The Severity of Environmental Pollution in the Developing Countries and Its Remedial Measures

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Abstract: Environmental pollution has a great impact on human health, ecosystems, and financial development. This paper depicts the recent studies on the severity of environmental pollution in developing countries. Its remedial measures were based on a questionnaire survey in the polluted sites, which collected data and information on the types, causes, effects, sources, and duration of environmental pollution, obtained from available publications and newspaper information reported in recent years. A total of 400 respondents from 10 zones of Dhaka City Corporation, Bangladesh, were interviewed as a case study via a semi-structured questionnaire survey. The results revealed that only 39.0% of respondents had explicit knowledge about environmental pollution. Air pollution was identified by 73.8%, noise pollution by 63.0%, water pollution by 55.2%, and soil pollution by only 6.5% of respondents in their surroundings. Automobiles, domestic activities, municipal garbage, and vehicle horns are significant sources of environmental pollutions. Around 49.0% of the respondents did not understand the effectiveness of currently conducted environmental programs. A discussion regarding the urgency of forming a local level environmental committee, the mass media’s active role, and monitoring the development activities was presented.

Keywords: urban environmental management; environmental information; statistical analysis; environmental policy; environmental awareness

1. Introduction

Environmental pollution is a burning issue for most developing nations in the world [1]. Bangladesh, India, and Pakistan, which are developing countries, have the highest exposures to fine particulate matter in the air among the 10 most populous countries globally [2]. The environmental degradation, such as air, water, land, and noise pollution, is a danger to human health, ecosystems, and financial development [3]. Rapid industrialization in developing countries has led to the emission of a range of toxic effluents directly into the soil, air, and water [4]. Pollution badly affects the GDP growth of developing countries such as Argentina, Bangladesh, Bolivia, Brazil, China, Colombia, India, Laos, Morocco, Nepal, Pakistan, Peru, and Zambia, at national and local levels [5]. These nations suffer from severe contamination annually, causing ill health, death, and disabilities in millions of people, as their economies largely depend on natural resources [6]. More than half of the global premature deaths occur due to high air pollution in South Asian countries, especially in India, China, Bangladesh, Nepal, etc. [7]. Being situated in a developing country, Dhaka, the capital and primate city of Bangladesh, is one of the most contaminated cities in this nation and the third most contaminated city in the world [8,9]. Rapid urbanization and uncontrolled population growth create mismanagement of urban services and general environmental quality deterioration [10]. More than 7 million people live in Dhaka, with a density of 49,182 people per sq. km. in a total area of 143 sq. km. [11]. The rapid growth of urbanization and the enormous demands on urban utility services, waste disposal, transports, social services, etc., generates tremendous pressure on the geo-environment [12–16]. The unplanned construction of the road, railways, flyover, and
buildings causes air pollution by mixing road dust and soil dust in the atmosphere [17]. Highly polluted air reduces the city’s economic growth and poses severe health issues [18]. An index was prepared by the United States Environmental Protection Agency, which ranked Dhaka as the fourth most polluted city with one of the lowest quality air globally and an index value of 195 [19]. According to the 2019 World Air Quality Report, Dhaka has the second-highest average annual PM$_{2.5}$ concentrations (µg/m$^3$) in the air [20]. The city’s rivers are getting polluted due to industrial and domestic activities, sewerage, medical waste, municipal waste, discharge of toxic chemicals, etc. [21]. The soil pollution issue is not recognized correctly and ignored in various policy documents. Moreover, noise pollution is adversely affecting the urban environment and is causing a severe health hazard for the city dwellers [22].

