Research Article

Assessment of Healthy Eating and Active Lifestyle on Campus Environment in a University Setting as Perceived by Students Using the Innovative Photo Voice Method, a Healthy Eating and Active Lifestyle (HEAL) Study

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Abstract | Healthy workplace environment is gaining enormous attention of the researchers. Food and lifestyle are main characteristics of a healthy workplace environment. Taken in this meaning, the food environment of the university has great implications on overall health of students. However, little is known about how university students perceive food and lifestyle environment. This study was aimed to connect student participants in a photovoice action study design in university settings to identify themes of healthy eating and lifestyle environment. This study used action-research design with photovoice-elicitation technique engaging students of different age categories, both male and female, from a variety of study disciplines at Bacha Khan University, Charsadda, KPK, Pakistan. Data on food and physical activity were collected using a set of food and lifestyle photos, which were intended to describe various situations of on-campus food and active lifestyle environment. Students identified support and barriers for healthy eating. They also identified barriers and support for active lifestyle on campus. The support and barriers identified by students coded under themes of food and active lifestyle environment. Themes related to nutrition and food were: self-cooking; convenience of fruits/vegetables; clean water unavailability; poor/low food quality; high food prices; low food diversity and restricted food environment. Themes related to physical activity were limited physical activity (PA) resources; lack of programmed PA and limited knowledge/awareness support. Participants were very contented with photo-elicitation stimulated discussions. Using these photos, students were able to differentiate between healthy and unhealthy eating and lifestyle habits. Photo elicitation is an effective technique to engage participants to define food environment, and the related supports and barriers of a food and lifestyle environment.

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1. Introduction

Workplace health is an emerging scientific area of interest. Recent research studies have shown that effective workplace wellness programs directed at healthy eating and active lifestyle have been found in reducing health risk incidence (Bezzina *et al.*, 2022). Some of the non-communicable diseases (NCDs) including, for example, diabetes, obesity, heart disease, cancer, and depression have been particularly reported to be associated with workplace environment (Harris *et al.*, 2022; Boyle and La Rose, 2009). In addition, numerous studies have reported associated costs of these disease for individuals, organizations, and governments in relation to workplace wellness (e.g. Pronk, 2021). Moreover, studies have also focused on recruitment and retention of healthy and engaged members in the context of workplace healthy environment (Morrison *et al.*, 2008; Burton, 2007).

Both physical and social environments play important role in positively impacting dietary patterns (Story *et al.*, 2008). Because, university students (US) usually spend more time studying and living on campus, it is likely that their dietary habits greatly influenced by the campus food and nutrition environment. For instance, Kapinos and Yakusheva (2011) in their study confirmed that on campus food environment is strongly related to weight-gain during the studying years. Foods available in the local and on-campus groceries, tuck-shops and convenient food stores influence in creating a convenient food environment (Ravikumar *et al.*, 2022; Horacek *et al.*, 2013), which may be in most of the cases provide unhealthy foods.

Extensive body of research has examined the changes in the environment that may motivate individuals to alter their food choices (Horacek *et al.*, 2013; Yeh *et al.*, 2008; Larson *et al.*, 2006; Shepherd, 2002). Shepherd (2002) argues that factors like availability and prices of food, and some cultural and social factors have been identified as main drivers for food consumption patterns. Moreover, on-campus healthy food availability and food-preparation abilities are closely associated with healthy food choices. As noted by Horacek *et al.* (2013), these attributes are strongly related to a student's dietary patterns and behaviors. Further, Larson *et al.* (2006) observes that students with proficient ability of cooking their meals also tend to consume high nutritious quality foods than those students who mostly rely on convenient and prepared foods. Similarly, costly fruits and vegetables and no food preparation time may prevent individuals from consuming healthy foods as observed by Yeh *et al.* (2008). Research studies also show that students on campus tend to eat excessive sugar and fats, and are less likely to eat vegetables and fruits (Breitenbach *et al.*, 2016).

