

Hospital healthy cafeteria initiatives: a systematic review of consumer behaviour related studies

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Abstract

Unhealthy food has become a concerning issue in the context of hospital cafeterias. Cafeterias in hospitals have been value-added with healthy menu offerings and safe eating practices to promote healthy eating to customers. Research in food service operation precisely in hospital healthy cafeterias is abundant. However, the scope of the study, study design and study setting varied. This paper aimed to present a systematic review of hospital healthy cafeteria initiatives-based research within the context of consumer behaviour. Published research between the year 2000 through 2020, conducted within the hospital cafeteria was assessed. The main criteria of selection were the existence of a comprehensive description of the instrument, questionnaire, or interviews used to gather the relevant data. Initial 53 articles underwent careful evaluation independently to ensure that they were empirical research carried out within the context of healthy cafeterias at hospitals. As a result, 29 articles were reviewed. The scope of the study includes consumer behaviour, the effect of promotion on sales in healthy cafeterias, management and service personnel, the audit of the compliance of healthy cafeterias and the effects of food category or nutrition labelling intervention. Quantitative research design has been used in most research compared to qualitative and mixed methods and the subject of studies involved hospital staff, visitors and food service managers. The findings of this review implied that healthy cafeteria initiatives have been introduced in the hospital food service. But more consumer behaviour research, continuous food service staff training, strategic promotion and intervention programs for healthy menus, eating habits and lifestyles could be implemented to make hospital healthy cafeterias successful.

1. Introduction

Globally, the prevalence of obesity as well as non-communicable diseases (NCD) including diabetes and hypertension continue to rise over the years due to unhealthy eating practices (Burgoine *et al.*, 2014; Bennett *et al.*, 2018; Jilcott Pitts *et al.*, 2018). It is commonly argued that individuals who would often consume meals away are more susceptible of NCDs (Sahud *et al.*, 2006; Wu and Sturm 2014; Jackson *et al.*, 2016; Onufrak *et al.*, 2019). As of 2016, it was reported that an estimated 40.5 million (71%) of the 56.9 million worldwide deaths were caused by NCDs of which 15.2 million (38%) were amongst individuals aged between 30 years and 70 years, and 23.6 million (58%) above the age of 70 years (Bennett *et al.*, 2018).

A more alarming fact is that the availability of unhealthy food within the setting of hospital cafeterias has also become an issue of concern (Lesser *et al.*, 2012;

Lederer *et al.*, 2014; Harel *et al.*, 2015). In several western countries, hospital cafeterias were heavily criticized by scholars for not upholding a positive image of promoting healthy eating practices by selling customers less healthy food as well as permitting fast-food franchises to operate inside the hospital premises (Auer, 2006; Freedhoff and Stevenson, 2008; Lesser *et al.*, 2012; Bell *et al.*, 2013; Harel *et al.*, 2015).

In an attempt to encourage healthy eating which would potentially lower the prevalence of NCD, the healthy cafeteria initiative was launched and implemented beginning with public hospitals before being expanded into other institutions (Abdul Rais *et al.*, 2019; Abdul Rahman *et al.*, 2020). The general aim of this initiative is to foster healthy eating practices among customers by limiting the options for comfort food whilst offering wider varieties of healthier alternatives especially fresh fruits and low-calorie snacks (Dawson *et*

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al., 2006; Bell *et al.*, 2013; Donohoe Mather and McGurk, 2014; LaCaille *et al.*, 2016; Moran *et al.*, 2016). Various strategies including food labelling colour coding, stealth marketing, pricing incentives, loyalty programs and food shelf manipulations were imposed to maximize and encourage better healthy food selections at the cafeteria (van Kleef *et al.*, 2012; Thorndike *et al.*, 2014; Lindeman *et al.*, 2016; Patsch *et al.*, 2016; Thorndike *et al.*, 2016; Chan *et al.*, 2017).

To better understand the sustainability of the healthy cafeteria initiative, scholars have done research evaluating various elements. From the perspective of the customers, studies would often focus on customers' acceptance, satisfaction, and food purchase patterns. Meanwhile, from the perspective of the cafeteria operator, studies would highlight staff commitment, the effectiveness of food labelling, and sales figures for healthy food. A holistic understanding is indeed important to ensure that healthy cafeteria initiatives fulfil the long-term aim of producing a healthy society. Therefore, this paper aimed to compile and review the literature relating to the implementation of hospital healthy cafeteria initiatives within the context of consumer behaviour.

