Chemical Contaminants and Pollutants in the Measurable Life of Dhaka City

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ABSTRACT

Environmental pollution and food contamination are as old as the civilization itself. It is the consequence of the development of civilization, over utilization of nature, industrialization and in fact a price for the progress. It is highly prominent in Dhaka city. Air pollution is mainly due to the vehicle emission, industrial discharge and burning of fossil fuel. The water resource of Dhaka becomes a major health threat due to arsenic contamination, inadequate household/industrial/medical waste disposal and industrial effluent management. Food contamination came from the commercialism of business people who are doing this knowingly to maximize profit. Necessary steps are to be taken to protect the environment for our own existence. This paper reveals chemical pollution and contamination issues of Dhaka city, the capital of Bangladesh.

Keywords: Medical and Household waste; Health Hazard; Chemical Intoxication; Cancer; Food Poisoning; Pathogen; Contaminants, Civilization

INTRODUCTION

Contamination is the presence of an unwanted substance where it should not be or at concentrations above recommended. Pollution is contamination that results in detrimental biological effects to resident communities. All pollutants are contaminants, but not all contaminants are pollutants. All elements of the natural environment can be altered, sometimes with harmful results. Air, food, water, and the earth can all become sources of ailment, in the home, public, or work environments. In urbanization, all processes are viewed in relation to the city. Generally, better utility, good medical care, better food supply, education scope, jobs, industrialization, entertainment, electrification, specialization of professions are the basic causes of huge urban population growth. Better access to utilities and energy plays an important role in city development -- with this, people can relish all the modern facilities. Undeveloped areas got connected with road communication. It brings the people from those areas, for the use of media, technology, information for more standard living. With increased civilization and industrialization, both air and water, in Western or developing countries, contaminates with toxic substances that are either direct results of discharge or produced by photochemical degradation. Dhaka, being the capital of Bangladesh ranked 3rd worst in Air Quality Index (AQI) in the world. Besides, the city of nearly 20 million inhabitants, Dhaka faces challenges on this front, ranging from chemical outpouring, poor sanitation, river and canal water pollution from the surrounding industries, all resulting from the impromptu nature of urban civilization. Food contaminants and adulterants gave a new dimension in city life, together rest of the country. The healthcare providers role in environmental health is related principally to being alert to the conditions predominant in the community and of working with others to adequately control any of the attendant hazards.

URBANIZATION AND ITS IMPACT

Urbanization is one of 21st century's most developing trends. Cities are the dominant force in continual economic growth, development, and prosperity in both advanced and developing countries. In developed countries, the growth of the urban population has stabilized, and urbanization is taking place rapidly. Currently, 55% of the world's population (four billion people) reside in urban areas

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which will be nearly 70% by 2050 (United Nations, 2018). By 2030, over 60% people will live in the cities (Megacity Challenges, Siemens AG), two billion more people will have migrated to cities-- placing uncommon pressure on infrastructure and resources, particularly those related to water (According to UN and World Bank) (Benedito, 2018). From 2016 to 2030, a 35% population growth is expected in the top ten megacities. Furthermore, as more than three-quarters (around 80%) of the world's mega-cities are coastal, there will be a substantial impact on water ecosystems from ridge to reef. Because of this, local and regional authorities lead actions targeting water-related obstacles, including energy and water, an increased demand for food, housing gaps and climate change (NewNation, 2018 and Daily Sun, 2018). Forecasts indicate cities in developing countries including Dhaka, Karachi and Lagos will surpass cities like Osaka, New York and Sao Paulo by 2030 (Joal et.al, 2014). It demands an extra 50% energy and water that pressurize the sources and threaten global water security. This has an apparent effect on both economic development and public health. It has been predicted that the urban population in Bangladesh will rise to between 90 and 100 million by 2050, which will be around 50% of the total population (Shishir, 2018). The leather tanning industry has been identified as one of the main causes of pollution in the Capital city of Dhaka of 10 million people of both environment and water. About 60,000 tons of row hides and skins are processed every year using chloride and ammonium sulphate, followed by dehairing during de-liming, solvent vapors release a huge volume of crude effluent into the open causing air and water pollution (Jahan et.al., 2014).

