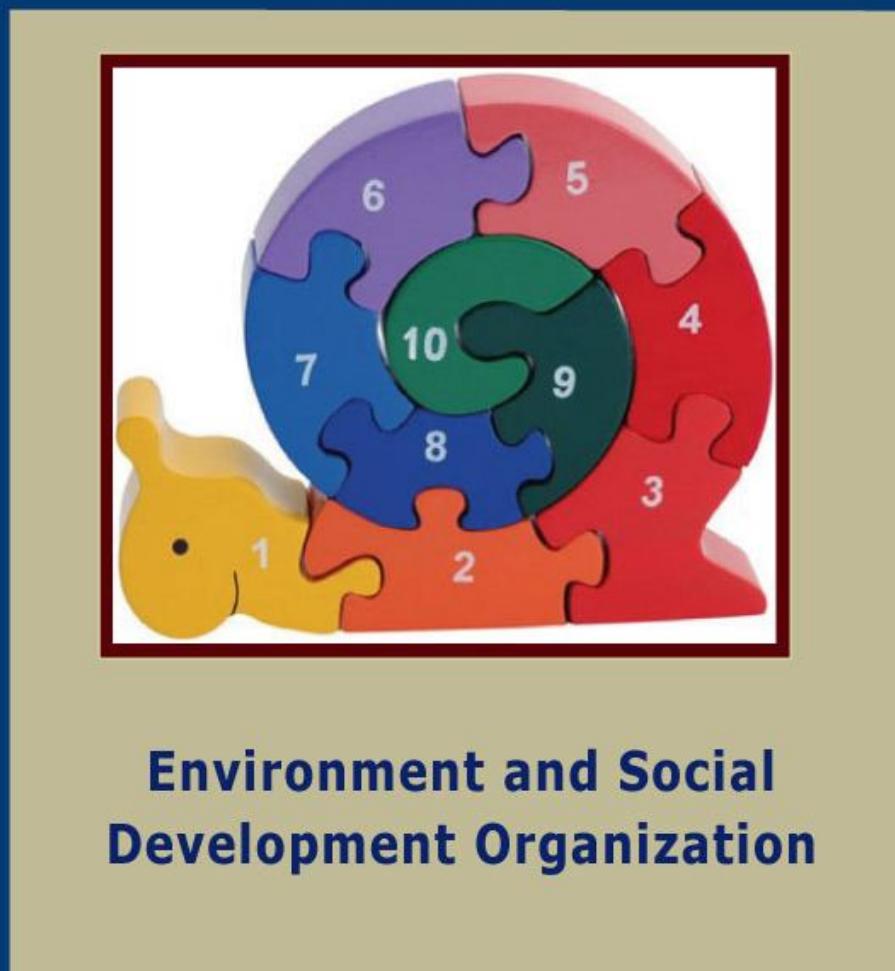
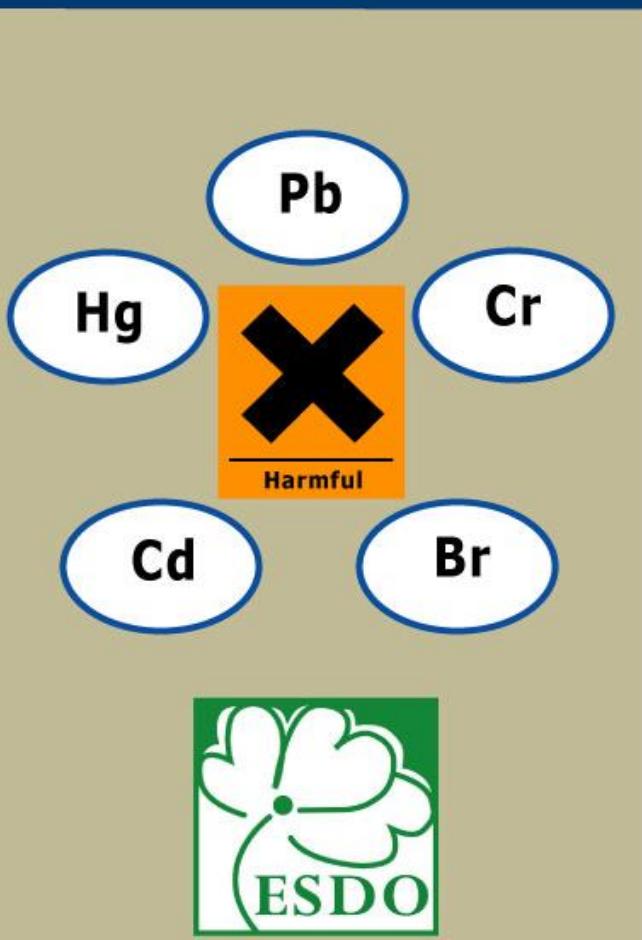


Study Report On "TOXIC TOYS"

Heavy Metal Content & Public Perception in Bangladesh



**Environment and Social
Development Organization**

Study Report

On

"Toxic Toys": Heavy Metal Content & Public Perception in Bangladesh

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Environment and Social Development Organization (ESDO)

ESDO is a non-governmental organization working on environmental and health issues with various stakeholders, to create a toxic free Bangladesh and sustainable living environment. ESDO is a participating organization of International POPs Elimination Network (IPEN), IUCN, WAMFD and ZMWG

"TOXIC TOYS"

Heavy Metal Content & Public Perception in Bangladesh

Acknowledgement

We acknowledge the cooperation of toy manufacturers, importers, wholesalers, retailers and people of several backgrounds of Bangladesh who provided the information of the present toy market situation of Bangladesh.

We also acknowledge those parents who helped us to collect the information of public perception.

We acknowledge our regional partner; Centre for Public Health and Environment Development (CEPHED), Nepal for helping us to provide the opportunity of analyzing the toy samples in the lab. We also give our sincere thanks to Zero Waste Collation, Philippines and IPEN for related information.

Acknowledgement also goes to ESDO team; Ms. Sarah Jabeen Kristy, Ms. Rifat Nowshin Mayukh, Mr. Kawsar Uddin Maruf, Mr. Mamun-ul Hasan, Mr. Ali Hossain for their help in numerous ways.

Abbreviations

CEPHED	Centre for Public Health and Environment Development
DD	Data Deficient
ESDO	Environment and Social Development Organization
EU	European Union
GDP	Gross Domestic Product
IPEN	International POPs Elimination Network
IUCN	International Union for Conservation of Nature
NBSM	Nepal Bureau of Standard and Metrology
NGO	Non Government Organization
Ppm	Parts Per Million
SMEs	Small and Medium-sized Enterprises
US	United States of America
WAMFD	World Alliance for Mercury Free Dentistry
X-ray	X-radiation
XRF	X-ray Fluorescence
ZMWG	Zero Mercury Working Group

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Forward

The study of "Toxic Toys" has been done according to commitment towards a "Toxic Free World". In spite of all constraint ESDO's young researchers has reached a milestone in the field of child health safety. It must be noted this is the first study on toys in Bangladesh. Inadequate data related information and fund were challenged; all though the research team has finally succeeded to complete this study and prepare a comprehensive report.

I believe this report will help farther academic research, create public awareness and facilities policy adaptation and implementation.

I take this opportunity to congratulate Dr. Shahriar Hossain and his dedicated team for the excellent work done by them.

Syed Marghub Murshed

Former Secretary, Govt. of Bangladesh

&

Chairperson, ESDO

Executive Summary

Toys are most intimate friends of children. The use of toy is found beyond time, space and culture. In recent times the toy industry has seen the largest progress all over the world. For some countries it's one of the most contributing sectors of the GDP, China is playing the key role in this case. As a small populated country of the South-Asia, Bangladesh also manufactures a small proportion of clay, cotton, wooden and plastic toys. However, more than 80% toys are being imported from different countries of the world.

In advancement of the toy industry, it's also a major concern that most of the toys our children play contain high levels of toxic metals; including lead, mercury, cadmium, bromine and chromium. These toxic heavy metals that have been associated with serious health impact such as learning disability, hormone problem and cancer, and for those have been identified by US and EU regulatory agencies as hazards for human and environment. Babies and young children are the most vulnerable populations because their brains and bodies are still developing and they frequently put toys into their mouths, according to this and many other research and advances.

Environment and Social Development Organization (ESDO) has conducted this study on toxic metals level on the toys and public perception in Bangladesh from October 2012 to August 2013. During this study, toys were collected from of different stores of Dhaka city markets and sent for analysis to Nepal Bureau of Standard and Metrology (NBSM), Nepal. The selection was based on the country of origin, composition and color.

Levels of toxic metals in 97% toys tested were significantly above the EU and US recommended ceiling of lead, cadmium, bromine and chromium. The plastic toys are the most contaminated as "Toxic Toys" category and the lead is the highest concentrated metal in different category of toys. Many international brands like Barbie, and Lego toys also exposed by lead, cadmium and chromium. Local clay and wooden color toys found high concentration of lead and chromium.