2. Methodology

2.1 Search parameters

A systematic literature search with electronic databases was conducted for articles published from the year 2000 through 2020. The main criteria of selection were the existence of a comprehensive description of the instrument, questionnaire, or interviews used to gather the relevant data. Articles were searched inside Scopus and manual search through Google Scholar using the keywords of 'hospital healthy cafeteria' and 'hospital cafeteria satisfaction'. A total of 53 search results were obtained. Each title, abstracts, and full text were evaluated independently to ensure that they were within the context of healthy cafeterias at hospitals. Articles that are not within the context of being non-empirical were excluded. Research involving questionnaires or electronic assessment tools was given particular care to assess the validity of the tools described in the articles. Exploratory factor analysis, confirmatory factor analysis, per cent agreement, kappa statistics, and intraclass correlation coefficient or Cronbach's α were particularly looked for.

2.2 Setting

The relevant studies were conducted at healthcare institutions in 6 different countries: United States ($n = 19$); Canada ($n = 2$); Netherlands ($n = 1$); Malaysia ($n = 4$); Nepal ($n = 1$); Australia ($n = 2$).

2.3 Sample size and population

Two types of samples were identified which are human respondents and hospital cafeterias. Cross-sectional quantitative studies would have a sample size ranging from 321-602 human respondents. Longitudinal intervention studies would have larger samples ranging from 1003 to 5695 respondents. As for qualitative studies, a smaller sample size was observed between 8-41. For studies relating to cafeteria scoring in terms of sales and compliance with regulations, the number of samples ranges from 14-39.

2.4 Data collection

Data relating to variables of interest in the context of the hospital's healthy cafeteria were assessed using either quantitative, qualitative and mixed methods. The quantitative studies are administered either using questionnaires or electronic assessment tools. Cross-sectional studies would last between 2-7 months. Meanwhile, the longitudinal studies would take up to 24 months to complete. Numbers and types of items differ in each research depending on the variables measured ranging from 9 to 57. Nine studies assessed the validity and reliability of research instruments either through Cronbach's α , exploratory factor analysis, confirmatory factor analysis, per cent agreement, kappa statistics, and intraclass correlation coefficient. The qualitative studies were accomplished through interviews or focus groups conducted by at least 2 people which usually last between 45 mins to 2 hrs. To ensure the accuracy of the information, some interviews were even recorded.

3. Results

A total of fifty-three search results were obtained through Scopus and another three were obtained through Google Scholar using the mentioned keywords. Any similar articles that appeared with the Google Scholar search or irrelevant articles were ignored. Upon reviewing the content of each article, a total of 24 were excluded due to them being conceptual papers, case studies, and not being related to the healthy cafeteria at hospitals. The remaining 29 papers are compiled in Table 1.

3.1 Aims of the studies reviewed

A total of twenty-nine studies published from 2000 to 2020 are reviewed to determine the current research regarding hospital healthy cafeterias which look into the perspectives of consumer behaviour, the effect of promotion on sales in the healthy cafeteria, the attitude of service personnel, auditing the compliance of healthy cafeterias and effects of food category or nutrition

Table 1. Characteristics of twenty-nine studies in the systematic review

Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Abdul Rahman et al. (2020)	To explore customers' overall acceptance of dining at the hospital's healthy cafeteria.	11 public hospital cafeterias in Selangor and Putrajaya, Malaysia.	570 customers consisting of hospital staff and visitors.	Cross-sectional onsite survey was administered over course of 2 months.	Semi-structured questionnaires consisting of 57 items and optional 4 opened ended questions.	Exploratory factor analysis (EFA) and Cronbach Alpha.	<ul style="list-style-type: none"> Overall acceptance was at an average level. The strongest factor influencing repurchase decision, highest value, most satisfying, and potential of commercializing the healthy cafeteria concept were discussed qualitatively.
Abdul Rais et al. (2019)	To confirm the causal relationship between healthy cafeteria attributes and post-purchase behaviour.	11 public hospital cafeterias in Selangor and Putrajaya, Malaysia.	570 customers consisting of hospital staff and visitors.	Cross-sectional onsite survey was administered over course of 2 months.	Semi-structured questionnaires consisting of 57 items.	Confirmatory factor analysis (CFA) and Cronbach Alpha.	<ul style="list-style-type: none"> Customers' perceived value recorded weak moderating effect. Eating behaviour and satisfaction significantly mediate the effect on the causal relationship between healthy cafeteria attributes and post-purchase behaviour.
Azizan et al. (2016)	To evaluate customers' nutrition knowledge and perception of the healthy cafeteria.	4 public hospital cafeterias in Sabah, Malaysia.	Convenience sampling of 366 customers consisting of hospital staff and visitors.	Cross-sectional survey was administered amongst first-timers and regular customers of the cafeteria.	Structured questionnaires evaluating: General nutrition knowledge. Perception towards the healthy cafeteria. Practice of use of nutritional	Not evaluated.	<ul style="list-style-type: none"> Nutrition knowledge of customers is at a good level. Customers are favourable healthy cafeterias using low-fat milk in gravied food.
Rafidzah et al. (2020)	Determine customer satisfaction level and to identify the difference between demographic profiles.	3 public hospitals (Sabah, Malaysia).	321 respondents.	Cross-sectional survey at onsite hospital cafeteria.	24 Item questionnaire evaluating food quality, service quality and pricing .	Not evaluated.	<ul style="list-style-type: none"> Customers were most happy with various healthy menu items offered, presence of physical facilities, the price is cheaper than nearby food establishments. Only price has a significant the difference with various demographic factors.

