IJFR 4 (2017) 1-11 ISSN 2056-9734

International Journal of Food Research
www.bluepenjournals.org/ijfr

Enhancing culture of health in food deserts: Reports of a community supported agriculture study in San Bernardino, CA

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Article History
Received 10 July, 2017
Received in revised form 05 August, 2017
Accepted 10 August, 2017

Keywords:
Farmshare, Community-Supported Agriculture (CSA), Nutrition, Food sources.

Article Type:
Full Length Research Article

ABSTRACT

Healthy food access is a problem in San Bernardino city, California with reports of more global-chain retail food outlets compared to fresh produce places like farmers' markets. The aim of this study was to explore the implications for community-supported-agriculture Farmshares as alternative food networks that could also bridge the food access gap in the city. Participants (182) were enroled into two groups, aged 18 years and older, one per family. Participants' biometrics were measured at the beginning and after 8 weeks of the program. Group 1 received once weekly-Farmshare produce, one-hour weekly health education classes, and participated in a one-hour weekly physical activity (PA). Group 2 participated in one-hour weekly PA session. Differences in the study's endpoints were compared between the groups prior to the intervention and after 8 weeks. Using the grounded theory approach, the factors that could influence participants' produce choices were investigated. When analyzed by groups, Farmshare/exercise/education participants experienced a 4-point drop in their beats/minute heart rates after 8 weeks. Daily fruits and vegetable consumption increased by 1.2 significant points in the Farmshare/exercise /education group. Qualitatively, 15 participants were interviewed on the factors influencing their produce choices. From the analyses, the basic social process' core category 'barriers' was identified and clustered into five key factors: Cost, time, preference, accessibility and lack of awareness. Of the 76 participants who received the Farmshare intervention, 29% were willing to continue after the intervention's completion. Farmshare programs could be viable options for healthy food access in disadvantaged settings, however, there are barriers that need to be addressed. Possible guidelines may include enlightenment on utilizing food assistance vouchers for Farmshares and implementing policies which make healthy foods more accessible.

INTRODUCTION

Foods, food environments, different activity levels, and other lifestyle habits can contribute immensely to longevity depending on which direction the dial for choices are pulled, whether through healthy lifestyle modification or the converse (Kimura et al., 2009; White et al., 2013). According to a 2007 California Center for Public Health Advocacy (CCPHA) study, the Retail Food Environmental Index (RFEI) is a rating used to describe the relative abundance of retail food outlets in a given area. In the initial report, San Bernardino's RFEI was

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rated 5.72 (CCPHA, 2007) on a rating of cities evaluating stores which offer mainly healthy food options like fresh produce compared to those providing unhealthy choices, for instance, triple steak burger or extra cheese pizza. The RFEI is determined by dividing the total number of fast-food restaurants and convenience stores by the total number of supermarkets and produce vendors (including produce stores and farmers markets) in a given area (CCPHA, 2007; Babey et al., 2011).

According to the CCPHA report, the RFEI for California is 4.2, meaning that there are over four unhealthy food outlets in California for every healthy one. Retail food indices indicate that food outlets with higher values are associated with 'food deserts'- when quality, affordable, and healthful food choices are difficult to obtain due to physical, social, or economic barriers. Regions where RFEIs are less than 5 (the lower the better) have been suggested to have healthier food environments and those higher than 5 with less healthy food outlets. Areas with higher retail outlet indices have been associated with increased obesity and poorer health outcomes (Spence et al., 2009).

The possible connections between the retail food environments and health quality of life of San Bernardino residents make the food environment issue worth discussing. This quest has given rise to other reports and studies that explored some morbidity and mortality rates in San Bernardino city and county in comparison with the state of California's. According to Hoffman et al. (2011), the average age of death for San Bernardino city residents was 65 years, compared to a county average of 69 years, and 73 years for California. Of the leading causes of death, cardiovascular diseases mortality rates per 100,000 residents were 308 for the city of San Bernardino, 238 for the County, and 182 for the State of California (California DOPH, 2008, as cited in Hoffman et. al., 2011). Similar disparity trends exist across different health outcomes from the city to the county, and to the State (Table 1). Many of these indicated health outcomes are associated with poor nutrition, low PA levels, and unhealthful environmental conditions (Hoffman, et al., 2011; Kimura et al., 2009; Olsen and Miller, 2011).

