Consumption Pattern of Soft Drinks and Awareness on Traffic Light Labelling System of Prepacked Soft Drinks Among Young Adults in the Ampara District

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Abstract- The survey was carried out to evaluate the soft drink consumption pattern and the awareness of the traffic light labelling system among the young adults' consumers in Ampara district. There were 204 young adult consumers used as the sample population. The self-administered questionnaire was assessed based on socio-demographics, anthropometric measurements, consumption habits, awareness of traffic light labelling system, and awareness of adverse health effects due to soft drinks consumption. The results revealed that a higher number of consumers (48.53%) were concern about the health and nutritional benefits of soft drinks while purchasing, and 43.63% of the population were consuming soft drinks for leisure purposes. Further, 73.5% of the consumers were consuming fruit juice/drinks frequently, and 26.5% fractions were consuming carbonated beverages. Further, most of the consumers (78.43%) were consuming soft drinks 1-2 times per weekly basis. There were 80.4% of the consumers aware of the traffic light labelling system, and most of them (72%) were purchasing the soft drink based on the sugar level. Hence, 71.5% of the population were consuming medium sugar levels. 81.4% of the population was aware on type 2 diabetes is related to a higher level of sugar. Eventually, most of the consumers considered their health and nutritional aspects during the purchasing by selecting a medium level of sugar and consuming 1-2 times per week. Along with, a larger proportion had aware of the traffic light labelling system for sugar-based soft drinks and were consuming considering the sugar level of soft drinks.

Keywords: soft drinks, traffic light labelling system, consumption pattern, awareness, young adults.

I. INTRODUCTION

Soft drinks are non-alcoholic drinks that mainly include fruit juices and carbonated drinks. Carbonated drinks consisting of a different chemical mixture of natural or artificial sweeteners, caffeine, water, color, flavoring agents, and chemical preservatives, injected with CO_2 gas (Shahjahan *et al*., 2019). Sri Lanka's overall demand for soft drinks costs around US $80 million, and its fruit juice market share is worth $12 million. The fruit beverage industry holds a market share in Sri Lanka worth $12 million with an annual growth rate of 12% (Niroshan *et al*., 2008; Rambukwella *et al*., 2015).

Soft drinks are consumed mainly for leisure purposes and an essential contributor to hydration (Shahjahan *et al*., 2019). Soft drinks can be an important part of hydration strategies for weight reduction (Ferry, 2005). The intake of soft drinks is rising across the globe daily. Increasing income, urbanization, and population growth are significant factors that include a high proportion of adolescents who are more likely to consume soft drinks (Shahjahan *et al*., 2019). Besides, increasing domestic demand, the hot climate, and insufficient access to clean drinking water are other factors conducive to soft drink consumption (Silva and Premathilaka, 2016).

Sugar-sweetened drinks have adverse effects on general health and oral health (Ratnayake and Ekanayaka, 2012). Consumption of soft drinks associated with increased body weight and reduced nutritional consumption can lead to the generate different non-communicable diseases such as cancer and heart disease (Shahjahan *et al*., 2019). The high prevalence of diabetes, cardiovascular disease (CVD) and early mortality, bring a major economic and health cost to society (Pallegedara, 2018). Sugar-sweetened carbonated beverages in children and teens encourage weight gain and obesity (Malik *et al*., 2006). Studies have shown that the consumption of soft drinks in children and teenagers can decrease the dietary intake of vitamins A and C, calcium, magnesium, and riboflavin. In comparison, calorie consumption can rise, and overnutrition can grow

into obesity, raising the risk of bad health for children (Guthrie and Morton, 2000).

An effective food labelling system can help to decrease obesity and facilitating consumers to make healthier purchasing choices (Machín *et al.*, 2010). It is also essential that all customers can comprehend food labelling schemes (Carbone and Zoellner, 2012). Traffic light product labels have been shown to help consumers make healthier choices when consuming food (Morley *et al.*, 2013; Roberto *et al.*, 2012; Thorndike *et al.*, 2012).