Peoples do not have adequate knowledge about the causes and consequences of environmental problems. However, some educational institutions have been undertaken to enhance the environmental management system of Bangladesh [23]. People’s environmental perception and their actions against environmental pollution, and the possible health risks associated with pollutants, are rarely given attention in the country [24]. It is essential to know people’s perception on the environmental pollution to understand the actions they take with regards to the environment [25]. Additionally, we need to understand the environmental psychology to create effective environmental policies. Moreover, local people can highlight their daily experiences on the severity of environmental pollution [26]. People’s knowledge and past experiences about environmental issues significantly influence their perceptions, attitudes, and awareness-building [27]. In that case, local knowledge can be useful in creating pressure on environmental planners to find new ways to improve environmental conditions to help policymakers in decision-making via coordinating with professional practitioners and scientists [26]. Practical and encouraging public responses to environmental pollution issues can reduce environmental problems [28]. Therefore, in light of the above discussion, Dhaka City, Bangladesh, was selected as the study area in a developing country to represent residents’ observations and views on the types, causes, effects, sources, and timing of environmental pollution and provide recommendations for pollution reduction. This research is highly significant for policy-making and application to the environment. Many researchers have already investigated the physical and chemical properties of the contaminated air, water, and soil for measuring the level of environmental pollution. The researchers also identified the various types, causes, effects, and duration of environmental pollution. To date, very few or no studies reported the residents’ knowledge, observation, and opinion about the overall environmental pollution. In this research, the primary information about environmental pollution was collected through a semi-structured questionnaire survey in the study area. A total of 400 respondents were selected by a simple random sampling technique, considering gender, age group, religion, marital status, education level, occupation, economic class, and living duration. Demographic characteristics, causes of environmental pollution, and the effect of pollution sources, such as sources of water pollution, air pollution, soil pollution, and noise pollution, are presented, and possible remedial measures are discussed.

2. Materials and Methods

2.1. The Study Area

Dhaka is one of the oldest and most prominent cities in the South Asian region [29], and is Bangladesh’s capital city, covering an area of 1528 km$^2$ [12,30]. It is located in the central part of Bangladesh and lies in the lower parts of the Ganges Delta, between the latitudes 23°35’ N–23°54’ N and the longitudes 90°19’ E–90°30’ E (Figure 1). The city’s expansion is bounded by the Buriganga River in the south, the Turag River in the west, and the Balu River in the east [13,31]. The city’s land area is mostly flat with slight undulations, and is close to the mean sea level [12,32].

The study area enjoys distinct primacy for its large population in the national urban hierarchy. This city contains 37% of the total national urban population, which is higher than
the combined total of the next three largest cities of Chittagong, Khulna, and Rajshahi [33]. The urban population is growing massively at an estimated 4.2% annually through rural–urban migration [34], as the city is an attractive place for employment opportunities to millions of rural poor people in Bangladesh [32,33,35]. Every year, millions of poor people (who are too unskilled to get a job in the formal urban sector) migrate from rural areas to Dhaka City to find a job [36]. This city’s economy is mainly based on the informal sector [37], which provides jobs for many people, and contributes to 36% of the national GDP and creates 31.8% of the country’s total employment [38]. Moreover, Bangladesh earns the highest foreign exchange from the Ready-Made Garments (RMGs) sector, as 80% of the RMGs factories are located in this city, providing jobs for thousands of especially women workers who migrate from different parts of this country [33,38,39]. The rapid growth of RMGs with other pull factors is the main reason for the city’s population increase. The city plays an important role in the country in terms of its share of the total population and the concentration of civil administration, economy, trade, and commerce. It is well connected with railways, roads, and waterways to all topmost towns and cities, as it is centrally located in the country [40]. Thus, people can come quickly to this city for better healthcare services, educational facilities, and better employment opportunities that caused the town to become overcrowded [32,33]. The study area is now suffering severe environmental difficulties due to rapid population growth, unplanned urbanization, improper solid waste management, and unsatisfactory environmental behavior. Thus, Dhaka City was selected as the study area for understanding the inhabitants’ thoughts and views on what they observe in their surrounding environment. Dhaka City Corporation (DCC) is now divided into two city corporations, the Dhaka North City Corporation (DNCC) and the Dhaka South City Corporation (DSCC), and each city corporation is divided into five zones for administrative convenience (Figure 1).

