FOOD AFFORDABILITY: SUSTAINABLE FOOD CENTER INCREASING FOOD ACCESS THROUGH DOUBLE DOLLARS INCENTIVE

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THESIS

Submitted in partial fulfillment of the requirements

for the degree of Masters of Public Policy in Public Policy at

The University of Texas at Arlington

May, 2020

Arlington, Texas

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Abstract

Food barriers have become a growing problem for many communities due to lower access to healthy foods. Not having access to healthy foods has been linked to health problems rising in communities. There are several food barriers including affordability of food that causes individuals of low-income groups to struggle to gain access to fruits and vegetables. Communities across the world have been creating and implementing new policies and programs in order to reduce the geographic and monetary barriers to increase food access. The Sustainable Food Center has been utilizing their Double Dollars Program to help lower income families who are on food benefits. Incentives called Double Dollars that are equal to dollars in value are given to individuals that can be used to purchase fruits and vegetables at the Sustainable Food Center farmer's markets. The data collected by the Sustainable Food Center indicates that the program has affected individuals gaining access to healthy foods. Future research needs to be conducted to understand the effect the Double Dollars Incentive Program as it transitions into the Double Up food Bucks Program has had on healthy food access for lower income groups.

Introduction

Public health has been a growing policy issue as many communities face increased health problems that are connected to lack of a healthy diet (Hossfield and Mendez 2018). This is correlated with the rise in food barriers caused by geographic and monetary factors that influence food access (Larson, Story, and Nelson 2009). Where people live can affect healthy food availability and distance to food. This is due to grocery stores tending to be located in larger areas of population with higher costs of living. Those of lower income are then forced to live in locations further away from grocery stores that contain low food options (Hossfield and Mendez 2018). These locations then become what is referred to as "food deserts" where healthy food is in low quantity (Shaw 2014,105). Due to the distance to healthy foods mobility can then be a barrier within itself due to people not always having reliable public or private transportation (Shaw 2014,105).

The geographic factors cause low food access as well as the factor of income which can have large influence over what types of foods can be bought due to budgetary constraints (Hossfield and Mendez 2018). Lower income families who are on food benefits are limited to not only what food they can afford, but then to what stores accept food benefits. The feasibility of not only gaining access to food in general but to healthy foods is a challenge. Food access barriers have been linked to health problems due to not receiving proper nutrition and diet that is needed for a healthy lifestyle (Mayer, Hillier, Bachhuber, and Long 2014). Poor communities that face income-related food barriers have higher rates of heart disease, obesity, diabetes, and other health risks (Hossfield and

Mendez 2018). Food access has become an integrated issue in implementing policies and programs to support public health and healthy food systems in communities.

In Austin, Texas the Sustainable Food Center (SFC) as indicated on the Sustainable Food center website is a non-profit with several programs designed to help local residents overcome food access boundaries to gain access to healthy foods such as fruits and vegetables. The Double Dollars incentive program under the SFC focuses on reducing the food barrier of affordability for people of lower income in order to gain access to fresh fruits and vegetables while still supporting local growers at participating farmers markets. The program's objective has been to do this by providing incentives known as "Double Dollars" that will match dollar to dollar up to thirty dollars per person and per visit on food programs like Women, Infants, and Children (WIC), Supplemental Nutrition Assistance Program (SNAP), and Farmer's Market Nutrition Program (FMNP). The incentives can be used at designated SFC farmer's markets and partner markets where the double dollars are used to purchase fruits and vegetables from the vendors participating at the market. The incentives are then collected at the end of each market day and the vendors are then paid every two weeks based on how many double dollars were used for purchases. This enables participants of the Double Dollars incentive program to get double the amount of healthy food for their benefits and reduce the food barrier of affordability while increasing access to a healthy diet.

Literature Review

Food Access Barriers

Healthy Food access has become a topic of global policies, programs, and legislation due to the issues being multidimensional in nature. Several barriers can affect people's ability to gain access to healthy foods including insufficient budgets for healthy food, physical proximity to healthy retail food, the healthy food available, and poor access to transportation to shopping areas (Wolfson et al. 2019). Low food access causes food insecurity which refers to the "inability to eat a healthy diet (malnutrition) and food deprivation" (Hoflund, Jones, and Pautz 2018, 55). The geographic and financial barriers have had negative consequences on health that have been linked to heart disease, obesity, diabetes, and cancer due to the constraints of access to healthy foods (*Food Access in Austin*, City of Austin).

Low food access can be connected to the development of spaces know as food deserts that are described as "areas of relative exclusion where people experience physical and economic barriers to accessing healthy foods" (Shaw 2014,105). These locations occur where "affordable nutritious food is virtually unobtainable" and car-less residents are unable to reach the supermarkets that are farther distances away (Shaw 2014,105). With population shifts from rural to other areas retailers in the industry have moved to communities with higher income (Pine 2017, 33). Those who don't live near the new infrastructure are limited to available transit options (Pine 2017, 33).

