Impact of Varied Menu Nutrition Labelling Formats on Consumer Food Selections using FAFH

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

The adoption of menu labelling in restaurant menus is a sporadic but constructive pursuit worldwide. The aim of this study was to investigate the impact of varied menu labelling formats on consumer food acceptance alongside the consumer's knowledge about nutrition hitherto.162 adults aged 18–40 were distributed among the three menu classification settings: (1) No labelling; (2) kilocalorie labelling; (3) kilocalorie, total fat and free sugars with TLS (Traffic light system) labelling. Participants were offered with their allocated menu online via goggle forms and instructed to select two starters as they would at any restaurant. Followed by this, the participants were exposed to all the three menu labelling conditions simultaneously and were asked to select any one of the three menu category formats which they would prefer to see at restaurants. The variances in the macronutrient content of the starters selected by the participant's as per the allocated menu classification condition were analysed using one way ANOVA. Legislatively mandated menu labelling schemes at food and beverage establishments needs to be emphasized and enforced politically, to function as prime drivers of public health action in foreseeable future.

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1. INTRODUCTION

Triple burden of malnutrition i.e. co-existence of over-nutrition, under-nutrition and micro nutrient deficiency is an emerging public health concern in developing countries like India. As India still continues to overcome under nutrition and related diseases especially in children, problems associated with over nutrition are rapidly proliferating. However, the participants subjected to menu labeling setting no 3, selected starters which were lower in energy and fats compared to other two menu labeling conditions. The aim of the paper is to provide menu labelling for healthy food choices by enacting National food labelling.

2. LITERATURE REVIEW

The major drivers of the global obesity epidemic are unplanned urbanization, globalization ,increased energy consumption, sedentary lifestyle ,declining levels of physical activity, local food environment and increased consumption of FAFH (Food Away From Home) [1].

Major shifts in the dynamics of food and beverage sector and consumer behaviour has to lead increased frequency of dining out in India. Increasing per capita income in India partially translates to more disposable income among the working population [2]. One of the major spending outlets for this surplus income is food consumed outside home settings i.e. FAFH. Eating out is no more an activity associated with special occasions but an occasion in itself and a form of entertainment for consumers. Frequency of dining out has drastically increased in India, specifically in urban areas. About 50 per cent of India's population dines out at least once in every three months. This frequency is far higher in Indian metropolises (8 times per month) but less compared to other countries such as US (14 times per month), Brazil (11 times per month), Thailand (10 times per month) and China (9 times per month) [3].

Nevertheless, consumers are unaware of the high energy density of FAFH foods at large and significantly underestimate the energy, fat and saturated fat content of menu items, with actual levels approximately twice the estimated amounts [4]. Therefore, with an increase in FAFH consumption, there has been an increase in intake of total calories, total fat, trans-fatty acids, saturated fat, and sodium among consumers. Practically excess food intake is commonly associated with weight gain and obesity which in turn directly or indirectly contributes to reduce longevity [5].

As a step towards management of the contemporary obesogenic environment, government authorities and agencies all around the world increasingly recognize the importance of self-awareness, consumer education and industry involvement over dietary factors as facets to reduce the increasing prevalence of NCDs."Nutrition labeling" is one such endeavor involving food and beverage industry participation bordering on customer's self-consciousness about nutrition to improve the public health. The term "Menu labeling can be used in different contexts as a synonym for calorie information for nutrition [6], for the colored traffic light system or for food and nutritional information". Comprehensive menu labeling is a public health strategy that is disputed worldwide as a way to help consumers to make informed choices [7]. Studies have established that display of nutrition information of food products is linked with increased adoption of healthier diets. Images with calories mentioned makes food less enticing by dipping reward system activation and increasing control system initiation. Traffic Light system (TLS) which lays out 'at a glance' information using globally recognized color codes to indicate the nutrient contents may assist consumers in differentiating foods in restaurant menus.