![Figure 1. Location and extent of the study area (source: modified from [41]). Note: DNCC = Dhaka North City Corporation and DSCC = Dhaka South City Corporation.](image-url)
2.2. Model Used in This Study

The Behavioral Change Model by Hungerford and Volk [42] was used in this study. The model expresses the link between environmental knowledge, attitude or awareness, and responsible environmental action (Figure 2). The environmental perception of human beings inspires the environmentally friendly attitude or understanding that also stimulates human psychology to grow environmental acting. Again, environmental knowledge and behavior depend on the demographic characteristics [43–45]. Thus, the respondents’ status of experience and observation about environmental pollution assumes their environmental behavior and actions in the study area, indicating the severity of environmental pollution in developing countries.

![Figure 2. The Behavioral Change Model of Hungerford and Volk [42].](image)

2.3. Data and Information Collection

In this study, mainly primary data, along with secondary data, were used. For showing the state of people’s observation about environmental pollution, a questionnaire survey was conducted as part of the primary data collection in both city corporations (DNCC and DSCC). Direct field observation was also conducted for the study. The field survey was carried out by a research team comprising 10 surveyors from 2 March to 16 March in 2018. The secondary data were used as supplementary to the primary data. Various published and unpublished documents, such as books, journals, reports, dissertations, theses, national and international newspapers, online newspapers, etc., were used as secondary data sources. ArcGIS software was used to prepare the map for showing the location of the study area.

2.4. Structure of the Questionnaire

A semi-structured questionnaire was prepared for primary data collection to understand peoples’ environmental knowledge level, designed by reviewing the relevant studies [24,46–50]. The study’s finalized questionnaire was on the causes, types, sources, effects and timing of environmental pollution, and environmental program and media effectiveness. The questions were arranged as open-ended and close-ended. The questionnaire’s response to each close-ended question was categorized into options, and respondents were requested to choose the appropriate options. The structure of the questionnaire is exhibited in Table 1.

| No. | Major Sections                      | Questions                                                   |
|-----|-------------------------------------|-------------------------------------------------------------|
| 1   | Demographic profile of the respondents | • Gender  
• Age  
• Religion  
• Marital status  
• Occupation  
• Monthly income in Bangladeshi Taka (BDT)  
• Living duration |
Table 1. Cont.

| No. | Major Sections                                                                 | Questions                                                                                                                                 |
|-----|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 2   | Primary knowledge about significant types, causes, effects, and sources of environmental pollution | • Knowing the level of causes and types of environmental pollution: clearly/moderately/fairly/partially/unknown  
• Identification of the major types of environmental pollution in the study area  
• Identification of the causes of environmental pollution in the study area  
• Identification of the major effects of environmental pollution  
• Identification of the sources of different types of environmental pollution in the study area |
| 3   | Observation of pollution timing and duration                                     | • Daily: daytime/nighttime  
• Weekly: Numbers of days in a week  
• Seasonally: wet season/dry season |
| 4   | Effectiveness of current environmental programs and media preference for environmental information | • Effectiveness of conducted environmental programs: very effective/average/poor/unknown  
• Types of media: Television/newspaper/online/radio/book/others |

2.5. Sampling Technique and Sample Size Determination

For the questionnaire survey, a total of 400 households (one respondent from one family) were randomly selected with a 95% confidence level and ±5 precision level [51] from a total of 1,576,746 households of the Dhaka City Corporation [52]. The following simplified formula, detailed by Yamane in [51], was used:

\[ n = \frac{N}{1 + Ne^2} \]

where \( n \) is the sample size, \( N \) refers to the population size, and \( e \) is the level of precision.

The questionnaire survey was completed by the residents of 10 zones of both city corporations (DNCC and DSCC), taking 40 respondents from each zone using a simple random sampling technique.

2.6. Data Processing and Analysis

Collected data were processed and analyzed separately using the Statistical Package for the Social Sciences (SPSS) software version 20 by IBM corporation, New York, NY, USA and MS Excel. The analyzed data were incorporated into the text, tables, and graphs. To understand the respondents’ opinion towards the causes, types, sources, effects and timing of different environmental pollutions, normal frequency (n) and percentage (%) distribution and multiple response analysis were used. For measuring percentage, the following formula was used:

\[ % = \frac{f}{N} \times 100 \]

where \( % \) is the percentage, \( f \) is the frequency, and \( N \) is the number of cases [53].