Over 2.3 million households in the United States live farther than one mile away from a Super-market while not having access to a vehicle (U.S. Congress 2009, 5). Data from previous studies on time use and travel mode indicate that "people living in low-income areas with limited access spend significantly more time (19.5minutes) traveling to

a grocery store than the national average (15minutes)" (U.S. Congress 2009, 5). Other obstacles including having children present, health of the resident, and the availability of public transportation can affect the ability to travel far distances to a grocery for access to healthy foods (Shaw 2014, 106). Lower income groups who live further distances with limited transit options are at higher risk of experiencing food insecurity (Pine 2017,33).

Residents who don't have access to full-service grocery stores further in distance then make purchases at local shops that may not have a high quality or variety of fresh food compared to bigger supermarkets (Pine 2017,33). This is due to local shops having a possible "monopolistic position (pricing power) or inefficiencies" over the quality of food that is available (Bonanno and Li 2015). Proximity to convenience stores with higher processed low-quality food and fast food restaurants causes those facing barriers to access healthy foods to turn to alternative lower nutritious food (US Congress 2009,5). People who eat foods lower in nutrition are at higher risk of not "obtain[ing] enough food for an active and healthy life" (Mayer et al. 2014). Alternative options such as farmer's markets can play a crucial role in reducing spatial access to individuals at certain points of the year but are not always available in some areas due to seasonal conditions (Widener, Metcalf, and Yam 2011). This leads to individuals being food secure in certain parts of the year while being food insecure in others (Widener, Metcalf, and Yam 2011).

Affordability for healthy food can also be a barrier for gaining healthy food access for even those who live close to supermarkets. This issue where lower income groups have access to a supermarket but cannot afford to buy the food that is available is known as a "food mirage" (Breyer and Voss-Andreae 2013). This represents the concept

of food being in abundance but not equally being distributed due to socio-economic status (Pine 2017, 28). Grocery stores may be available in the area, but the food is not economically obtainable for low-income households (Breyer and Voss-Andreae 2013). This is due to the fluctuation in pricing from policy shifts in the food production overtime (Morland 2014, 57).)

U.S. farm bill legislation and government subsidies have been focused on commodity crops such as corn and soybeans and have led to producing processed foods at a lower price (Morland 2014, 37). Crops such as fruits and vegetables have been considered specialty crops and receive less funding or rewards form the United States Department of Agriculture (Morland 2014,45). The U.S. government limits competition between farmers who grow commodity crops under subsidies and farmers who grow specialty crops causing the control over food prices to be given to a small number of farmers (Morland 2014, 45). Fruits and vegetables are grown in small supply occupying three percent of farmland in the United States with groceries largely relying on produce imported from other countries (Morland 2014,43). This has led healthy food prices to increase overtime and only be access by those with higher incomes (Morland 2014, 45).

A Study conducted in South Carolina surveyed families from eight different counties found that compared to households that were food secure households that were food insecure reported poor quality of fresh fruits and vegetables in their neighborhoods (Ma et al. 2016). Even with supermarkets having fresh food available the barrier of income can reduce the opportunity for those of lower income groups to have access to healthy foods. Income effecting available selection and purchase of quality of healthy

foods can then be connected to household cooking behaviors (Wolfson et al. 2019). Research conducted by Wolfson et al. studied shopping and cooking behaviors through a survey that concluded that lower income groups facing low food access were more likely to cook with packaged/boxed products while also spending the least amount of time cooking dinner on both weekdays and weekends compared to those of higher income. The food prices and total available budget heavily influence food purchases and intake of fresh fruits and vegetables (Lin et al. 2014).

In a qualitative study conducted in Central Texas, researchers utilized a questionnaire that was distributed to 13 focus groups that contained participants from low income communities in the area to research perspectives of food choices and food barriers (Evans et al. 2015). The results concluded that 75% of the participants faced low access to healthy foods due to obstacles like high prices of healthy food, distance to supermarkets, and the lack of quality in food that is available within closer proximity (Evans et al. 2015). People who responded to the questionnaire showed knowledge and preference to health and the issues surrounding dietary behavior were heavily influenced by the food barriers faced in their communities (Evans et al. 2015).

