

# Study on how rural and urban communities understand the risks of Agro-chemicals in foods

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**Abstract:** Food production is an essential factor in the growing population of the world. Base on this factor, various methods are used to accelerate food production and productivity in different contexts. In that process, chemicals are used on a large scale at different stages. Today this situation is affecting various aspects of human lives and it is also affecting to change the buying patterns of the consumers. Considering this, a study has been conducted on how rural and urban communities perceive the risks of agro-chemicals in food when food purchases. The main purpose of this is to identify how rural and urban communities perceive the risks of agro-chemicals in food, and as a sub-objective, how much consumers are aware of the agro-chemicals in foods and how chemicals in foods effect on the behavior of consumers. It can also be called whether the way is informed. The impact of agro- chemicals in food exposure on rural and urban communities is a matter of concern and a comparative study is being conducted in Passara and Maharagama Divisional Secretariats. Information were obtained from 200 houses by covering 100 houses equally in each Divisional Secretariat Division through questionnaires and interviews. The findings of the study revealed that, only 100% of the urban population buys food, 62% of the rural population buys where they cultivate the rest of 38% on their own. Almost all urban dwellers who buy food when they are aware of the dangers of agro- chemicals contained food. The main problem facing the people is the high cost of agrochemical free food. Although this is not considered by most of the urban community, it has been a decisive factor in focusing on the rural community. Most respondents had expressed interest in healthy and nutritionally rich food as well as environmental concerns and sustainability. The most important consideration when buying food is the family's preferences and low cost, respectively. Most food buyers are at an optimal level of awareness of the chemical risks in foods. Also, although awareness of the dangers of chemicals in foods is similar in urban and rural areas, it can be concluded that the response to food purchases is different in urban and rural areas.

**Keywords:** Food, Risk, Consumption, Chemicals

## I. INTRODUCTION

Today, chemicals have become an essential part of the food production process. This was a by-product of the Green Revolution and led to an exponential increase in world food production. Until the 15th century, the use of modern technology for agriculture was minimal. Then came the era of chemical agriculture with the agrarian revolution, which saw the widespread use of chemicals from crop cultivation to the end of the food production process (Gunasekara, 2004). The unfortunate situation here was that the negative effects of the

chemical increased. As a result, traditional agriculture based on the subsistence agrarian economic system that existed in the country in the past has now become a large-scale production process. The people of the world enjoyed the good results of the Green Revolution, but many of the evils that arose at the same time were socialized. This can be referred to as the chemical hazard present in food. Its main effect can be seen in the increase in the amount of chemicals used in food, which directly affects the consumers of Sri Lanka and has a wide range of social, economic and health risks. For example, it can be taken the changes occurred in farming, food processing, and transportation. Chemicals can contain a variety of toxic chemicals, some of which can have a variety of health effects on humans. These are not harmful if they are not exposed to prolonged and high levels. Scientists help to safeguard against these harmful effects by establishing safe levels (European Food Safety Authority, 2016). These effects vary according to the social status of the rural and urban areas and have been extensively studied in this study.

Food consumption patterns are changing rapidly nowadays. Issues such as environmental awareness, the nutritional value of food and health concern have influenced the consumer's food purchase decision. Therefore, factors such as eco-friendliness, health-friendly and knowledge of organic food have become a major motivator for the consumption of organic products. This statement is supported by several studies which have concluded that consumers buy organic products due to organic products being healthier, safer, tastier, with better quality and most importantly environmental friendly compared to conventional products (Dumea, 2012). Chemicals are the components needed to create everything in the world. All living things, including humans, animals, and plants, are made up of chemicals. All foods are made from chemicals. The agrochemicals in foods are harmful to the body, and almost every chemical in the food is harmless, and most foods contain chemical compounds such as carbohydrates, proteins, fats, and fiber. Many of these add up naturally and contribute to a diet. Some chemicals are naturally present in the food chain. For example, it can be seen how these chemicals are mixed in farming, food processing, and transportation. Chemicals can have a variety of toxicological properties, some of which might cause effects in humans usually, these are not harmful unless we are exposed to them for a long time and at high levels. Scientists

help to safeguard against these harmful effects by establishing safe levels (European Food Safety Authority, 2016).