The highest level of lead concentration was found as 8305.8 Parts Per Million (ppm) following cadmium 490.5 ppm, chromium 2502.2 ppm and bromine 3923 ppm. All these concentrations are of several times higher than the EU suggested limit. It was surprising that no mercury level was found in the studied samples.

75% of the samples were contaminated with bromine following 62.5% with lead, 27.5% with chromium, 20% with cadmium and 0% with mercury.

Study found very low level of awareness and understanding of "Toxic Toys" amongst the business and consumers/parents in Bangladesh. Unfortunately no regulation and policy on toy safety yet taken by the government.

According to the survey the general trends of parents is to purchase foreign toys without any understanding of the toxic exposure. 74 % of the parents said they buy foreign toys for their children. Perception about toxic exposer: 64% of the parents don't have any idea whether the toys they buy are safe or not, 88% of parents don't have any knowledge about the toxic metals in toys, 58% said that their children tend to seek oral motor or sensory input by putting toys in their mouth, but only 20% have noticed health problems of their child due to using or chewing of toys.

This study also found lack of public awareness and enforcement of the law is a major cause of environmental hazardus by discarded toys. More then 70% parents admit they just dump the toy litter in the waste bin togather with other litters.

Study found discurded toys endup with landfil, water bodies and drain. According to the expart it is a human impact on the environment and is a serious environmental issue. "Toxic Toys" litter can exist in the environment for long periods of time before degrading and be transported large distances into the sea.

Introduction and History of Toys

Toys are used for entertaining children of different ages. It's almost an innate nature of the children to pass most of their times with toys. Toys type, shape, composition and color may vary place to place but the custom is practiced in all the societies. The toy industry has emerged largely in recent times and for some countries it's one of the most contributing sectors to the national economy. There are around 80 million children under 14 in the EU, and about 2,000 companies employing over 100,000 people directly in the toys and games sector, most are small and medium-sized enterprises (SMEs)¹.



Figure 1: Toys of different ages and cultures

However, the history of toys show that Greek and Roman children used to play with balls, clay rattles, clay dolls, hand carts, hobby horses, hoops and spinning tops. Between the Dark and Middle Ages, when children were old enough to play they also learnt to work and use weapons and tools. In the 19th century the main retailers of technical toys were opticians who sold steam engines, magic lanterns, building blocks and optical toys such as the kaleidoscope and zoetrope. Victorian parents believed that children should not play games on a Sunday but they were allowed to play with Noah's Arks because of their religious significance. Many famous toy companies started business in the 1890s and 1900s. Britains started making toy soldiers and later farmyards, zoos,

¹ Toy Safety (2009) Ensuring Children Benefit from the Highest Level of Protection. European Commission. See at: http://ec.europa.eu/enterprise/sectors/toys/files/toys-safety-brochure/w-toys-safety-brochure_en.pdf

cowboys and Indians and railway figures. Hornby produced clockwork and electric trains and Meccano. World War II brought toy production to a standstill. In the 20th century, the cinema and later TV, has had a major influence on the retail of toys. The use of battery power and computers has changed the way that toys operate. However the principles behind the toys are often the same with clockwork train replaced by the electric, the walking and talking doll relying on batteries rather than clockwork and string. Now there is also a return to wooden toys, traditional looking teddy bears and simple games such as marbles and spinning tops.²



Figure 2: Innate affection of children to toys

² Brief History of Toys (2013) Hampshire Museums Service. See at:
<http://www3.hants.gov.uk/childhood-collections/toys/history-toys.htm>

Worldwide Toy Industry

Toys are very big business globally, generating over \$80 billion in 2010³ and it's clear that the market is spreading year after year (Figure 3)⁴.

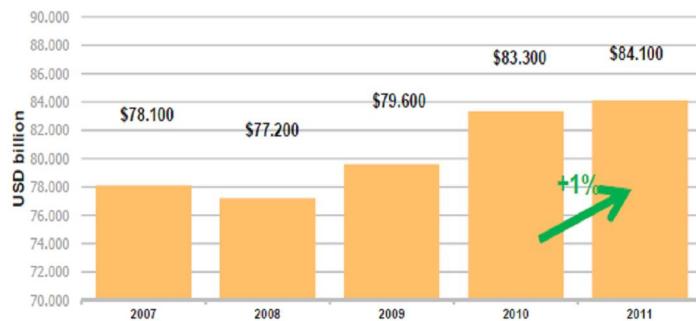


Figure 3: Increase of world toy market from 2007-11

Most of the industrialized countries are now concentrating on toy production. China is playing the leading role of them and in 2010 the toy manufacturing cost of the country was more than 10,000 billion US dollars which is about 30% of its GDP (Figure 4).⁵

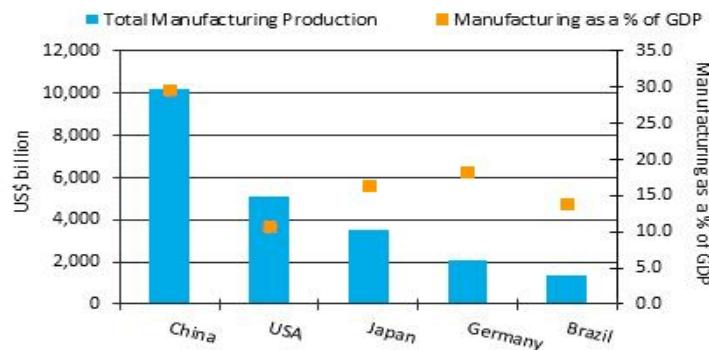


Figure 4: World's largest markets by total manufacturing production: 2010

³ TOXIC TOYS: PLAYING WITH POISON (2013) GRID-Arendal. See at:
<http://www.grida.no/news/press/5526.aspx>

⁴ The European Toy Market in 2011 The European Toy Market in 2011 (2012) NPD Group. See at:
http://www.toyassociation.org/App_Themes/tia/pdfs/facts/npd.pdf

⁵ World's Largest Markets by Total Manufacturing Production: 2010 - See at:
<http://blog.euromonitor.com/2012/06/is-china-losing-its-shine-as-worlds-toys-manufacturing-hub.html>

Toy industry in Bangladesh

Bangladesh toy industry is an emerging one in contrast to world's perspective. However, there is no published data found to represent this industry. From the discussion of the people related to this industry it was found that plastic and clay based toys are most dominating of this market having 38.3% and 18.1% contribution respectively. Other types are wooden 15.3%, cotton & fabric 8.5%, metal 7.4%, rubber 5.9%, paper & board 3.5%, jute 1.8% and ceramic 1.2% (Figure 5).⁶

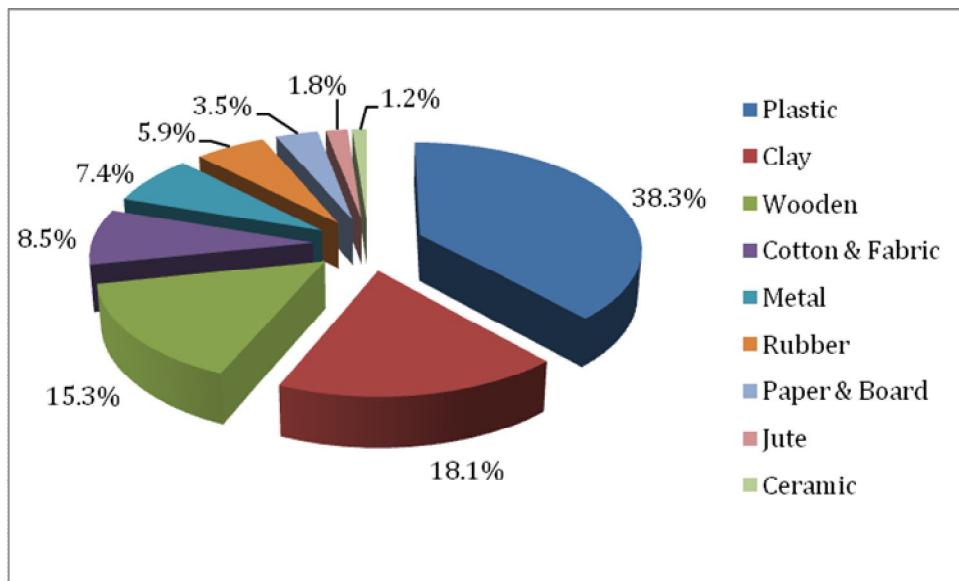


Figure 5: Toy industry of Bangladesh on the basis of composition

⁶ Discussion of ESDO team with manufacturers, importers, wholesalers and relevant personnel of the toy industry of Bangladesh

Import and Manufacture Trend of Toys on the Basis of Composition

From the time of early civilization of Bengal, people are engaged in pottery and used to manufacture different types of child products with clay. That's why present situation of Bangladesh toy market represent 16.3% of clay based toys of the 19.7% of toys manufactured in the country. Rest of the toys (80.3%) are imported where 37.9% are plastic based following 15.1% wooden, 8.3% cotton and fabric, 7.2% metal, 5.6% rubber, 3.3% are paper and board, 1.8% clay and 1.1% ceramic based.⁷ The situation is presented in Figure 6.