Community supported agriculture Farmshare (CSA-F) programs were explored as alternative food sources in disadvantaged communities (participants below poverty line) to bridge the food access gap in San Bernardino city.

The research questions put forward included the following:

(a) Is there any significant difference in indicators of participants in this CSA-F program compared to another group that does not receive such program (comparison group)? Anticipated indicators were fruits and vegetable consumption patterns, weights, body mass index (BMI), percentage (%) of body fat, % of muscle, resting metabolism, body age, visceral fat, heart rate, and blood (pulse) pressures;
(b) Being that research is replete associating lower BMI with reduced morbidities, what are some of the associated biometric variables that can significantly predict participants' BMI?
(c) If any, what factors influence participants' choices of including more fruit and vegetable in their diets?

MATERIALS AND METHODS

Study design

The current study was a mixed, longitudinal, quasi-experimental study with non-equivalent comparison groups. Interventions were delivered once weekly for 8 weeks, and participants were measured at baseline (weeks 0-1), and at after eight weeks. There were two groups in this study, the intervention recipients [Group 1 (n = 76)] received: once weekly Farmshare, one-hour weekly health education, and they participated in a one-hour weekly physical activity (PA) session. The comparison participants [Group 2 (n = 106)] participated in a one-hour weekly PA. Intervention group participants were residents of San Bernardino Waterman Gardens Community (WGC), an affordable housing and low socio-economics (SES) community, located on the east side of the city of San Bernardino in Southern California. The comparison group participants were community residents living within 3-5 miles of the WGC, and were also considered living in a low SES area.

To understand the implications of exploring Farmshare programs as alternative food networks in the study areas, a mixed method research was utilized so as to obtain quantitative and qualitative feedback which can explain the perceptions or the implications of these alternative food networks.

A quantitative survey was administered to study participants (n = 182) to measure their biometrics (body weights, % body fat, % visceral fat, % muscle, resting metabolism, BMI, blood pressures, and heart rates) and produce consumption patterns at the beginning of the program and after 8 weeks. The study's qualitative component included guided interviews (n = 15) exploring possible barriers influencing participants' fruit and vegetable consumption and choices. For all participants enrolled, a convenience sample was used and participation was voluntary.

The Healthy San Bernardino Coalition (HSBC) members assisted in publicizing the current study through the different grass root (local) agencies that they work with in San Bernardino city. One of such agencies is Latino Health Collaborative whose team members helped to coordinate the Striders program, the PA portion of this study within the comparison group. In addition to the

Table 1. Death rates per 100,000 residents in 2008.

Causes of death	San Bernardino (SB) City	SB County	California
Cardiovascular diseases	**308**	**238**	**182**
Total cancers	**193**	**172**	**158**
Lung diseases	73	61	39
Diabetes	**41**	**32**	**21**
Total accidents	41	27	29
Flu and pneumonia	30	19	19
Alzheimer's disease	30	32	29
Liver diseases	20	12	11

Note: Age Adjusted Mortality Rates Table. Outcomes in bold have been associated with diets and environments. Adapted from San Bernardino County Department of Public Health, 2008, as cited in Hoffman et al. (2011).

publicity via HSBC partners, posters and flyers were posted in the priority communities: information materials about the study were also handed out through canvassing by going door to door in WGC and the nearby park areas, for example, Speicher Memorial Park, Perris Hill Park, and at the unincorporated city of Muscoy's library community center.

The HSBC is a coalition of community stakeholders with priorities for improving healthy food and health access, promoting safer and healthier San Bernardino community for enhanced security and activity engagement.

Many San Bernardino community residents also assisted with referral and recruitment of other residents/neighbors to this program. Residents who indicated interests in the study were contacted by trained personnel using an institutional reviewed board (IRB) approved telephone script.