Consumers should have knowledge about the goods that they are purchasing from the market. This is especially important when the consumers purchase food products for their consumption. At present, there is an issue regarding the chemical additives in food which are available in the market. If this is properly communicated to the consumers there is no doubt, since they know it has a risk for their health, they would reduce purchasing in all possible ways. This may compel them to identify food with minimum additives of chemicals affecting demand and the demand pattern for different foods (Wijekoon & Prasad, 2020). However, there is a dearth of studies focused on this matter in the Sri Lankan context. Therefore, this study investigates how the rural and urban communities understand the risks of chemicals in foods.

This research has been conducted with the aim of finding how rural and urban communities understand the risks of chemicals in foods. Therefore, the research study was carried out in the covering Passara DSD as a rural and Maharagama DSD as an urban area. Thus, it can be considered as a comparative analysis of consumer behavior in both rural and urban communities living in the surveyed area.

Objectives of the research were,

- To identify how rural and urban communities understand the dangers of agro-chemicals in foods.
- To evaluate the role played by media and other source of communication has on the awareness about chemical among consumers
- To Identify through which communication methods consumers have gained knowledge of the chemicals present in food
- To identify how consumers are aware of agro-chemicals in foods.
- To identify how agro-chemicals in foods affect consumers

## II. MATERIALS AND METHODS

### 2.1 Study Area

A comparative study is being conducted in the Passara and Maharagama Divisional Secretariats.

Passara DSD is an agricultural DSD where tea, vegetables and paddy are cultivated with a population of around 48,000 (2012 statistics). Lack of irrigation facilities in these areas adversely affects paddy cultivation. Chena cultivation is done in dry highlands and vegetables and crops are grown in chenas. The industrial sector is comparatively less developed, and some industries generate income to a certain extent where the required resources are regionally available. Also, tourism is popular in some areas.

Maharagama is a DSD in Colombo District, Sri Lanka on the High-Level (A4) Road about 10 km from the center of the commercial capital. It developed rapidly in the 1980s as a

dormitory suburb with a population of around 208,802 (2012 statistics). Maharagama DSD is the home to rich section as well as a section living below the poverty line. Majority of the population engaged in the service sector and industrial sectors while the population living in sub-urban areas are engaged in cultivation.

### 2.2 Selection of Sample and Sample Sizes

The suitable samples were selected from two areas, representing both urban and rural sectors. Data were obtained from Passara DSD, and Maharagama DSD representing rural and urban areas. 200 Householders were included from Maharagama DSD (100 Householders) and Passara (100 Householders) where A total of 100 house holders were selected for this research from random sampling method.

When considering the prominent reason for the particular sample selection, the main occupation of the people in the Passara DSD is farming. A majority of them cultivate vegetables and fruits for consumptions and for selling purposes. Additionally, they use high amounts of pesticide in their cultivation. Therefore, they have an understanding of the chemicals used in agriculture. Focusing on Maharagama, Majority of the population engaged in the service sector and industrial sectors. Only sub-urban area peoples were engaged in cultivation. But it is very rare. As a result, they may not have as much understanding of the chemicals they use in food production

### 2.3 Data collection and Analysis

Data collection was done by using both primary and secondary sources. Primary data were collected through a questionnaire. In addition, 100 interviews have also been conducted with householders in two areas, representing both urban and rural sectors. Data were obtained from Passara DSD, and Maharagama DSD representing rural and urban areas. 200 Householders were included for the present study from Maharagama DSD (100 Householders) and Passara (100 Householders). Structured intercept interviews were conducted in different places, on different days and at different times of the day over-representation.

Qualitative data analysis was performed and especially the study depended on the primary data. To analyze the qualitative data especially in the case study method; interviews have been conducted and answers summarized. SPSS statistical software (version 22) was used to analyze the correlation between variables. Hypotheses were testified by using correlation analysis. To analyze other quantitative data, a content analysis was done using graphs, charts and tables.

### 2.4 Limitations

Collecting and analyzing the data for the study may not be precise and highly accurate due to following limitations which were unaccounted by the researchers.