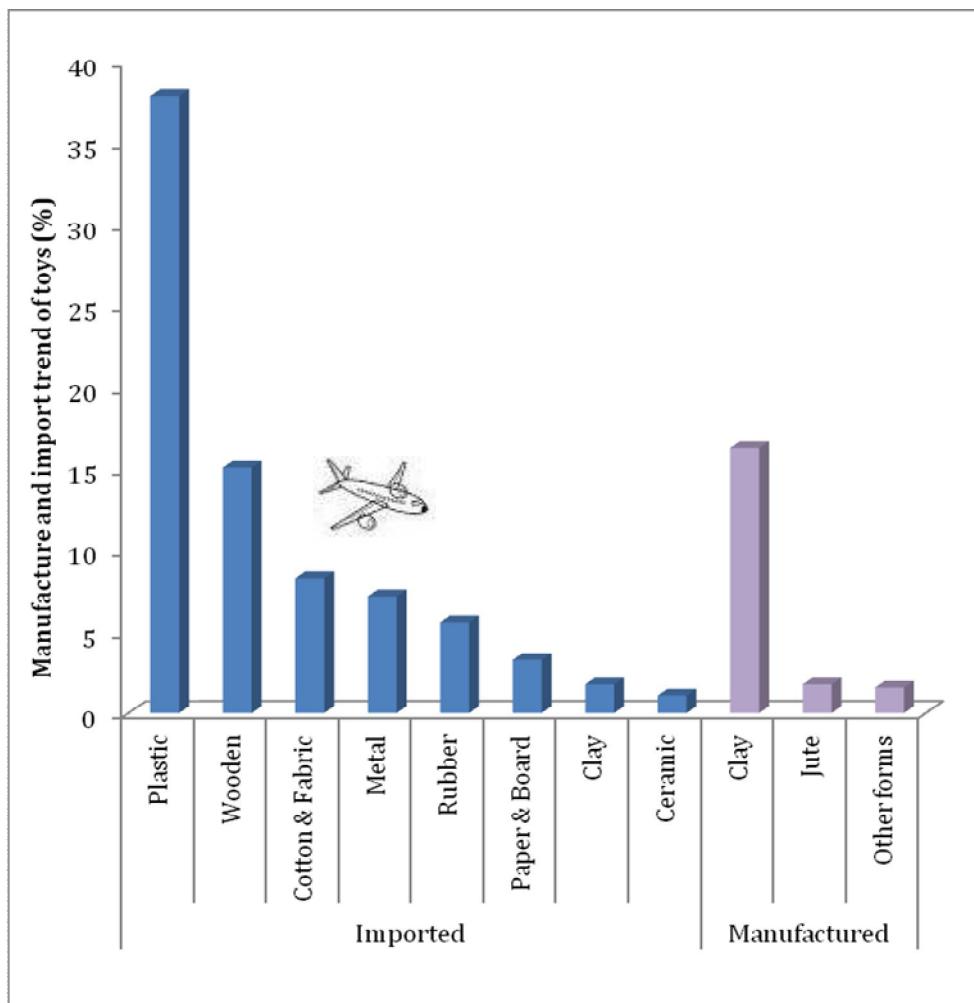


Figure 6: Import and manufacture trend on the basis of composition

⁷ Discussion of ESDO team with manufacturers, importers, wholesalers and relevant personnel of the toy industry of Bangladesh

Manufacturing Countries of Toys of Bangladeshi Market

Toy industry of Bangladesh is one of the most diversified ones. Bangladesh itself produces 19.7% of the toys of which most are clay based. Rest of the toys is imported; where China is in the leading position with 70.3% of the toys.⁸ This large proportion of toy import from China is common in two recent reports of Nepal⁹ and Eastern Europe, Caucasus and Central Asia region¹⁰. Details about the Bangladeshi toy market on the basis of its manufacturing countries are discussed in Figure 7.

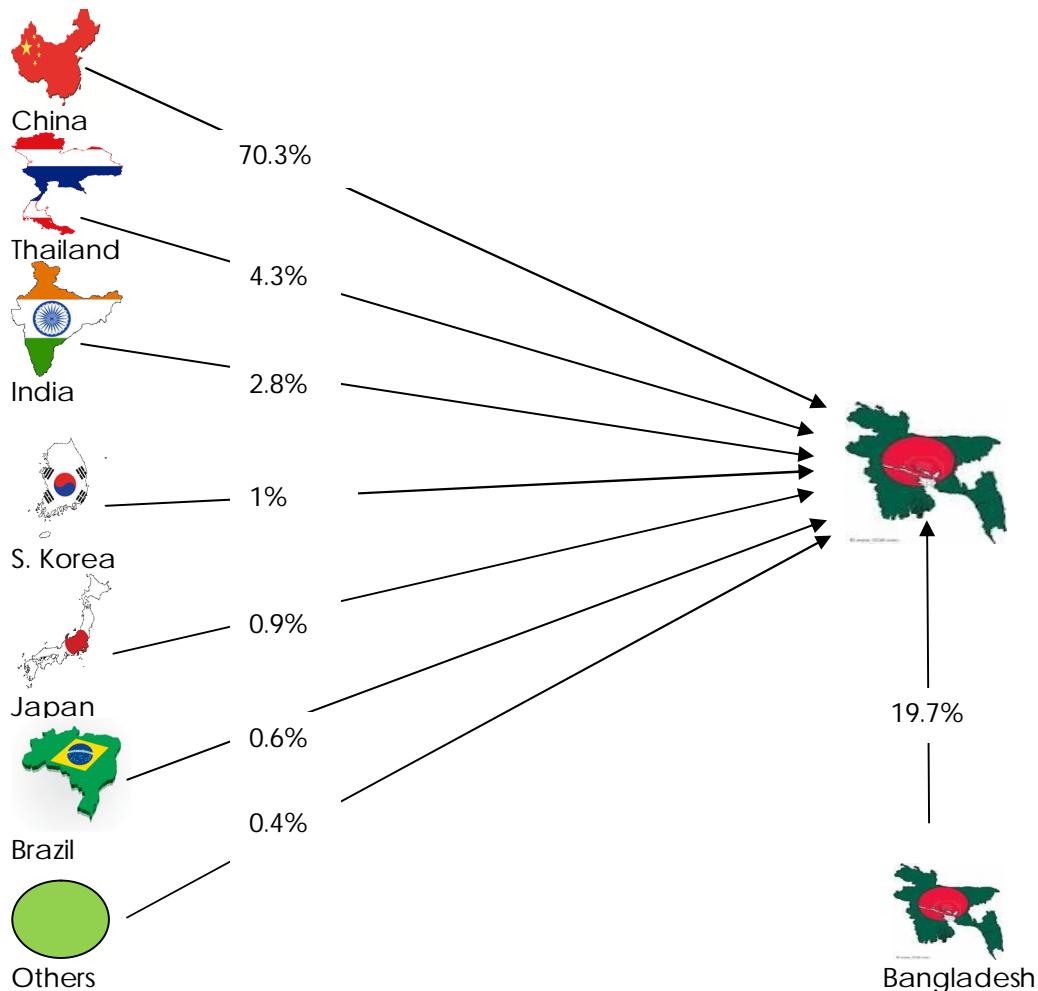


Figure 7: Toy industry of Bangladesh on the basis of manufacturing countries

⁸ Discussion of ESDO team with manufacturers, importers, wholesalers and relevant personnel of the toy industry of Bangladesh

⁹ Study of heavy metals in children's toy and campaign for safe play in Nepal (2013) Centre for Public Health and Environment Development (CEPHED)

¹⁰ Toxic metals in children's products: An Insight into the Market in Eastern Europe, Caucasus and Central Asia (2013). GRID-Arebdal. See at: <http://www.ipen.org/documents/toxic-metals-children%20%99s-products>

Toxic Metals in Toys and Its Impacts on Child Health

Toys are thought to be the most intimate friends during childhood. Playing with toys are quite important to children's intellectual development and physical growth. However, toys with potential safety hazards can cause different health problems, of which some can have long lasting effects. Lead is known as a neurotoxin with no safe level of exposure. Very little concentration of lead can give rise to difficulties in learning, attention, coordination, anemia, vision and speech. Mercury damages the kidneys and can inflict damage on almost all the systems of the body. Cadmium has disastrous impacts on lungs, kidney, bones, pancreas and blood. Toxic effects of bromine is observed in skin, lungs, blood, eyes, stomach and heart whereas chromium has toxic effects on skin, lungs, kidneys, reproductive system and liver. Children are the most vulnerable of the toxic effects of these metals as during that time their brain, nervous system and associated organs are yet in developing condition. Most common toxic metals and their associated health impacts are discussed in Table 1 and Appendix 1.

Table 1: Toxic metals of toys and their associated impacts on child health

Body parts	Lead	Mercury	Cadmium	Bromine	Chromium
Skin					
Lungs					
Kidneys					
Bones					
Pancreas					
Blood					

Brain					
Reproductive system					
Eyes					
Stomach					
Heart					
Intestine					
Liver					

International Standards of Toxic Metal in Toys

Toxic metals in toys are of great concern in several industrialized countries and international organizations. All of them have standard regulations regarding this issue. Two of the most important international standards are mentioned here (Table 2).