Experts concentrated on product labelling as a critical method to teach people and help them make healthier choices. As previous works show, it guarantees that product labelling is an essential information source that can impact consumer decision-making (Trudel *et al.*, 2015). The health ministry unveiled a 'Traffic Light Color Code Scheme", which adopted three colours for displaying its sugar level, according to an end to non-communicable diseases in Sri Lanka. Red, amber, and green are used to explain the meaning: red refers to heavy sugar levels, amber represents medium sugar levels, and green to low sugar levels and free soft sugar drinks that are healthier (Weerasinghe and Selvarajan, 2018). This study aims to determine the soft drink consumption pattern and the awareness of the traffic light labelling system among the young adults in the Ampara district.

II. METHODOLOGY

This study was a population-based survey, which was carried out in Ampara district, Sri Lanka. This survey was carried out from November 2020 to January 2021, using groups of consumers from different retail shops located in the Ampara district. This research's focus participants were young adults; soft drink consumers, aged between 18 to 40 years. A review in the census report indicated that around 25% of the Sri Lankan population are aged between 18 to 40 years (Census of Population and Housing, 2012). Therefore, to calculate the sample size of this study, the Ampara district's population size is considered 610,719, according to the latest census report (Census of Population and Housing, 2012). The sample size was 204 at the confidence interval of 95% and accepting a sampling error of 5%, and simple random sampling technique was implemented to collect the data.

A datasheet was given, and verbal consent was received from all participants before the invitation to participate in the survey. The anonymity of the researchers was maintained during the analysis in order to uphold ethics. To ensure the readability and accurate administration of data collection forms, data obtained via the questionnaire was pre-tested on ten consumers. The items in the questionnaire were kept simple for the convenience of consumers. The self-administered questionnaire assessed socio-demographics, anthropometric measurements, consumption habits, awareness of traffic light labelling system, and awareness of adverse health effects due to soft drinks consumption. Accordingly, the following hypotheses were developed to test the predictions.

H_0: There is no relationship between awareness of traffic light color labelling and the BMI of the customers
H_1: There is a relationship between awareness of traffic light color labelling and the BMI of the customers

The descriptive statistics used to analyze the frequency distribution and Pearson chi-squared test employed to test the hypothesis. The analysis of data was analyzed by SPSS statistical package (SPSS 20.0, IBM, New York, NY, USA).

III. RESULTS AND DISCUSSION

The mean values of body mass index (BMI) of the men and women population were 22.67 and 21.63, respectively, as normal weight. The mean BMI of men were comparably higher than the women. However, higher proportion of women (65.1%) categorized under normal body weight compared to men (62.1%) (Figure 01). All participants of 35-40 aged group people categorized as normal BMI and 50% of 30-35 age group had normal body weight. According to the BMI cut-off for South Asians (WHO expert consultation, 2004), a considerable amount of the population BMI categorized as normal (63.2%) and few were categorized as obese (3.5%) (Table 01).

Table 01: BMI distribution between age groups of the population

		BMI Range			
		Underweight (%)	Normal weight (%)	Overweight (%)	Obesity (%)
Age	15-20	0.0	75.0	25.0	0.0
	20-25	20.4	64.7	12.8	1.9
	25-30	9.8	63.4	22.0	4.9
	30-35	0.0	50.0	50.0	0.0
	35-40	0.0	100.0	0.0	0.0
Total Population		17.6%	63.2%	15.7%	3.5%