Table 1 (Con.t). Characteristics of twenty-nine studies in the systematic review

Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Dawson <i>et al.</i> (2006)	Assess purchase patterns at the hospital cafeteria, attitude changes, and eating behaviour changes after the Eat Smart program implementation.	St Peter's Hospital, Ontario (Canada).	504 hospital staff.	Dillman's Tailored Design Method.	The questionnaire booklet consisted of nine closed-ended and five open-ended questions.	Not evaluated.	<ul style="list-style-type: none"> • Almost 70% visited the cafeteria at least once a week, purchased one to five meals within a week and were well aware of the Eat Smart program. • Perceived benefits of Eat Smart include improved awareness, about healthy eating, the convenience of having healthy food options, and increased energy intake.
Kimathi <i>et al.</i> (2009)	Determine customer satisfaction, healthy food station offered; to document the financial contribution.	University medical center, United States.	655 staff and students	Questionnaire distributed via e-mail to a random sample of staff and students.	24-item questionnaire	Validate by previous researchers (Resnick <i>et al.</i> , 1999).	<ul style="list-style-type: none"> • Purchased from the healthful options station recorded a good level of satisfaction based on: <ul style="list-style-type: none"> i. the healthfulness of entrées ii. food presentation iii. food quality iv. overall quality of the cafeteria v. length of the line vi. food choices • However, sales at the healthy food station were lower compared to the comfort food station.
Bell <i>et al.</i> (2013)	Evaluate perceptions towards the healthy food availability, healthy food labelling offered in health care facilities	5 health-service operated food outlets, 90 vending machines in health care facilities in the Hunter New England, new south Wales, (Australia).	168 parents, 17 food outlets.	Telephone interviews and pen and paper Surveys. Pre and post cross-sectional audits of vending machines and outlets.	Mixed method: Pen and paper questionnaire, phone conversation and observation at food outlets and vending machines .	Not evaluated.	<ul style="list-style-type: none"> • Parents and managers believed that appropriate labels on healthy choices should be made visible, all health service food outlets should provide mostly healthy items. • Minimum availability and labelling of healthy food options were poor in spite of the support of parents.

Table 1 (Con.t). Characteristics of twenty-nine studies in the systematic review

Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Tamrakar et al. (2020)	Exploring staffs perceptions, enablers and barriers to healthy eating in a hospital cafeteria.	Dhulikhel Hospital-Kathmandu University Hospital, (Nepal).	33 hospital staff for focus group discussion 6 canteen workers 3 managers.	Exploratory qualitative study.	Focus groups discussion with 4 different respondent categories: (a) support staff, (b) management staff, (c) health personnel working on 8- hour shifts, and (d) health personnel who work during normal office hours.	Not evaluated.	<ul style="list-style-type: none"> Main factors for promoting healthy eating were identified as the affordability of healthy food options, and commitment from cafeteria operators, administration and the level. Most commonly reported barriers were the scarcity of healthy food options, healthy foods being expensive, and
Chu et al. (2014)	Investigated the financial impact of menu labelling.	University hospital cafeteria.	17 selected food items.	Sales and revenue data were collected through a quasi-experimental approach.	Sales record of selected food items pre-intervention and post-intervention.	Not evaluated.	<ul style="list-style-type: none"> Sales, revenue, or gross profit were not significantly impacted by menu labelling.
Patsch et al. (2016)	Evaluate food sales and profit based on health promotion and price intervention.	Penrose Hospital (PH) and St. Francis Medical Center (United States).	2 hospital cafeterias.	2 phase intervention involves before and after implementation of marketing and pricing components.	Sales records of burgers and salads were collected before and after the intervention.	Not evaluated.	<ul style="list-style-type: none"> The average weekly burger sales increased 13-fold. Salad sales increase significantly at only one hospital.
Sato et al. (2013)	Role of nutrient food labels as a cost -effective way to boost purchases of healthy entrées.	Kaiser Permanente San Francisco Medical Center (United States).	32 select food items.	Pre-intervention sales were recorded within 4 weeks from mid-June 2010. Post-intervention sales were recorded within 4 weeks from mid-June 2010.	Sales record of regular menu items pre and post-intervention Sales record of healthy pick items pre and post-intervention.	Not evaluated.	<ul style="list-style-type: none"> Mean sales for Health Pick increased as compared to Regular Menu sales which record a decrease.