All the study participants (including both the intervention and the comparison groups) consented following standard ethical protocols as approved by the IRB office of sponsored research. The inclusion criteria included: one person per family, male or female, at least 18 years of age, women who self-reported as not-pregnant (in case of rigorous activity restrictions).

The intervention group participants (n=76) residents in WGC, consented to attend a one-hour weekly health education class, a one-hour weekly exercise activity during which they also received free weekly Farmshare produce. The comparison group participants (n=106) consented to attend one-hour weekly exercise activity during the study.

Quantitative data collection

All program participants completed a 4-page questionnaire (made available in English and Spanish) which included four health-related quality of life questions, some questions about fruit and vegetables consumption, respondents' demographic information and a measurement (biometrics: body weights, % body fat, % visceral fat, % muscle, resting metabolism, BMI, blood pressures, and heart rates) section. The study survey (including the biometrics) were administered within the same time frame (1–2 weeks' difference) to both intervention and comparison groups at weeks 0–1 and seven-eight. Two weeks' intervals were allotted for measurements in case participants missed 1 week, which they could make up in the other week. Biometric section was completed on site and was coordinated by a licensed practicing professional (registered nurse).

Qualitative data collection

Using the grounded theory approach as developed by Glaser and Strauss (cited in Bitsch, 2005), literature text analyses was completed for food access issues in San Bernardino. The reports indicated that the city of San Bernardino is a "food desert" (CCPHA, 2007; Hoffman et al., 2011). Hoffman et al. (2011) reported that in California, there were at least four options of unhealthy food options for every healthy option (for example, four global fast-food restaurant chains for every one produce store). After conducting the literature text analyses that indicated a food access problem in San Bernardino, focus group discussions were held with key informants in the WGC. Data was gathered through field notes, journals, and by further literature consults on food access issues in San Bernardino. Participants (15 in number) were also interviewed using a semi-structured face-to-face guided interview format on their fruit and vegetable consumption practices focusing specifically on factors influencing those choices.

Program intervention

The intervention group (WGC) received one-hour weekly

health education, one-hour weekly PA classes taught by health professionals (registered dietitians, bilingual: Spanish and English speakers) from San Bernardino Department of Public Health Nutrition. Translation devises and interpreters were provided as needed. A separate section was provided for children's activity (managed by graduate students/volunteers) to limit participants' distractions.

The HSBC and the Latino Health Collaborative funded the Farmshare and associated logistics costs for the program. Farmshare costs covered the price for a full share of weekly produce estimated to meet fruit and vegetable needs for a family of four for intervention participants. The produce was supplied by the Old Grove consortium of farmers located mainly in the Inland Empire, Southern California. An example of a typical weekly Farmshare produce as supplied by Orange Grove farmers included (in pounds) eight oranges (5 lbs.), two grape fruits (1), six Fuji apples (1/2), six Gala apples (1/2), one bunch of grapes (2), one bunch of beets (1), one bunch of chard (1) two Zucchinis (1/2), one bag of baby spring mix spinach (1/2), three Persian cucumbers (1), one bunch spicy or Italian basil (1/2) and Heirloom tomatoes (1/2).

The incentives for participating in the program were one season (13 weeks) once weekly supply of Farmshare produce (valued at $364/participant), free one-hour health education classes and materials, free one-hour weekly PA classes, and health screenings (valued at $80/participant). Health screening measurements included participants' weight, height, BMI, resting metabolism, % body fat, % muscle, % visceral fat, heart rates and blood pressures. Incentives for the comparison group participants included free health screening (valued at $80 per participant), free health education counseling and materials, $10 gift cards given in two $5 installments and their names being entered into raffle drawings for ten kitchen items.

Healthy quality of life

The CDC's Healthy Days Core (CDC HRQOL-4) measurement scale was utilized for the purpose of this study to measure participants' quality of life (CDC, 2005; Van Esch et al., 2011). The CDC HRQOL-4 instrument measures quality of life for general health and has been utilized in different studies (Van Esch et al., 2011; Toet et al., 2006; CDC, 2005; Hagerty et al., 2001). As defined by the World Health Organization (WHO), quality of life relates to individuals' perception of their roles in life, their position in context of their cultures, and values in relations to their goals, aspirations, or expectations (WHOQOL, 1995; as cited in Van Esch et al., 2011).