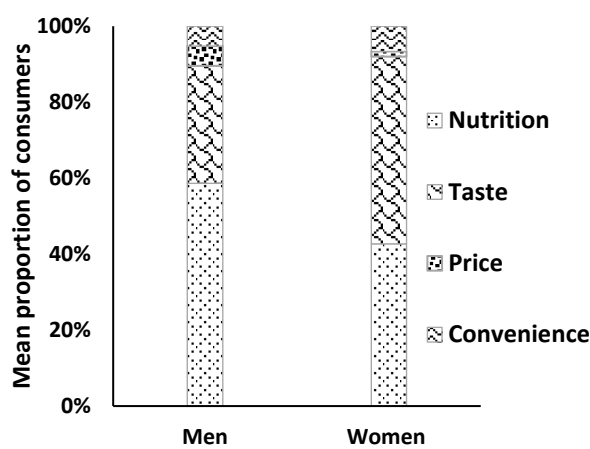N = 204
(Source; Field survey, 2021

Figure 01: Gender-based BMI distribution of population

According to the survey data, the participants gave priority (48.53%) for looked on the health and nutritional benefits of soft drinks, while few of the population (2.5%) considered the cost of the soft drink during the purchasing (Table 02). The finding of Sonnenberg *et al*., (2013) also demonstrated that health and nutritional aspects are the important factors during the purchasing point. The gender-based analysis exhibits that men gave priority to the health and nutritional aspects (58.62%) while female population (51.37%) was priority to the taste of the soft drink (Figure 02). At the same time, the aged based analysis explains, the 15-20, 25-30, and 35-40 age group population were selecting the soft drink to taste however, 20-25 and 30-35 age group of people considered the health and nutritional aspect of soft drinks. The sensory and social interactions are major factor associated with the consumption pattern of soft drinks (Pachucki *et al*., 2011; Sartor

et al., 2011). The comparisons of factors affecting the purchasing of soft drink in contrast to the BMI showed that underweight, normal and overweight range people were mostly selecting their soft drink based on the taste however obese people were selecting based on health and nutrition (Table 02).
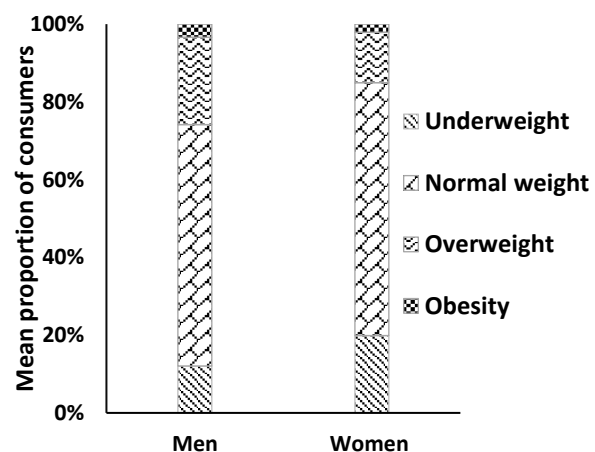

Figure 02: Gender-based analysis of factors affecting the purchasing of soft drinks

When considering the purpose of consumption among the populations, 43.63% of the population were consuming soft drinks for leisure, and a smaller fraction of the population (4.41%) were consuming soft drinks to give a company for their friends (Table 03). The gender-based analysis also yielded the same result as both men (32.7%) and women (47.95%) were consuming soft drink for leisure purposes (Figure 03). Furthermore, 15-20 and 35-40 age groups were consuming the soft drink for fulfilling the energy requirement and 20-25 and 25-30 age groups consuming mainly for their leisure while 30-35 age group shared the proportion equally (Table 03) for energy

Table 02: Determination of the factors on the purchasing of soft drinks

		Factor considered on purchasing			
		Nutrition (%)	Taste (%)	Price (%)	Convenience (%)
Age	15-20	25.0	50.0	25.0	0.0
	20-25	51.3	45.5	0.6	2.6
	25-30	39.0	46.3	7.3	7.3
	30-35	100.0	0.0	0.0	0.0
	35-40	0.0	100.0	0.0	0.0
BMI	Underweight	44.4	50.0	0.0	5.6
	Normal	9.9	87.8	0.8	1.5
	Overweight	40.6	50.0	3.1	6.3
	Obese	80.0	0.00	20.0	0.0
Total Population		48.5%	45.5%	2.5%	3.5%

N = 204
(Source; Field survey, 2021)

consumption and giving company to their friends. Benajiba and Eldib (2018) explained that indispensable during the social gathering and leisure purpose are also the factors considered during the purchasing of the sugar sweeten soft drinks. The fraction of the population who consume soft drink for leisure purpose mostly occupy underweight, normal and overweight categories of BMI ranges. Furthermore, obese people were selecting their soft drink for energy need.