Moreover, university students are also victim of low physical activity (PA) as previously reported in numerous studies (Ferreira *et al.*, 2022; Garn and Simonton, 2022). This is because students spend more time in leisure activities, studying and preparing for their exams. This may result into weight gain and finally obesity and its related physical and physiological disorders. These unhealthy dietary patterns and sedentary lifestyle may lead to low quality of education and training of the students. With prevalent unhealthy dietary patterns and sedentary life-style of the university students, it becomes important to understand why and how the university students make the dietary choices. Also, it is equally important to investigate why students on the campus have sedentary lifestyle. This understanding is warranted for improving students' dietary and overall lifestyle behaviors. In this study we, for the first time, used an innovative technique (photovoice) for data collection and analysis. Our aim was to explore what individual and on-campus environmental factors may motivate dietary behavior change through the perceptions of their experiences the university students usually exposed to. Universities have enormous human and structural resources, but also many challenges and constraints such that it is practically difficult to support any wellness programs (Freedman and Rubinstein, 2010). However, it is warranted that universities must assess the level of their workplace health in terms of diet and PA. The knowledge thus gained as a result of this study will be used for on-campus food policies. Also the findings of the study are expected in developing and implementing resources and strategies for further improving healthy eating and active lifestyle environment as a key role of the university's health and wellness initiatives introduced in future. The main purpose of this qualitative action research was to engage student participants in order to identify support/barriers to a healthy eating and active lifestyle (HEAL) in the context of a public university environment. For this purpose, the photo-elicitation technique was utilized to arouse an alluring discussion.

2. Materials and Methods

2.1 Participants

This was a collaborative study with NEAT organization (Nutrition Education Awareness and Training). The study was conducted in September, 2020. NEAT is a government registered organization of Khyber Pakhtunkhwa province of Pakistan that works for the betterment of nutrition education and awareness (Alam *et al.*, 2019, 2021; Begum *et al.*, 2019; Almajwal *et al.*, 2020). Ethical approval for the present study was obtained from research ethics board of NEAT.

Participants of the current research were students of the Bacha Khan University, Charsadda. Students of different departments of the university were invited to participate in the research study through personal communication by the first author and also through the students studying Human Nutrition and Dietetics.

2.2 Data collection

2.2.1 Tool of data collection

Initially, color photographs (n= 41) were made by professional photographers, who have previous experience in scientific photography. A final of 23 photographs were selected for data collection. The details of these selected photographs with description are provide in Figure 2. Briefly, these photographs represented the whole food environment inside the university and outside the immediate market of the university, where foods are available for students.

All participants provided written consents for participation before the start of the study.

2.3 Procedure for data collection

Students were requested to report to the lab of Human Nutrition and Dietetics (HN and D) at 10.0'o clock in the morning. As per the data collection schedule, there were 2 group sessions; one for female students (n= 16) students and the other for male students (n= 16). Data were collected during these group sessions. Before the actual data collection sessions, an introductory session was arranged to welcome the students and to guide them on how to respond to various photographs. Participants were asked to carefully examine these photographs in a critical manner. They were encouraged to discuss with each other the themes these photos were depicting. They were guided how these photographs were representing both immediate external and internal university food environments: food/eating, physical activity and fitness, and also general scenes. The participants were then enquired to propose various resources for the promotion of healthy eating and active lifestyle. All responses were recorded and not associated with participants in order to protect the confidentiality of the respondents. We also collected evaluation forms to assess the students' perception about this new method and their satisfaction with the study tools.

2.4 Data analysis

Quantitative data was analyzed using SPSS software. Data was cleaned and then analyzed. The SPSS version 21 (SPSS Inc. Chicago, USA) software was used for all analysis. Descriptive statistics were summarized by calculating frequency and proportions. DA Miner (QDA Miner®) software was used for analysis of the data and discussion group responses. The details of the software are provided elsewhere (Derobertmasure and Robertson, 2014). Briefly, the step by step thematic network approach was carried out.

3. Results and Discussion

Initially, 65 students showed their interest to participate. However, final data could be completed on 32 students as 33 students did not participate. Out of those who could not participate, 8 students were not eligible and another majority of the students (n= 25) couldn't report to the lab on the day of data collection.

Table 1 gives baseline socio-demographic data of the student participants. As can be seen, the final sample comprised of 32 students (16 (50%) females). Mean (SD) age of students was 22.5±2.5 years. Mean (SD) value of students' BMI was 24.1±5.6. BMI was calculated as: weight (kg) of the students/height(m^2). The mean BMI suggested a normal body weight, although there were underweight and overweight/obese students also. Most students had no idea of their weight status.

Students were from a different discipline but mostly (32.9%) from HN and D.

3.1 Eating habits (Healthy and Unhealthy)

Based on photographs (particularly photos related to food environment, Figure 2), students were able to draw clear differentiation between unhealthy and

Table 1: Baseline characteristics of students (*n* = 32).