Fruits and vegetables intake

In estimating the number of fruit and vegetables serving for participants, a brief measure for evaluating fruit and vegetables consumption in adolescents developed by Prochaska and Sallis (2004) was adopted and used in this study. The two main questions from this screening tool requested respondents to indicate how many servings of fruit (F_1), and vegetables (V_2) they eat on a typical day. The options given were 'zero', 'one', 'two', 'three', and 'four or more'. These researchers estimated the total frequency of fruit and vegetables consumed by respondents by adding together the frequencies of fruit and vegetables (F_1+V_2) the participants ate daily. The intraclass correlation for paper-based versus computer version of Prochaska and Sallis' screening tool was 0.68, with 0.80 for a same day test, and 0.47 for a retest about 4 weeks later. The instrument correlated more with a 3-day food record data ($r=0.23$, $p<0.01$) as compared to the Youth Risk Behavior Surveillance Survey (YRBSS) fruit and vegetable scale ($r=0.04$, $p=0.67$) (Prochaska and Sallis, 2004).

Physical activities

The exercise (activity) regimen questions for current study were adapted from the Youth Risk Behavior Surveillance Survey (YRBSS) developed by the Centers for Disease Control and Prevention, CDC (2015). The activity questions include:

"*In the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time*".

Biometrics

The biometric measurements for this study were assessed using the Full Body Sensor Body Composition Monitor and Scale Model HBF-514c. This body sensor monitor works by bioelectrical impedance method to estimate body fitness indicators such as: body weight, % body fat, % visceral fat, % muscle, resting metabolism, and BMI (Aandstad et al., 2014; Maghsoudi et al., 2014; Makwana et al., 2012).

Blood pressures

Pulse pressures were estimated from systolic and diastolic blood pressures. Blood pressures were

measured with all participants in a sitting position; three blood pressure readings were recorded at 5 min intervals on the same arm (unless contraindicated). Triple blood pressure readings were taken to aid better precision in determining respondents' actual blood pressures through averaging of those readings.

Statistical analyses

Paired *t*-test analysis was used to complete analysis for participants who completed the evaluations by week eight of program intervention to evaluate if there were any significant changes before and after the intervention program in the study's endpoints.

Data collected were also entered into the statistical software programs SPSS 23 (IBM Corp, 2014) and SAS 9.1.4 (SAS Institute, Inc. Cary, NC). Multiple linear regression was applied to predict BMI. The predictors were added stepwise: body fat (percentage), visceral fat (percentage), resting metabolism (calories), skeletal muscle (percentage) and age. All variables in this model were continuous. The variable exercise did not make any changes to the research model significantly, although it was recommended as a good predictor.

We observed that while 182 participants started the study, by 8 week, participants who continued with the study reduced to 90 (~50%). A sensitivity analysis was completed to explore if participants who were absent by week 8 differed by specific characteristics which could have made them selectively drop out from the study. Participants who were present at 7-8 weeks were coded as 1, and those absent as 0. Both groups of participants were then compared on all the endpoints of consideration at baseline.

Qualitative analyses

Using a semi-structured guided interview survey, participants conveniently sampled on voluntariness, ages 18- 55, mean age 38, were interviewed until saturation by four interviewers (two of whom were bilingual promotor as for Spanish and English interpretation and translation) on observed barriers for including more fruits and vegetable in their diets. Fifteen participants were interviewed (face to face) comprising of 12 women and three men. Of the participants interviewed, nine were identified as being of Hispanic origin, three as black/African-Americans, one as Asian, and two as mixed races, Hispanic-white and black-white. Participants were interviewed for about 10-15 min at the Waterman Gardens' community center. Interview questions were open-ended with room for significant prompting, directing, and focusing (for example, 'If any, what factors make it difficult for you to eat more fruits and vegetables'); 'How can those factors (identified limitations) be addressed?'; 'What do you know about Farmshare programs?'; 'How would you improve current Farmshare programs?'. Codes were read and re-read for emergent themes. Themes were organized into phenomena which were 'barriers' participants indicated for not including more fruit and vegetable choices in their diets.