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Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Thordike et al. (2014)	Assess the effectiveness of 3-color food labelling and choice architecture cafeteria intervention.	Massachusetts General Hospital (United States).	Longitudinal cohort of 2285 hospital Employees.	Sales of food collected before and after intervention traffic light food labelling for 2 years.	Changes in 12- and 24-month sales were compared during the 12th and 24 th month by the employee cohort.	Not evaluated.	<ul style="list-style-type: none"> Sales of red labelled items fell to 4% at baseline. Green sales increased 5%. Red beverages decreased 9%. Green beverages increased 8 %.
Sonnenberg et al. (2013)	Determine the effect of labels. Evaluate customers' awareness and purchases based on healthy food labels.	Massachusetts General Hospital (United States).	162 pre-intervention 233 post-intervention.	Customers were surveyed before and after the implementation of the 3-colour food labelling for 2 months.	Customers were interviewed at each cashier upon purchasing food. Cashier programmed to identify types of items purchase.	Not evaluated.	<ul style="list-style-type: none"> Respondents would have a high tendency to purchase healthier choices if they notice the labels on display.
Lederer et al. (2014)	Assess cafeteria knowledge, practices, and attitudes towards nutrition-related topics.	17 hospital cafeterias in New York City (United States).	17 cafeteria managers.	On-site survey administered within 7 months.	A survey tool that included 22 items relating to manager characteristics; hospital cafeteria practices, menu planning; cooking methods; nutrition standards and policies.	Not evaluated.	<ul style="list-style-type: none"> More than two third had completed training in nutrition and only practice correctly in some aspects of nutrition. Small demand for healthy foods and lack of support from the customer was perceived as the biggest challenge in making healthy changes to the
Dauner et al. (2011)	Examine the processes involved in the selection, purchases and pricing of healthy food within a hospital cafeteria setup and factors facilitate and/or hinder these processes.	St. Luke's Hospital in Duluth, Minnesota (United States)	25 interviewees ranging from the hospital's chief executive office vice presidents all the way to the food handlers.	A trained interviewer conducted the interview in 2 hrs with the assistance of a note-taker.	Qualitative: Semi-structured interviews Voice recording is used for the accuracy of information	Not evaluated	<ul style="list-style-type: none"> Institutional strength must be capitalized on so that the incorporation of nutritious and sustainable food could be made possible.

Table 1 (Con.t). Characteristics of twenty-nine studies in the systematic review

Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Jilcott Pitts <i>et al.</i> (2016)	Evaluating barriers and potential facilitators in implementing healthy foodservice regulation at worksites and hospital cafeterias.	4 federal government worksites and 5 hospitals (United States).	Purposive sample. 9 foodservice managers.	90-minute-long interview.	Structure survey via Qualtrics Telephone. An external company recorded and transcribed it verbatim.	Not evaluated.	<ul style="list-style-type: none"> Support from top management, adequate Vendor options and having dietitians' assistance were perceived as facilitators. Small options of vendors, complaints from customers and external expertise for menu labelling were perceived as barriers. Denoting healthier options, social media marketing and shelf manipulation of healthier options are the most frequently used behavioural design
Jilcott Pitts <i>et al.</i> (2018)	Evaluating barriers and facilitators for sustaining financial success in healthy food operations.	Hospital cafeterias in North Carolina (United States).	8 hospital food service directors.	Qualitative method via an interview over the course of 2 months.	Qualtrics survey about characteristics of their hospital food service operation. One-hour semi-structured interview.	Not evaluated.	<ul style="list-style-type: none"> Two overarching themes were discussed: <ul style="list-style-type: none"> the demand for healthy food versus actual sales of healthy foods. the production of healthy food versus the actual supply of healthy foods.
McCurley <i>et al.</i> (2019)	Assess the usefulness of food purchases at worksites in improving employees' dietary quality and cardiometabolic health of workers.	Massachusetts General Hospital (United States).	602 hospital employees.	Survey and health assessment administer over the course of 2 years.	Online survey consisting of items relating to medical history, medication use, and health behaviours.	Not evaluated.	<ul style="list-style-type: none"> Higher Healthy Eating Index scores were associated with lower obesity prevalence and healthier purchases made.