- Some of the respondents were not able to provide required answers due to lack of awareness on chemical hazards
- Most of the respondents were more eager to give their personal view and opinions based on their own experiences instead of providing a general view about the subject

### III. RESULTS AND DISCUSSION

#### 3.1 Results

Attitude is a learned predisposition to behave in a consistently favorable or unfavorable manner with respect to a given object. Therefore, this study studies attitudes towards chemicals in foods and how their perceptions change with those attitudes. According to the results shows how rural and urban communities understand the risks of agro-chemicals in foods. For any person, the external and internal factors around the person influence the understanding of something. Data on the factors that led to their understanding were obtained through questionnaires, and the results are as follows:

Table 1. Gender Distribution in surveyed areas

		No	Percentage (%)
Sex	Male	76	38.0
	Female	124	62.0
	Total	200	100.0

According to this study, a significant number of data contributors are women. (62% - Female) and 38% - Male). This is a factor that affects the success of the research more than anything else. Because women are the deciding factor in a family's diet.

Table. 2 Level of Education

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
Level of Education	No schooling	8.0	2.0
	Grade 1-5	18.0	5.0
	Up to O/L	68.0	54.0
	Up to A/L	5.0	35.0
	Degree Level	1.0	4.0
	Total	100.0	100.0

Level of education play an important role in awareness about hazards and improved lifestyle. When focusing on the level of education of the data contributors in the two study areas used in this study, a significant difference in the level of education can be identified. The number of people who have received higher education (G. C. E. O/L and above) in Maharagama DSD is higher compared to the Passara DSD. In Maharagama DSD, combined percentage of people who have studied O/L and up to the degree level is 91%. But Passara DSD is 74%. The percentage of those who have received no formal

education and attended school only up to Grade 5 is 9% in Maharagama DSD. When it goes to Passara DSD is 26%.

Table 3. Source of Supply

	Responses	
	Percentage (%)	
	Passara DSD	Maharagama DSD
Market	64.5	100.0
Own cultivation & Market	35.5	0
Total	100.0	100.0

Based on the data received, it is possible to identify a significant difference between Passara and Maharagama in terms of food supply. There, 100% of the families in Maharagama DSD were buy food food from the Market. But in Passara, only 64.5% of respondents. Rest of the respondents in Passara DSD are use both methods (35.5%).

Table 4. Type of Market

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
From the market, then it is	Close by boutique	48.0	52.0
	Supermarket	2.0	27.0
	Weekly fair	40.0	21.0
	Economic centers	10.0	0
Total		100.0	100.0

According to data contributors in the Passara DSD, most people buy food from the nearest shop. It is 48% as a percentage. After that, most people buy food at weekly fair. It is 40%. About 10% of respondents buy food from the economic center and 2% from supermarkets, respectively. But in the Maharagama DSD the situation is completely different. 52% of people buy food from the nearest shop. Although a very small percentage of respondents in the Passara DSD buy food from supermarkets, a high percentage of 27% of respondents in the Maharagama DSD buy food from supermarkets and and 10% from weekly fair.

Table 5. Awareness on agro- chemicals in foods

	Responses	
	Percentage (%)	
	Passara DSD	Maharagama DSD
Yes	100.0	100.0
No	0	0
Total	100	100.0

According to Table 5, It can be seen that 100% of the respondents in rural and (Passara DSD and Maharagama DSD) are aware of the agro-chemical content of the food.

Table 6. Awareness on the impact of agro- chemicals in foods

	Responses	
	Percentage (%)	
	Passara DSD	Maharagama DSD
Yes	82.0	100.0
No	18.0	0
Total	100	100.0

According to this table, in the Passara DSD, 96.2%27% of respondents are aware of the hazardous impact of agro-chemicals and chemical substances on the human body and the nature. Only 18% said they have no understanding of such effects. However, a different situation can be identified in the Maharagama DSD, 100% of the respondents are aware of the hazardous impact of chemicals and chemical substances on the human body and the nature. This may be due to their higher education level.

Table 7. Understanding on the chemicals contain in imported food products

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
What is your view about chemical components contained in the imported food items?	Contain a small amount	13.0	3.0
	Contain a large amount	73.0	87.0
	Normal	5.0	8.0
	No idea	17.0	2.0
Total		100.0	100.0

People have a good understanding of the usage of chemicals in food that are been imported. Respondents in Passara DSD, 73% of respondents think it is in a large amount. 13% know that it is Contained a less amount. while 17% said they have no idea about the amount of chemicals that have been used in imported food items. Focusing on Maharagama, Its nearly same as the Passara DSD. 87% of Respondents think it is in a large amount. 8% think the percentage is normal.