Characteristics	Responses	N (%)	Mean ± SD
Gender (male/female)		16/16 (50/50%)	
Mean Age (years)			22.5 ± 2.5
BMI(Kg/m2)			24.1 ± 5.6
Field of study	HNandD	6 (18.8)	-
	Biology/Zoology	5 (15.6)	
	Management Sciences	5 (15.6)	
	Social Sciences	6 (18.8)	
	Computer Sciences	5 (15.6)	
	Chemistry	5 (15.6)	
Job	No job	19 (59.4)	-
	Job	12 (37.5)	
	No Information shared	1 (3.1)	
Physical activity			
	Exercise (1-2 times per week)	6 (18.8)	-
	Exercise (3-4 times per week)	4 (12.5)	-
	Exercise (5or >5 times per week)	6 (18.8)	-
	No exercise	16 (50)	-
Self-assessment weight status*			
	No Idea	12 (37.5)	-
	Normal Weight	10 (31.2)	-
	Overweight	4 (12.5)	-
	Obese	3 (9.4)	-
	Underweight	2 (6.2)	-
Self-perceived general health status	No Idea	15 (46.9)	-
	Healthy	10 (31.2)	-
	Unhealthy	7 (9.4)	-

Table 2: Self-reported unhealthy vs. healthy eating habits related to the campus.

Unhealthy eating habits	Frequency n (%)	Healthy eating habits	Frequency n (%)
Sweets (i.e., desserts/ ice-cream/ candy/ chocolate)	25 (78.1)	Fruits and vegetables consumption	26 (81.3)
High fat/salty foods (i.e., fried food, baked on fire) intake	21 (65.6)	Drinking clean water	13 (40.6)
Unhealthy snacks	15 (46.9)	Balanced diet in terms of ingredients	12 (37.5)
Over protein consumption (i.e., too much meat, liver, eggs)	13 (40.6)	Control over Portion	8 (25.0)
Overeating with Irregular meals/timings	10 (31.3)	Having breakfast all the days of week	8 (25.0)
Skipping breakfast	10 (31.3)	Eating with friends in company	8 (25.0)
Low water consumption but high juice consumption	5 (15.6)	No ghee/lard/fat (e.g., less sauces with fats)	7 (21.9)
Eating disorders	5 (15.6)	whole food instead of much processed	7 (21.9)
Low fruit and vegetable consumption	5 (15.6)	Junk-foods (*samosa, pakora, dahi-bully* etc)	7 (21.9)
Drinking too much black tea	4 (12.5)	Foods with appropriate protein consumption	7 (21.9)
Eating late at night	4 (12.5)	Self-prepared meals	6 (18.8)
Too much coffee consumption	3 (9.4)	Healthy snack (i.e., nuts, fruits, green tea)	5 (15.6)

healthy foods, and also unhealthy and healthy food habits depicted in numerous ways in these photos. Every participant was asked to list as many as possible unhealthy and healthy eating habits and then share these with their groups (Table 3). In addition, they were also encouraged to mention why a particular option is unhealthy or healthy according to their judgment. Consumption of fruits and vegetables,

Table 3: Self-reported unhealthy vs. healthy lifestyle habits related to the campus.

Unhealthy lifestyle habits	Frequency n (%)	Healthy lifestyle habits	Frequency n (%)
Asking the bearers for bring food to the hostel rooms	25 (78.1)	Walking vigorously for classes	26 (81.3)
Using motorbike for coming to the campus from nearby localities	21 (65.6)	Being member of at least one game team	13 (40.6)
Offering salt at their hostel rooms instead at the Masjid	28 (87.5)	Using bike instead of car or motorcycle as a mean of transportation	14 (43.8)
Gaining weight due to sedentary behavior	16 (50.0)	Offering congressional Salat on the campus	9 (28.1)
Sitting in the lawn for long periods	22 (68.8)	Cleaning/vacuuming of rooms in hostel	7 (21.9)
Watching TV for long period	11 (34.4)	Washing clothes	14 (43.8)
Using mobile phone while sitting or even laying on bed for long periods	11 (34.4)	Going outside for food instead asking the bearer to bring it to hostel room	7 (21.9)
playing passive video games, playing on the computer	7 (21.9)	Helping out physically disabled friend/class-mates to move around	5 (15.6)
Videoconferencing instead of physically meeting the people	5 (15.6)	Mapping the floor	7 (21.9)
Sleeping for longer on the weekends	7 (21.9)	Scrubbing the floor/bathroom	4 (12.5)
Longer nap (with excuse to do sun bathing)	4 (12.5)	Walking to get essential groceries	13 (40.6)
eating/drinking while lying on the bed	8 (25.0)	Dusting	5 (15.6)
sitting while studying light notes	7 (21.9)	ironing	6 (18.8)
using the most nearby toilet/wash room	4 (12.5)	Running Up And Down The Stairs	17 (53.1)
using too much of the motor bike	8 (25.5)	Carrying a modest but not very heavy shoulder bag	7 (21.9)
Sitting while commuting	5 (15.6)	Stand or walk around while waiting for public transport	9 (28.1)

