, which might be alarming for the political environment. Similarly, health-related rumors are negative in most cases. As mentioned earlier, the COVID-19 pandemic has a serious contribution in the burgeoning health-related negative rumors that emerge from information scarcity, situational uncertainty, and mass anxiety, mentioned in detail in the studies of Allport and Postman (1946), Difonzo and Bordia (2007a), and Watson and Hill (2006). Meanwhile, a single COVID-19-related rumor claimed at least 800 lives worldwide from January to March 2020 (Coleman, 2020).

### 5.3. Limitations and Implications

This study has a few strengths and limitations. First, the time durations for data collection were not equal for all the years (see Table 1). The only reason is that this study was conducted in mid-2020, which makes it virtually impossible to take the whole year into account. Second, crosstabulations may not effectively describe the interrelationships between the variables, but it helps to predict

the trend to some extent. We suppose that correlation coefficient analyses among the variables would provide some better insights. Third, findings from many relevant studies were not possible to incorporate into this research because of time and resource constraints. Fourth, the data for this study was collected from a fact-checking website that is seemingly a reliable source for rumor data. However, two issues are important to note: Fact-checkers often fail to address all the rumors due to their limited resources and accesses (Brennen et al., 2020), and data from a single source may not present a holistic scenario. Therefore, for a more efficient future study, more extensive data from various sources would be required. Fifth, ample researches have been done so far that deal with rumor typologies but not from the perspective of the popular themes of social rumors. Also, source and aim analyses are scant in previous literature. In this regard, this study produces some novel findings and opens a new threshold for further researches in this area, offering a methodological and conceptual framework for online rumor analysis. The results may help to understand what types of rumor topics are more popular among netizens, produced from which sources with what aims, and to what extent they vary in different situations. More importantly, surging religion-related rumors suggest taking necessary precautions to restrict digital communalism (Al-Zaman, 2019). Similarly, proper information flow is essential during a crisis period (e.g., a pandemic) to restrain negative health-related rumors. The results may also guide relevant micro- and macro-level policymaking and strategic decisions in the context of Bangladesh. We also think, however, that a few research endeavors are still required to bridge some existing knowledge gaps. The South Asian region, as mentioned in the introduction, has become a hotspot of social media rumors, having detrimental impacts on society. Therefore, we would like to invite more research that would deal with who produces rumors, how they are produced, what are the popular distribution channels, who are the most desired target audiences, how people engage with rumors, what are their most frequent outcomes, and what measures should be taken to prevent this problem.

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