RESULTS

Demographics

Table 2 represents the demographic information about the participants. There were 182 participants enrolled in the study overall, 76 of these (41.8%) were in the intervention group, and 106 (58.2%) in the comparison group. The study comprised mainly of females, 160 (88%). The mean age among intervention group was 42.3 years, and for the comparison group participants 36.7 years. Fifty-three (69.7%) of the participants were identified as Hispanic in the intervention group, while 92 (86.8%) of those in the comparison group were identified as same.

Predicting body mass index (BMI)

The final model predicting BMI was:

BMI=15.08 + 0.13 (% body fat) + 0.95 (% visceral fat) + 0.01 (resting metabolism calories) - 0.36 (% muscle) - 0.08 (age in years).

$F(5, 159)=271.15$, $p<0.001$ with an adjusted R^2 of 0.895 (Table 3 for predictor variable coefficients and their associated significance).

Comparing participants' outcomes

In the paired *t*-test analyses, for all participants who completed the first 8 weeks, (n = 90), significant changes were observed in overall participants' health quality of life, heart rates, percentage of body fat, percentage visceral fat, and fruit and vegetable consumptions (See Figure 1 for some associated differences in study's endpoints).

For all participants who continued in this study till 8 week (n=90), there were statistically significant improvements in general health quality of life, weights, % body fat, % visceral fat, and fruit and vegetables consumption patterns (Table 4). The noted significant differences persisted only within the intervention group when they were analyzed separately for within-group variations.

Differences were noted in these intervention

Table 2. Study participants [N = 182; (%)].

	Intervention Group-WGC residents (%)	Comparison-San Bernardino residents (%)	Chi square p-value
Participants	76(41.8)	106(58.2)	
Race Ethnicity			
Hispanic	53(69.7)	92(86.8)	0.01
Non-Hispanic	23(30.3)	14(13.2)	
Gender			
Male	9(12.9)	6(5.7)	0.11
Female	61(87.1)	99(94.3)	
Age in years (Mean±Standard deviation)			***t*-test p-value**
	42.33±8.8	36.7±11.4	0.001

Table 3. Predictors of body mass index by multiple linear regression.

Predictors	**BMI beta coefficients**	**Standard error**	***p*-value**
Intercept	15.08	2.93	<.001
Variables			
% Visceral fat	0.95	0.10	<.001
% Body fat	0.13	0.03	<.001
Resting metabolism (Per 100 cal)	1.00	0.10	<.001
% Muscle	-0.36	0.07	<.001
Age in years	-0.08	0.02	<.001
R^2/adjusted R^2		0.95/0.90	
F		271.15	
***p*-value**		<.001	

Table 4. Differences in study endpoints from the beginning of study and after 8 weeks (n=90).

Outcomes	**Mean Diff.±Standard deviation**	***p*-value**
Health quality of life	0.29±1.18	0.03
Heart rate (beats/min)	-1.92±10.96	0.12
Weight (lbs)	-1.18±4.43	0.01
Percentage body fat	0.51±1.90	0.01
Percentage visceral fat	0.17±0.61	0.01
Resting metabolism (cal)	-5.26±61.32	0.42
Percentage muscle	-0.08±2.74	0.78
Body mass index (kg/m^2)	0.04±1.12	0.77
Fruit vegetable consumption	0.91±2.76	<.001
Pulse pressures	1.69±10.53	0.13