Chemical Pollution and Contamination Due to Urbanization

Smog results from the interaction of the ultraviolet rays in sunshine and the unburned hydrocarbons of automobile engines or factories and smokestacks. These products, when trapped by the thermal inversion engendered by local topography, cause damage to mucous membranes and lungs when inhaled (Timothy et.al., 2006). Acute episodes of air pollution have been found to exacerbate illness and even cause death in people who already have respiratory and cardiovascular diseases. Supporting evidence exists demonstrating that second-hand tobacco smoke increases the risk of cardiovascular diseases or cancer as well (WHO, 2014). According to World Bank's Country Environmental Analysis (CEA) 2018 report, air pollution lead to deaths of 46,000 people in yearly in Bangladesh (Ahmad et.al, 2018). Waterborne infectious disease is very common today, all the public supplies are literally contaminated with water drainage system reported many places. Many complaints about the taste, appearance, and physical qualities of locally supplied water have led to a brisk in bottled water (Kun et.al., 2012). Water contamination with ground-source chemicals (e.g., pesticides, fertilizers) remains an ongoing possibility. Food remains a significant vehicle of disease organisms (Wasim et.al., 2009). Foodborne disease, more commonly but often incorrectly called "food poisoning," is grossly underreported. In most instances the illness produced by contaminated food is mild and of short duration, but more severe outbreaks (such as hepatitis A, most commonly seen in public restaurants) can. Epidemics of food-borne disease are dramatic and sudden, and most people become sick within 6 to 24 hours after consuming the contaminated foodstuffs. The epidemic pattern of food-borne disease presents differently from the gastrointestinal symptoms (e.g., nausea, vomiting, and diarrhea) induced by intestinal enteroviruses occur (Foodborne Illness and Outbreak Investigation Manual, 2008).

THE DHAKA CITY AT A GLANCE

Living in Dhaka city endowed with a traffic jam, street foods, unplanned buildings, narrow road space, noise pollution along with environmental pollution and issues of contamination (Sadiq, 2018). Some people make joke like "Traffic jams teach us things like patience and how to plan ahead of time" (Azmin, 2015). Many people sleep roadsides, railway platforms, mosques and market places. People rushes this city for job, business and other opportunities like uninterrupted utilities. Along with general people, the city is also heaven for muggers, robbers, thieves, pickpockets, frauds, drug dealers and organized criminals (Puja, 2017). People rarely can see the sunrise or sunset due to thousands of buildings. hawkers are illegally occupying the public walkways, pedestrians are now forced to walk on the

roads which raises the risks of accidents and adds to the already unbearable traffic congestion in those areas. Economist Intelligence Unit (EIU) surveyed 140 cities around the world for its Global Live-ability Index 2018, scoring them on over 30 specified parameters under five categories: Infrastructure, education, culture and environment and healthcare facilities (The Global Livability Index, 2018). All these things make this a difficult to breath place and a second worst place in the world to live in. Some 18,000 deaths from environmental pollution took place in 2015 in Dhaka (Environment Desk, 2016).

Air Pollution

The most profound chemicals found harmful to human health and at high enough concentrations (Table 1) can even be fatal are Carbon monoxide (CO), Sulfur dioxide (SO_2), Nitrogen oxides (NOx), Ozone (O_3), Hydrocarbons (HC) and Suspended Particulate Matter (SPM) found in places surround Dhaka. Possible health hazards found to be headache, eye-nose-throat irritation, allergy, lung injury, trauma and even death with long term exposure (Chen et.al, 2007; Daily Prothom Alo, 2014; Mohammed et.al, 2018).

Table 1. Coefficient trend of air pollutant parameters at different locations in the city of Dhaka (July 2016- June, 2017).