3. Results

3.1. Demographic Information of Respondents of the Study Area

For the study purpose, a total of 400 respondents were interviewed; among them, about 66.3% of respondents were male, and around 33.8% of respondents were female. In terms of age, below 18 years old was not taken into account for the study. Approximately 44.8% of total respondents belonged to the age group of 31–40 years, followed by nearly 27.8% of respondents in the age group of 21–30 years and 26% in the age group of above
40 years. The rest of the respondents (1.5%) were in the age group of 18–20. Most of the respondents (74.8%) were married, and Muslim respondents were dominants (91.3%). With regards to educational status, around 46.3% of respondents completed tertiary education, and 37.8% had completed secondary education. Only 12% had completed primary education, while 4% received no education (Table 2).

### Table 2. Demographic information of the respondents of the study area.

| Demographic Characteristics | Frequency (n = 400) | Percentage | Mean | Std. Dev. | Chi-Square ($\chi^2$) | p-Value |
|-----------------------------|--------------------|------------|------|-----------|-----------------------|---------|
| Gender                      |                    |            |      |           |                       |         |
| Male                        | 265                | 66.3       | 1.34 | 0.473     | 42.250                | 0.000   |
| Female                      | 135                | 33.8       |      |           |                       |         |
| Age Group                   |                    |            |      |           |                       |         |
| 18–20 years                 | 6                  | 1.5        |      |           |                       |         |
| 21–30 years                 | 111                | 27.8       | 2.95 | 0.772     | 152.140               | 0.000   |
| 31–40 years                 | 179                | 44.8       |      |           |                       |         |
| >40 years                   | 104                | 26.0       |      |           |                       |         |
| Religion                    |                    |            |      |           |                       |         |
| Hindu                       | 33                 | 8.3        |      |           |                       |         |
| Muslim                      | 365                | 91.3       |      |           |                       |         |
| Christian                   | 2                  | 0.5        |      |           |                       |         |
| Marital Status              |                    |            |      |           |                       |         |
| Unmarried                   | 90                 | 22.5       |      |           |                       |         |
| Married                     | 299                | 74.8       |      |           |                       |         |
| Widow/Widower               | 8                  | 2.0        |      |           |                       |         |
| Divorced                    | 3                  | 0.8        |      |           |                       |         |
| Education Level             |                    |            |      |           |                       |         |
| Illiterate                  | 16                 | 4.0        |      |           |                       |         |
| Primary                     | 48                 | 12.0       |      |           |                       |         |
| Secondary                   | 151                | 37.8       |      |           |                       |         |
| Tertiary                    | 185                | 46.3       |      |           |                       |         |
| Occupation                  |                    |            |      |           |                       |         |
| Unemployed                  | 27                 | 6.8        |      |           |                       |         |
| Business                    | 112                | 28.0       |      |           |                       |         |
| Service                     | 134                | 33.5       |      |           |                       |         |
| Home manager                | 74                 | 18.5       |      |           |                       |         |
| Student                     | 53                 | 13.3       |      |           |                       |         |
| Monthly Income              |                    |            |      |           |                       |         |
| <10,000 BDT                 | 133                | 33.3       |      |           |                       |         |
| 11,000–15,000 BDT           | 26                 | 6.5        |      |           |                       |         |
| 16,000–20,000 BDT           | 45                 | 11.3       |      |           |                       |         |
| 21,000–30,000 BDT           | 110                | 27.5       |      |           |                       |         |
| >30,000 BDT                 | 86                 | 21.5       |      |           |                       |         |
| Living Duration             |                    |            |      |           |                       |         |
| <1 year                     | 6                  | 1.5        |      |           |                       |         |
| 1–3 years                   | 31                 | 7.8        |      |           |                       |         |
| 3–5 years                   | 76                 | 19.0       |      |           |                       |         |
| 5–10 years                  | 104                | 26.0       |      |           |                       |         |
| >10 years                   | 183                | 45.8       |      |           |                       |         |

Regarding the occupation, approximately 34% of respondents were service holders and 28% are businessmen. Around 19% of respondents were female home managers. Only 13.3% were students and 6.8% were unemployed respondents. The income of the respondents was categorized according to their earning information. The highest portion of respondents (approximately 33.3%) had monthly earnings of below 10,000 Bangladeshi Taka (BDT), whereas about 28% of respondents had an income between 21,000–30,000 BDT and about 22% had an income of above 30,000 BDT. The survey result demonstrates that 45.8% of people had lived in the study area for more than 10 years, followed by 26% of respondents from 5 to 10 years and 19% from 3 to 5 years (Table 2).