Table 8. Willingness to buy food grown using chemicals

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
Do you consume foods grown using chemicals?	Yes	100.0	91.0
	No	0	9.0
Total		100	100.0

In this case, 100% of the Passara DSD respondents are consuming foods which have been grown using chemicals. But, In Maharagama DSD, Majority of the people (91%) who

participated in the survey are compelled to consume food grown using chemicals and chemical components Only 9% have moved away.

Table 9. Reasons

	Responses	
	Percentage (%)	
	Passara DSD	Maharagama DSD
Family preference	20.0	10.0
Common Accessibility	15.0	6.0
Low Cost	53.0	24.0
Convenience	12.0	60.0
Total	100.0	100.0

Respondents in Passara DSD, knows that food contains chemicals, the main reason for buying those foods, is that they are low cost (53%). Few respondents buy food at the family's preference (20%). Meantime, Respondents in the prominent reason of Maharagama DSD, is the Convenience (60%) which follows by the low cost that it stays at 24%.

Table No. 10: Awareness on illnesses caused by chemicals

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
Are you aware of the illnesses caused by consuming non-organic foods?	Yes	71.0	88.0
	No	29.0	12.0
Total		100.0	100.0

This table shows that people have a considerable percentage of understanding on the illnesses caused by consumption of non-organic food, i.e. food grown using chemicals, fertilizers, pesticides, chemical components etc.

Table 11. The source gained awareness about the agrochemicals in foods

	Responses	
	Percentage(%)	
	Passara DSD	Maharagama DSD
Television	63.0	80.0
Radio	6.0	3.0
Internet	2.0	11.0
Newspapers	21.0	2.0
Hand Bills	0	0
NGOs	0	0
Societies in the area	0	0
Through neighbors	3.0	0
Other sources	5.0	4.0
Total	100.0	100.0

No significant difference can be identified in both areas

Table No. 12: Awareness on illnesses caused by chemicals

		Responses	
		Percentage (%)	
		Passara DSD	Maharagama DSD
Are you aware of the illnesses caused by consuming non-organic foods?	Yes	91.0	94.0
	No	9.0	6.0
Total		100	100.0

According to this tables, respondents from both Maharagama and Passara have a significant understanding of foodborne illness caused by agrochemicals.

#### IV. DISCUSSION

This study examines how rural and urban communities understand the risk of agrochemicals in food and make behavioral changes in food consuming.

Awareness of the agro-chemical content of food is available without any different for both rural and urban. But the ability to respond the awareness is largely remained on the hands of the rural community. The limiting factors in the urban environment have greatly contributed to this. Rural people live in a wider free environment than the urban population and there are plenty of opportunities for choices. Passara is a rural area with a large size of land and the ability to earn for living by cultivating food items.

Maharagama is an urban area where there are exclusive outlets where chemical free products but they are available on high prices which can be afford by low-income people in the urban areas. Not only Maharagama DSD, People in both Passara and Maharagama areas major barrier to buy organic food was the high price. Most people will buy organic food if they can afford it.

With urbanization, people lead busy lives with less time to think about their health. As a result, the risk of chemical exposure to food is higher in urban areas than in rural areas. In some cases, unintentional indirect chemical exposure can also be seen.

Grown foods using agrochemicals are common in the market. There is no urban or rural difference. But there are very few food outlets that do not use agrochemicals. There are more such shops in urban areas. This is because there is a high demand for this in the urban bourgeoisie. But most of the urban people do not have the financial means to buy these

foods. As a result, people are more likely to consume food knowing that there are dangers and risks of agrochemicals in the food.

According to this study, rural population have some knowledge about agriculture. They have a considerable level of knowledge about the chemicals used in crop cultivation. Some respondents also cultivate for their own consumption. But urban people live in a different work environment. They meet their complete food needs by purchasing. As a consequence of that, perceptions of agrochemicals in foods vary from urban to rural.

But today with the advancement of communication media people in both urban and rural areas have some adequate understanding of the agrochemicals present in food.

Television has become one of the main means of educating the rural masses about this. This is due to the presence of a television in any home. Although the situation is similar for the urban population, the Internet and newspapers have made some contribution to this.

Another peculiarity identified by this study is that people in both urban and rural communities think that food imported in large quantities contains agrochemicals. According to them, the agrochemical content of Sri Lankan food is less than that of imported food which creates a dangerous situation.

Finally, this study found that understanding the risk of agrochemicals in food did not differ significantly from rural and urban. But it can be pointed out that there are slight differences between rural and urban in terms of responses.

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