Food Barriers Effect on Health

Food insecurity caused by food access barriers for individuals and households have led to health disparities in communities (Hossfield and Mendez 2018). This includes health issues connected to "several diet-related chronic issues such as cardiovascular disease, diabetes, hypertension, cancer, and obesity" (Smith and Morton 2009). This is largely due to having limited foods available and supplementing nutritious food with

convenient processed foods (Hossfield and Mendez 2018). Deficiencies in micronutrients have caused negative outcomes in health for many communities (Hoflund, Jones, Pautz 2018, 55). Urban areas containing lower income groups have a "higher than average concentration of fast food restaurants" (Bosso 2016). Areas consisting of high amounts of available fast food are connected to higher obesity rates and diabetes due to having lack of access to affordable food (Bosso 2016). High fructose corn syrup has been largely consumed in American diets due to its low production cost (Morland 2014,57).

Neighborhoods do not have equal access to healthy foods and the segregation due to income has influenced poor dietary patterns (Larson, Story, and Nelson 2009). Research studies have made connections between neighborhoods that have access to supermarkets with more varieties in healthy foods are more likely to have higher consumption of fresh fruits and vegetables versus neighborhoods who don't have access (Larson, Story, and Nelson 2009). The availability of low nutritional food with the increase prices of fresh fruits and vegetables has then caused those in poverty to turn to poor dieting to survive (Hossfield and Mendez 2018). In a study conducted using a National Health and Nutrition Examination Survey found low income Households were more likely to develop higher systolic blood pressure and chronic kidney disease compared to those of higher income groups (Suarez et al. 2015).

The Health issues involve risks for adults as well as children of families who face food insecurity. Children who have low food access have been connected to "negative health and development outcomes including more frequent common illnesses, iron-deficiency anemia, over-weight or obese status, increased likelihood of hospitalization,

increase rick of developmental delays, and lower physical and psychosocial functioning" (DeMartini et al. 2013). The combination of having farther to travel for food, the availability of fresh fruits and vegetables, and income level have cause increased rates of health issues. These negative outcomes result in having indirect and direct healthcare costs that in turn cause loss of productivity and inability to work (Hoflund, Jones, Pautz 2018, 55).

Several counties in Texas currently face health disparities caused by food barriers. Dallas County currently faces low healthy food access that largely effects populations of lower income in the South side of Dallas (Albert, Manon, and Waldoks 2015). Neighborhoods in the Dallas metropolitan area who lower access to food have been connected to higher rates of obesity and health risks. Texas Comptroller has warned that the high rates of health risks connected to obesity could potentially cost Texas employers "$32.5 billion annually by 2030" (Albert, Manon, and Waldoks 2015). indicates Travis County faces all four food barriers which includes low proximity, lower household income, fewer mobility options, and less healthy food available in areas with lower supplies (Food Access in Austin GIS Maps). Understanding what barriers bring challenges for food access can help the cities focus on implementing initiatives towards increasing food access and improvements to public health.

Increasing Affordability

An obstacle that continues to be a large food barrier for individuals and families is being unable to afford healthy fresh fruits and vegetables. People of lower socioeconomic status tend to face food barrier due to having constrained budgets that limit expenses that

can be used towards purchasing healthy foods (Lin et al. 2014). The government has faced this challenge by funding federal food assistance programs targeted to individuals within federal guidelines for lower income (Mayer et al. 2014). SNAP was initiated in the 1960's to address "growing rates of underconsumption and inadequate nutrient intake" for disadvantaged populations (Hassan 2017, 202). Individuals are given cash benefits for "purchasing food in normal commercial transactions at retail channels such as stores and farmer's markets" (Obenchain and Spark 2016, 141). The United States Department of Agriculture established the WIC program in 1975 that is aimed towards providing "nutrition education, healthy foods referrals to health and other social services during key periods of growth and development" (Davis et al. 2019). The program gives vouchers to participants to "individuals for purchasing specific foods" (Obenchain and Spark 2016, 141). WIC has helped increase breastfeeding, household food security, and academic achievement in children for those who participated in the program compared to nonparticipants of lower income groups (Davis et al. 2019).

In a study conducted in Philadelphia, individuals who were not on food benefits like SNAP were significantly more likely to face food insecurity (Mayer et al. 2014). Those who were on food benefits still faced food insecurity due to affordability of healthy foods in their neighborhoods. This is due to the programs not always being effective in every setting such as rural communities where healthy foods that are available have higher food prices (Hoflund, Jones, and Pautz 2018, 56). Other research conducted in Minnesota indicated that even with the availability of a program like SNAP that some individuals within lower income groups such as seniors will not accept

supplemental assistance due to negative stigma or because of lacking knowledge of the criteria to participate (Oemichen and Smith 2016). Research indicates that federal food assistance programs have been effective in reducing food insecurity but may need to be modified or have additional support due to public health disparities caused by socio-economic factors (Hassan 2017, 202).