Food and beverage industry holds the responsibility to assist the customer in making understandable nutrition information is made available at POP [8]. Food and beverage sector is an important stakeholder for building a healthy eating environment. Consumer health and food and beverage establishments can mutually benefit by incorporating nutrient information as a part of food menus. Menus with nutrition information are perceived to be of greater value by customers compared to their conventional counter parts [9]. Such menus are successful at alluring likeminded customers who are willing to pay more, which will translate into sound revenue. Consumer value restaurants which provide a healthy eating environment by revealing nutritional information and it boosts their loyalty towards the restaurant by perceived

image and trust [10]. Thus, restaurateurs are expected to furbish themselves to address the needs of growing health-conscious clientele.

Globally, the practice of mandatory menu labeling at restaurants is highly sporadic, but, government requisitions for food and beverage institutions to practice voluntary "menu labeling" are increasing. In 2019, FDA (Food and Drug Administration) imposed mandatory menu labeling (only calorie information) in USA for restaurants chains and food service establishments with 20 or more branches [11]. In Australia, Mandatory menu labeling has been imposed in a few Australian states namely Australian Capital Territory, New South Wales, and South Australia.FSA (Food Standards Agency) has prodded fast food restaurants to willingly mention calories on their menu cards in United Kingdom. By 2025, the Malaysian government has planned to enact a nationwide menu labeling law to help consumers make nutritious selections while dining at eateries. In 2018, FSSAI has issued draft regulations asking food and beverage establishments to voluntarily print calorie information of the dishes in the menu [12]. The future scope for menu labeling seems promising in India and implementation of menu labeling in the entire spectrum of food and beverage industry in India is a need of the hour to improve customer awareness and to favor healthy food choices.

2. METHODS AND MATERIALS

2.1 Study Locale

Pune, Maharashtra

2.2 Type of Study

Quasi-experimental.

2.3 Sample Design and Sample Size

Data was collected from samples (N=162) using convenience and snowball sampling techniques.

2.4 Inclusion and Exclusion Criteria

Participants of both sexes in the age group 18-40 were selected to participate in the study. Individuals under clinical dietary restrictions and a known history of disease were excluded from the study to avoid the possibility of bias towards healthier options [13].

2.5 Control and Experimental Groups

One Control and two experimental conditions (i.e. menus labeling conditions) were used in the study. They are,

(i)	Menu 1 (control) - Starter menu with no menu labelling;
(ii)	Menu 2 - Starter menu with kilocalorie (Kcal) labelling;
(iii)	Menu 3 - Starter menu with kilocalorie, total fat and free sugars with TLS labelling

The participants were divided into three experimental groups. Group 1(n=50), group 2(n=61), group 3(n=51) were exposed to menu 1, menu 2, menu 3 respectively. Each participant was assigned to view only 1 of the 3 menus labeling conditions to make their starter choice. Fig. 1 shows the experimental design.

2.6 Development of Menu Labeling

2.6.1 Standardization of the starter recipes

The weight of the raw ingredients is taken after an order for the particular starter was placed through KOT (Kitchen Order Token). After the cooking process is completed, the weight of the final product and accompaniments like tomato sauce, mayonnaise are also taken. For fried starters, the difference in oil weight before and after the frying process was taken as amount of oil absorption. Standardization process was repeated thrice for each dish to ensure better accuracy of the amount of ingredients used in cooking [14].

2.6.2 Calculation of nutrient composition of the menu

Diet Cal software version 10.0 and Food Data Central – USDA were used as sources for nutrient calculation. Energy, macronutrients (carbohydrates, fat, and protein) and free sugar content per portion of starter dishes were calculated and tabulated. The macro-nutrient content of one starter dish is shown in Table number 1.

2.6.3 Development of three menu labelling conditions

Three menus synonymous with the each other (in terms of style, font, colour scheme and description of the dish) are designed in Microsoft

word version 13.0. Menu 1 (control) consisted of name of the dish, and price per portion but no nutrition information. As per the calculated nutrient values, Menu 2 consisted of name of the dish, description, price per portion, and energy in kilocalories. Menu 3 consisted of name of the dish, description, price per portion, energy in kilocalorie represented in traffic light system and fat, sugar content in grams per portion represented in traffic light system based on United Kingdom's *Guide to Creating a FOPNL for Pre-packaged Products Sold through Retail Outlets*. Table 2 shows the cut-offs used for categorizing starters for TLS in menu 3.