Table 03: Determination of the purpose to consume the soft drinks

		Purpose of the soft drink consumption				
		Energy (%)	Companion (%)	Taste (%)	Digestion (%)	Leisure (%)
Age	15-20	50.0	0.0	25.0	25.0	0.0
	20-25	18.6	2.6	25.0	6.4	47.4
	25-30	19.5	9.8	22.0	12.2	36.6
	30-35	50.0	50.0	0.0	0.0	0.0
	35-40	100.0	0.0	0.0	0.0	0.0
BMI	Underweight	22.2	0.0	13.9	2.8	61.1
	Normal	19.8	4.6	26.7	6.9	42.0
	Overweight	15.6	9.4	25.0	15.6	34.4
	Obese	40.0	0.0	20.0	20.0	20.0
Total Population		20.1%	4.41%	24.02%	7.84%	43.63%

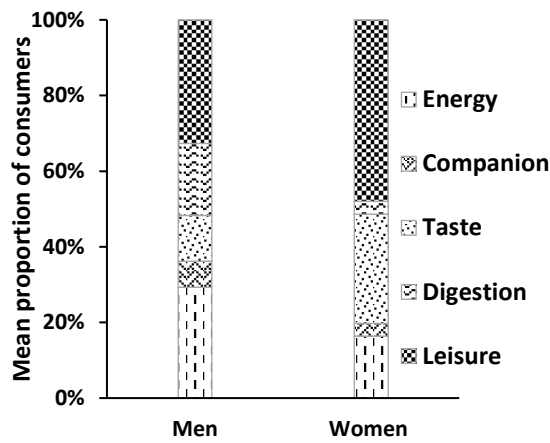N = 204
(Source; Field survey, 2021)

Figure 03: Gender base analysis of purpose to consume the soft drinks

Among the population, most of them were consuming fruit juice and drinks frequently (73.5%), and a lesser proportion consumed carbonated beverages (26.5%) (Table 04). According to the findings of Ratnayake and Ekanayaka (2012), adolescents of Sri Lankan population consumed sugar-sweetened carbonated drinks more than sugar-sweetened fruit drinks once weekly or more often. Further, the gender-based analysis explains that both male (63.79%) and female (77.4%) were consuming the fruit juice mostly (Figure 04). The age groups of lower third were mostly consuming the fruit juice and drinks frequently; however, 35-40 age group peoples were consuming the carbonated beverages frequently. Meanwhile, the youngest age group shared the proportion equally for both fruit juice and drinks and carbonated beverages. The population bellowed to obese BMI range were mostly consuming fruit juices while obese people
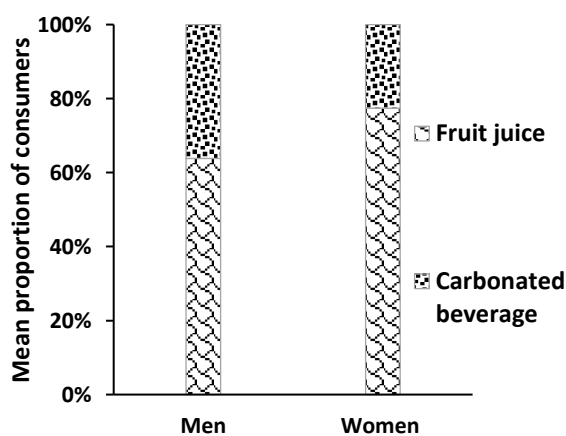

Figure 04: Gender-based analysis of type of soft drinks frequently consumed

were mainly consuming carbonated beverages frequently (Table 04).