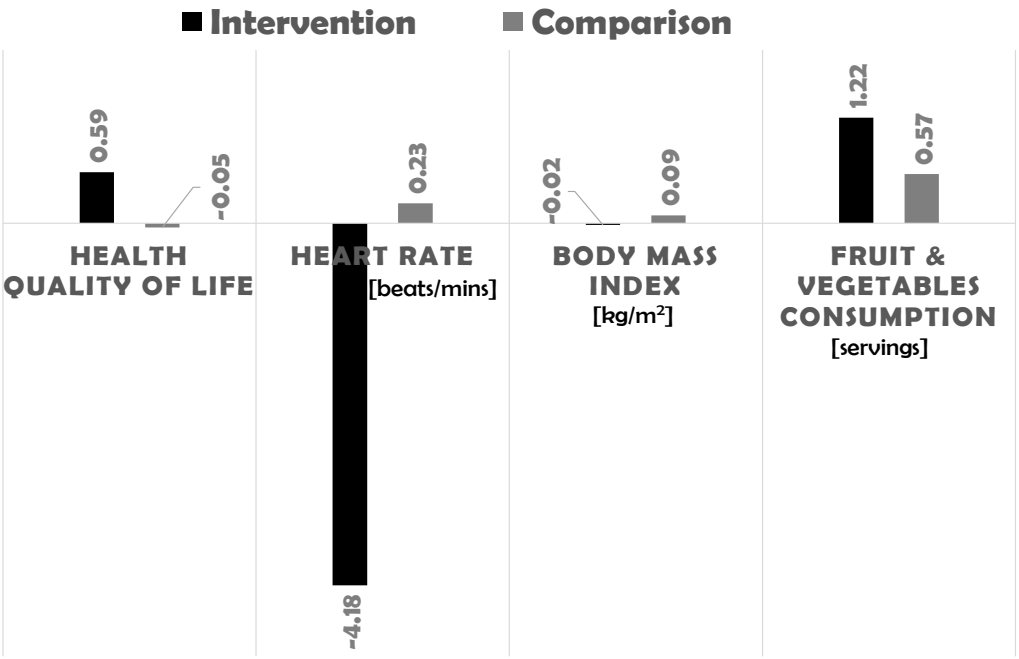

Figure 1. Comparison of baseline and 8 week measurement mean differences in participants' outcomes.

Table 5. Differences in study endpoints from the beginning of study and after 8 weeks; analyses by group.

Outcomes	PA only group (n = 42)		Farmshare+ health education + PA group (n=45)	
	Mean±Standard deviation	*p*-value	Mean±Standard deviation	*p*-value
Health quality of life	-0.05±1.24	0.80	0.59±1.04	0.01
Heart rate (beats/min)	0.23±11.01	0.89	-4.18±10.57	0.02
Weight (lbs)	-1.19±5.70	0.18	-1.17±2.87	0.01
Percentage body fat	0.28±1.66	0.27	0.72±2.10	0.03
Percentage visceral fat	0.09±0.57	0.29	0.24± 0.65	0.02
Resting metabolism (cal)	3.05±84.04	0.81	-13.02±25.15	<.001
Percentage muscle	-0.06±0.99	0.69	-0.10±3.71	0.86
Body mass index (kg/m^2)	0.09±1.26	0.62	-0.02± 0.99	0.89
Fruit Vegetable Servings	0.57±3.02	0.23	1.22±2.49	<.001
Pulse Pressures	1.65±10.41	0.30	1.74±10.76	0.29

participants' healthy quality of life, heart rates, weights, % body fat, % visceral fat, resting metabolism, and fruit and vegetable consumption patterns. There were no significant differences in comparison group participants' endpoints in their within-group variation analyses (Table 5). Among participants in the intervention group, their health quality of life increased about 0.59 points. Intervention participants' heart rates also significantly decreased 4 points. Other endpoints that significantly decreased among intervention participants were weights and resting metabolism calories. It was conflicting to note that in this group, percentage body fat, and percentage visceral fat increased 0.72, and 0.24 points respectively (Table 5).

Sensitivity analyses

There were 49 (~65%) participants who remained in the program from the intervention group and 41(~39%)

participants in the comparison group at week 8. A sensitivity analysis to compare all participants at baseline was performed; the basis for differences compared was whether they continued or discontinued with the program by the 8 week. In comparing participants who were present at baseline but absent by week 8, there were no significant differences in all the outcomes of consideration. This indicates that those participants who dropped out of the study were not significantly different from those who continued by week 8. Dropout rates could have been due to chance, and with no particular order or characteristics from those who continued with the program at least from the study's endpoints of consideration.