2.7 Development of Online Questionnaires

Through Google forms platform, three Google forms containing structured brief questionnaire were developed. The responses/ options in the questionnaire were either dichotomous and polychotomous in nature. All the Google forms consisted of similar questions but different menu images. A pretest was conducted to test the functionality of the online questionnaire prior to data collection.

2.8 Data Collection

The participants were instructed to select two starters as they would at any restaurant. After selecting the starters, all the participants were requested to view all three menu labeling formats irrespective of which menu they were assigned for selecting starters [15]. Respondents were asked to choose any 1 of 3 menu labeling formats as per their preference. The response rate of the questionnaire was 88.5%.

2.9 Statistical Analyses

Statistical analyses were performed using IBM SPSS statistics 19. Statistical analysis involved both descriptive and analytical statistics. One-way ANOVA was used to analyze mean differences in the nutrient values of the starters (energy, total fat and free sugar) selected by participants in the three study groups.
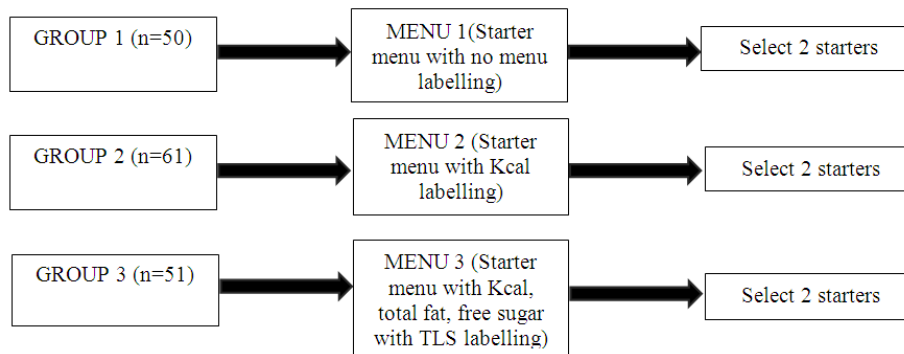

Fig. 1. Experimental design for menu labeling

Table 1. Macro-nutrient content of a starter dish

Appetizer name	Calories per portion Kcal	Carbohydrates per portion (in g)	Protein per portion (in g)	Fat per portion (in g)	Total free sugars per portion (in g)
Classic French fries	344	40.73	4.24	18.15	9.24

Table 2. Cut-offs used for categorizing starters for TLS menu labeling in menu 3

Nutrient information (per portion of the appetizer dish)	Green (low) 🟢	Amber (medium) 🟡	Red (high) 🔴
Calories (k Cal)	≤100	>100 - ≤200	>200
Total fat (g)	≤3.0	>3.0 - ≤17.5	>17.5
Added sugar(g)	≤5.0	>5.0 - ≤22.5	>22.5

3. RESULTS

3.1 Impact of the Menu Labeling Format on the Nutrient Content of Participant's Starter Selection

Using one way ANOVA, it was found that mean/average energy, total fat and free sugar content of the starters did not vary significantly by menu labeling condition (p > 0.05). However, average energy and total fat content of the starters ordered by the participants under kilocalorie, total fat and free sugars + Traffic light system condition is the lowest among the three experimental groups. The average energy content of the starters ordered by participants under kilocalorie, total fat and free sugars + Traffic light system (779 kcal) is less than average energy content of the starters ordered by participants under both kilocalorie labeling (786 kcal) and no menu labeling condition (818 kcal). The average total fat content of the starters ordered by participants under kilocalorie, total fat

and free sugars + Traffic light system (39.20 g) was lesser than average energy content of the starters ordered by participants under both kilocalorie labeling (41.20 g) and no menu labeling condition (43 g). A similar trend was not seen in case of free sugar content of the starters. Graphical representation of these results is given in Fig. 2. Table 3 enlists the average energy, total fat and free sugar content of starters as per menu labeling condition.

3.2 Preference for Menu Labeling Format among Participants

Approximately 6 out of 10 participants i.e. (59.26% of all participants) look for kilocalorie, total fat and free sugars + TLS (Traffic Light System) labeling. 21.60% and 19.14 % of the participants chose to see no labeling and kilocalorie labeling in restaurant menus respectively. Fig. 3 shows the preference of menu labeling format among participants.