Other federal, state, and local efforts to form programs and policies have emerged in addition to federal food assistance programs that focus on trying to increase food access through the aspect of affordability. Several government and non-profit organizations have built agricultural communities near urban centers to expand opportunities for helping with regional food insecurity by growing nutritious food at affordable prices (Fitzgerald, 2000). Many organizations have been focusing on implementing programs that "combine financial incentives and healthy food purchases" in order to address affordability of healthy food for individuals that usually would not have the opportunity due to cost (Dimitri, Oberholtzer, and Nischan 2013).This idea has caused programs like the "Double Up Food Bucks" to be initiated in areas struggling with lower income (*Fair Food Network*, pg.1). The project, which initially began in Detroit, has grown from a small local program into a larger statewide initiative designed to help lower income families gain access to healthy fresh foods and vegetables by utilizing vouchers that can be used at local farmer's markets.

As the population continues to grow in central Texas, many locals have concerns over access to healthy foods due to the economic strain on lower income families and support for local farmers in the area. Organizations like the Sustainable Food Center have

emerged that focus on helping residents in the Central Texas region have access to food no matter what level of income. As indicated on the SFC website, this occurs through the utilization of what was once called “SFC Double Dollars” but now has begun transitioning into the “Double Up Food Bucks Program”. This has helped the Sustainable Food Center to continue to grow their program through joining a national network while conducting the same policies.

Objective/Methodology

In order to use the Double Dollar Incentives a person on food benefits must first redeem money from their electronic benefits card that is swiped through federal SNAP and WIC machine applications at an SFC Farmer’s Market booth. The FMNP program is an official program under WIC so participants who receive WIC will also use the WIC machine application to receive FMNP double dollar incentives. The individual will then receive up to thirty dollars in the double dollars incentives per market day that can be at spent at certified vendor booths at SFC Farmer’s Markets. One double dollar incentive is equal to one dollar and the incentives are color coded based on the food benefits the individuals receive. The incentives can only be received by vendors who are certified to accept SNAP and WIC benefits. Once an individual has the incentives they can be used at any time at participating farmer’s markets and never expire. At the end of each market day the incentives are collected from the vendors and the total incentives redeemed are recorded for each vendor. Vendors then receive payment through a check two weeks later based on the total amount in double dollars incentives that were redeemed at their booths.

The objective is to study the effect the Double Dollars incentive program implemented by the Sustainable Food Center has had on food access for low income individuals utilizing the double dollar incentives to increase affordability. The research utilizes a quantitative approach with a causal research design that first looks at the relationship that the independent variables of total number in dollar value of incentives given to individuals per market day, the estimated number of vendors for each market day, the year in which the market is occurring, whether or not the market day took place in a winter month, if the market was on a Saturday or an off day, and the lagged amount in redemptions at the vendors for every farmer's market day have with the dependent variable of total number in incentives redeemed at vendor booths for each farmer's market day. The relationships are used to understand the effect the program has had on healthy food access based on affordability, and then data based on income level and number of individuals living under the poverty level is utilized to give a geographical representation of the participants.

For 2018 and 2019 a time series chart is utilized to show the difference in incentives given compared to the incentives redeemed at farmer's market based on farmer's market days over time to see at what points in the year the effect is taking place. The zip codes that were collected from the participants for the 2018 and 2019 program years are mapped using Geographic Information System (GIS) software joined with Zip Code Tabulation Areas (ZCTA) data files from the Census Bureau on the number of people below the poverty level and median household income. The data is color coated based on level of income and the amount of people that reported being below the poverty

level in the 2013-2017 American Community Survey. This gives a descriptive analysis on the economic characteristics of the participants of the Double Dollars Incentive program and gives insight into the background of participants and where they live.