Understanding factors influencing participants' fruit and vegetable choices

Basic social process' core category "barriers" influencing respondents' produce choices were identified as factors influencing participants' fruit and vegetable choices. This emerged from the recurrent patterns and themes as reported by participants (comparative analyses). These barriers influencing participants' produce choices were clustered into five key factors: economy (cost), time (fruit/vegetable preparation), individual preferences, accessibility (ease of obtaining), and awareness (enlightenment).

Farmshare program continuity among intervention participants

Participants in the intervention group were asked to indicate their interests for continuing with the Farmshare program after the program intervention ends. An accountant [economic mobility coordinator (EMC)] from the HSBC partners was identified to provide the logistics support as needed. The EMC assisted willing participants to plan and coordinate their family finances so they could start saving some money aside (with the accountant) for the next Farmshare season after the current intervention was completed. The savings were also used to gauge' participants' interests in continuing with the Farmshare program after the study was completed.

DISCUSSION

The idea that CSA Farmshare programs, as alternative food networks, could supplement other food environmental and justice efforts was explored in this study; thereby bridging the food access gap especially in food desert areas. Attempt was made to expand food access in a low SES community setting while simultaneously learning about food access barriers that residents may experience. Evaluating the study's effort, it appears to benefit participants in WGC within the 8 weeks of assessment. Overall, WGC participants reported an increase in their fruits and vegetables consumption.

For 8 weeks, participating WGC residents received weekly Farmshare produce, in addition to the hourly weekly health education and exercise sessions. During the group analyses while comparing trends of biometrics within each group, the WGC participants experienced some significant increase in their health quality of life, fruit and vegetable consumption as well as significant decreases in their heart rates, weights, and resting metabolism (daily calorie intake). In implementing and evaluating CSA-F programs especially among populations with limited means (low SES), sustainability has to be forefront in the discussions.

It was also noteworthy that we could predict participant's BMI when information on each person's % body fat, % visceral fat, resting metabolism, % muscle, and age are available. In targeting the obesity epidemic therefore, current study implications call for increased activity especially as one ages. Specific efforts directed at reducing body fat, visceral fat, and caloric intake may lead to gains in health through decreased BMI and reduced complications related to obesity problems.

For this study, an EMC personnel from the HSBC was available to set up times to look at WGC participants' accounts (if willing) to assist in their planning and saving towards future Farmshares. While the majority of the WGC participants indicated that they liked the Farmshares, and wanted to continue after the intervention was completed, only 22 participants (29%) started saving towards future shares with the EMC. The total savings over three months towards the Farmshares from the cohort was $865, which was about 11% of what a full Farmshares for those 22 participants would have been. The contributions (savings) indicates that at least 22 (29%) of the WGC participants were willing to commit to eating healthier by considering Farmshare options to the point of saving towards their own shares. These interested patrons, however, still needed financial or other supplementary resources to participate in Farmshare programs effectively.

It was observed that telling some participants to contribute to their future Farmshares discouraged them because they felt they could not afford to save at all. One intervention participant when asked if she was planning or willing to continue in the next Farmshare season stated this:

"*I'm still undecided. I don't know if things will fit with my schedule with school and work I'm working to complete my associate degree. Also, I don't know if I can afford it. If it's a little less expensive like say less than $20 a month,*

because it's a low income community here. Some of us get paid once a month, and it's so little that some of us can only pay like $190 for rent, so it's a little difficult because my income is like $800 a month".

In terms of participation, by the 7-8th weeks of the program, only 49 (65%) from the initial 76 participants in the intervention group continued on for the evaluation. In the comparison group, only 41 (39%) from the cohort receiving exercise training continued until 8 week. Three attempts were made for each participant through the promotor who called and reminded participants who missed programs' Farmshare, exercise, or training sessions in both groups. Participants who missed more than 3 weeks' participation were dropped from the study. Participants who could not continue gave different reasons for not continuing. Some of the reported reasons were: time, cost of participation (saving for future Farmshares), not too much variety of fruits and vegetables, and scheduling conflicts.

It was also conflicting to note that contrary to expectations, intervention participants' percentage body fat, and percentage visceral fat increased instead of decreasing. The metabolic changes (fatty/visceral cellular increases) could be the initial healing process of body's response to the trauma or physiologic insults of inflammation.