3.2. Residents’ Opinion about the Causes and Types of Environmental Pollution

In the study area, respondents were asked whether they knew about the types, causes, and effects of environmental pollution. According to their replies, around 39% of respon-
Respondents knew about these clearly, 34.7% moderately, 14.0% fairly, and 11.0% partially. Only 0.8% of people did not understand the causes of environmental pollution (Figure 3).

Figure 3. Knowing the respondents’ level about the types, causes, and effects of environmental pollution in the study area.

Respondents in the study area were also questioned about environmental pollution types that they could identify through daily observation. Their answers revealed that air pollution was recognized by 73.8% of respondents, noise pollution by 63.0%, water pollution by 55.2%, soil pollution by 6.5%, and other pollution by 2.0% of people (Figure 4).

Figure 4. Types of environmental pollution identified by the respondents (multiple responses).

People who know the causes of pollution also mentioned the significant causes of environmental pollution in their surrounding area (Table 3). About 88.3% of people claimed that unplanned urbanization responsible for contamination in the city. Moreover, 85.0% of people reported that improper waste disposal continually contaminates the soil, air, and water of the town, and 87.6% of them remarked that land fill-up by waste caused land pollution, around 88.3% stated that chemicals and wastes created water contamination. Approximately 76.3% of people mentioned construction works, and 74.8% of people identified automobiles and industries as causing air and noise pollution. Lastly, 69.5% claimed environmental pollution is increasing rapidly due to less vegetation cover in the city.
Table 3. Major causes of environmental pollution identified by the respondents.

| Causes of Environmental Pollution                      | Percentage |
|---------------------------------------------------------|------------|
| Rapid population growth                                  | 40.3       |
| Unplanned and ill-planned urbanization                   | 88.3       |
| Deforestation                                            | 69.5       |
| Improper waste disposal and management                    | 85.0       |
| Emissions from industries and automobiles                | 74.8       |
| Emissions of fossil fuels                                | 48.8       |
| Chemical effluents from industries                       | 88.3       |
| Landfills by wastes                                      | 87.6       |
| Construction works                                       | 76.5       |
| Indiscriminate use of loudspeakers                       | 59.0       |

Source: Field survey, 2018 (Multiple responses).

The respondents of the study area also mentioned the effects of environmental pollution (Table 4). About 91.6% of interviewees thought waterborne and airborne diseases are increasing gradually due to environmental pollution, injurious to health. Pollution eradicates the living and non-living components of environments and leads to the imbalance of ecosystems by impeding the ecosystems’ natural recovery, stated by about 77.4% of respondents. About 86.7% of respondents reported that smoke, smog, and suspended particles in the air and landfilling by non-biodegradable wastes destroy the city’s prettiness. Noise pollution interrupts the personal and working life of about 92.0% of respondents. About 75.3% of respondents reported that greenhouse gas emissions from industries and vehicles in the atmosphere increase the global temperature. Due to air pollution, the inclining temperature trend affects the other elements of weather and climate, and the final consequence is climate change.

Table 4. Major effects of environmental pollution identified by the respondents.

| Effects of Environmental Pollution                      | Percentage |
|---------------------------------------------------------|------------|
| Impacts on human health                                  | 91.6       |
| Imbalances of ecosystems                                 | 77.4       |
| Destroying the beauty of the city                        | 86.7       |
| Affecting the personal and working life                  | 92.0       |
| Global warming and climate change                        | 75.3       |

Source: Field survey, 2018 (Multiple responses).

