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The impact of front of package label design on consumer understanding of nutrient amounts among residents of the urban area in Chennai

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ABSTRACT

The producer, selling and utilisation of packed nourishments have supported a preeminent flood lately in India. Food labelling is one of the vital population-based methods that can help customers make beneficial food selections by offering essential information about the food on the packaging. The present study aims to assess the impact of front of package label design on consumer understanding of nutrient amounts among residents of the urban area in Chennai. A cross-sectional study was conducted in an urban area in Chennai. Four hundred participants were studied by convenient sampling method. Participants were from 18 years age and above. The study duration was about three months. A pretested and semi-structured questionnaire was given, and the desired information was elicited. Data was then analysed with the help of statistical package for the social sciences software (SPSS). Chi-square test was done to test the significance ($p<0.05$). The mean age was of the participants was found to be 27.52 ± 11 SD. About 63% of participants preferred packed foods over unpacked foods. And 68% of participants have nutritional knowledge and looked into nutrition facts on the back of the pack. Association of gender and socioeconomic class with knowledge of participants were found to be insignificant. Association of occupation with the frequency of purchasing packed food products was significant. Many people look into the nutrition facts table and do not understand and fail to interpret. It is important to provide front of pack labels for better understanding of the consumers.

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INTRODUCTION

The worldwide wellbeing trouble from less than stellar eating routines is expanding (Forouzanfar *et al.*, 2013). Regular intake of foods that are elevated in fat, sugars and sodium can cause overweight or obesity. This can be a risk factor for cardiovascular disease, diabetes, musculoskeletal disorders. Most of the world population live in countries where overweight and obesity kills more peoples than underweight. As per the statistics in 2016, more than 1.9 billion adults aged 18 years and older were overweight of these over 650 million adults were obese. The worldwide prevalence of obesity nearly tripled between 1975 and 2016 (WHO, 2020). Nutritional labelling of food is practised in over 70 countries globally in the majority of cases on a mandatory basis. The important element is in the form of a table on back or side of the package. The usage and effects of the standard back of pack labelling have shown that this type of labelling

is of little value for many consumers. Especially less educated people find difficulty in understanding the nutrient tables on the back of the pack. The labelling on the back of the package is often understood as not visible sufficient and tough to read so that studying them while shopping would be time-consuming (Grunert and Wills, 2007). Many consumers are interested in healthy nutrition and wish for a clear, easily understandable nutrition labelling of foods (Grunert *et al.*, 2010; Dana *et al.*, 2019). This is best achieved by labels and symbols that are positioned on the front of the package and visible, so-called front of package labels (FOPLs). Informative labels provide only information without any judgement or recommendation (Elmadfa and Meyer, 2019). On the opponent, interpretive labels that estimate the food against defined criteria and include guidance about its consumption (Elmadfa and Meyer, 2019). All FOPLs contain graphical representation for easy understanding of foods nutritional quality. Nutri score is the latest implemented. Out of these FOPLs Nutri score, keyhole, and healthy choice does not display nutrient values. This study aims to assess the impact of front of package label design on consumer understanding of nutrient amounts amongst residents of the urban area in Chennai.

MATERIALS AND METHODS

The study was designed to be a cross-sectional study and was conducted in an urban area in Chennai, India. All people above the age of 18 years who gave the consent were included. People with psychiatric illness and visual defect were excluded. The sample size for this study is 400, assuming the prevalence to be 50% as there are not much reference articles were available for this study. Convenient sampling method was used. The study duration was about three months, from 7 January 2020 – 31 March 2020. Detailed information about the study was given to participants before collecting data. A semi, structured, and pretested questionnaire was prepared. The questionnaire has demographic details and questions regarding the nutrition table and front of package labels. The data was collected through google forms. Participants were asked questions based on nutritional knowledge and preference of packed food products. Cookies pack which showed the front of the pack (FOP) labels for sugar, saturated fat and sodium to which the participants was randomised with a magnifying glass, red circle, black stop sign and a text was representing high in text.