Table 3. Average energy, total fat and free sugar content of starters as per menu labeling condition

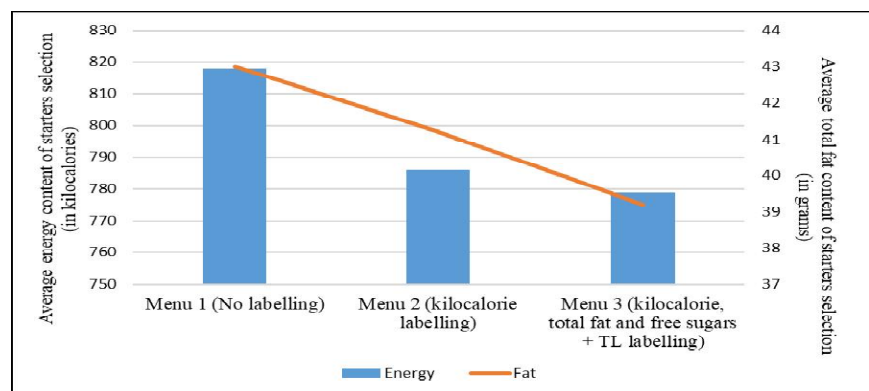| Variables	Menu labeling format N=162		
	No labeling (n=50)	kilocalorie labeling (n=61)	kilocalorie, total fat and free sugars + TLS (Traffic light system) labelling (n=51)
Mean energy content of the starters (in Kilocalories)	818	786	779
Mean total fat content of the starters (in grams)	43.00	41.20	39.20
Mean free sugars content of the starters (in grams)	13.62	12.09	13.81

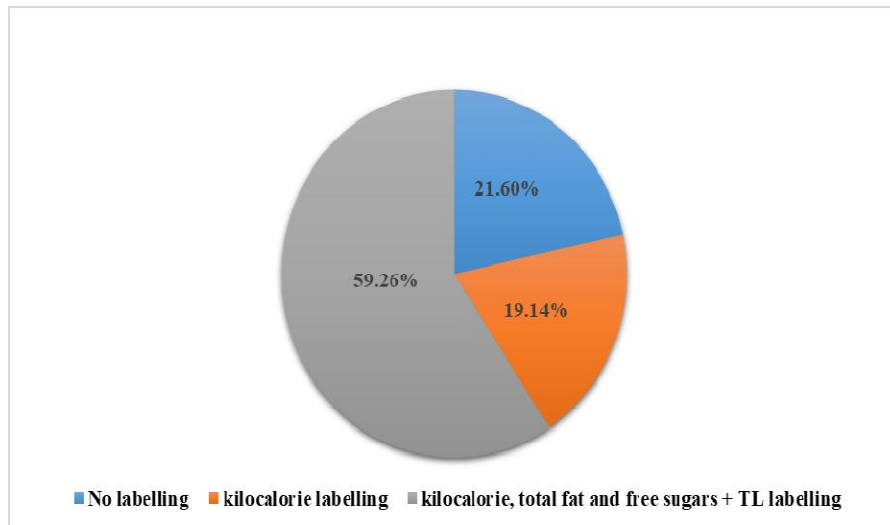**Fig. 2. Average energy and total fat content of the starters as per menu labeling condition**

Fig. 3. Preference of menu labeling format among participants

Table 4. Participant's self-rating about their knowledge on health and nutrition

Participants self-rating about their knowledge on health and nutrition	Menu labeling condition			
	Total N=145	No labeling (n=50)	kilocalorie labeling (n=44)[a]	kilocalorie, total fat and free sugars + TLS labelling (n=51)
1	3(2.07)	2(4)	0(0)	1(1.9)
2	8(5.52)	3(6)	3(6.81)	2(3.92)
3	58(40)	15(30)	20(45.45)	23(45.10)
4	55(37.93)	23(46)	19(43.18)	13(25.49)
5	21(14.48)	7(14)	2(4.54)	12(23.53)

*Data is represented as % in brackets; [a] denotes missing data n=17

3.3 Participant's Self-Rating About Their Knowledge on Health and Nutrition

Using the quote, "I am knowledgeable about health and nutrition" as the reference, the participants were asked to rate themselves on a scale of 1 to 5 wherein, 5 corresponds to strongly agree, 4-agree, 3-neutral, 2-disagree, and 1-strongly disagree. Table 4 shows participant's self-rating about their knowledge on health and nutrition.