drinking clean water, balanced diet with all ingredients and so on were but a few of the options presented as healthy eating habits. With Regard to drinking habits, surprisingly, carbonated beverages consumption was not mentioned as an unhealthy drinking habit, although the most common daily drinks (i.e., tea, water and juices etc.), were given some consideration by the participants.

Figure 1 shows a schematic representation of the themes/sub-themes and some selected quotes. There were some responses that were coded under several elaborated themes. In general, seven overlapping themes relating to food and nutrition and three themes relating to physical activity emerged across all images: themes relate to food and nutrition were (1) self-cooking of healthy foods (as much as 44% photos), (2) convenience of fruits and vegetables (as much as 22% photos), (3) drinking water availability (4) Food Quality is compromised (5) Food Prices are not subsidized (6) Diversity of food still limited (7) restricted Food Environment. Themes related to physical activity were: (1) Vast campus with limited PA resources (2) programmed PA is lacking (3) Knowledge and awareness support is limited (20% of the photos). The session evaluation analysis shows hat participants were very satisfied with the tool and discussion stimulated by the photo-elicitation.

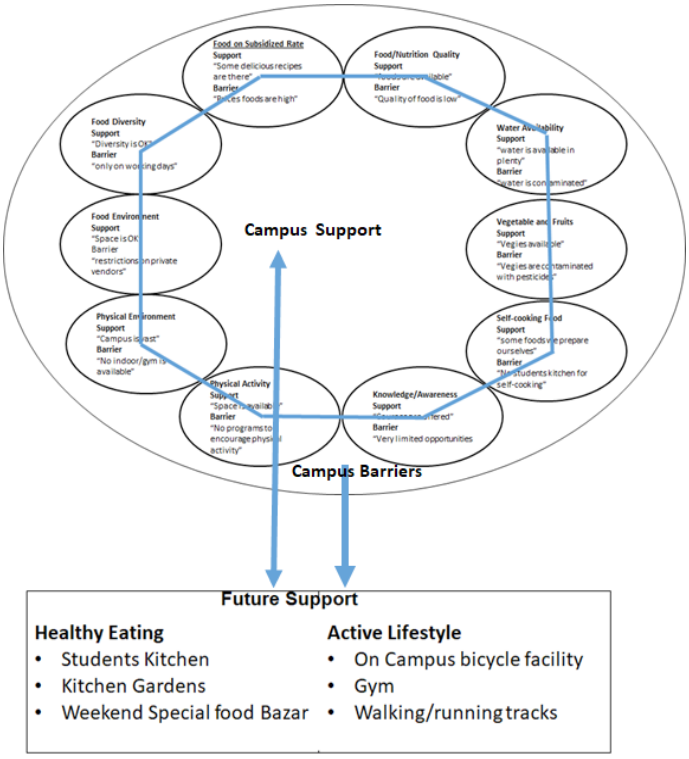

Figure 1: Schematic presentation with selected quotes of the students.

The Figure 1 shows a total of 7 themes related to healthy eating and 3 themes related to active lifestyle.

As can be seen these themes were: Themes related to food and nutrition were (1) self-cooking of healthy foods, (2) convenience of fruits and vegetables, (3) drinking water availability, (4) food quality (5) high food prices (6) low food diversity and (7) restricted food environment. Themes related to physical activity were: (1) vast campus/limited PA resources (2) lack of programmed PA and (3) limited knowledge/ awareness support.

3.2 Selected quotes from the students

We present in the following some quotes from the students related to eating and active lifestyle habits.