3.3. Residents’ Remarks about Sources of Significant Environmental Pollution in the Study Area

Based on the dwellers’ responses in the study area, in the case of air pollution, around 92.5% of respondents stated that automobiles are the most important source of air pollution in the city. About 63.5% of respondents stated municipal solid waste to be a source of air pollution, 47.2% domestic activities, 46.0% construction activities, 39.7% the discharge of industrial effluents, 36.2% industrial activities, 29.2% medical waste, 14.5% deforestation, and 2.2% agricultural activities (Figure 5a).
Respondents mentioned the principal sources of water pollution in the study area, of which domestic activities were identified by 66.0% of respondents, municipal solid waste by 58.8%, municipal sewage treatment plants by 49%, industrial activities by 44%, discharge of industrial effluents by 36.2%, medical waste by 24.2%, urban runoff from roads, landfill areas, commercial and residential sites, etc. by 24.2%, agricultural activities by 12.5%, transportation by 10.6%, and oil spill by 7.2% (Figure 5b).

Respondents pointed out several sources to consider soil pollution in the field survey. Municipal solid waste (52.0%) and deforestation (51.4%) were considered to be mainly responsible for soil pollution in the city, followed by urban runoff (43.0%), industrial activities (40.8%), agricultural activities (37.4%), discharge of industrial effluents (33.0%), construction activities (26.8%), municipal sewage treatment plant (19.0%), and medical waste (17.9%) in both city corporations (Figure 5c).

There are many sources of noise pollution found in the study area (Figure 5d). The most common sources identified by the respondents included vehicle horns (99.0%), use of mikes and soundboxes (94.5%), overpopulation (69.4%), construction sites (69.0%), automobiles (63.0%), industrial pollutants (10.9%), domestic activities (6.6%), and other sources (6.3%).

### 3.4. Observation of the Duration and Times of Major Environmental Pollutions in the Study Area

During the survey, the respondents were questioned when they have especially faced major environmental contamination types, mostly during the day, week, and main seasons. All respondents stated that they regularly face air pollution in the daytime, but 29% also...
noticed it during the night. About 72.8% of people claimed that they observe air pollution every day of the week; moreover, around 40.6% of people experienced it in the wet season compared to 94.9% of people in the dry season (Figure 6).

Water pollution is a regular phenomenon in the daytime in the study area, but about 43% of respondents also think it happens during the night. Approximately 76.6% of people observed water pollution every day of the week, and about 98.4% of people experienced it in the wet season; only 44.8% of people noticed this pollution in the dry season. Generally, the degree of water pollution is higher in the dry season. However, water bodies are almost dried up in this season, so water pollution is not visible to the study area respondents. About 100% of respondents encountered soil pollution in the daytime, whereas only 12.3% also thought it happens during the night. About 70% of people observed soil pollution every day of the week, and around 70.1% of people experienced it in the wet season; 81.7% of people found this pollution in the dry season. Each and all respondents mentioned experiencing noise pollution in the daytime, but 34.9% also experienced it during the night. Around 80.1% of people experienced noise pollution every day of the week, and about 81.7% of people experience it in the wet season; 98.0% of people observe it in the dry season (Figure 5).

Figure 6. Duration of major types of environmental pollutions noticed by respondents (multiple responses).

3.5. Effectiveness of Current Environmental Programs and Respondents’ Media Preference in Environmental Information

Respondents were asked whether current environmental programs are effective or not for environmental awareness. Around 51.0% of respondents knew about the activities that can decrease pollution in their surroundings. They also mentioned those activities/programs: public awareness program, social engagement on cleaning and tree plantation, law enforcement activity, etc., arranged by the government as well as non-governmental organizations. About 28.5% of respondents claimed that these environmental programs could effectively reduce environmental pollutions in the city. Around 22.3% of respondents gave an average response to the effectiveness of environmental programs. On the contrary, 49.0% did not know about environmental programs (Table 5).
Table 5. Effectiveness of environmental programs/activities.

| Effectiveness of Environmental Programs/Activities | Percentage |
|---------------------------------------------------|------------|
| Very effective                                    | 28.5       |
| Average                                           | 22.3       |
| Poor                                              | 0.3        |
| Unknown                                           | 49.0       |

Source: Field survey, 2018.