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Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
LaCaille et al. (2016)	Examine the effectiveness of an obesity prevention intervention at worksites.	6 satellite clinics and 1 main hospital (United States).	500 hospital staff.	Quasi-experimental control group for 1 year.	Anthropometric measures. Questionnaire items related to: Dietary intake; Physical activity; Knowledge; Perceptions of support; Perceived co-worker support; Information; Reactions to Go!; Weight and health history .	Cronbach alpha.	<ul style="list-style-type: none"> Neither group showed no significant increases in weight, BMI, or waist was observed in all groups. The intervention group showed a modest increase in physical activity and a drop in fruit, vegetable servings and fibre intake was observed in the intervention group. They also reported significant increases in knowledge, information, perceptions of employer commitment, and health discussions with peers.
Derrick et al. (2015)	Evaluate the nutrition environments of hospitals within a health care system; the influence of the LiVe Well Plate health initiative on the nutrition environment.	Hospitals implementing the LiVe Well Plate versus Hospital not implementing (United States).	A convenience sample of 21 hospitals .	Cross-sectional observational study.	Usage of Hospital Nutrition Environment Scan (HINES) for scoring.	T-tests and analysis of variance.	<ul style="list-style-type: none"> Hospitals recorded 35.3+- 13.7 (range = 7 to 63) points of 86 total possible points. Higher mean nutrition composite scores were observed in health initiative hospitals compared to those hospitals that are not part of the health initiative. (49.2 vs 29.7; P<0.001).
Tsai et al. (2018)	Conduct baseline food environment audits and for comparison with the revised nutritional Guidelines.	2 hospitals (Australia).	14 fixed food outlets and 70 vending.	Cross-sectional assessment conducted for 1 month.	Paper-based audit tool evaluating: product availability, product placement, 'promotional' pricing and advertising of foods and beverages.	Validate by previous researcher s (Roy et al., 2016; Kelly et al., 2012).	<ul style="list-style-type: none"> Substantial improvements were observed in meeting nutrition guidelines namely, availability, placement, and promotion.
Winston et al. (2013a)	Evaluate the state of consumer nutrition environments.	Acute-care hospitals (California, United States).	Convenience sampling of 39 hospitals.	Cross-sectional, descriptive survey.	Hospital Nutrition Environment Scan survey.	Validated in another study (Winston et al. 2013b).	<ul style="list-style-type: none"> Hospitals achieved only 29% for their cafeteria, 33% for vending machine, and less than 1% for gift shops.

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Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Winston et al. (2013b)	Evaluated the inter-rater reliability of The Hospital Nutrition Environment Scan (HNES).	Acute-care hospitals (California, United States).	Convenience sampling of 39 hospitals.	Data were collected from hospitals for 2 months by 2 trained raters.	Hospital Nutrition Environment Scan survey.	Percent agreement, intraclass correlation coefficient and kappa statistics.	Results based on percent agreement, kappa statistics and intraclass correlation coefficient indicates the Hospital Nutrition Environment Scan is reliable to evaluate current consumer nutrition environments.
Levy et al. (2012)	Evaluate the effectiveness of a two-phase point-of-purchase intervention in improving food choices between demographic groups.	Massachusetts General Hospital (United States).	4642 employees	A two-phase point-of-purchase intervention involving colour coding labelling and choice architecture.	Cashier programmed to link to employee meal payment cards to identify types of items purchase.	Not evaluated	<ul style="list-style-type: none"> Latino and black employees purchased a higher percentage of red label items at baseline and a lower percentage of green. Upon labelling the trend show a reverse pattern with more green selection as opposed to red.
Thordike et al. (2016)	Determine the effects of social norm feedback and financial incentives toward employees' healthy food choices selection.	Massachusetts General Hospital (United States)	Randomized controlled trial of 2672 employees	Participants were categorized into 3 groups: <ul style="list-style-type: none"> Monthly letter with social norm feedback about healthy food purchases, comparing employees to "all" and to "healthiest" customers Monthly letter with social norm feedback plus a small financial incentive for increasing green purchases No contact. 	A change in the proportion of green-labelled purchases at the end of the 3-month intervention was observed	Not evaluated	<ul style="list-style-type: none"> The percentage increase in green-labelled purchases was larger in the feedback-incentive arm compared to the control group.