- We know what a good healthy food is (pause) but the actual issue is where to find it we cannot enforce the groceries shops to bring foods of our choice. Neither can we enforce the university administration to give us foods as we need (MS4).
- Actually there is no food policy, I know this is challenging as university cannot enforce the outside market shops to have certain food items. However, the inside university environment is under the control of university administration. They can do this. But they do not do it. I think they still have not appreciated the importance of healthy food for students (MS13).
- We hear about water quality of the university is very bad. The poor drainage is polluting the water. We often have gastric problems. This is probably due to this bad water. The water is contaminated as this is an agricultural area. This is not unexpected. We need water filtration plant. If you ask me I can pay for that. I know how important it is (MS29).
- Prices of foods are high. No control on this. No policy on prices. The shopkeepers and hotel owners do charge you how they like (MS8).
- No gym exists. Some time we cannot play or exercise due to harsh weather. In rainy season it is impossible (MS11).
- Even a kilometer long cycling track will be enough. We need exercise every day. We want to do. We mainly do walking. But you know, sometime it becomes boring. We need those exercise that require lesser time (MS18).
- I know 20-25 minutes of bicycling will be enough as a whole day requirement. I have calculated it. I have also confirmed it from literature. I think it is a good workable idea (MS32).
- We female students suffer a great deal. We do not have a separate cafeteria where we can eat freely. Neither we have separate space to do some indoor game or exercise. This is a shit! (FS23).
- Being female I cannot move around freely like many other girls I wear veil and abaya (the long overcoat worn on the dress). This makes me either staying inside at some private corner or the maximum sitting on the lawn (FS21).
- For a girl like me, I wish even rope-skipping is enough to stretch my muscles (FS25).
- You know we will cover the expenses for any extra facility. I mean for good food, some reasonable place to eat and exercise. Believe me, many friends of mine say that. Although we already spend much on semester fees, no problem (FS20).
- When it comes to exercise, you are not allowed by the daily time constraints to do it. I mean schedules are tight and very tricky to get something as an alternative for exercise from the daily routine life (MS11).

The present study had two main goals (1) how students perceive the on-campus environment with regard to diet and physical activity (2) what in their opinion are healthy and unhealthy food habits and certain lifestyle habits. The study used a photovoice methodology for collection of data. In general, seven overlapping themes relating to food and nutrition, and three themes relating to physical activity emerged across all photos (Figure 1). These themes explain the food environment inside the university campus and also the surrounding immediate marketplace, on which the students mainly depend for groceries and related daily life needs. The themes analyzed from the data manifest that quality of food, availability of food, prices, and knowledge about nutritious foods are the main challenges that define the on campus food environment. When asked, whilst using the photos as source of information the students were able to identify the healthy eating habits from unhealthy eating habits. The ability of the students for such discrimination is mostly correct according to the modern day knowledge of nutrition. Similarly, students were also able to differentiate between healthy and unhealthy lifestyle activities (Table 2). These analyses of the students were also mostly up-to-date according to modern scientific literature on physical activities, for example, the WHO guidelines on Physical activity (Bull *et al.*, 2020). Students were also able to analyze the photos to provide valuable data on the barriers to healthy nutrition and lifestyle activities (Figure 1). These barriers were generally related to prices of healthy food items, time constraints

for getting healthy foods either to go faraway to eat or to self-cook nutritious diets, lack of awareness and technical support from the institution. Walking was highly reflected in the responses and the most likely reason walking was the most preferred type is that, It is one of the easiest to perform, easy to stick with, safe, has low or no cost associated with it, and does not require any special skills or equipment. The quotes of the students revealed interesting aspects of the eating habits and active lifestyle patterns with mostly narrating the existing barriers.

Figure 2: Photo examples of the study. These photos give a snapshot of the prevailing food environment inside and outside the campus.

University life is associated with changes in food and PA (Baum, 2017). There are numerous contributing factors that may cause these changes. For example, limited access to self-cooking facilities is usually the main cause. Although, university dining facilities may offer a wide array of dining options (Klassen *et al.*, 2005; Burrows *et al.*, 2017; American College Health Association, 2018; Pember and Knowlden, 2017; Higler *et al.*, 2017; Marquis, 2005; Jhonson *et al.*, 2018; Giskes *et al.*, 2011), students usually in developing countries face these facilities provided by university administrations. In the present study, students were able to identify university-related environmental barriers, including, for example tight study schedules and burden of exams. These are the observations of other studies as well (e.g., Sogari *et al.*, 2018).