In the survey, people were also asked whether they participated in any environmental education program or not. Only 9.0% of respondents remarked that they had taken part in programs arranged by DSCC, DNCC, and other agencies in the last few years to protect the city’s environment and reveal the programs’ details. In 2014, a pilot project named ‘Clean Streets for Dhaka City’ was conducted by DNCC and DSCC to work for the Better Bangladesh Trust to develop a better waste management system [54]. In 2017, an awareness program was conducted by Reckitt Benckiser (Bangladesh) Limited to create awareness on the well-being and hygiene among five million people, of which the name is “Dettol-Channel i Porichonno Bangladesh,” which will be completed in 2020 [55]. Several universities of Dhaka organize rallies and awareness-raising programs on ‘World Environment Day’ every year.

Respondents were also asked what types of media they liked to use to acquire environmental information. Most people thought that television programs (91.7%) and newspapers (84.4%) were effective at creating awareness about environmental pollution’s harmful impact, followed by radio (62.9%), books (69.6%), and online sources (57.7%) (Figure 7).

Figure 7. Types of media chosen by the respondents (Multiple Responses).

4. Discussion and Policy Implications

The study reveals that city dwellers perceive different aspects of environmental pollution from their surrounding environment. About 61% of respondents do not know distinctly about the types, causes, and effects of environmental pollution, which indicates that their daily activities contaminate their surrounding environment. Unfortunately, they are not well informed about this matter. More than 50% of respondents were able to identify the air, water, and noise pollution, but only a few respondents identified soil pollution. Moreover, many respondents could not recognize the significant sources of air, water, soil, and noise pollutants, showing their unawareness about the environment. Many people
come to Dhaka City to get better public facilities every day, and many unskilled poor people come to search a job, engaging in different informal sectors. This rural–urban migration of people creates a force on the urban environment, and the responsible organizations of this city have failed to control this migratory force. Another important aspect is that people ignore the existing environmental laws of this country. The Government of Bangladesh (GoB) has enacted and amended several environmental acts, rules, and laws to improve the environmental condition. The major legislations are the Environment Policy, 1992; Bangladesh Environment Protection Act, 1995; Environmental Conservation Rules, 1997; Ozone Depleting Substances (Control) Rules, 2004; Bangladesh Environment Court Act (ECA), 2010 (formed in 2000); National Environmental Policy, 2018, etc. [56–59]. The National Environment Management Action Plan (NEMAP) from 1995 to 2005 was developed by the Ministry of Environment and Forest (MoEF) to ensure environmentally friendly development via a policy framework that has a guideline for promoting proper resources management, raising awareness among the people, and improvement of environmental degradation [60]. The Department of Environment (DoE) in Bangladesh is working to reduce air pollution under the CASE (Clean Air and Sustainable Environment) project, with an emphasis on raising awareness among the general population to understand the necessity of clean air for the city [61]. Though the country has many environmental laws, and the responsible authorities have taken several initiatives to implement them, enforcement has been unsuccessful due to the population’s common tendency to ignore the existing regulations [56,62].

The findings of the current study show the resemblance with other research. The survey of residents in Al-Suwaiq Wilayat, Sultanate of Oman, showed 77% of the respondents had a high degree of interest and concern about environmental issues, but still needed environmental education and awareness programs [27]. People’s understanding, awareness, and participation towards environmental issues are significantly low in Bangladesh [24]. People’s knowledge level and behavior in Dhaka towards air pollution were low among different age groups, income groups, and occupation groups [63]. Similar findings were found in another study [64]. The overall situation explains many causes of the illiteracy of dwellers to environmental pollution in the study area. Moreover, the numbers of awareness-raising programs are not enough to make people proactive in decreasing pollution in the study area. These facts are also common for developing countries, where environmental pollution is increasing severely day by day due to public environmental ignorance and intention of acting.