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Authors	Aims	Setting	Sample size	Data collection method	Instruments	Validity	Results
Thordike <i>et al.</i> (2019)	Role of eating program implementation in reducing calories purchased by hospital employees.	Massachusetts General Hospital (United States).	Longitudinal cohort of 5695 employees.	Information on food purchased was collected through employee ID cards before and after the implementation.	Sales data linked to employee IDs were used to track purchases. Cafeteria sales database updated to include calorie information.	Not evaluated	<ul style="list-style-type: none"> Red-labelled items, decreasing 42 kcal per transaction. Green-labelled items increased by 6 kcal per transaction. Yellow-labelled items remain unchanged.
van Kleef <i>et al.</i> (2012)	Examine the effects and interplay between shelf arrangement and assortment structure on consumer choices for healthy and unhealthy snack products.	University lab and hospital staff canteen, (Netherlands).	158 undergraduate students.	Two-factor experimental design manipulating shelf arrangement of snack offerings in confine environment and a natural environment.	Brief survey to evaluate participants' assortment and their choice.	Cronbach Alpha.	<ul style="list-style-type: none"> Both lab and field studies showed a higher probability of healthy snack choices when more than two-thirds of the assortment consisted of healthy snacks compared to conditions with a quarter of healthy snack assortments. No significant differences were observed regarding shelf display location of a healthy snack.
Vanderlee and Hammond (2014)	Examine the impact of displaying comprehensive nutrition information at the point of sale on consumer noticing, the perceived influence of the information on food choices, nutritional content of food ordered and consumed.	1 intervention cafeteria 1 control cafeteria Ottawa Hospital (Canada).	1003 respondents.	Exit survey administered over the course of 5 weeks.	Questions relating to: Menu label impact; Health and nutrition behaviours; nutrition information support on menus.	Not evaluated	<ul style="list-style-type: none"> Patrons at the intervention site use nutrition information to guide their food purchase and recorded significantly low energy, sodium, saturated fat and total fat intake than patrons at the control site.
Webb <i>et al.</i> (2011)	Examines patron perception on cafeteria calorie labelling program. Examines rigorous information on purchases pattern changes	6 non-profit owned hospital cafeterias (United States).	554 respondents	12-week pilot program of calorie labelling of menu choices.	Exiting lunch hour patrons completed A survey relating to attitudes, awareness, and usage of posted calorie information and demographic details.	Not evaluated.	<ul style="list-style-type: none"> More respondents noticed calorie information at poster plus menu board sites than at poster-only sites. The majority of patrons supported the provision of calorie information. A significant increase in purchases of lower calorie, side dishes and snacks at the menu board site were observed.

labelling intervention. Within these varied scopes, the setting of the study, variables measured, and the outcome of the study are examined.

Based on the reviews, eight (8) studies are related to consumer behaviour, and aimed to assess customers' perception, acceptance, satisfaction and purchase intention. Six (6) of the studies applied quantitative data collection methods, while another two (2) studies applied qualitative and mixed methods respectively. The subjects of studies involved staff and visitors (for 4 studies), one (1) study carried out research among staff and café operators, two (2) studies were conducted among restaurants' staff, and one (1) study involved parents and food service managers.

A total of nine studies related to sales performance and management of hospital cafeterias were included in the review. A total of five studies evaluated the effect of promotion materials and food labelling on sales figures at healthy cafeterias. Whilst four studies focused on management practices mainly assessing how staff perceived healthy cafeteria implementation and barriers that need to be overcome.

Research focusing on the dietary quality and health in hospital cafeterias was also included in the review. These include two studies aimed to evaluate dietary quality and health of healthcare staff eating at the cafeteria, using multiple tools to gather data for assessment. On the other hand, four (4) studies that audit the compliance of healthy cafeterias, used traditional pen and paper as well as electronic scoring instruments. The majority of studies (6 studies) evaluate the effects of food category or nutrition labelling intervention on healthcare workers' purchase patterns as well as changes in calorie intake.