All these 3 FOPs were also presented with high in text for a total of 7 experimental conditions. All the mark plans were designed according to FOP symbols proposed by health Canada. The participants were asked the following question: which front of pack label symbol grabs more attention and which is the best image for educating consumers that a product is high in saturated fat and sugar. Participants selected one of the fops displayed on the screen. The data being collected were entered in a Microsoft Office Excel sheet. After completion of data collection, data were entered in Microsoft Excel spreadsheets and frequency of all variables were checked for completeness at regular intervals. Data was then analysed with the help of statistical package for the social sciences software (SPSS) for windows version 21. Chi-square test was used to determine the association between categorical variables. The socioeconomic class was calculated using a modified kuppusamy scale.

RESULTS AND DISCUSSION

This study was done to assess the impact of front of package label design on consumer understanding of nutrient amounts. Among 400 study participants, the majority of them were in 18-37 age group 337(84.25%). The mean age was found to be 27.52 $\pm$ 11 Standard deviation. There were more male participants 214(53.5%) compared to female participants 186(46.5%). There were more students 202(50.5%) that is half of the study participants. The socioeconomic class 1were about 44(11%), class 2 were 235(58.75%) more than half of the participants were from class 2, and class 3 were about 121(30.25%) (Table 1)

Frequency of purchasing packaged food products

Over 37.75% of consumers purchase packaged food products 2 to 3 times a week. About 22.25% of consumers purchased packaged food products every week while 15.25% of consumers purchased once in a month. And 7.5% of consumers purchased every day. In a study conducted by (Vemula *et al.*, 2014) over 12% of all consumers revealed purchasing packed food products all the days and over 44% of consumers purchased packaged food products when week by week while a fourth of them purchased every fortnight. From this study, 60% of consumers purchase at least once a week.

Packaged foods purchased from

More than half of the consumers, that is 56.75% purchase packaged food products from supermarkets. About 36.5% of consumers purchase packaged food products from nearby retail shops, while

Table 1: Demographic characteristics of study participants. N=400(100%)

Sociodemographic Details		Frequency(N)	Percentage(%)
Age	18-37	337	84.25%
	38-57	54	13.5%
	58-77	7	1.75%
	78-97	2	0.5%
Sex	Male	214	53.5%
	Female	186	46.5%
Occupation	Student	202	50.5%
	Employed	157	39.25%
	Homemaker	31	7.75%
	Retired	10	2.5%
Socio-Economic Class	Class 1	44	11%
	Class 2	235	58.75%
	Class 3	121	30.25%

Table 2: Frequency and percentage on awareness of the study population. N=400 (100%)

		Frequency(N)	Percentage(%)
Frequency of purchasing packaged food products	Everyday	30	7.5%
	2 or 3 times a week	151	37.75%
	Every week	89	22.25%
	Once in 15 days	69	17.25%
	Once in a month	61	15.25%
Packaged food products brought from	Supermarket	227	56.75%
	Online shopping	27	6.75%
	Nearby retail stores	146	36.5%
Packed food better than non packed food	Yes	252	63%
	No	148	37%
Things noticed in packed food products	manufacture date and expiry date	246	61.5%
	Price	50	12.5%
	Colour and design of the package	25	6.25%
	Nutritional label	61	15.25%
	FSSAI logo	14	3.5%
	The time required for cooking	4	1%
Nutrition facts looked on the back of pack	Yes	272	68%
	No	128	32%
Effectiveness of symbol	Magnifying glass	25	6.25%
	A magnifying glass with high in text	113	28.25%
	Red circle	32	8%
	A red circle with high in text	108	27%
	Stop sign	18	4.5%
	Stop sign with high in text	36	9%
	Plain text	68	17%

Table 3: Association of Gender and Socioeconomic class on knowledge of study participants. N=400(100%)

S.No			Packed			Look into nutrition facts on the back of the pack		
			Yes	No	P-value	Yes	No	P-value
1	Gender	Male	135(33.75%)	79(19.75%)	0.970	146(36.5%)	68(17%)	0.917
		Female	117(29.25%)	69(17.25%)		126(31.5%)	60(15%)	
2	Socio economic Class	Class 1	31(7.75%)	13(3.25%)	0.094	30(7.5%)	14(3.5%)	0.451
		Class 2	154(38.5%)	81(20.25%)		165(41.25%)	70(17.5%)	
		Class 3	67(16.75%)	54(13.5%)		77(19.25%)	44(11%)	

Chi-square test has been applied, and the result is not significant at p<0.05.