The study’s outcomes and the discussion mentioned earlier leads us to recommended some strategies and policies at the local, institutional, and national levels:

- Discouraging rural–urban migration at the national level: It is essential to decentralize all public amenities by displacing the garment industries from Dhaka City, growing employment opportunities in rural areas, using modern technology in agriculture, and establishing better healthcare centers and educational institutions all over the country.
- Forming an environmental committee at the local level: Every city ward authority (the lowest administrative unit) can create an environmental committee that directly discusses environmental information with the local people through leaflets, workshops, seminars, cleaning programs, etc.
- Improving solid waste management at the community level: A waste management committee can be formed at the community level that regulates waste disposal for overall environmental management. The committee can inspire the people to keep their domestic waste separately and properly dispose of it.
- Starting an environmental education subject at the institutional level: A mandatory environmental awareness-related subject can be introduced in primary schools, where children will practice how to use resources and to clean their surrounding environments.
- Making films, documentaries, and drama for environmental awareness: Environmental information based on documentaries, movies, advertisements, and drama can be
made and shown on television and shared on social media, including YouTube, for mass awareness.

- Encouraging environmentally friendly transportation: Eco-friendly vehicles can reduce air pollution by replacing fossil fuels to clean energy such as solar and wind energy.
- Regulating the dust from roads and construction sites: Building or construction sites must have a solid fence during construction. Road pavement, regular washing, cleaning, and water spraying, particularly in the dry season, can reduce the road’s dust.
- Reducing the price of environmentally friendly products: Lessening the value of eco-friendly products can attract consumers to purchase them.
- Increasing the tree plantation for noise pollution reduction: A huge number of trees inside and surrounding schools, parks, hospitals, markets, and recreational places can control noise pollution.
- The three Rs (reuse, reduce, and recycle) of resources: Reusing resources can diminish waste from the environment and save money. Reducing the emission of greenhouse gases and debris can help to build a sustainable environment for future generations. People should be encouraged to mend and maintain their daily essential products and recycle them.
- Evaluating environmental impacts: Before starting any development works, the proper authority must assess the environmental effects. A skilled workforce should be recruited in the Department of Environment, Dhaka, Bangladesh, for its early evaluation process and surveillance.

5. Conclusions

The paper analyzes the extent and severity of environmental pollution in developing countries. The remedial measures were suggested based on the questionnaire survey in the polluted sites, collected data, and information on the types, causes, effects, sources, and duration of environmental pollutions obtained from available publications and newspaper information. The demographic characteristics, causes of environmental pollution, and the impact of the sources of water pollution, air pollution, soil pollution, and noise pollution were presented in tabular and graphical form for better understanding. The results showed that 39.0% of the respondents had explicit knowledge about environmental pollution, while 73.8% had explicit knowledge about air pollution, 63.0% about noise pollution, 55.2% about water pollution, and 6.5% about soil pollution. It is interesting to note that about 49.0% of the respondents did not understand the currently conducted environmental programs’ effectiveness. The outcomes of the study are also similar to the pollution status of China, India, and Pakistan. A comprehensive discussion on the urgency of forming a local-level environmental committee, an active role of the mass media, and monitoring the development activities are presented, along with the countermeasures taken by the government of the country.

Author Contributions: N.N.: Conceptualization, methodology, formal analysis, investigation, resources, data curation, writing—original draft preparation, writing—review and editing, visualization, supervision, project administration, and funding acquisition. S.M.: Formal analysis, methodology, investigation, data curation, and writing—original draft preparation. Z.H.: Conceptualization, Formal analysis, visualization, writing—original draft preparation, and writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the University Grants Commission and Jagannath University (UGC-JnU Project, 2017-18) of Bangladesh (Grant No. 131/2011/1540) for the research paper. The funding authorities have no involvement in the study.

Institutional Review Board Statement: No ethical issue or concern related to human subjects and environment was reported in this study.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.
**Data Availability Statement:** All data of this manuscripts are available if it is necessary. The data are not publicly available due to ethical restrictions on the use of the data.

**Acknowledgments:** The authors wish to gratefully acknowledge the University Grants Commission and Jagannath University (UGC-JnU Project, 2017-18) of Bangladesh for financial assistance of the paper’s research. The authors also show gratitude to the respondents for their voluntary participation during the questionnaire survey. Finally, we express our thanks to the anonymous reviewers who reviewed the paper.

**Conflicts of Interest:** The authors declare no conflict of interest.

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