4. Discussion

Consumer behaviour related studies involving a consumer who directly dine at hospital cafeterias have reported from average (Abdul Rahman *et al.*, 2020) to good level of acceptance and satisfaction (Dawson *et al.*, 2006; Kimathi *et al.*, 2009; Rafidzah *et al.*, 2020) and positive perceptions (Azizan *et al.*, 2016). A similar positive perception was also observed amongst parents and foodservice managers despite the low availability and labelling of healthy food options (Bell *et al.*, 2013). Focus group interviews amongst customers highlighted that affordability as well as commitment from cafeteria operators as major factors in effectively fostering healthy eating at the hospital cafeteria (Tamrakar *et al.*, 2020). The affordability of healthy food alternatives has also been seen to be an issue concern, especially in developing nations (Cox *et al.*, 1998; Muhihi *et al.*,

2012). Strong administrative commitment and policies to offer subsidies for healthier food options may be implemented to encourage purchases and consumption (Kahn-Marshall and Gallant, 2012; An, 2013). However, it should be cautioned that such strategies would be challenging to implement especially for cafeterias that are profit-oriented in both public and private hospitals (Pridgeon and Whitehead 2013). These cafeteria operators usually operate in urban hospitals are able to offer choices of local and international menu items compared to those operating in rural areas that tend to focus on local dishes based on ingredient availability. As contended by Abdul Rais *et al.* (2019), re-patronization at a healthy cafeteria can only be achieved through the moderation of perceived value as well as the mediation of eating behaviour and satisfaction. Meanwhile, Kimathi *et al.* (2009) argued that a high satisfaction or acceptance rate does not always guarantee re-patronization (Adebanjo, 2001) as their studies found that sales figures of healthy food were much lower compared to sales of comfort food.

Chu *et al.* (2014) contended that menu labelling does not significantly hamper sales and revenue thus relieving concerns about the adverse effect of menu labelling on food sales at the hospital cafeteria. However, other studies relating to the sales performance of hospital healthy cafeterias reported that the intervention of colour labelling, nutrient labelling, health promotion and price intervention can indeed increase sales purchase of healthy food (Sato *et al.*, 2013; Sonnenberg *et al.*, 2013; Thorndike *et al.*, 2014; Patsch *et al.*, 2016). Sales figures of selected healthy food can increase as much as 8% through the appropriate intervention means. The findings are in line with the advocacy of Chan *et al.* (2017) that price discounts can contribute about 5% to a sales increase of healthy food. However, to maximize sales, the authors suggested adapting reward points that can boost sales as high as 28%.

A number of studies have also taken the route of evaluating the hospital's healthy cafeteria initiatives purely from the operator's point of view. As highlighted by Lederer *et al.* (2014), some cafeteria managers perceived that lack of demand for healthy foods was the main limitation in making healthy changes to hospital cafeterias. On-going training is essential for improvements to the food environment at the hospital cafeteria, especially for those staff who may lack the knowledge and experience in nutrition. Managers also tend to express inadequate selections from vendors, customer complaints negative responses by staff, difficulties with marketing changes internally and externally as well as additional expertise required for menu labelling as potential barriers that need to be

overcome (Dauner *et al.*, 2011; Jilcott Pitts *et al.*, 2016). In order to financially sustain a hospital healthy cafeteria, Jilcott Pitts *et al.* (2018) posed that the best practices for boosting sales of healthy food include evaluating well-received new dishes, shortlisting popular healthy food recipes through point of sale (POS) and nutrition analysis software, launch tastier healthy food options, higher food costs for the new healthier menu can be offset by adjusting the price point of other offerings, realign employee and customer discounts to favour healthier food choices.