Table 2: Toxic metals in toys standard of EU and US

Regulatory body	Lead	Mercury	Cadmium	Bromine	Chromium	
EU (in dry, brittle, powder-like or pliable toy material) ¹¹	13.5	7.5	1.9	DD	III	IV
					37.5	0.02
US ¹² ,	90	60	75	DD	60	

Toxic Toys Regulation in Bangladesh

In Bangladesh there is no proper regulation regarding toxic metals in children toys, hence toys loaded with toxic metals are being imported from different countries of the world. However, there are some indications about hazardous substance in 'The Bangladesh Environment Conservation Act, 1995' as 'hazardous substance means a substance, the chemical or biochemical properties of which are such that its manufacture, storage, discharge or unregulated transportation can be harmful to the environment'.

Objectives

Objectives of the present study are:

- To know the concentration of toxic metals in toys of the markets of Bangladesh.
- To know the public awareness about toxic metals in toys.

¹¹ Directive 2009/48/ec of the European Parliament and of the Council of 18 June 2009 on the safety of toys. See at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:170:0001:0037:EN:PDF>

¹²Status Report: Review of Metals in the Toy Safety Standard ASTM F 963 (2012) Consumer Product Safety Commission, United States of America. See at: <http://www.cpsc.gov/PageFiles/93496/F963status03142012.pdf>

Materials and Methods

Sample collection of toys

In 2012-13, Environment and Social Development Organization (ESDO) of Bangladesh collected 40 toy samples from the markets of Dhaka city. The selection was based on the country of origin, composition and color.

Samples were then coded and sent to Nepal Bureau of Standard and Metrology (NBSM), Nepal for testing. This was done due to the lack of reliable X-ray Fluorescence (XRF) machine in Bangladesh and Nepal being the partner country of this project. The concentrations of heavy metals in the collected samples were analyzed by using XRF analyzer in the lab of NBSM. The XRF instrument shows the content of elements in the surface layer of an object. Energy transfers are measured by exposing the object to X-ray or gamma radiation.

Laboratory study to identify toxic chemicals

The analysis of major and trace elements in geological materials by XRF is made possible by the behavior of atoms when they interact with X-radiation. An XRF spectrometer works because if a sample is illuminated by an intense X-ray beam, known as the incident beam, some of the energy is scattered, but some is also absorbed within the sample in a manner that depends on its chemistry.

When this primary X-ray beam illuminates the sample, it is said to be excited. The excited sample in turn emits X-rays along a spectrum of wavelengths characteristic of the types of atoms present in the sample. The atoms in the sample absorb X-ray energy by ionizing, ejecting electrons from the lower (usually K and L) energy levels. The ejected electrons are replaced by electrons from an outer, higher energy orbital. When this happens, energy is released due to the decreased binding energy of the inner electron orbital compared with an outer one. This energy release is in the form of emission of characteristic X-rays indicating the type of atom present.

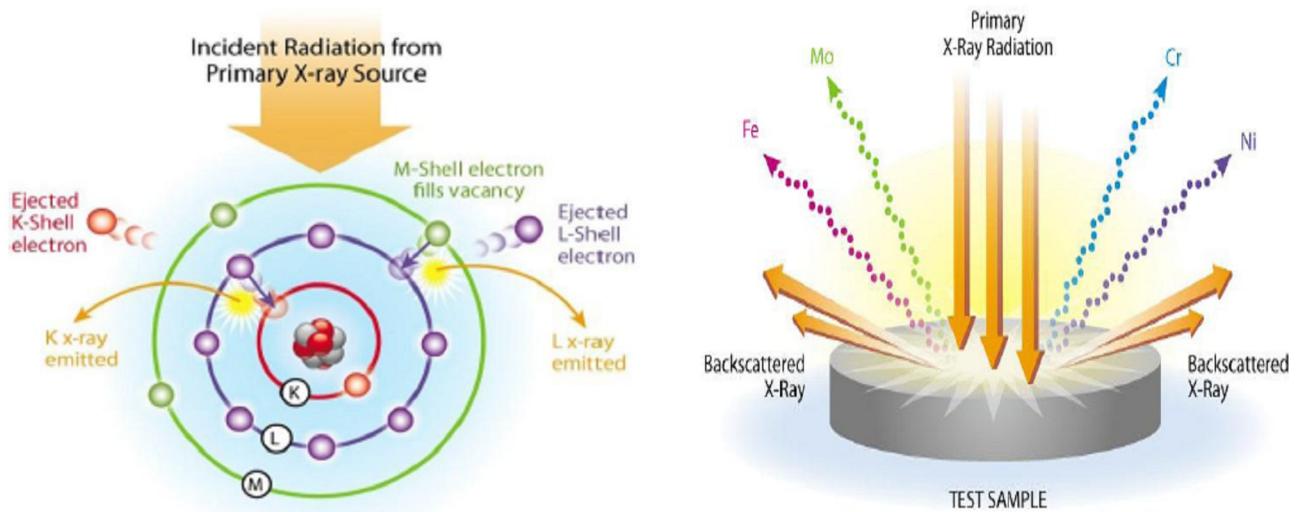


Figure 8: Working principle of XRF

Survey of Public Perception

A structured questionnaire (Appendix 2) was developed and survey was carried out during 2012-13 session. Based on questionnaire survey primary data were collected from peoples having their own child. 50 interviewees were taken into consideration for collecting required information.



Figer 9: Toy Retailer at Dhaka Market

Results and Discussion

Heavy Metals in Toys

A total of 40 different types of toys which are mostly available in Bangladeshi market were purchased and analyzed to know the heavy metals load in them. The complete test results are provided in Appendix 3. The sample results are expressed as parts per million (ppm) (Figure 9).

From the study, the average concentration of heavy metals found are lead 401.78 ppm, mercury 0 ppm, cadmium 18.48 ppm, bromine 311.97 ppm and chromium 330.44 ppm which is much higher than the EU standard (Table 3).

The highest level of lead concentration was found as 8305.8 ppm in a clay based cup of yellow color which is about 615 times higher than the EU standard. Cadmium was found the highest as 490.5 ppm in the same cup which is about 258 times higher than EU limit. Chromium was found the highest as 2502.2 ppm in the same cup which is about 66 times higher than the EU limit. Simultaneously, the highest bromine concentration was found as 3923 ppm in a plastic camera of silver color. It was surprising that in the 40 studied toys no mercury level was found which a very good sign of this study is. However, it's true that the lowest limits of the heavy metals of the analyzed toy samples also crossed the detection limit of EU.

Table 3: Concentration range of heavy metals in the studied toys

Heavy metals	Range	Concentration (ppm)	Average (ppm)
Lead	Lowest	21.4	401.78
	Highest	8305.8	
Mercury	Lowest	0	0
	Highest	0	
Cadmium	Lowest	16.2	18.48
	Highest	490.5	
Bromine	Lowest	5.6	311.97
	Highest	3923	
Chromium	Lowest	9.6	330.44
	Highest	2052.2	

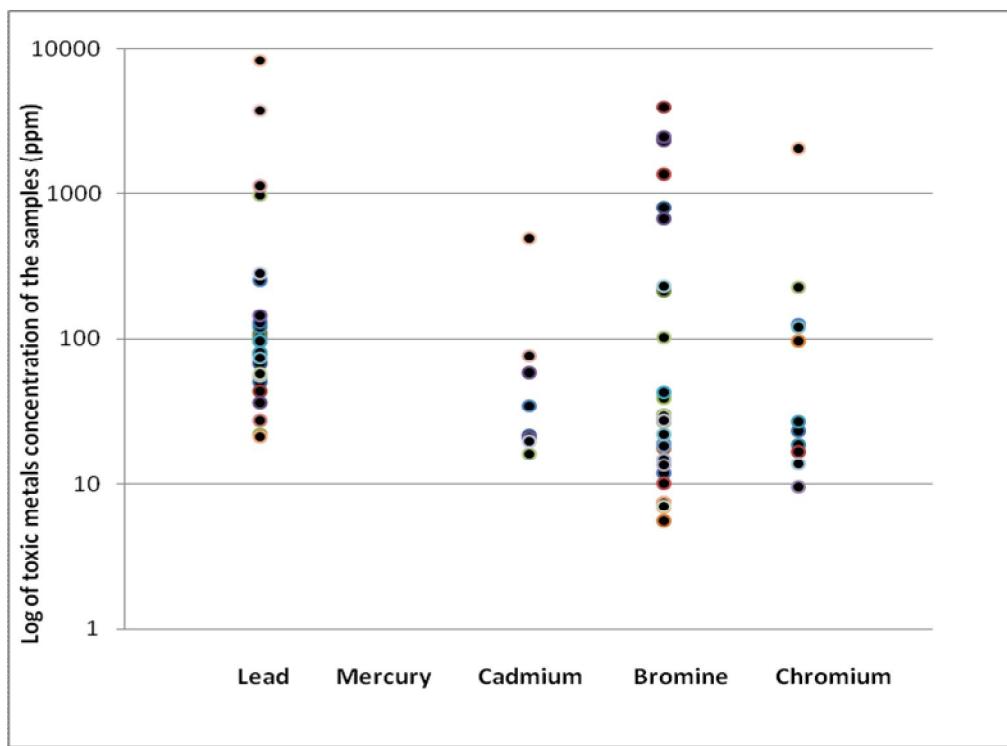


Figure 10: Heavy metals content of 40 analyzed toys

Study results show that, bromine was in the top position in terms of percentage of heavy metals load. 75% of the samples were contaminated with bromine following lead 62.5%, chromium 27.5%, cadmium 20% and mercury 0%.