In this adaptive process, following physiologic insult, inflammatory mediators are released, triaged, and with reparatory white blood cells, open up blood vessels to eliminate debris and toxins in the cells, thereby swelling up (inflamed). According to a physiology article documented by Borer (2008), aerobic exercise has the capacity to oxidize fat by increasing mitochondria volume and function especially in the skeletal muscles. These mitochondria overload can create higher reactive oxygen species which shift fatty cell and tissues in readiness for carbohydrate metabolism (Saris and Heymsfield, 2007; Silva, 2006; Civitarese et al., 2006). It would be expected that these increased body/visceral fat will decrease (as was noted in the remaining cohort monitored) with time as the body re-configure itself to a more consistent activity routine.

Implications for policy and practice

Health education and promotion

Addressing the problem of obesity over time has been a daunting task for many generations (Flegal et al., 2012). The multiple factors that contribute to obesity and other health problems make it difficult to precisely identify best practices for health. The parts that food environments play in contributing to obesity rates as well as the associated risks for different diseases, such as diabetes, and cardiovascular outcomes (Montonen et al., 2005; Liu et al., 2012) cannot be over-emphasized. Alternative food options are needed especially in areas of food deserts. As noted through this study, innovative ways to empower community residents through education and policy infrastructures which make healthier choices such as CSA-F, not only easily accessible, but possibly more affordable are recommended. Current study is also one step in bridging the class based disparities that have been documented in CSA-F; most patrons are White/Caucasians and majority of those who participate in these programs are of higher socio-economic statuses (Lang, 2010; Wilson, 2013).

Aging population

The elderly need to be more positively engaged and are recommended to increase their activity levels to counter the ever-pulling effect of physiological efficiency decline that accompany ageing. Besides, the physical, cognitive, social, or other declines associated with ageing can limit elderly independence, reduce their quality of life, and ultimately infringe on overall economy (King and King, 2010). The elderlies' unique needs are such that this age related changes place them at a disadvantage whereby they could be nutritionally and activity compromised without being readily recognized (Wells and Dumbrell, 2006). The burdens of these co-morbidities in addition to the associated physiological changes are indications for deliberate, yet aggressive preventive measures. Innovative strategies that can address elderly' needs are recommended. Also, a complementary, participatory, and multidisciplinary approach is warranted to fill these gaps in identifying factors that compromise elderly' quality of life. Following retirement, most seniors may have time to engage with the built environment as there is more time and freedom to productively contribute to their local communities. Community supported agriculture programs could therefore, be ventures through which these vulnerable elderly population group can contribute productively to their local economies through participation or engagement.

Conclusion

The current study is an attempt to move the needle on the different processes guiding participants daily eating and activity decisions which can consequently affect their quality of life.

After the 8 week Farmshare program, intervention recipients experienced significant improvements in some health outcomes of consideration: self-reported health quality of life, weights, heart rates, resting metabolism, percentage body fat, and visceral fat.

Areas to investigate for future studies may include studying CSA-F participation in more diverse populations and across different SES statuses. Such studies can have randomization implemented in participants' enrollment to tease out as much as possible, extraneous influences that can mask direct study outcomes and/ or implications. In low income populations, people's willingness and attitudes towards using their assistive or supplemental nutrition vouchers like women infants and children's cheques, CalFresh vouchers, etc. for Farmshares can also be explored.

Limitations of the study

Logistics of planning around limited funding, participants' small sample size, and attrition were significant limitations in this study. As a pilot study exploring possible health implications of CSA-F, sample selection was voluntary and this was another limitation. By not being able to randomize participants to program interventions for example, CSA-F, this precludes current study from being generalized in application to other populations or different settings with similar interventions. One possible recommendation to reduce attrition may be to equitably incentivize randomized participants from the same community without interference or cross over influences, however, limited and earmarked-grant specific-funding prevented this during the implementation. In consideration of possible biases, questionnaires and biometric data collection were completed simultaneously in the 0-1 and 7-8 weeks of the study to provide baseline and at least one comparison trend measurements.

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