Air Pollutants	Estimated Coefficient Trend at Different Locations							
	Savar, Brick Field Areas	**Dhaka Cantonment**	**West Rasulpur, Dhaka**	**Birulia, Savar**	**North of DEPZ, Savar**	**South of DEPZ, Savar**	**East of DEPZ, Savar**	**West of DEPZ, Savar**
Volatile Organic Carbon (VOC) mg/kg	2.547*** -0.0017 [0.974]	1.571** -0.03166 [0.8291]	0.595*** -0.0023 [0.9687]	1.075*** -0.0042 [0.9541]	0.846** -0.0424 [0.793]	1.834** -0.0367 [0.811]	1.587** -0.04 [0.801]	0.819** -0.042 [0.7953]
Carbon dioxide (CO_2) mg/kg	0.070* -0.134 [0.580]	0.115** -0.0466 [0.78125]	0.088** -0.0217 [0.8659]	0.123 -0.302 [0.339]	0.024 -0.8596 [0.0122]	0.06 -0.00004 [0.9976]	0.181 -	0.520** -0.046 [0.781]
Carbon monoxide (CO) mg/kg	0.218*** -0.0027 [0.965]	2.092** -0.0355 [0.815]	0.349 -0.00000661 [0.999]	1.268** -0.0388 [0.8053]	1.085*** -0.0002 [0.9934]	0.880*** -0.00146 [0.9772]	1.051** -0.013 [0.9038]	0.708*** -0.0009 [0.9827]
Oxygen (O_2) (%)	0.825 -0.32 [0.3200]	0.134 -0.854 [0.0131]	3.094** -0.0466 [0.78125]	0.392* -0.0605 [0.7422]	0.455 -0.1456 [0.560]	1.093*** -0.0018 [0.9730]	0.869 -0.000000005 [0.9999]	0.442 -0.14278 [0.565]
Relative Humidity (%)	0.165 -0.6392 [0.0825]	-0.082 -0.4686 [0.185]	0	0	0.125 -0.224 [0.4375]	-0.095* -0.0625 [0.7369]	0.125* -0.0823 [0.6879]	0.197*** -0.0004 [0.9889]
Sulfur Dioxide (SO_2) mg/kg	0.880** -0.0119 [0.9089]	4.616* -0.0546 [0.7582]	1.352*** -0.0008 [0.9836]	4.671** -0.0502 [0.7708]	0 -	0 -	8.377** -0.0137 [0.9005]	1.494* -0.0615 [0.739]
Nitrogen Oxide (NOx) mg/kg	3.233** -0.0144 [0.8972]	4.768** -0.0456 [0.7843]	2.770** -0.0508 [0.7689]	1.918** -0.0466 [0.78125]	2.920** -0.0466 [0.78125]	1.698** -0.0466 [0.78125]	1.671** -0.0466 [0.78125]	2.561** -0.0466 [0.78125]

Hydrogen Sulfide (H_2S) mg/kg	0.435*** -0.0003 [0.9917]	-2.35 -0.5512 [0.1298]	1.521** -0.0273 [0.8445]	0.547 -0.7802 [0.0301]	1.823** -0.0427 [0.7930]	1.806 -0.123 [0.600]	1.339 -0.153 [0.5458]	0.652* -0.0606 [0.7420]

(Mohammed et.al, 2018)

The AQI in Dhaka during the winter, where more than 4,500 brick kilns operate, typically wavers above 250 – a level expressed unhealthy for all groups – but often spikes much higher (Stanford News, 2018). Brick kilns, unfit vehicles run by fuels with higher level sulphur, as well as construction works, rundown roads have been identified as major sources of air pollution (Imtiaz, 2018 and Independent Online Desk, 2018). Day by day the amount of dust include air pollution in the city has been increasing. The air quality, particularly in Dhaka has assuredly been getting worse. Air pollution, according to Thomson Reuters Foundation, caused largely by burning fossil fuels, is cutting global life assumption by an average of 1.8 years per person, making it the world's top killer (DhakaTribune, 2018). AQI 201 to 300 is marked as "extremely unhealthy" or hazardous air. At present AQI level of Dhaka has 309, which is in extreme "unhealthy" position (Ahmad et.al, 2018).