Lifestyle decisions and actions are greatly affected by physical environments (Freedman and Rubinstein, 2010). The findings of our study indicated that location of food services, opening/ closing timings of canteens, restricted food menus and menu items, and relatively higher prices of food items with poor price-control policy by the university administration are the main barriers to healthy food environment. As also suggested by others (Freedman and Rubinstein, 2010), participants of the study also identified a need for food and nutrition standards under university food and nutrition policy.

The physical environment also affects the PA of people. The current study participants noted that there are many opportunities for PA on the campus. However, these opportunities are not properly utilized. Students were also aware of the health benefits of PA. These findings are in agreement with other studies (e.g. Haines *et al.*, 2007), where health benefits for those who become moderately active have been reported. Most of the students were of the view of sound PA on-campus policy and stated: To create an organization that supports healthy eating and active lifestyle, the organization should remove perceived barriers and strengthen or introduce supports. For example, healthy eating and active lifestyle communication could be changed to a support by creating relevant internet/ website resources and campus signage, perhaps accompanied by a mascot or symbol to enhance awareness.

There are some strengths as well as limitations of the present study. One of the main strengths is photovoice (action research) as a data collection tool. As noted by Macdonalsd (2012), action research is an emerging methodology that can be used for development of effective wellness and health programs. This research provides the participants with a unique participating opportunity (Wang and Burris, 1997; Harper, 2002), and also allow sharing life experiences (Catalani and Minklen, 2010) that may be used for shaping public health policies (Findholt *et al.*, 2011), particularly in the university settings thus enabling students for healthy lifestyle supports (Good hart *et al.*, 2005) and also food security and assurance (Martin *et al.*, 2010).

Photo elicitation participants of the present study noted that the photographs simulated a walking tour around the campus. One participant quoted his experience in these words: This helped students think about their day-to-day activities and whether their environments were supportive or not of healthy eating and active lifestyle. Photo-elicitation stimulated responses in more depth as also reported by others (e.g. Meo, 2010). Several participants noted that the photo-elicitation technique supported

their engagement. As noted by one participant: It (photovoice) helped in developing sense of ownership of the outcomes, thereby enhancing success for the implementation of future healthy eating and active lifestyle strategies. Another student was of the view that: Some of the themes identified by the participants were not ones the researchers would have considered, demonstrating the power of engaging the community members in designing programs. There was a variety of students from a number of diverse study disciplines, which might have immensely added to collect more judgments (e.g., diverse experiences/opinions) into the workplace food environment. Wellness programs should be considered in the strategic plans of universities and, owing to the emphasis on healthy eating and active lifestyle, dietitians can play a leading role in establishing and maintaining effective programs.

Regarding the limitations, we are of the view that students were not appropriately trained for analyzing the photos, which led us to complete the study and compile the data in relatively longer time as much of the time was spent in training them on how to respond to photos. Also, students were asked to respond and submit their opinions in English language (other than their mother tongue), which might have hindered them to report what actually they meat to. Future studies should consider this. Also, some students preferred to use video clips instead of photos for better situational analysis. In addition, the sample size use for the present study was relatively small. However, it can be argued that it was a study on pilot basis, where we purposely used small sample for data quality control. For qualitative research such as used in this study, a small sample size is not limiting (Baker and Edwards, 2012). Sample size/number of sessions were believed suitable due to extensiveness of disciplines represented and repetition of themes demonstrating permeation of the data. All participants completed the session evaluation forms and returned. The effect of seasons cannot be ignored on the food preferences. This study was performed during the start of the summer months March), when many people may have different dietary habits and preferences as compared to when in winter season. Future studies must focus on conducting investigations in the winter months as well.

Conclusions and Recommendations

in conclusion, the present study demonstrated that photo elicitation is an effective technique to engage participants to define food environment, and the related supports and barriers of a food and lifestyle environment. Also, the overall food and PA environment of the university, as perceived by the students, is poor. There is a need of polies to improve the food and PA environment of the universities.

Novelty Statement

The method of photo- voice is an innovative technique of data collection. The method is also a faster mean of huge data collection in relatively shorter time. Students participated also had the opportunity to learn how to perceive about their immediate food environment.

Author's Contribution

Iftikhar Alam: Conceived the idea, designed the study and wrote the first version of the report. Other authors helped in correction
Iftikhar Alam and Muhammad Ali: Carried out fieldwork and collected the data.
Iftikhar Alam and Muhammad Farooq: Analyzed the data.

Conflict of interest
The authors have declared no conflict of interest.

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