A larger fraction of young adult population of the Ampara district (78.43%) were consuming the soft drink 1-2 times per week. Further, few of them were consuming up to 4-6 (3.92%) and more than seven (7) times (4.9%) in weekly basis. Nearly 82% of the adolescents of Sri Lanka consumed sugar-sweetened soft drinks once weekly or more often, and of these 2% are daily consumers (Ratnayake and Ekanayaka, 2012). The gender-based analysis also exhibited both men (72.4%), and women (80.0%) were consuming soft drinks 1-2 times per week (Figure 05). The age and BMI based analysis also yielded the same result as all age groups of young adults, and all BMI ranges were consuming soft drinks 1-2 times per week. (Table 05).
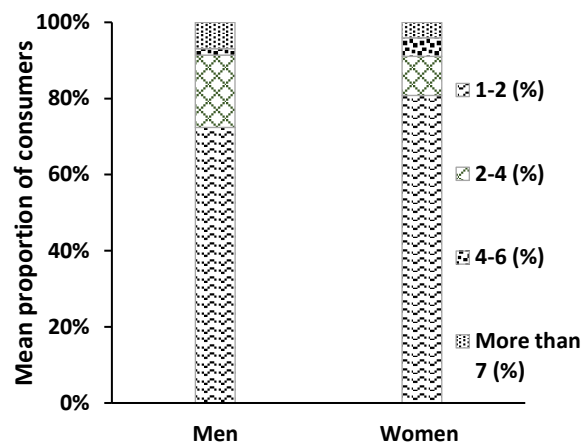

Figure 05: Gender-based analysis of consumption frequency of soft drink

Further, a considerable amount of consumers out of the population (80.4%) had aware of the traffic light labeling system imposed on sugar-sweetened products. Among them, both men (81%) and women (80.1%) were well aware of the traffic light labelling system for soft drinks (Figure 06). Meanwhile, the age-based analysis resulted that all age groups of young adults in Ampara districts were considerably aware of the traffic light labeling system for soft drinks. The comparison in related to the BMI ranges and awareness on traffic light labelling system demonstrated that the consumers with various BMI ranges had an awareness of traffic light labelling system (Table 06).

Table 04: Determination on the consumption of type of soft drink

		Type of soft drink	
		Fruit juice (%)	Carbonated beverage (%)
Age	15-20	50.0	50.0
	20-25	75.6	24.4
	25-30	68.3	31.7
	30-35	100.0	0.0
	35-40	0.0	100.0
BMI	Underweight	72.2	27.8
	Normal	76.3	23.7
	Overweight	68.8	31.3
	Obese	40.0	60.0
Total Population		73.5%	26.5%

N = 204
(Source; Field survey, 2021)

Table 05: Determination of the consumption frequency of soft drink

		Frequency of consumption in a week			
		1-2 (%)	2-4 (%)	4-6 (%)	More than 7 (%)
Age	15-20	50.0	50.0	0.0	0.0
	20-25	81.4	9.6	4.5	4.5
	25-30	70.7	19.5	2.4	7.3
	30-35	50.0	50.0	0.0	0.0
	35-40	100.0	0.0	0.0	0.0
BMI	Underweight	75.0	19.4	5.6	0.0
	Normal	77.9	11.5	3.1	7.6
	Overweight	84.4	9.4	6.3	0.0
	Obese	80.0	20.0	0.0	0.0
Total Population		78.43%	12.75%	3.92%	4.9%

N = 204
 (Source; Field survey, 2021)

Table 06: Determination of awareness on traffic light labelling system

		Awareness	
		Yes (%)	No (%)
Age	15-20	50.0	50.0
	20-25	80.1	19.9
	25-30	82.9	17.1
	30-35	100.0	0.0
	35-40	100.0	0.0
BMI	Underweight	72.2	27.8
	Normal	80.9	19.1
	Overweight	87.5	12.5
	Obese	80.0	20.0
Total Population		80.4%	19.6%