Water Pollution

Moving on to the issue of water quality and pollution, the National Sustainable Development Strategy (NSDS) of Bangladesh identifies the following reasons behind degradation of surface water quality:

- Insufficient enforcement of environmental regulations
- Confusion about institutional responsibility for the quality of urban water bodies
- Encroachment of rivers and water bodies
- Rural-to-city migration
- Unregulated industrial expansion (Ferdous, 2018).

The Rivers Buriganga, Shtalakhka, Balu, Tongi Khal and dholeswari which runs past Dhaka City, is at present one of the most contaminated rivers in Bangladesh (Asif, 2017). The city is suffering from an acute lack of domestic water supply. Water is involved in the spread of contagious diseases in essentially two ways. The well-known direct ingestion of infectious agent when drinking contaminated water. The second is due to a lack of sufficient water for personal solitariness purposes (WHO, 2011). Approximately 80% of all sicknesses and diseases can be attributed to inadequate water supply and sanitation worldwide (UN Secretary General, 2003 and Malik et.al., 2012). However, the rivers and canals continued to be intervened, and more wastewater from houses and industrial units poured into the rivers without any treatment, with several major sources of contaminats being outside the city area—in Gazipur, Tongi, Savar, Ashulia (UNDP, 2010). According to Dhaka Water Supply and Sewerage Authority (DWASA), it can currently supply 75% of water demand, out of which 85% is from groundwater sources (Deep Tube wells) (Manoj et.al., 2017). The presence of toxic metal lead in Elephant road, Dhaka. University, Jatrabari, and Demra area and toxic Pentachlorophenol (PCP) and actual pathogenic bacterial load in the WASA supplied drinking water from different areas of Dhaka city were found to be ineligible for human utilization (Table 2).

Table -2: Lead, Cadmium, Chromium and Arsenic content in first 14 water samples *

Sample No.	Sampling Area	Pb content (mg/L)	Cd content (mg/L)	Cr content (mg/L)	As content (µg/L)	Total Bacterial Count c.f.u./100mL
1	Dhaka University	0.52	0.05	BDL	0.78	4.0 × 105
2	Bangshal	BDL	0.03	BDL	0.43	2.1 × 104
3	DMCH	BDL	0.04	BDL	0.25	1.0 × 104
4	Basabo	BDL	BDL	BDL	5.12	4.2 × 106

5	Komlapur	BDL	BDL	BDL	0.21	
6	Badda	BDL	0.04	BDL	1.29	1.0 × 105
7	Sobujbagh	BDL	0.04	BDL	0.42	5.2 × 106
8	Shagun Bagichaa	BDL	0.06	BDL	BDL	5.0 × 103
9	Demra	0.46	0.07	BDL	0.44	-
10	Jatrabari	0.51	0.07	BDL	0.15	1.5 × 104
11	Mohammadpur	BDL	0.07	BDL	0.53	5.0 × 103
12	Panthapath	BDL	0.07	BDL	0.29	3.0 × 104
13	Elephant Road	0.53	0.08	BDL	0.10	2.5 × 104
14	Shampur	BDL	0.08	BDL	0.56	3.5 × 104

(Murshed et.al, 2013) * 2 table contents accommodated in 1.

Some 80% of wastes are being discharged into the rivers in Bangladesh. No wonder our water supplies are in unsecured. Around 250 industries are liberating chemical contaminants into the Buriganga and Sitalakhya river. Every day 4,000 tons of solid and 22,000 tons of tannery waste assimilates with water in Buriganga river. Sewage is being discharged directly into the rivers, and the low-lying parts around urban areas (Daily Asian Age, 2018). By 2021 the garments export target has been set at $50 billion. But the success comes at a huge substantial cost. The dyeing and finishing plants are the major contaminants of water. Turag that flows by Tongi is almost dead with pollution. Its water looks ink black and gives out such a bizarre smell (Inam et.al., 2017). Wetlands around Dhaka city are being demolished through land development and scrapping of toxic effluents and crude sewage. Industrial effluents have totally destroyed the ecology of rivers near these large urban areas (Shishir, 2018). In Dhaka, 20 canals have escaped. Liquid and solid wastes, and heavy metals like copper, iron, lead, and nickel are deploring the BOD, COD, DO, TDS, P^H of water (Jahan et.al., 2014).