Individual eating behaviours are increasingly acknowledged to be influenced by major food environment characteristics. Essentially, health institutions need to be consistent in creating healthy food environments that fulfil healthy dietary guidelines. Several studies assessing the effectiveness of hospitals' consumer food environment have been conducted in the United States (Winston *et al.*, 2013a; Derrick *et al.*, 2015) and Australian healthcare settings (Tsai *et al.*, 2018). Psychometrically tested tools used were the Hospital Nutrition Environment Scan for Cafeterias, Vending Machines, and Gift Shops (HNES) (Winston *et al.*, 2013b) and paper-based audit tools designed to evaluate the key food environment guidelines (Tsai *et al.*, 2018). Findings from these studies highlighted that the average consumer nutrition environment of the participating hospitals was found to be less supportive of healthful eating, thus warranting nutrition-improvement interventions (Winston *et al.*, 2013a; Derrick *et al.*, 2015; Tsai *et al.*, 2018). Indeed, the influence of healthy hospital initiatives in improving the nutrition environments within hospital cafeterias was evident. The cafeterias in health initiative hospitals that posted calories on the menu and labelling "healthy" foods were reported to have recorded far greater mean nutrition composite scores compared with hospitals that are not part of the health initiative (Derrick *et al.*, 2015). Other empirical evidence also pointed to the importance of creating good consumer nutrition using a point-of-purchase intervention that could deliver a large impact on consumers' food choices (Webb *et al.*, 2011; Levy *et al.*, 2012; Van Kleef *et al.*, 2012; Vanderlee and Hammond, 2014; Thorndike *et al.*, 2016). Continuous and objective audits assessing the nutrition environments of hospital settings are therefore vital to eliminate self-report bias and to ensure the success of compliance with government policies relating to healthy food and beverages considering the health facilities as public sector institutions that should serve as a good benchmark in exposing consumers to proper healthy food environments.

Healthy eating interventions at workplaces are

reported to have the potential in improving dietary intake, hamper weight gain, and improve employees' health, thus trimming substantial healthcare costs of obesity-related illness the employers. A longitudinal study by (Thorndike *et al.*, 2019) from 11 large urban hospitals in the US showed that the cafeteria healthy eating program that utilizes traffic light labels and choice architecture resulted in a sustained decrease in calories purchased, documenting a 6.2% decrease in calories per transaction over 2 years. Using a dynamic model of weight change, the employees who were frequent purchasers were estimated to lose weight up to 2 kg over 3 years after the implementation of the program, assuming that compensatory changes in diet or physical activity did not take place. In contrast, a 12-month multi-component obesity prevention program based on a social-ecological framework involving employees from a mid-size healthcare system in the US has shown no effects in hampering weight gain (Lacaille *et al.*, 2016). Several other studies that used similar ecological approaches have also reported mixed findings, recording very small to no success in weight gain prevention (Pratt *et al.*, 2007; French *et al.*, 2010; Goetzel *et al.*, 2010; Lemon *et al.*, 2010; Linde *et al.*, 2012; Williams *et al.*, 2014)

Although the beneficial effects seen in weight changes were substandard, significant positive impacts on the other health behaviours such as greater increases in walking activity, nutritional knowledge, peer health discussions and positive attitudes were apparent (Lacaille *et al.*, 2016). It was suggested that implementing low-intensity physical activity such as walking and stair climbing may be easily intergraded into the worksite environment compared to utilizing far more complex behaviours of changing dietary habits and involving more vigorous exercise (Lacaille *et al.*, 2016). Of note, the overall diet quality and cardiometabolic risk of an American hospital's employees (n = 602) were improved following a worksite healthy eating intervention using traffic-light food labelling (McCurley *et al.*, 2019). Given the high proportion of poor dietary quality foods commonly obtained at work (Onufrak *et al.*, 2019), improvements to the diet quality were particularly instrumental for it is known to lower the risk of major chronic disease, regardless of weight change (Sotos-Prieto *et al.*, 2017). These findings showed that incorporating simple behavioural nudges in the worksite food environment such as choice architecture and food labelling could provide more excess towards healthier choices, hence improving employees' overall diet and health.

5. Conclusion

This review has looked at the 29 studies in the

hospital healthy cafeterias researched on consumer behaviour, management and health concerns among various subjects using different methods, globally. Consumers perceived a healthy cafeteria positively although the healthy menu is not the reason for re-patronage because healthy menus are more costly than normal menus. Despite that, it is evident that supplementing a healthy menu may increase sales in healthy cafeterias provided that price discounts and reward-point systems were made available. Healthy cafeteria management may also need to increase the promotion of healthy menus to increase their demand and at the same time invest more in training the staff for better comprehension of the concept of healthy menus in order to prepare them. Healthy eating intervention programs together with the promotion of healthy lifestyles at work were found to be successful in the healthcare premise. Thus, consumer behaviour must be well understood, staff of foodservice premises must be well trained and the promotion and intervention program of healthy menus, eating habits and lifestyles must be regularly implemented in order to improve the health status of both consumers and healthcare workers.

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