Table 4: Association between occupation and frequency of shopping

	Employed N=157	Student N=202	Homemaker N=31	Retired N=10	P value
2 to 3 times a week	69 (17.25%)	73 (18.25%)	8 (2%)	1 (0.25%)	0.011
Everyday	15 (3.75%)	12 (3%)	1 (0.25%)	2 (0.5%)	
Everyweek	32 (8%)	49 (12.25%)	6 (1.5%)	2 (0.5%)	
Once in 15 days	23 (5.75%)	40 (10%)	5 (1.25%)	1 (0.25%)	
Once in a month	18 (4.5%)	28 (7 %)	11 (2.75%)	4 (1%)	

Chi-square test has been applied, and the result is significant at p<0.05.

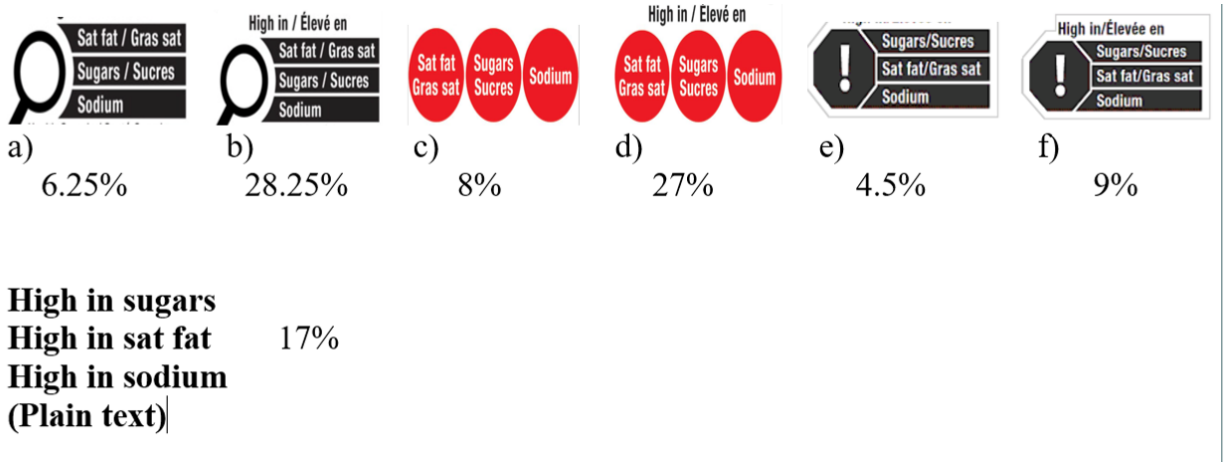

Figure 1: Front of package labels

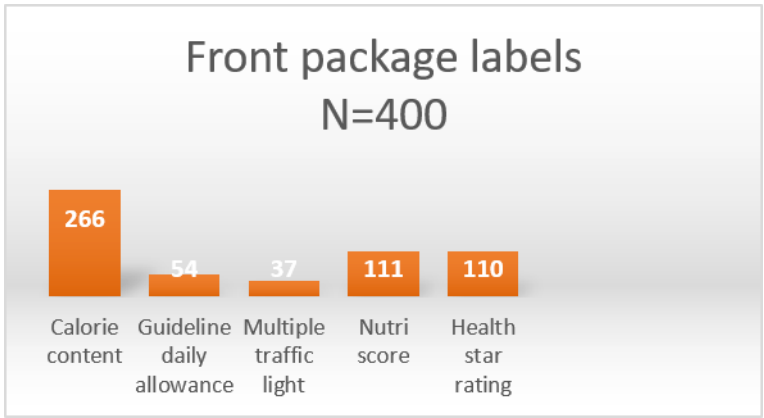

Figure 2: Different front of package labels you notice in a pack

only 6.5% of consumers purchase from online. Many consumers prefer purchasing from supermarkets because most of their goods are packaged. Another reason for preferring supermarkets is that they provide quality and time for consumers to look into the packaged food products and assess the nutritional values, labels and select appropriate packaged food. About 71% informed that label is a significant thought while purchasing packed food (Vemula *et al.*, 2014). In a study conducted by Vemula *et al.* (2014), 90% of the respondents read labels before purchasing.