Medical and Household Solid Waste

Dhaka City Corporation (DCC) is unable to impose rules on the public. On the institutional side, rules and governance are not clear. The role and liabilities of waste generators are not clearly defined i.e., the present law does not provide forfeits for illegal discharge of waste or dumping. Lack of scientific measures for problem solving and DCC has shortages of proficient human resources and finances (Mitali et.al, 2018). The accrued waste is junked by the inhabitants in the city's streets, open storm water and wastewater drains or open water bodies where and whenever the collection service is non-existent or not functioning properly (Abu, 2018). In particular, slum or peripheries are afflicted by such a bearing. During the annual monsoon rains and storm water effluents which are clogged by solid waste overflow, creating an acute sanitary and wholesome threat in low-lying slum areas particularly. Solid waste generation profile is Per Capita Waste Generation: 0.56 kg/cap/day, Total Waste Generation DCC Area: 5000 tons/day and 70% - 80% of the solid waste is organic. Around 200 metric tons of medical wastes are engendered in the city per day (Approximately 6% of total waste) (Mohiuddin, 2018). Different industries and their discharges to pollution in Dhaka are: fertilizers/pesticides (6.6%), food industry (12.1%), pharmaceuticals (15.9%), metals (14%), Pulp and paper (47.4%) (Mohammad et.al., 2006; Shishir, 2017; Daily Asian Age, 2018).

Table 3: Medical Waste of different categories

Waste Category	Description with Examples
Infectious waste	Pathogens may be present. E.g. excreta, laboratory cultures, tissues, materials or equipment that have been in contact with infected patient.
Pathological waste	Human tissues or fluids. E.g. blood and other body fluids, fetuses.
Pharmaceutical waste	Wastes containing pharmaceuticals. E.g. pharmaceuticals that are no longer

	needed or expired
Genotoxic waste	Waste containing substances with genotoxic properties. e.g. waste containing cytotoxic drugs (often used in cancer therapy); genotoxic chemicals.
Chemical waste	Chemical substances present in a waste. E.g. laboratory reagents, film developer; disinfectants that are expired or no longer needed; solvent.
Wastes with high content of heavy metals	Batteries, broken thermometers, blood-pressure gauges.
Pressurized containers	Gas cylinders, aerosol cans
Radioactive waste	Radioactive substances present in a waste. e.g. unused liquids from radiotherapy or laboratory research, contaminate glassware, packages or absorbent paper.
Sharps	Sharp wastes. E.g. needles, knives, blades, broken glass infusion sets.

Medical waste may contain highly toxic chemicals and can present a mechanism for conveyance of diseases (Table 3). The growth of the medical sector around the world over the last decade connected with an increase in the use of disposable cheap medical products has contributed to the large amount of medical waste being generated. For a megacity like Dhaka, even less harmful wastes generation rates can lead to the gathering of large quantity wastes (Manzurul et.al., 2008). This large amount of medical waste poses from different healthcare establishment (HCE) (Table 4) significant health risks to the people correlated with waste disposal and treatment. During monsoon, the situation gets worse as medical, toxic chemicals and sewage waste flood Dhaka streets, polluting dozens of surrounding areas in the process. The reuse of syringes by the general public represents one of the greatest public health problems in the developing world related to health care waste. Worldwide, an estimated 10 to 20 million infections of Hepatitis B and C and HIV occur annually from the reuse of discarded syringe needles without prior sterilization (Simonsen et.al., 1999).