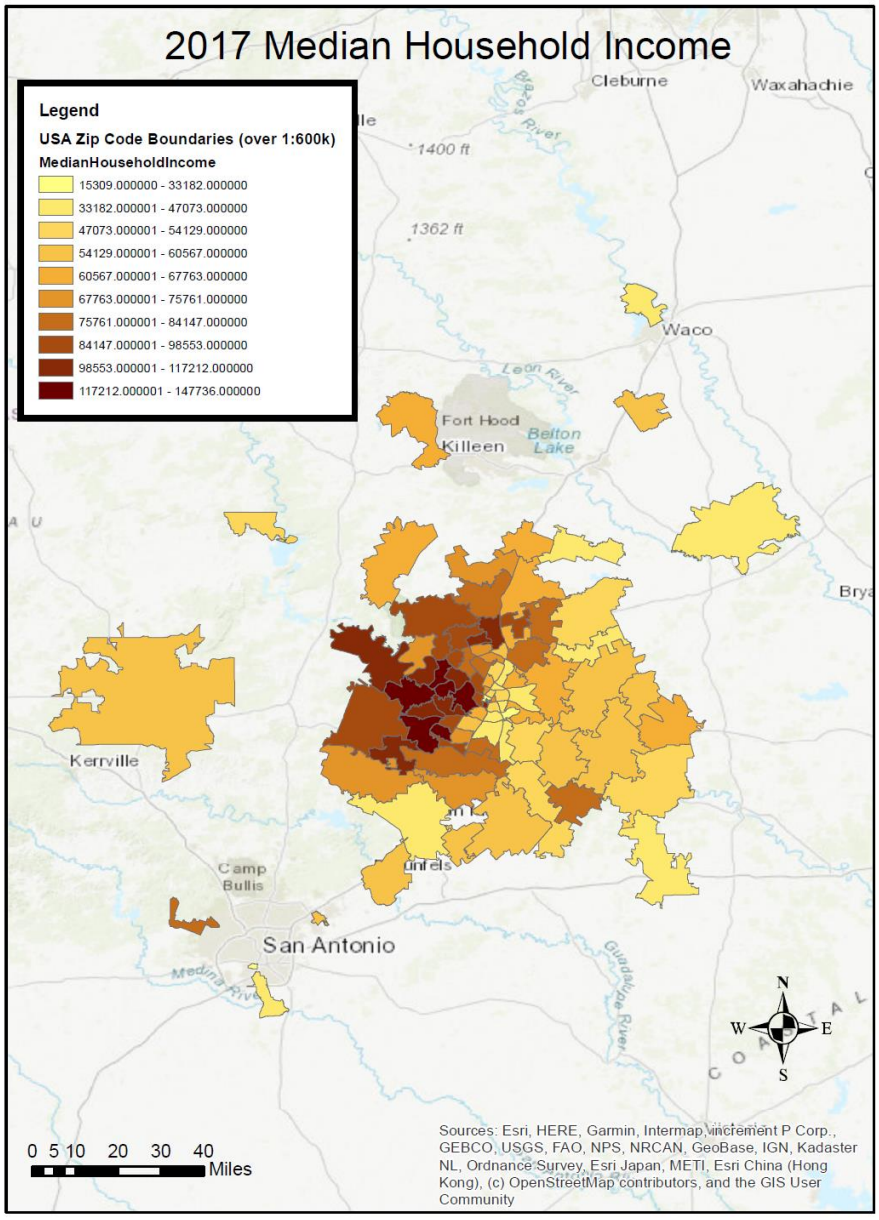
For this study, a linear regression model estimates the impact of the Double Dollars Incentive program on food expenditures at farmer's market, controlling for other factors. The dependent variable is the total number in dollar value of redemptions at vendors booths for every farmer's market day. The dollar value redeemed is used as the dependent variable because it represents the individuals gaining access to healthy foods at the farmer's markets. The redemptions indicate whether the double dollars incentives have an effect on individuals being able to afford fresh fruits and vegetables by increasing money available to spend. This directly tests the hypothesis that Double Dollar incentives have an effect on increasing access to healthy foods for individuals. The data was collected by the Sustainable Food Center in 2018 and 2019.

The independent variables include the total dollar value of incentives given to individuals per market day, the estimated number of vendors for each market day, a dummy variable for the year in which the market is occurring, a seasonal dummy that indicate winter dates, and a lag of the dependent variable by one market period. The dollar values in incentives per market day is used as the main variable to directly test the hypothesis that the program is having an effect on food access. The number of vendors per market day that were reported will show if the variance in the amount in vendor booths that the participants could redeem the double dollars had a possible effect on redemptions on particular market days. The variable for year was placed in the model to

verify if there was any variation in incentives versus the amount in redemptions based on occurrence in 2018 or 2019. The variable differentiating the winter months and the other months shows if there is in any seasonal variation in amount of incentives redeemed due to winter weather. The lagged amount in redemptions models the serial trend of redemptions from one market day to the next. The variables for the number of incentives given, the amount of double dollars in incentives redeemed at vendor booths, and winter month were transformed into natural logs to understand the elasticity of the percent changes in dependent variable when associated with the natural logged independent variables.