Packed foods vs unpacked foods

In this study, 63% of consumers prefer packed foods over unpacked foods. People believe that packed foods are better than unpacked food products. Packaging of food prevents contamination and provides more shelf life. Moreover, packed foods have food labels which provide them with a better understanding of the selected food product. In a study done by Vemula *et al.* (2014), the most significant thought for purchasing packed food were reported to taste and closely followed by price. Hence, several customers are worried about the quality, authenticity and shelf life of foods.

Things noticed in packed food products

The results revealed that about 61.5% of consumers that is nearly two-third of this study population look into manufacture date and expiry date before purchasing the product. The second most thing noticed in the package is a nutritional label. This is around 15.25%, followed by the price, which was noticed by 12.5% of consumers. In a study on Indian teenagers, Saha *et al.* (2013) found that most of the respondents viewed for date of manufacturing, expiry date and best before date. Manufacturing date along with expiry dates and storage instructions reflect two characteristics of Indian youth; first, their preference for fresh products (Kapoor and Kumar, 2015) and second their intention is for future use. Price continued as the primary information which consumers regularly look for before they purchase the product (Kumar and Kapoor, 2017). The cost has been one of the main factors which opt for the final purchase of the food products (Singla, 2010; Vemula *et al.*, 2014). Indian clients overall have been viewed as value delicate (Thomas and Forbes India, 2014).

Nutrition facts looked on back of the pack

Over 68% of respondents reported that they look into nutrition facts on the back of the pack. Nowadays, people are concerned about eating healthy foods. Many people look into the nutrition facts table and fail to understand as they are difficult to understand. In India, nutritional labels do not frequently read as customers either lack they find the information too technical to understand (Singla, 2010; Vemula *et al.*, 2014). The consumers who do not pay attention to food label can be explained either due to repeat purchases of the same product (Kreuter *et al.*, 1997; Byrd-Bredbenner *et al.*, 2000). A study in Singapore announced high food label use among customers yet detailed that low degrees of information and wellbeing education were obstacles in their comprehension and utilisation of nourishment data (Vijaykumar *et al.*, 2013).

Effectiveness of front of package labels

Which symbol is effective to inform customers that food is high in saturated fat and sugar?

All label designs were displayed following early repetitions of FOP symbols proposed by Health Canada (Government of Canada, 2018).

In this study the magnifying glass with high in a text (28.25%) and a red circle with high in a text (27%) was the most effective symbol selected by the respondents; the stop sign was the least selected (Figure 1). In a similar study led by (Goodman *et al.*, 2018) the red stop sign (37.7%) and the triangle + exclamation mark (22.0%) were most popular symbols, and magnifying glass (4.2%) was the least frequently selected.

The percentages on FOP labels are unclear, and few individuals found them helpful. In FDA focus groups, some customers did not recognise % DV labels (Lando and Labiner-Wolfe, 2007). In a study of 1525 supermarket buyers in New Zealand, the least chosen among four front of pack labelling systems was the % DI label (Gorton *et al.*, 2009), in this same study it was found that MTL symbol was preferred most often. The UK FSA study found that the best indicator of adequate label knowledge was the presence of text showing whether an item had high, medium or low degrees of a particular supplement (Malam *et al.*, 2009). Participants in the UK told that they most often look for fat, then sugar, calories, salt, saturates and additives (Grunert *et al.*, 2010). People with ailments stated most now and again checking sugar content if diabetic and salt and for substance for those with coronary illness. Those purchasing for children most often check salt and sugar (Food Standards Agency, 2018). An interview constructed study of 1019 customers in Korea found that 58% of participants thought colour differences based on nutrient content (as seen on the MTL, label) deliver important information but 33% of respondents had difficulty understanding what the information was conveying (Kim and Kim, 2009).

In this analysis, many persons experienced four or five nutrients should be shown on the front of pack label with calories, trans fat, total fat cholesterol and sodium.