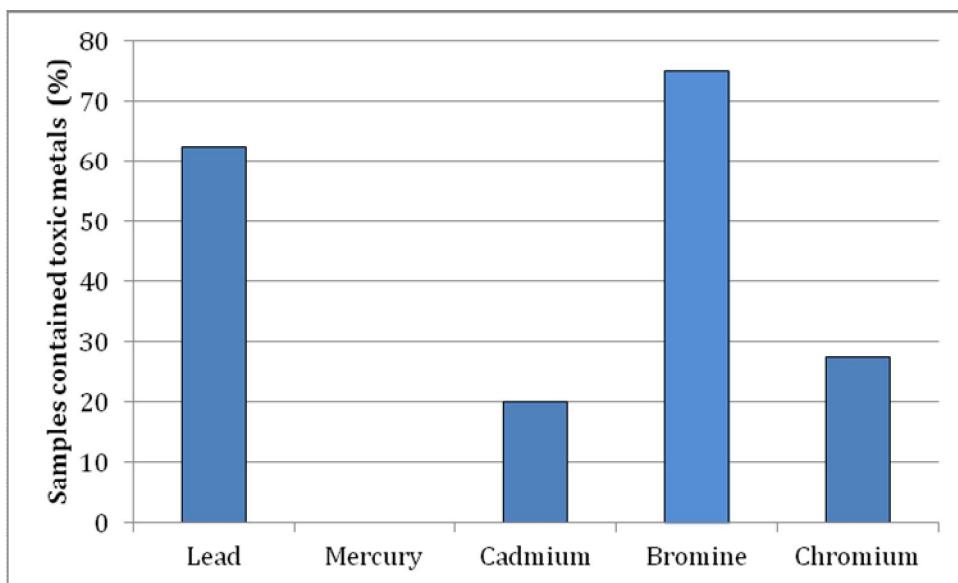


Figure 11: Percentage of samples contained different heavy metals

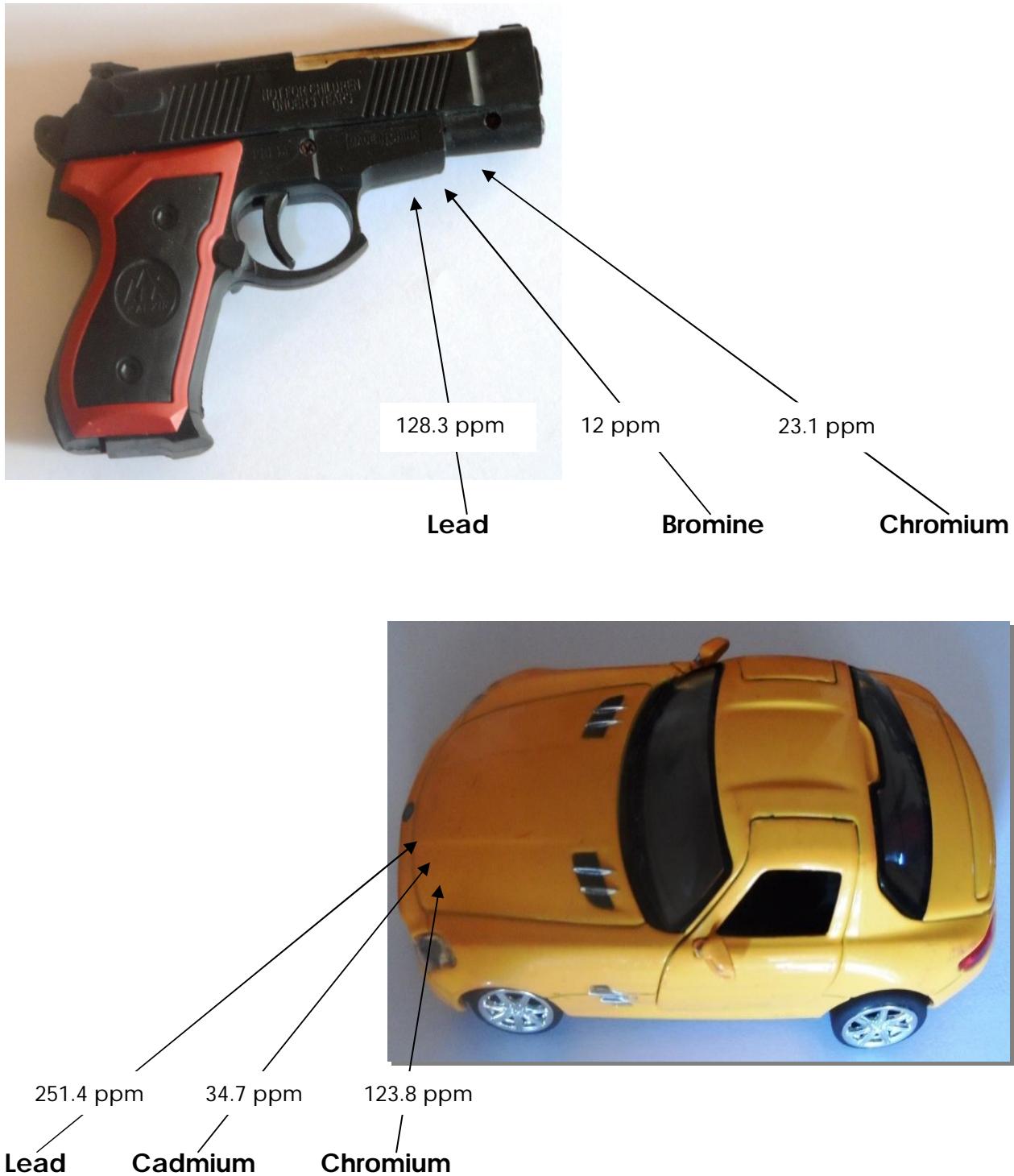


Figure 12: Detailed analysis of two toy samples

Public Perception

Knowledge of toy safety is one of the basic needed informations for the parents in respect of childcare. It's not only the matter of toxic metals but children's age is also a fact of choosing the right toys. In Bangladesh, parents sometimes introduce inappropriate toys to their children which don't match their age, height or maturity. From the present study it was found that only 12% of the parents are aware of the toxicity caused by toys which denotes that nearly 47 million children of Bangladesh are in great danger.

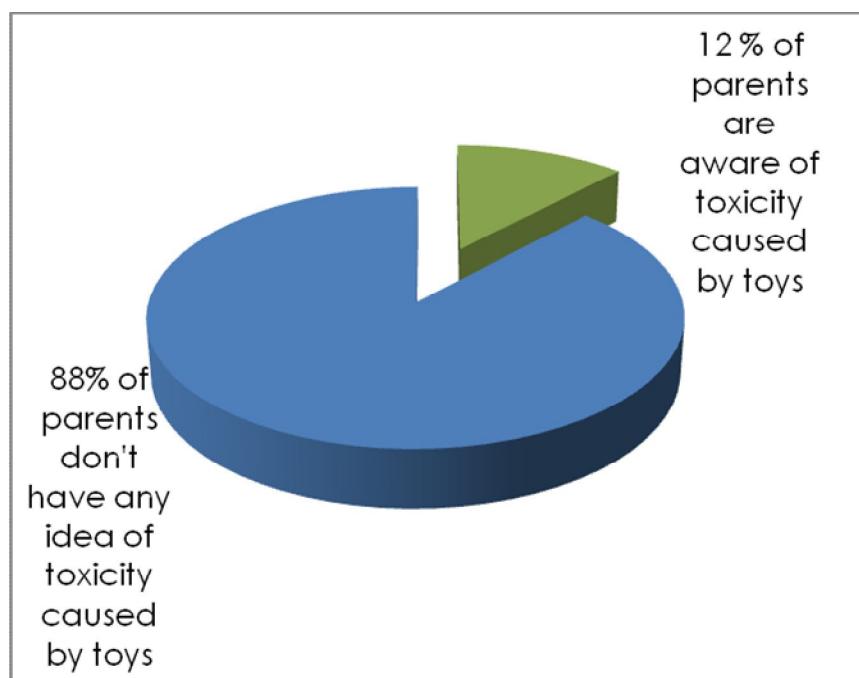
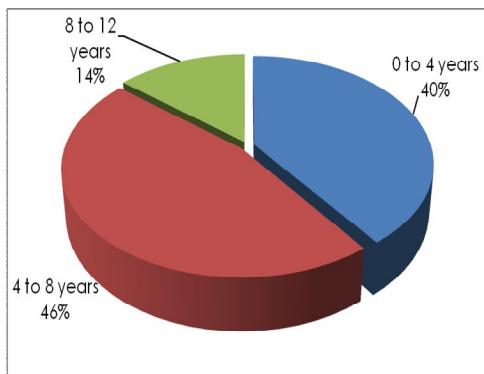


Figure 13: Awareness level of Bangladeshi parents about toxicity of toys

Developed countries all over the world are now creating awareness of toy safety on parental level. The U.S. Consumer Product Safety Commission (CPSC) closely monitors and regulates toys. Any toys made in or imported into the United States after 1995 must comply with CPSC standards¹³ and some general guidelines of toy-shopping by CPSC are: toys made of fabric should be labeled as flame resistant or flame retardant, stuffed toys should be washable, painted toys should be covered with lead-free paint, art materials should say nontoxic, crayons and paints should say ASTM D-4236 on the package, which means that they've been evaluated by the American Society for Testing and Materials.