Table 4. Amount of wastes with types generated in different HCEs in Dhaka city

Color	Type of wastes	Amount (in kg)					
		DMCH	BMCH	GH**	PC**	DC**	Total
Black	General waste (Kitchen waste, medicine box)	2587 (79.01)	563 (83.65)	729 (77.31)	286 (75.26)	143 (48.97)	4308 (77.45)
Yellow	Infectious waste (Cotton bandage, amputated body parts, placenta, blood & urine bags)	489 (14.94)	59 (10.57)	132 (14.00)	46 (12.10)	57 (19.52)	783 (14.08)
Green	Plastic waste (Syringe without needle, saline bags, gloves)	79 (2.41)	18 (3.22)	32 (3.39)	21 (5.53)	63 (21.57)	213 (3.83)
Red	Sharp items (needle, blade, knife, Vial-ampoule)	36 (1.10)	6 (1.07)	12 (1.27)	9 (2.37)	6 (2.06)	69 (1.24)
Blue	Liquid waste	83 (2.53)	27 (4.83)	38 (4.03)	18 (4.74)	23 (7.88)	189 (3.40)
	Total:	**3274** (100%)	**673** (100%)	**943** (100%)	**380** (100%)	**292** (100%)	**5562** (100%)

DMCH: Dhaka Medical College Hospital; **BMCH**: Bangladesh Medical College Hospital; **GH:** General Hospitals; **PC:** Private Clinics**; and DC:** Diagnostic Centers

Food Contamination

Dhaka city now alone generates huge solid wastes per day from industrial discharge, fertilizers, fossil fuels, sewage sludge and municipality wastes and they are the major sources of heavy metals in soils and subsequent uptake by crops, vegetables and other food items causing serious health hazards to human beings (Hashem et.al., 2017; Mahmud, 2015

and Ashiqur, 2016). A significant discharge of heavy metals like vanadium, molybdenum, zinc, nickel, mercury, lead, copper, chromium, cadmium and arsenic took place from soils to vegetables (spinach, tomato and cauliflower) grown in industrially polluted soils of Gazipur and Keraniganj in Dhaka (Rafiqul, 2013). Industrial wastes and effluents are being released aberrantly on soils, into canals, rivers, along the road sides or in the vicinity of the industrial areas without any treatment where polluted river water is being used for irrigation purpose in paddy and vegetable cultivation causing absorption of heavy metals through the food chain by human beings (Zubair et.al, 2013).

Food Adulterants

Important food hazards include microbial hazards, pesticide residues, misuse of additives, chemical contaminants, including biological toxins and adulteration. Although microbiological contamination and chemical hazards have received most attention, it is recognized that food adulteration and food fraud should not be neglected considering their role in public health (FAO/WHO Expert Consultation, 1986). Food adulteration includes various forms of practices, such as mixing, substituting, concealing the quality of food by mis-labelling, putting up decomposed or expired food, and adding toxic substances (Park, 2005). About the proportion of adulterated food items in the market varied between 70% to 90%. Nearly 80% food items in the market were found contaminated in a random survey by public health laboratory of Dhaka City Corporation in 2004 (Staff Correspondent, 2011 and Mirza et.al., 2014). According to the International Centre for Diarrheal Disease & Research, Bangladesh (ICDDR, B), there is approximately 150 food items in the country. A study by the Institute of Public Health (IPH) revealed that more than 50% of the food samples they tested were adulterated. Textile dyes, which are highly injurious to health, are being randomly used to color many types of food. Fish is considered to be an essential protein for people of all ages. Many fish sellers spray fish with formalin in an assorted manner, it makes the fish or fruits stiff and keeps them looking fresh for longer. Undoubtedly human health is now under the possession of formalin, in our country about 400 tons formalin is being imported which are goes to human stomach, even though for laboratory or research purposes 100 tons of Formalin is quite enough, 80% of the imported formalin being added to food only for business purposes (Table 5).

Table 5: Toxic elements in noxious addition of food/additives

Contaminants	Food/Additives	Possible Outcome
Coloring agents chrome, tartzine and erythrosine	Spices, sauces, juices, lentils and oils	Cancer in kidney, liver, skin, prostate and lungs
Rye flour (ibid)	Barley, bread and wheat flour	Convulsion and miscarriage
Hormone (ibid)	Cauliflower	Infertility of women
Coal tar and industrial Dyes	Sweets, Sauce, Pastry cream, powders spices	Carcinogenic
Burnt oil	Crispy snack	Food poisoning, reflux, heartburn
Shad Fish (Imported)	Heavy Metal (Cadmium, Lead)	Over safe consumption level shows heavy metal toxicities.
Agenomato or monosodium glutamate (ibid)	Chinese restaurant food items	Nervous system disorder and depression
Flour	Chalk Powder	GI problems
Soap	Ghee (Clarified butter made from the milk of a buffalo or cow, used in South Asian cooking)	GI problems
Calcium Carbide/ Ethylene	Ripening of fruits	Cancer in kidney, liver, skin prostate and lung