N = 204
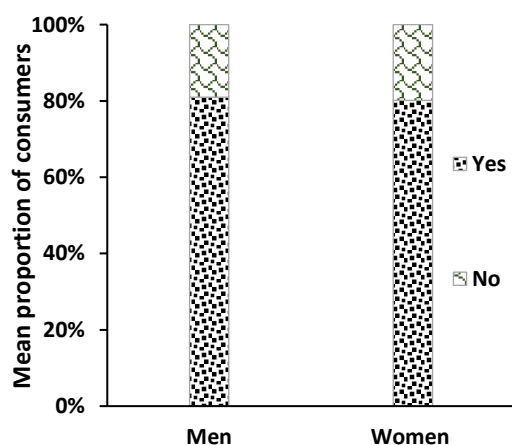(Source; Field survey, 2021)

Figure 06: Gender-based analysis of awareness on traffic light labelling system

In general, most consumers purchasing soft drinks based on the sugar level of the drink (Sonnenberg *et al.*, 2013). According to this study, considerable amount of the population (71.5%) was drinking a medium level of soft drink. Among them, both men (63.8%) and women (74.7%) were selecting medium sugar level of soft drink for the consumption (Figure 07). The age-based analysis of the population shows that lower third age groups were mostly drinking medium levels of soft drinks. Furthermore, the 35-40 age group people selecting a low level of sugar level and 30-35 age group equally share the proportion for both low and medium level of soft drinks (Table 07). According to the labelling regulation of Sri Lanka for sugar sweeten beverages, more than 11 g of

sugar per 100 ml categorized as high level of sugar, 2-11g/100ml and less than 2g/100ml are medium and low level of sugar category respectively (Weerasinghe and Selvarajan, 2018).
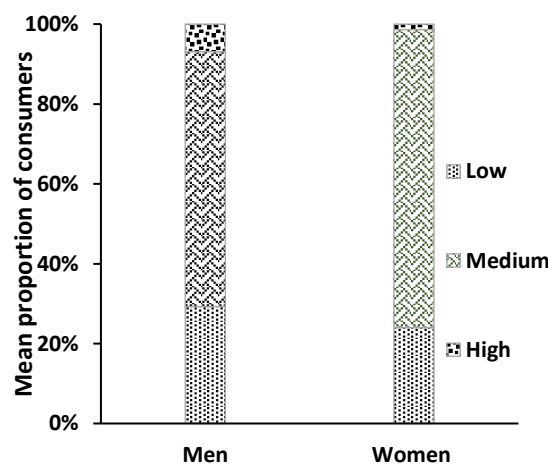

Figure 07: Gender-based analysis of consumption of soft drink based on the sugar level

The survey results show that a higher proportion of the population (81.4%) had well aware on type 2 diabetes is related to higher sugar level of foods. Gender-based analysis showed that both men (68.97%) and women (86.30%) were aware on type 2 diabetes is related to higher sugar level in foods (Figure 08). The all age grouped consumers with various BMI ranges of young adults were also well aware of type 2 diabetes (Table 08).

Table 07: The consumption of soft drink based on the sugar level

| | | Sugar level of soft drink | | |
		Low (%)	Medium (%)	High (%)
Age	15-20	0.0	100.0	0.0
	20-25	25.6	72.4	1.9
	25-30	24.4	68.3	7.3
	30-35	50.0	50.0	0.0
	35-40	100.0	0.0	0.0
BMI	Underweight	22.2	75.0	2.8
	Normal	22.9	74.0	3.1
	Overweight	37.5	59.4	3.1
	Obese	40.0	60.0	0.0
Total Population		25.5%	71.5%	3%

N = 204
(Source; Field survey, 2021)

Table 08: Awareness of type 2 diabetics and high sugar level

| | | Awareness | |
		Yes (%)	No (%)
Age	15-20	100.0	0.0
	20-25	84.0	16.0
	25-30	73.2	26.8
	30-35	80.0	20.0
	35-40	100.0	0.0
BMI	Underweight	86.1	13.9
	Normal	82.4	17.6
	Overweight	71.9	28.1
	Obese	80.0	20.0
Total Population		81.4%	18.6%