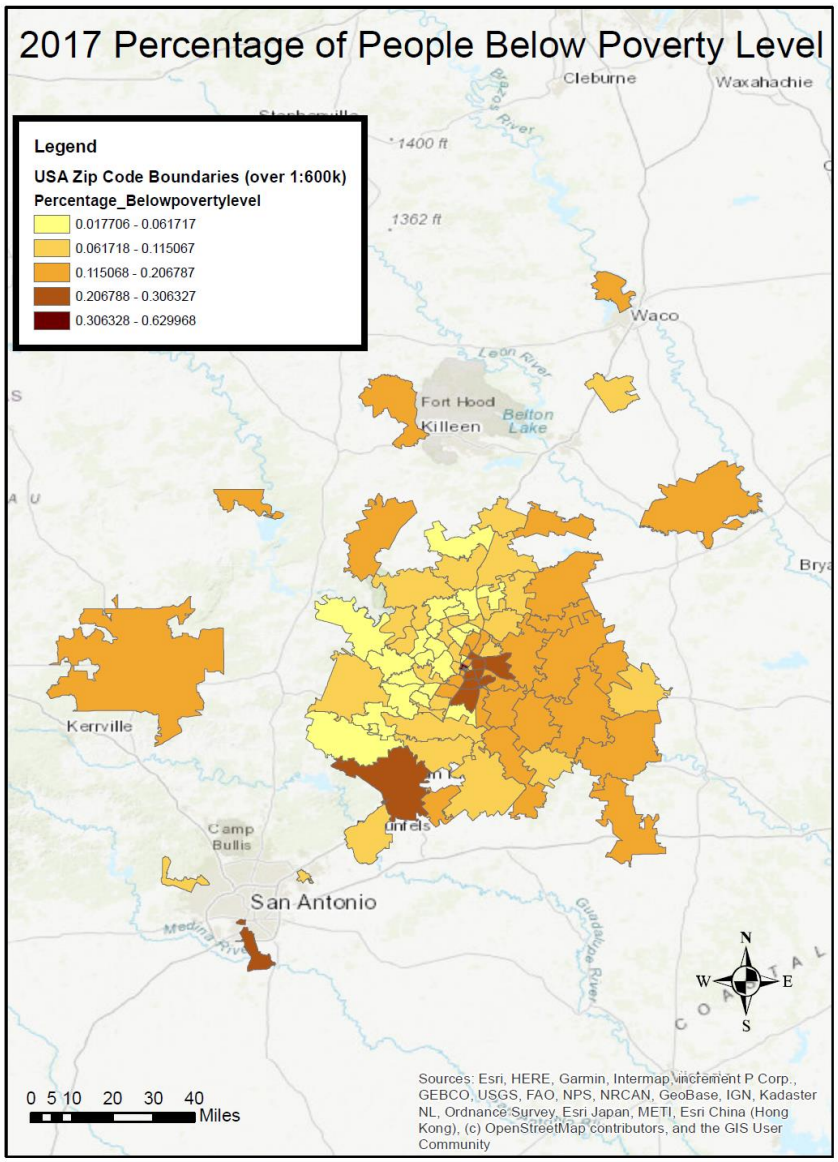
The sample population used in the analysis is the total for the market days rather than individual people due to vendors reporting total amount in double dollars redeemed rather than per redemption for individual people. Though the program started in 2012 the data collection for both the vendors and the incentives given is only available for 2018 and 2019 which is why only those two years will be used in the data analysis. The regression tests if the incentives caused people to gain access to healthy foods through the amount that was actually redeemed at vendors booths and how other factors like season, year, or number of vendors could have effects on the dependent variable.

Results



The 2017 Median Household Income map represents 91 zip codes collected by the SFC from participants of the Double Dollars Incentive Program representing the 2017 US Census Bureau data for median household income for each zip code. The median household income is the median of total households in the area of each

household's total income and any benefits they receive. The average amount in dollars for median household income is 71,708 dollars and the median amount for the data set is 69,986 dollars. The minimum household income is 15,309 dollars and the maximum household income is 147,736 dollars.



The 2017 Percentage of People Below Poverty map represents 91 zip codes collected by the SFC from participants of the Double Dollars Incentive Program. The map represents 2017 US Census Bureau data for percentage below poverty line for each zip code. The percentage of individuals with income below the poverty level indicates people from the past twelve months who have lived below the poverty line. Data was for US Census Bureau was collected by the American Community Survey from 2013-2017. The average percent of people living under the poverty level is 12.3 percent and the median for the data set is 10 percent. The minimum percentage of individuals living under the poverty level is 1.77 percent and the maximum percentage of individuals living under the poverty level was 63 percent.