dioxide		
Urea (ibid)	For whiten rice and puffed rice	Damage of kidney & nervous system, Respiratory problem
Brick Dust	Chili powder	Respiratory problem
Sulfuric acid and palm oil	Condensed milk	Cardiac function problem
Saw dust, Used and exhausted tea leaves	Loose Tea	Respiratory problem
Sodium cyclamate	Sweetmeat	Cancer, Fetal abnormality
Metanil Yellow Aniline dyes	Turmeric powder	Carcinogenic
Melamine	Milk Products	Kidney malfunction
Oleomargarine or lard	Butter	Asthma and weakened kidney function
Yellow and Sudan Red colors (ibid)	Chili powder	Tumors in liver and bladder and finally for cancer
DDT	Dried fish (Shutki)	Cancer especially breast cancer, liver cancer and pancreatic cancer, reproductive damage (Weaken semen, early menopause, exposure of teratogen and birth defects) and some neurological damage reported.
Coliform Bacteria	Bottle and Jar water	GI problems
Formalin	Preservation of fish, meat, fruit and milk	Throat cancer, blood cancer, childhood asthma and skin-diseases.
Poisonous coloring agents like auramine, rhodamine b, malachite green, yellow G, Allura red, and Sudan red	Applied on food items for coloring, brightness and freshness	Damage liver and kidney and cause stomach cancer, asthma and bladder cancer

(Mirza et.al, 2014; Zubair et.al, 2013; Mohammad S, 2018; Arifur et.al, 2015; Nishat, 2017; Abu, 2013; Nehreen et.al, 2016; Newsdesk, 2018, Shafkat, 2013; Staff Correspondent, 2011; Sharifa et.al, 2014, Rajib, 2015; Editorial, 2014; Mahboob, 2015)

Milk in rural areas is usually devaluated with dirty water, which can cause hepatitis. People are now acquainted with the milk adulteration technique that uses a thickening agent, sorbitol, and detergent. ICDDR, B recent studies shows nearly 75% samples from primary-level producers were contaminated with coliform and more than 50% with fecal coliform bacteria. At the collection points, samples were found contaminated with a high number of coliform bacteria and fecal contamination of more than 90% while more than 40 % of the samples had a high E coli count. (Newsdesk, 2018). Vegetable and fruit samples collected from around Savar, Dhamrai and Tongi show the presence of textile dyes, which, in the short-term, will cause diarrhea, food poisoning and gastrointestinal problems, but in the long-term toxic materials will accumulate in the body with serious health implications. In the absence of effluent treatment plants (ETP), the factory wastes are depleted out at will into the farmlands, and ultimately contaminate the farm produce (uhavepassed.com). In Bangladesh, people allowed things like pollution and food contamination to run riot. Till now, neither under the health ministry nor the ministry of science and technology or the ministry of industries, has conducted any examination of the pesticide-residue levels or toxic chemicals in the foodstuff being marketed. These merchants and traders are the enemy not only of the nation and their own children but of the entire mankind. The holy Prophet (PBUH) has disowned those who indulge in this immoral business. He said ‘‘The adulterator is not one of us’’ (Editorial, 2017). Apart from these severe noxious pathogens found in different food samples (Table 6), that are potential causes of stomach problems.