(Refer Table 2 for results of frequency of purchasing packaged food products, packed food products brought from, packed foods better than non packed food, things noticed in packed food products, nutrition facts looked on the back of the pack, effectiveness of symbol)

From the results obtained, 33.75% of males prefer purchasing packaged food products, and 29.25% of females prefer purchasing packaged food products. Associating socioeconomic class with a preference of purchasing, 38.5% of class 2 preferred packaged food products,16.75% of class 3 preferred packaged food products (Table 3). The results were found to be insignificant with the association of gender and socioeconomic class with a preference of packed and unpacked food products. There is no similar study analysing gender and socioeconomic class with the preference of packed and unpacked foods.

People who look into the nutrition facts table on the back of the pack are analysed based on gender. 36.5% of males look into nutrition pack on the back of the pack, and 31.5% females look into nutrition pack on the back of the pack. In a study done by Niraj Kumar and Sanjeev Kapoor, the results revealed that gender difference proved significant in reading the food labels and a larger percentage of female consumers paid attention to food label as compared to that of male. The outcome that females were found farther thoughtful about the interpretation of the food labels while buying when compared to males (Campos *et al.*, 2011). Females, in common, have been found more cautious about food products which are considered to have unsafe food constituents like fat and sugar (Satia *et al.*, 2005). Analysing socioeconomic class with noticing nutrition facts on the back of the pack, about 7.5% of class 1, 41.25% of class 2 and 19.25% of class 3 looks into the nutritional label on the back of the pack. The results were found to be insignificant with the association of gender and socioeconomic class with knowledge of nutritional labels (Table 3). In a similar study, Washi (2012) conveyed that there was no statistically significant relationship between the level of education and level of awareness on food labelling among food consumers in the UAE. In a study conducted by Samson (2012), all participants who had primary education had a low level of understanding of food labelling.

From this table, 18.25% of students frequently purchase packed food products 2 to 3 times a week. 3.75% of employed respondents purchase packed food products every day. About 12.25% of students purchase every week, and 10% of the purchase once in 15 days, followed by 7% of the purchase once in a month (Table 4). Students are the most frequent shoppers of packaged food products followed by employed people. Awareness among students and employed people about nutritional labels and front of pack label is essential.

Multiple choice question

In this study calorie content information followed by nutria score and health star rating is the most selected labels by the respondents (Figure 2).

Calorie evidence is one of the most regularly read parts of data on nutrition labels (van Kleef *et al.*, 2008; Food Standards Agency, 2018) Customers additionally felt that calorie data alone was insufficient for them to settle on an educated decision; anyway, that review did not recognise what extra data customers would need (Lando and Labiner-Wolfe, 2007). FOP labels that include information about daily caloric needs were viewed positively and could be an important educational tool, as few people in the USA can accurately identify such needs (Lando and Labiner-Wolfe, 2007). One concern is that few people did not understand that red/ amber/green colours had meaning (Food Standards Agency, 2018). Some assumed the colours were related to specific nutrients (i.e. fats were always in red). However, this difficulty was overcome when the text was involved on the FOP label to show high/ medium/low levels of nutrients in food products. Food groups with the highest rates of uptake of health star rating labels were cereals, convenience foods, packaged fruits and vegetables, sauces and spreads. The majority of foods presenting health star rating labels had star ratings more than 3.0, and the average rating was 4.0 (Mhurchu *et al.*, 2017).

CONCLUSION

In this study, most of them preferred packed foods over unpacked foods. The reason they selected packed foods that it was hygienic, easy to store, more shelf life and the packed food products have nutritional labels. About two-thirds of respondents look into nutritional labels, but many fail to understand. Many people nowadays are concerned about eating healthy foods. Many packed food products with nutritional facts table do not help them in selecting healthy foods. It is important to provide front of package labels which help them in better understanding and interpreting the nutritional values. The front of pack labels should be in a simple

and graphical representation of the label with high in text. It is expected that the findings of this study will help the packed food industry in creating appropriate methodologies to make the front of package labels more useful and effective tool for communication with the consumers.

Limitation of the study

This research is carried out in a selected urban area, and this research needs to be carried out in many urban areas to know about the nutritional knowledge of consumers and the impact of front of pack label on consumers.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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