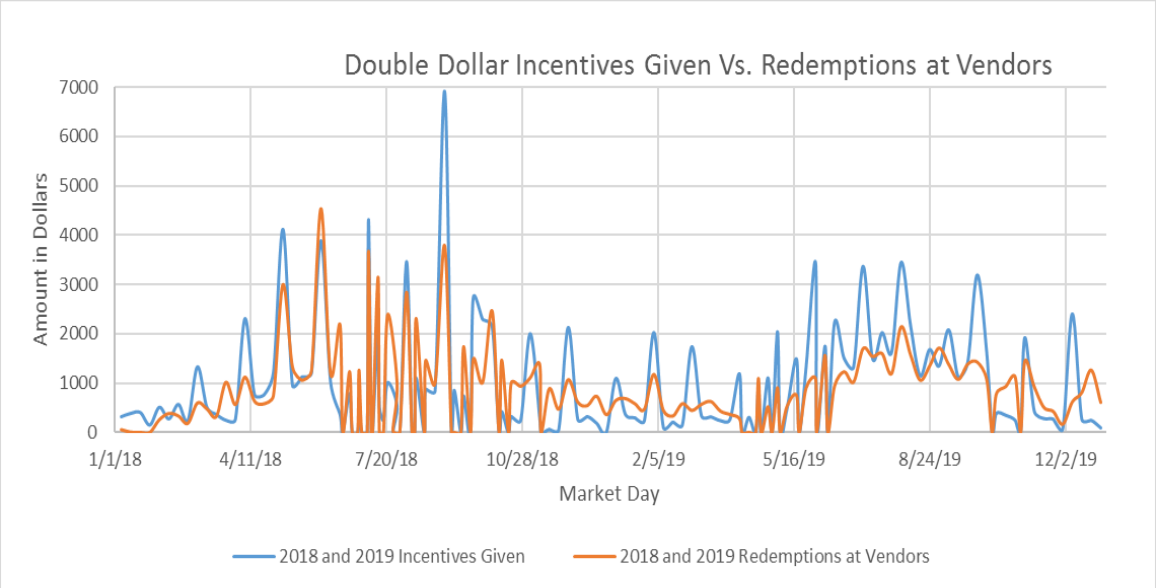


Figure 1: Time series representing 2018 and 2019 data from SFC.

Figure 1 shows the time series conducted between the amount in double dollar incentives that were given to individuals and the amount that were redeemed at

vendor booths during the course of the 2018 and 2019 seasons based on the farmer's market day. The months between April and October have the highest peaks of incentives given versus incentives that were redeemed at vendor booths. This indicates that the double dollar incentives had a larger impact on healthy food access during those points in each year. It's feasible that other factors such as growing season with more fruits and vegetables available during those periods of the year could cause the larger impact during those time periods. The highest total amount in incentives that were given to individuals per market day was $6,932 on September 1st 2018. This outlier of incentives given could be due to individuals who were participating in the program wanting to receive as many double dollars as possible for future spending during the upcoming holiday season on healthy food. The 2019 redemptions indicate that through June to October the amount in dollars for incentives redeemed stayed consistently between $1,000 to $2000 compared to the same months in 2018 that consisted of several zeroes. This is due to 2018 having more market days that were not on Saturdays where no double dollars were redeemed while in 2019 the same time period consisted of primarily Saturday Markets. The Double Dollars Incentive program had a larger overall impact for healthy food access in 2018 compared to 2019. The average total amount per market day in incentives redeemed at vendor booths was larger in 2018 at $877.08 than in 2019 at $772.87. This indicates a drop in the amount in dollars for people to gain access to healthy food through utilization of the program. Factors such as 2018 containing more overall market days due to vendors and individuals receiving incentives and redeeming the incentives on other days of the week compared to the data in 2019 could contribute to the differences in totals.

Descriptive Statistics							
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Redemptionsatvendors	134	8.42	.00	8.42	5.0518	3.01878	9.113
Laggedredemptions	134	8.42	.00	8.42	5.0040	3.04776	9.289
IncentivesGiven	134	8.84	.00	8.84	5.1838	2.85290	8.139
NumberofVendors	134	58	0	58	20.76	13.725	188.364
Winter	134	1	0	1	.19	.391	.153
Year	134	1	0	1	.46	.500	.250
Valid N (listwise)	134						

Table 1: Descriptive Statistics based on 2018 and 2019 data from SFC.

Model Summary									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.936[a]	.877	.872	1.07984	.877	182.287	5	128	.000
a. Predictors: (Constant), Winter, Year, IncentivesGiven, Laggedredemptions, NumberofVendors									

Table 2: Model Summary based on regression using 2018 and 2019 data from SFC.

Table 1 shows the population size of the sample of each variable, the range, the minimum and maximum values of each variables data set, the average of each variables data set, how the values are spread for each variable's data, and the amount in which random values vary in each variables data set. The adjusted R square in table 2 shows that 87.7 percent of the variance of the dependent variable RedemptionsatVendors can be accounted by the independent variables in the model. The indicates that the regression model is significant at the .00 alpha level.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1062.780	5	212.556	182.287	.000[b]
	Residual	149.254	128	1.166		
	Total	1212.034	133			
a. Dependent Variable: Redemptionsatvendors						
b. Predictors: (Constant), Winter, Year, IncentivesGiven, Laggedredemptions, NumberofVendors						

Table 3: Anova table based on regression using 2018 and 2019 data from SFC.