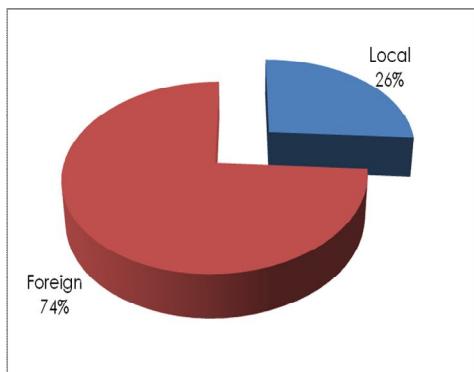
¹³ http://kidshealth.org/parent/firstaid_safe/home/safe_toys.html?tracking=P_RelatedArticle

The results of the perception of Bangladeshi parents about toxic metals in toys are shown below:



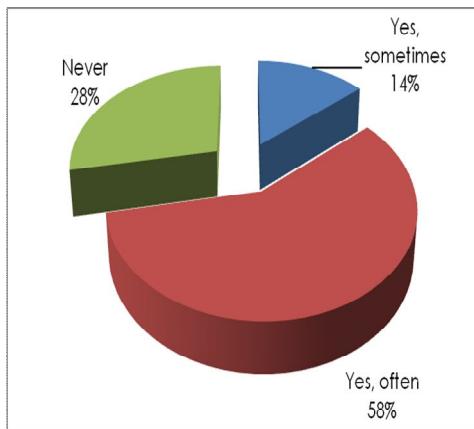
This study was based on 50 children of different ages where Figure 13 shows that 40% of the children was between 0-4 years of age following 46% between 4-8 years and 14% between 8-12 years of age.

Figure 14: Age of the surveyed children



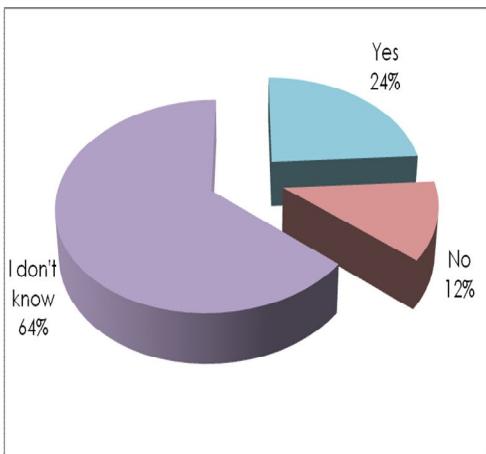
When parents were asked It was found that there is a tendency among parents to buy foreign colorful toys for their child. Figure 14 shows that 74 % of the parents buy foreign toys where only 26% buy local toys for their children.

Figure 15: Toy purchase rate on the basis of origin



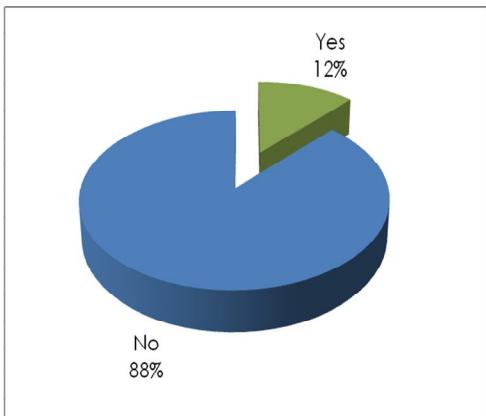
Parents shared their observation that children tend to seek oral motor or sensory input by putting toys in their mouth. 58% of parents mentioned that it's common to their children where 14% said that it's occasional and 28% said that it's totally uncommon to their children.

Figure 16: Percentage of children tend to seek oral motor or sensory input by putting toys in their mouth



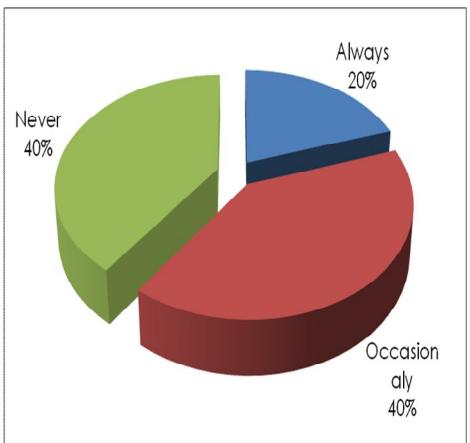
The majority of the parents of Bangladesh are unaware about safety of toys as 64% of the parents don't have any idea whether the toys they buy are safe or not. Only 24% think that their toys are safe where 12% thinks it isn't.

Figure 17: Perception of the parents about safety of toys



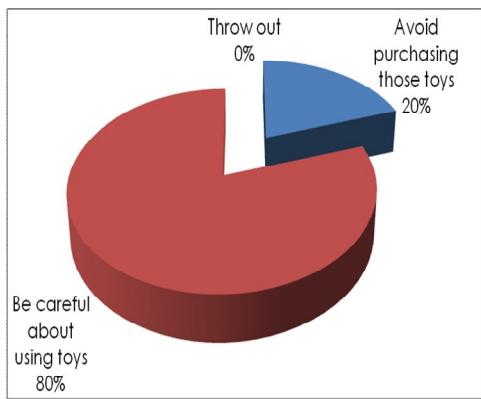
88% of the parents of Bangladesh don't have any knowledge about the toxic metals in toys where 12 % have some knowledge.

Figure 18: Idea of the parents about toxic metals in toys



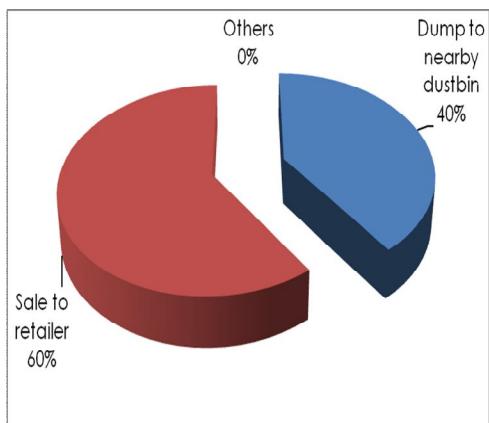
When parents were asked whether they have noticed any health problem due to using or chewing toys 20% said that it's a common phenomenon. Same number (40%) of the parents found it's occasional and never.

Figure 19: Idea about any health problem due to using or chewing toys



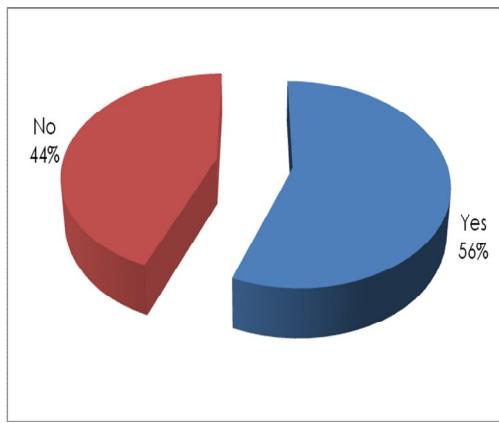
80% of the parents said that carefulness of using toys can be the next step to get rid of health problems caused by toys and 20% thinks that avoid purchasing those toys can be a solution.

Figure 20: Idea about the next step to get rid of health problems caused by toys



60% of the parents sell their discarded toys to retailers and 40% of them dump it to nearby dustbin.

Figure 21: Disposal of the discarded toys



56% of the parents realized that their discarded toys can affect the environment where 44% said that they don't think it will.