N = 204
(Source; Field survey, 2021)

Figure 08: Gender-based analysis of awareness on type 2 diabetics and high sugar level

According to the results, null hypothesis was not rejected as there was no evidence to reject the null hypothesis ($p>0.05$) (Table 09) Therefore, it concluded that there was a no relationship between awareness of traffic light color labelling and the BMI of the customers. Increased usage of traffic light labeling and its prevalence might be a cost-effective obesity prevention method (Sacks *et al*., 2011).
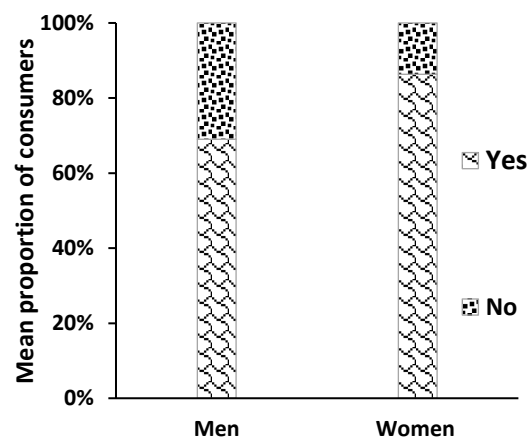
However, in this study, consumers of Ampara district have no relationship with the awareness of traffic light color labelling system and BMI.

Further, the age group of the consumers had a significant relationship with awareness on traffic light color labelling and awareness on type 2 diabetics related with higher sugar level ($p<0.05$). Likewise, gender and awareness of type 2 diabetics related to a higher sugar level had a significant relationship at $p<0.05$. When considering the relationship with the consumption pattern of the population and selected variables, gender had a significant relationship with the type

of soft drink consumed (p<0.05) (Table 10). Shin et al., (2016) reported that the frequency of consumption had a significant relationship with the obesity of individual.

Table 09: Pearson chi-squared analysis for predicted hypothesis

Hypothesis	χ 2	df	p
Awareness about traffic light color labelling vs BMI	2.573	3	0.462

df; degree of freedom, χ 2; chi-squared value, p; asymptotic significance(2-sided)

Table 10: Significance on awareness and soft drink consumption pattern

Variables	Awareness	χ 2	df	p
Age group	Traffic light color labelling	12.398	4	0.015*
	Sugar level of soft drink	1.222	4	0.875
	Type-2 diabetics	12.398	4	0.015*
Gender	Traffic light color labelling	0.021	1	0.527
	Sugar level of soft drink	3.243	1	0.072
	Type-2 diabetics	8.230	1	0.004*
BMI	Sugar level of soft drink	2.068	3	0.559
	Type-2 diabetics	2.543	3	0.468
Consumption pattern				
Age group	Frequency of consumption	12.015	12	0.444
	Type of soft drink	5.571	4	0.234
	Consumption of sugar level	8.490	8	0.387
Gender	Frequency of consumption	4.490	3	0.213
	Type of soft drink	3.947	1	0.047*
	Consumption of sugar level	5.459	2	0.065
BMI	Frequency of consumption	8.845	9	0.452
	Type of soft drink	3.825	3	0.281
	Consumption of sugar level	3.809	6	0.703

df; degree of freedom, χ 2; chi-squared value, p; asymptotic significance(2-sided),
* denotes the significance at 95% confidence level

IV. CONCLUSION

It was evident that most of the young adults of the Ampara district were consuming soft drinks considering their health and nutritional benefits. A larger proportion of the population had well aware of the traffic light labeling system and consuming

the soft drinks based on the sugar level. Even though the rest of the young adult population of the Ampara district needed to receive proper awareness on the traffic light labelling system and the health consequences due to the consumption of higher level of sugar levels contained soft drinks. However, in this study, consumers of Ampara district have no relationship with the awareness of traffic light color labelling system and BMI as hypothesis was rejected.

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