Table 3 indicates that the F-Statistic is 182.287 which means the independent variables have an effect on the dependent variable Redemptions at Vendors. The results show that the independent variables as a group accounts a significant amount of the variance of the dependent variable Redemptions at Vendors.

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	-.072	.263		-.273	.786	-.593	.449
	NumberofVendors	.143	.012	.652	12.144	.000	.120	.167
	Laggedredemptions	.044	.032	.044	1.367	.174	-.020	.107
	IncentivesGiven	.352	.057	.333	6.208	.000	.240	.464
	Year	-.101	.192	-.017	-.527	.599	-.482	.279
	Winter	.816	.250	.106	3.265	.001	.322	1.311
a. Dependent Variable: RedemptionsatVendors								

Table 4: Summary of Coefficients based on regression using 2018 and 2019 data from SFC.

Table 4 indicates that the independent variables of IncentivesGiven, number of vendors, and Winter each have statistically significant relationship at the .00 alpha level and .01 alpha level with the dependent variable Redemptions at Vendors. For every 10%

increase incentives given the amount in incentives redeemed at vendor booths increases by 3.52 percent. For every additional vendor that is at the farmer's markets the amount in incentives redeemed at vendor booths increases by .143 percent. For every additional market day occurring in winter the amount in incentives redeemed at vendors booths increases by .816 percent. When the variables are standardized and placed on the same scale (Beta column) the number of vendors has the largest effect on the dependent variable Redemptions at Vendor booths at .652, the IncentivesGiven had the second largest effect at .333, and the independent variable of Winter had the smallest effect on the dependent variable at .106.

Conclusion

Food access barriers can heavily influence food insecurity and the ability to gain access to healthy foods. Areas with low availability of food, further distances away from food resources, low access to quality food for nutrition, and food that is not affordable to everyone due income level effect people gaining access to the nutritious foods they need for a healthy lifestyle. Children and adults who lack access to healthy foods are at higher risk of food insecurity and health issues such as obesity and hypertension. Increased health problems can slow productivity for work and increase health insurance costs. Affordability of food for lower income groups has been an influential factor to being able to purchase fruits and vegetables. The U.S government created federal food assistance programs to increase access to fruits and vegetables for individuals and families in lower income groups. This includes the SNAP and WIC programs that provide electronic

transfer cards that contain benefits that can be used for purchasing healthy foods at local grocery stores and participating farmer's markets.

Other federal, state, and local organizations have formed programs to help increase affordability for lower income groups. The Sustainable Food Center located in Austin has been able to have a strong positive effect on food affordability through initiating the Double Dollars Incentive Program. The incentives redeemed at SFC Farmer's market and partner markets vendor booths have enabled individuals and families on food benefits to receive increased access to fruits and vegetables. The independent variables of IncentivesGiven, number of vendors, and Winter have a significant relationship with the dependent variable RedemptionsatVendors. The number of vendors plays an important role in individuals redeeming their double dollar incentives. The more vendors available increases the opportunity for individuals to redeem that double dollars for healthy foods. The winter months had a small influence over individuals redeeming their incentives and the amount in incentives given to individuals for use can increase chances of lower income groups utilizing the incentives to receive fruits and vegetables. The variation in year shows that the program doesn't have the same impact for every year. Figure 1 indicated that through the months of April to October are the peak months that people use the incentives to gaining access to healthy foods in 2018 and 2019. The time series represented the fluctuation of double dollars incentives redeemed at vendors booths based on the time of year the market occurred and the differences in total amounts for both incentives given and redemptions for those market days based on the year they occurred.

More research will need to be conducted to understand how the Double Dollars Incentive program effects access to healthy food for lower income groups over a longer period of time as it transitions into the Double Up Food Bucks Program. Data will need to be collected based on transaction of incentive that was redeemed per individual to gain a deeper analysis of the average amount of incentive being redeemed on an individual scale. More studies will need to research vendors booths and in produce available based on the time of year. For other incentive programs focused towards increasing affordability for lower income groups to gain access to health foods, more studies will need to be conducted to understand on a larger scale if the incentives are successful in their goals.

It's recommended that the policy for expiration date of the incentives be changed to one to two years rather than never expiring. The data for year 2019 indicated a drop in the amount in incentives redeemed so the new policy change could encourage individuals to use their incentives before the time period ends. The program can continue to implement the policy regarding enforcing vendors meeting the guidelines of the food assistance programs to be required to accept food benefits and double dollars. Since the data indicated that the number of vendors has the largest impact on the number of incentives redeemed the SFC wants to encourage as many vendors as possible accepting the double dollar incentives. The research and recommendations will continue in helping to develop policies and programs that are designed to increase affordability of healthy food for all income groups.

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