Figure 22: Idea about whether the discarded toys can affect the environment

Conclusion

Most of the toys in Bangladesh contain high content of toxic metals and there is no question about its effect. Children sleep with toys, put them in their mouths and even put them in their food. Lead, mercury, cadmium, bromine and chromium are highly poisonous metals (regardless if inhaled or swallowed) affecting almost every organs and systems in the body. From the study it was found that all the toy samples contained excess level of toxic metals except mercury which is alarming for our future generation. It's also disappointing that the parents don't have much idea of this issue. So, it's high time to take toy safety issue seriously and conduct awareness programs at different levels. Proper government regulation is also needed to stop importing toxic metals loaded toys. Future works need more comprehensive study regarding this issue and we are looking forward for the cooperation from the institutions and government.

Recommendations

- **Manufacturers** should follow consumer protection regulations limiting the amount of toxic metals allowed in children's toys. Along with, cautionary message i.e. labeling should be used on the packet of toys.
- **Government** should formulate a strict policy to ban on the import, manufacture, sell of toy that contains excess heavy metals. Also governments should force manufacturers to provide all hazardous and health-impact information of their products to them.
- **International** treaty on toxic metals free children products is necessary to ban toxic metals in toys.
- **Consumers** should be aware of the toxic metals of toys and should read the labeling of the toys carefully before purchase.
- **Media** should create mass awareness about harmful effects of toxic metals in toys.
- **Third party testing** is required to support a certification of compliance to the rules for children's products that are manufactured after the effective dates listed with each rule.

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Appendix 1: Factsheets of Toxic Metals Found in Toys

	Fact Sheet: Lead			
<ul style="list-style-type: none"> • Lead is a naturally occurring, soft, bluish-gray heavy metal • 50% of lead used today comes from recycled materials such as car batteries • <i>Plumbum</i>, the Latin word for lead, is the origin of the word plumber • Metals elemental symbol is Pb • Industrial emissions, combustion of leaded gasoline and widespread use of lead-based paint have all contributed to a vast amount of air, water and soil pollution in the 20th Century 				
Exposure to Lead				
<p>Lead is a very hazardous toxic, particularly for children, when it is accidentally inhaled or ingested. Though lead is found frequently in our environment, it has no known purpose in our bodies. When lead gets inside the body, the body confuses it with calcium and other essential nutrients. This confusion can cause permanent damage to the health of both children and adults. Until its harmful properties were discovered, lead was widely used in many everyday products such as paint, plumbing pipe, gasoline, pottery glaze, and furniture finish. Waste of lead can affect the environment in many ways. It may affect the soil, plants, micro-organisms and animal life cycle as well.</p>				
Harmful Health Effects by Lead				
Children	<p>For children, the main target for lead toxicity is the nervous system. Even very low levels of lead in the blood of children can result in-</p> <p>In rare cases, ingestion of lead can cause seizures, coma and even death for children.</p>	<ul style="list-style-type: none"> ✓ Permanent damage to the brain and nervous system, leading to behavior and learning problems, lower IQ, and hearing problems; ✓ Slowed growth; ✓ Anemia; 		
Pregnant Women	<p>Lead can accumulate in our bodies over time, where it is stored in bones along with calcium. During pregnancy, lead is released from bones as maternal calcium is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. Lead can also be circulated from the mother's blood stream through the placenta to the fetus. Lead in a pregnant woman's body can result in serious effects on the pregnancy and her developing fetus, including-</p>	<ul style="list-style-type: none"> ✓ Miscarriage; ✓ Reduced growth of the fetus and premature birth; 		
Adults	<p>Lead is also harmful to other adults. Adults exposed to lead can suffer from-</p>	<ul style="list-style-type: none"> ✓ Nervous system effects; ✓ Cardiovascular effects, in increased blood pressure and incidence of hypertension; ✓ Decreased kidney function; ✓ Reproductive problems (in both men and women); 		



Fact Sheet: Mercury

- Mercury is a naturally occurring element that is found in air, water and soil.
- Exposure to mercury – even small amounts – may cause serious health problems, and is a threat to the development of the child *in utero* and early in life.
- Mercury may have toxic effects on the nervous, digestive and immune systems, and on lungs, kidneys, skin and eyes.
- Mercury is considered by WHO as one of the top ten chemicals or groups of chemicals of major public health concern.
- People are mainly exposed to methylmercury, an organic compound, when they eat fish and shellfish that contain the compound.

Exposure to Mercury

Most people are exposed to low levels of mercury, often through chronic exposure (continuous or intermittent long term contact). However, some people are exposed to high levels of mercury, including acute exposure (exposure occurring over a short period of time, often less than a day).

Factors that determine whether health effects occur and their severity include:

- the type of mercury concerned;
- the dose;
- the age or developmental stage of the person exposed (the foetus is most susceptible);
- the duration of exposure;
- the route of exposure (inhalation, ingestion or dermal contact).

Generally, two groups are more sensitive to the effects of mercury. Foetuses are most susceptible to developmental effects due to mercury. Methylmercury exposure in the womb can result from a mother's consumption of fish and shellfish. It can adversely affect a baby's growing brain and nervous system. The primary health effect of methylmercury is impaired neurological development. Therefore, cognitive thinking, memory, attention, language, and fine motor and visual spatial skills may be affected in children who were exposed to methylmercury as foetuses.

The second group is people who are regularly exposed (chronic exposure) to high levels of mercury (such as populations that rely on subsistence fishing or people who are occupationally exposed). Among selected subsistence fishing populations, between 1.5/1000 and 17/1000 children showed cognitive impairment (mild mental retardation) caused by the consumption of fish containing mercury. These included populations in Brazil, Canada, China, Columbia and Greenland.

Harmful Health Effects by Mercury

Elemental and methylmercury are toxic to the central and peripheral nervous systems. The inhalation of mercury vapour can produce harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal. The inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested. Neurological and behavioural disorders may be observed after inhalation, ingestion or dermal exposure of different mercury compounds. Symptoms include tremors, insomnia, memory loss, neuromuscular effects, headaches and cognitive and motor dysfunction. Mild, subclinical signs of central nervous system toxicity can be seen in workers exposed to an elemental mercury level in the air of 20 µg/m³ or more for several years. Kidney effects have been reported, ranging from increased protein in the urine to kidney failure.



Fact Sheet: Cadmium

- Cadmium is a metal found naturally in the earth's crust.
- It is a chemical element with the symbol **Cd** and atomic number 48.
- This soft, bluish-white metal is chemically similar to the two other stable metals in group 12, zinc and mercury.
- Pure cadmium is a soft, silver-white metal and it's unusual to find it in its pure form.
- It's commonly found in combination with other elements such as oxygen (cadmium oxide) or sulphur (cadmium sulphate).
- The cadmium used in industry is a byproduct of zinc, lead, and copper refining. Industrial uses of cadmium include production of metal plating, rechargeable batteries, paint pigments, and plastics. Cadmium can be found in dust.

Exposure to Cadmium

Drinking/Eating: People can be exposed to cadmium when they eat plants grown in contaminated soil, or when they eat fish from contaminated water. Cadmium occurs naturally at low levels in many foods. The normal intake of cadmium (1-3 micrograms/day) does not appear to cause health problems. People can be exposed to increased amounts of cadmium by drinking contaminated water. Contamination of drinking water typically results from improper disposal of industrial chemicals.

Breathing: Cadmium is found in smoke from burning fossil fuels, municipal wastes, and cigarettes. People who smoke cigarettes have higher cadmium levels in their bodies than nonsmokers. Industrial facilities that process metal can create high levels of cadmium in the air and significantly increase the exposure of people living or working near them.

Touching: Cadmium is not easily absorbed through the skin.

Harmful Health Effects by Cadmium

• Symptoms may occur immediately or shortly after exposure to high levels of cadmium	<ul style="list-style-type: none">✓ Stomach irritation after ingestion of contaminated food or water;✓ Lung irritation following inhalation of cadmium particles or fumes at levels greater than 300 mg/m³;
• Health effects which can occur after several years of exposure to cadmium	<ul style="list-style-type: none">✓ Cancer can develop after long-term, high-level exposure to airborne cadmium;✓ Lung disorders, including emphysema or bronchitis, can develop after long-term exposure to cadmium in air. Kidney damage and/or kidney stones can form as a result of eating, drinking, or breathing elevated levels of cadmium;

However, the potential risks from cadmium exposure have been extensively studied, and are now tightly controlled by occupational exposure standards, regulations for cadmium in ambient air, water and soil, and legislation covering cadmium emissions, labeling and disposal of cadmium-containing products, and impurity levels in other products such as fossil fuels, fertilizers and cement.



Fact Sheet: Bromine

- Bromine is a chemical element with the symbol **Br**, and atomic number of 35
- It is a naturally occurring element which is liquid at room temperature
- It has a brownish-red color with a bleach-like odor, and it dissolves in water
- Bromine is found naturally in the earth's crust and in seawater in various chemical forms.
- Bromine can also be found as an alternative to chlorine in swimming pools
- Products containing bromine are used in agriculture and sanitation and as fire retardants (chemicals that help prevent things from catching fire)
- Some bromine-containing compounds were historically used as sedatives (drugs that can make people calm or sleepy). However, these drugs are for the most part no longer found on the market in the United States

Exposure to Bromine

- Following the release of bromine into water, one could be exposed by drinking the contaminated water.
- If food becomes contaminated with bromine, one could be exposed by eating the contaminated food.
- Following release of bromine gas into the air, one could be exposed by breathing the fumes.
- Skin exposure to bromine could occur through direct contact with bromine liquid or gas.
- Bromine gas is heavier than air, so it would settle in low-lying areas.