4. DISCUSSION

Mean/average energy, total fat and free sugar content of the starters did not vary significantly by menu labeling condition ($p > 0.05$). This is similar to the findings from studies where menu labelling did not result in any change in quantity of carbohydrates, total fat, saturated fat, etc.

ordered /consumed outside home. The finding regarding insignificant decrease in energy content is in line with who found that labeling was associated with a non significant kilocalorie reduction in restaurant setups. Such an insignificant decrease in energy and calories might have resulted from a multitude of reasons including a small sample size. Misinterpretation and/or non-usage of nutrition information to make foods choices might have been few of the reasons. According to Grunertand, difficulty in interpretation is mostly due to mathematically complex numeric information.

The average energy and total fat content of the starters ordered by the participants under no labeling condition (i.e. menu 1) is the highest among the three experimental groups. This is consistent with the findings. To improve customer's use of menu labels to make healthy foods choices, recommendations about menu

labels usage from credible and familiar sources like health professionals, friends or family and mass media may helpful. Simultaneously, perceived barriers for menu label usage should be reduced or removed by developing visible, quick and easy to interpret menu labels. High preference for TLS menu labeling is in context with the findings who suggest that qualitative information such as traffic light system, ingredients list plus symbols format were the most preferred menu labeling formats. This might be indicative of the fact that consumers show greater preference for simple display of nutrient values i.e. the use of symbols and colours over quantitative information, as the latter requires minimal effort.

Most of the participants considered themselves knowledgeable about health and nutrition as per the self-rating scale. But, the nutrition choices made are not affected by this perceived knowledge ($p > 0.05$). This suggests that lack of use of menu label is because of absence of knowledge or understanding. The usage or non-usage of nutrition knowledge to make food choices may be intentional or unintentional. Participants may have given more preference to taste as stated in current reviews suggesting that taste precedes both cost and nutrition as the most important determinant of food choice. It is also important to make sure that nutritional information doesn't compromise the essence of customer dining experience. Cautious handling of this issue through professional communication without affronting customers will be challenge for restaurateurs.

Overall, the findings suggest that menu labeling practices may help consumers to make healthy food choices. Hence, food and beverage establishments should consider adopting voluntary menu labeling practices.

5. CONCLUSION

Considering the gravity of the current health scenario in India, multi-level management of health i.e. management at Individual level, the community level, and the government level is inevitable. Menu labeling, if implemented, may function as a cost-effective intervention with unequalled outstretch at population level. However, to exploit its potential, challenges associated with consumer use of nutrition information should be duly addressed. Outcomes of this research work were in line with similar studies scrutinizing the effects of menu labelling

practices on consumer purchasing decisions. But, it should also be remembered that menu labeling is a mere tool and not a panpharmacon. Innovative programs/schemes like menu labeling harnessing research oriented solutions aided by political will and legislative action have potential to function as prime drivers of public health action in foreseeable future. Legislatively mandated menu labelling schemes at food and beverage establishments needs to be emphasized and enforced. A mid-range restaurant was used in the study to mirror real life food selection experience.

6. FUTURE DIRECTIONS AND RECOMMENDATIONS

Also, to avoid confusion among clientele over interpretation of the menu labels, it is crucial to develop a standard, brief yet informative menu labeling format specific to the Indian consumer loci. For maximizing the public health benefits of menu labeling schemes, nutrition education programs to improve nutrition literacy among consumers must be adopted.

7. STRENGTHS AND LIMITATIONS OF THE STUDY

Hence, results from this work will add to the knowledge base on this frontier. Due to small sample size, narrow geographic coverage and limited selection of menu items, the results of this study may not be generalized to other populations at large. Research on menu labelling practices and its impact on nutrition choices of consumers in India are in its nascent stage.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval for conducting the research was obtained from IRC (Institutional research committee), and IEC (Institutional ethics committee), SSBS (Symbiosis School of Biological Sciences), Lavale, Pune.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/72792