Table 6. Detection of foodborne pathogens in food and household water samples collected at point of use from four slums of Dhaka city, Bangladesh, December 2015 to May 2016

Presence of organisms in food/water	**Overall n = 56**	
Organisms present in Food	**n (%)**	**95% CI**
Yeast and mould (>100 CFU/mg)	48.0 (85.7)	0.74–0.93
Coliforms (>100 CFU/mg)	41.0 (73.2)	0.59–0.84
B. cereus (>100 CFU/mg)	27 .0 (48.2)	0.35–0.62
E. coli (>100 CFU/mg)	17.0 (30.4)	0.19–0.44
Staphylococcus (>100 CFU/mg)	8.0 (14.3)	0.08–0.27
V. cholera	2.0 (3.5)	0.01–0.14
Organisms present in Water	**Overall n = 16 n (%)**	**95% CI**
Total coliforms	16.0 (100)	–
Faecal coliforms	16.0 (100)	–
Total aerobic bacterial count	16.0 (100)	–
Yeast	16.0 (100)	–
Mould	16.0 (100)	–
Staphylococcus	16.0 (100)	–
E. coli	10.0 (62.5)	0.35–0.86
Faecal streptococci	9.0 (56.3)	0.29–0.79
Pseudomonas	7.0 (43.8)	0.21–0.71

Total coliforms and fecal coliforms count (CFU/g). (Ishita et.al, 2018)

It is an unfortunate reality that adulteration, especially in food, has become ubiquitous in the society. No one can justify or defend it. Most food products available in the market are adulterated. The average family is eating dangerous colors, chemicals like formalin and carbide, sawdust, soapstone, harmful chemicals and other harmful substances mixed with consumable goods. High level of pesticides content is present in grains, pulses, in fruits and vegetables that we eat (Kamruzzaman, 2016). Fecal bacteria found in 97% bottled water (Staff Correspondent, bdnews24.com 2017). Brick dust in chili-powder, colored chalk powder in turmeric, injectable dyes in watermelon, peas, capsicum, brinjal, papaya seeds in black pepper etc. are frequently used (Editorial, 2017). Even more unfortunate is the fact that this nefarious practice increases exponentially during the month of Ramadan. The shopkeepers and the merchants– many of them with a pious façade– try to earn a large amount of profit by this unethical practice, and so they play with the life and health of the people (Star Business Report, 2018 and Zamir, 2017). They mix dangerous things in the daily eatables. Even the medicine and drugs are adulterated. Most people can't even think of having the commodities like ghee, oil, salt and milk, free from impurities.

RECOMMENDATIONS

Pollution and contaminant control are a never ending, on the other hand a continuous process. It will increase with time as the civilizations go ahead. Pharmacists should be aware of the local occupations, companies, and factories and to be cognizant of the initial symptoms of disease. Again, pharmacists should become acquainted with the local community and to adapt the principles of health and medical care to the particular situations encountered. The pharmacist's continuing education requirements should include watching the local pattern of society and its diseases, and changing the emphasis toward evolving disease patterns and their control. Included in the current environmental issues are the workplace and the future of occupational safety and health regulations, hazards of local ambient environments, such as hazardous and other waste dumps, radioactive waste from weapons production, air emissions, and groundwater contamination of unknown magnitude; the Clean Air act and other and regulatory initiatives; waste

reduction and minimization, and radioactive waste and weapons production; global pollution, chlorofluorocarbons and the land ozone layer, the greenhouse effect, and global climate change; and conserving the tropical forest and biological diversity. Government and regulatory authorities are to play strong role in controlling food contaminants and adulteration. An out of the box thinking is decentralization i.e. to move few many important originations away from Dhaka city. With this decentralization, population density will be declined, the ill movement of business Crips will also be diluted.

CONCLUSION

With constant change to the physical, biological, cultural, social, and economic environment, both pharmacists and citizens should cultivate an informed awareness of these changes, and health providers should adapt their methods of health education, disease prevention, and disease control to the changes in each community. With an unusually large number of people seeking relief from health hazards, providers may play a much more fundamental and personal role in controlling food-borne diseases. The necessary role in environmental health is related primarily to being alert to the conditions prevailing in the community and of working with others to adequately control any of the attendant hazards.

Abbreviations: BDL (Below Detection Limit); BOD (Biochemical Oxygen Demand, also called Biological Oxygen Demand); COD (Chemical Oxygen Demand); DO (Dissolved Oxygen); TDS (Total Dissolved Solid); pH (A logarithmic scale used to specify the acidity or basicity of an aqueous solution); ICDDR, B (International Centre for Diarrheal Disease Research, Bangladesh).

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