Harmful Health Effects by Bromine

Immediate:

Breathing bromine gas could cause one to cough, have trouble breathing, get a headache, have irritation of ones mucous membranes (inside your mouth, nose, etc.), be dizzy, or have watery eyes.

Getting bromine liquid or gas on ones skin could cause skin irritation and burns. Liquid bromine that touches ones skin may first cause a cooling sensation that is closely followed by a burning feeling.

Swallowing bromine-containing compounds (combinations of bromine with other chemicals) would cause different effects depending on the compound. Swallowing a large amount of bromine in a short period of time would be likely to cause symptoms such as nausea and vomiting (gastrointestinal symptoms).

Long-term:

Survivors of serious poisoning caused by inhaling (breathing in) bromine may have long-term lung problems.

People who survive serious bromine poisoning may also have long-term effects from damage done by what is called systemic poisoning, for example, kidney or brain damage from low blood pressure.



Fact Sheet: Chromium

- Chromium is an element existing in several different forms
- Many chromium-containing compounds are used for plating, manufacturing paints and dyes, tanning leather and preserving wood
- The normal intake from eating foods that are high in natural chromium is 70-80 micrograms per day and is considered safe
- "Hexavalent" chromium is the most toxic form of chromium, and is shown to cause lung cancer when workers are exposed to high air levels for long time periods.

Exposure to Chromium

Breathing: People can be exposed to chromium by breathing chromium dust or fumes. This is the route of exposure that is of greatest concern.

Drinking/Eating: Most human exposure to chromium occurs when people eat fresh vegetables, meats, fish, and poultry. Drinking water is not normally a major source of exposure. Plants can absorb chromium and it can be passed to those who eat the plants.

Touching: Contact with contaminated soils can result in exposure to chromium. Exposure can be reduced by thorough washing of exposed skin and clothing to remove soil residues. Chromium can pass through the skin, but this is probably not a major route of exposure.

Harmful Health Effects by Chromium

The following health effects may occur immediately or shortly after exposure to high levels of chromium:

- Irritation to mouth, throat, lungs, and nose following inhalation of hexavalent chromium particles;
- Skin irritation and allergic reactions;
- Digestive problems, kidney damage, and liver damage after eating food or drinking water contaminated with hexavalent chromium;

The following health effects can occur after several years of exposure to chromium:

- Cancer: Lung cancer can develop after exposure to hexavalent chromium vapors or fumes.
- Respiratory: Lung irritation resulting in asthma can be caused by hexavalent chromium.
- Organ Systems: Chromium exposure can cause liver and kidney damage.
- Immune System: Animal studies show changes in immune system function.
- Reproductive Effects: Animal studies show damage to developing fetuses and lowered sperm production in males.

In general, chemicals affect the same organ systems in all people who are exposed. However, the seriousness of the effects may vary from person to person. A person's reaction depends on several things, including individual health, heredity, and previous exposure to chemicals including chromium and medicines, and personal habits such as smoking or drinking.

It is also important to consider the length of exposure to the chemical; the amount of chemical exposure; and whether the chemical was inhaled, touched, or eaten.

Appendix 2:

Survey Questionnaire on Toxic Metals in Toys

[For consumer]

Time:	Date:	Location.....	
Part-1 [Participant's Identical outline]			
Name			
Sex	Male _____	Female _____	
Age	≥ 20 _____, 20- 30 _____, 30- 40 _____, 40- 50 _____, ≥ 50 _____		
Education	Illiterate _____, Primary education _____ High school education _____ Higher education _____		
Income	5000-7000 _____ 25000-35,000 _____	5000-10,000 _____ ≥ 45000 _____	10,000-20,000 _____
Part-2 [Survey Questions]			
1. How old is your child?	a) 0 - 4 b) 4 - 8 c) 8 - 12		
2. What type of toy do you usually buy for your child?	a) Local b) Foreign		
3. Does your child tend to seek oral motor or sensory input by putting toys in their mouth?	a) Yes, sometimes b) Yes, often c) No, never		
4. Do you feel that most of the toys you purchase for your children are safe for them?	a) Yes b) No c) I don't know		
5. Do you have any idea about toxic metals in toys & children products?	a) Yes b) No		
6. Have your child ever face any health problem due to using toys or chewing toys?	a) Yes, often b) Sometimes c) No, never		
7. Considering this poisoning of toxic metals in child products, what is your next step to get rid of health problem?	a) Avoid purchasing those toys b) Be careful about using toys c) Throw out		
8. Where do you dispose the discarded toys?	a) Dump to nearby dustbin b) Sale to retailer c) Others		
9. Do you think the discarded toys indiscriminately disposed can affect the environment?	a) Yes b) No		

Name:

Signature _____

Appendix 3:

Results of Heavy Metals Information of the 40 Analyzed Toys

S. No./ Sample Code	Name	Composition	Color	Heavy Metal Concentration in tested Children Toys (ppm)				
				Lead	Mercury	Cadmium	Bromine	Chromium
BGD-001	Puzzle	Plastic	Green	68.03	-	21.6	802.1	-
BGD-002	Writing Board	Plastic	Red and White	-	-	-	7.4	-
BGD-003	Tennis Bat	Plastic	Green	-	-	-	215.9	-
BGD-004	Binocular	Plastic	Silver and Black	107.8	-	-	2347.8	-
BGD-005	Cup	Ceramic	Red and White	79	-	-	-	-
BGD-006	Ball	Sponge Form	Mixed	-	-	-	17.6	-
BGD-007	Doll	Plastic	Mixed	50.6	-	-	-	-
BGD-008	Camera	Plastic	Silver	43.5	-	-	3923	-
BGD-009	Gun	Plastic	Black	104.5	-	-	30.1	-
BGD-010	Watch	Plastic	Black	36.8	-	58.3	669.4	-
BGD-011	Kitchen Tool	Plastic	Silver	119.8	-	-	27.5	18.7
BGD-012	Gun	Plastic	Red	-	-	-	5.6	-
BGD-013	Gun	Plastic	Black	128.3	-	-	12	23.1
BGD-014	Helicopter	Plastic	White and Yellow	-	-	-	1348.8	16.9
BGD-015	Bubble	Plastic	Green	22.1	-	-	26.8	-
BGD-016	Puzzle	Plastic	Mixed	96.2	-	20.9	2444.8	-
BGD-017	Mask	Plastic	Purple	81.3	-	-	18.9	26.7
BGD-018	Mask	Plastic	Red	-	-	-	-	97.6
BGD-019	Car	Metal & Plastic	Yellow	251.4	-	34.7	-	123.8
BGD-020	Target Gun	Plastic	Green and Yellow	-	-	-	10.2	-
BGD-021	Chimpanzee Doll	Hard Plastic	Gray, Yellow and Orange	-	-	-	39.2	-
BGD-022	Toy Car	Metal & Plastic	Gray, Red and Skyblue	144.8	-	-	-	-
BGD-023	Photo Frame	Plastic	Goden Yellow	96.1	-	-	43.1	-
BGD-024	Doll with music	Cotton and Metal	Yellow and Orange	-	-	-	6.9	-
BGD-025	Wooden Board Puzzle	Wood	Blue and Yellow	-	-	-	18.5	-
BGD-026	Wooden Board Puzzle	Wood	Mixed	27.2	-	-	-	-
BGD-027	Wild Animals	Rubber	Mixed	971.5	-	16.2	102.8	226.6
BGD-028	Doll	Cotton Fabric	Skin and Yellow	-	-	-	7.2	9.6

BGD-029	Tennis Ball Nivia	Rubber and Cotton	Red	73.2	-	-	21.8	120.7
BGD-030	Spider Man Doll with key	Hard Plastic	Red and Yellow	21.4	-	-	7.5	-
BGD-031	Horse	Plastic	Red and Green	55.7	-	-	14.9	-
BGD-032	Ball	Rubber	Golden, Red and Blue	1121.9	-	76.9	-	-
BGD-033	Globe	Plastic and Paper	Mixed	57.4	-	-	29.4	-
BGD-034	Flower	Fabric	Red and Green	-	-	-	13.6	-
BGD-035	Hanging Doll	Cotton and Metal	Blue and White	-	-	-	231.4	13.7
BGD-036	Cup	Clay	Yellow	8305.8	-	490.5	-	2052.2
BGD-037	Car	Metal	Red	281.7	-	19.9	-	-
BGD-038	Male Hanging Doll	Plastic and Fabric	Mixed	3725.3	-	-	-	-
BGD-039	Doll	Plastic	Yellow	-	-	-	7	-
BGD-040	Ball	Plastic	Orange	-	-	-	27.4	-

Appendix 4:

Photographs: Some of the Toxic Toys in Dhaka Market



"Toxic-Free Toys : Healthy and Smiley Children"



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