

Master of Public Health
Integrative Learning Experience Report

***EDUCATING THE UNDER-SERVED ON DIABETES
PREVENTION AND HEALTHY LIFESTYLE HABITS***

by

Olivia Cantrell

MPH Candidate

submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

Graduate Committee:

Jennifer Hanson, PhD, RD
Richard Rosenkranz, PhD
Sandy Procter, PhD, RD, LD

Public Health Agency Site:

Memphis Tilth
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Site Preceptor:

Carole Colter, MPA, CNP, SHRM-CP

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Summary/Abstract

This integrated learning experience report will provide a detailed description of the internship experience fulfilled at Memphis Tilth, located in Memphis, Tennessee. Memphis Tilth is a food justice non-profit organization whose mission is to cultivate collective action for an economically sustainable, socially equitable, and environmentally sound local food system.

The primary focus of this experience was to assist in educating the population served by Memphis Tilth on healthy living through a healthy diet in order to prevent diabetes or in order to simply promote healthier lifestyles. The experience was comprised of various projects that benefited the array of groups served. The projects entailed creating an outreach presentation that explains the need and benefits of the community kitchen and garden classes to the community at large; educational infographics for kitchen and garden classes that explain the nutritional benefits, growing, and cooking techniques for different seasonal produce; an educational infographic explaining the wholistic benefits of gardening; an educational infographic describing the importance of hand-washing; a lesson plan for type 2 diabetes; and a lesson template for future use.

This experience with Memphis Tilth deepened my understanding of the public health challenges that exist in Memphis. Working with many of the projects within Memphis Tilth gave me a wholistic view and understanding of how to target populations in need by focusing on increasing access, affordability, and knowledge of healthy food options. To increase knowledge, educational infographics were created, and a short questionnaire was developed to gather feedback and evaluate the content, readability and cultural sensitivity of the infographs. From this experience, an understanding was gained of how to evaluate and modify educational products to best reach the intended audience. The experience that I gained working under Carole Colter and the many employees within Memphis Tilth, combined with my public health and nutrition coursework at Kansas State University, has equipped me well for a career in the field of public health.

Subject Keywords: diabetes, nutrition, under-privileged, health inequity

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Chapter 1 - Literature Review

Social determinants of health are a large predictor of health, morbidity, and mortality.¹ Morbidity and mortality rates, as well as many other diseases, specifically food-related illnesses, tend to correlate with the socioeconomic gradient.¹ It has been shown that socioeconomic status (SES) is strongly linked to diet-quality, with the more affluent and well-educated people having higher-quality diets.¹ Socioeconomic status is also the most consistent predictor of morbidity and mortality, with lower socioeconomic status being linked to higher rates of morbidity and mortality.^{2,3} This review will cover the mechanism by which income and access to food determine diet quality and how this, in turn, determines health, specifically diabetes.

More often than not, lower SES status means living in lower-income areas. To focus on improving public health, the area in which people live along with individuals must be the focus; meaning that deprivation, or the damaging lack of basic necessities, must be considered in neighborhoods.⁴ Lower-income living comes with many negative consequences that leads to deprivation, such as less access to healthy foods. Research findings link lower-income areas to increased distances from supermarkets and greater availability of fast food restaurants. In one study, lower-income neighborhoods—specifically those of low wealth, single parents, and renter-occupied—were more likely to have a fast food restaurant nearby than more affluent neighborhoods.⁵ Within impoverished neighborhoods, those that are predominantly African-American have been linked to even further distances to supermarkets and fewer healthy food options overall.^{6,7} Moreover, higher quantities of fast food restaurants have shown to be more prevalent in low-income areas, specifically those with a predominantly African-American population, leading to even greater disparity.⁸

Areas with a lack of healthy and affordable food options are often called food deserts. Along with food deserts there are also food swamps. A food swamp is a food desert with an oversaturation of unhealthy food options. This impedes access to healthy options while promoting consumption of unhealthy options, such as fast food restaurants. Past research has shown food swamps to be associated with higher obesity rates.⁹ This association becomes stronger when the population in the food

swamp is less mobile, which is probable considering persons of lower SES status have less access to transportation.⁹ High obesity rates in food swamps is significant because obesity increases the risk for diabetes and insulin resistance.^{10,11} A substantial body of work has shown that the prevalence of type 2 diabetes is linked to weight status and obesity.¹²⁻¹⁶

Besides obesity being a risk factor for type 2 diabetes, food swamps are also associated with hospitalization due to diabetes.¹⁷ In one study it was shown that income-level was inversely related to hospitalizations of people with diabetes mellitus, where residents of lower-income neighborhoods were 40% more likely to be hospitalized.¹⁸ In another study, the authors compared measures of deprivation to the rates of type 1 diabetes, type 2 diabetes, and obesity.¹⁹ The results showed that the prevalence of type 2 diabetes increased alongside the severity of deprivation.¹⁹ Among the people who had type 2 diabetes, the proportion of obesity also increased as did deprivation.¹⁹ Data was not provided to support the causal link between obesity and type 2 diabetes, but there is definite association between deprivation and type 2 diabetes.¹⁹ The inverse relationship between lower SES status and type 2 diabetes could be due to people in deprived areas being more exposed to factors that are associated with the onset of type 2 diabetes.^{20,21}

Associations between chronic diseases, obesity, and lower SES status may even differ among race. Previously it was mentioned that African-Americans were more prone to live further away from supermarkets. Studies also show that diabetes is more prevalent in African-Americans than in Caucasians, with glycemic control and healthcare differences as well, even when SES status is controlled for.^{22,23} One study found that African-Americans and Latino patients limited the care of their diabetes for financial reasons.²⁴ The burden of diabetes is substantial among populations living in low-income areas; with SES status, psychosocial factors, and culture factoring into consideration as well.²⁵

Preventative measures play an important role in addressing diabetes among lower-income populations. Primary prevention measures should target diet and exercise, as these are large controllable factors that play a role in diabetes and are even called in one article the “cornerstone of management”.²³ A primary prevention

measure that has shown to be effective in preventing and managing diabetes is education.^{26,27} Education and empowerment strategies can be done in various ways, whether targeting health disparities in race, generalized diabetes management, computerized education, or interpersonal education.²⁵ It is shown that all of these methods have some variation of success, with culturally-tailored interpersonal education being one of the most effective.²⁵ Overall, type 2 diabetes has shown to be a significant public health problem that needs to be addressed through various measures including primary prevention and education.

Chapter 2 - Learning Objectives and Project Description

This Integrated Learning Experience was carried out in Shelby County, Tennessee, which occupies all of Memphis, Tennessee. Shelby county is 763.17 square miles with a population of 936,961 as of 2017.²⁸ The median household income in Shelby County is \$48,415 and around 19% of the population lives in poverty and 11.6% without healthcare.²⁸ The racial make-up of this county is approximately as follows: 54% black, 41% white, 6.5% Hispanic, 3% Asian.²⁸

The literature review above applies to Shelby County in that obesity, food deserts, low SES-status, race, and diabetes are all correlated. There is apparent health disparity within Memphis. This report is going to be specifically looking at the disparity in risk factors for and rates of type 2 diabetes.

As mentioned earlier, poverty is related to diabetes. The Economic Innovation Group ranked Memphis the third metropolitan area in the country for the greatest concentration of residents in a distressed zip-code, distressed meaning in a state of poor economic and social standing.²⁹ It was found that in total 40.9% of Memphis lives in a distressed zip-code.²⁹ Across the country, all races and ethnicities, other than non-Hispanic whites, account for 56% of these distressed communities, while non-Hispanic whites account for 75% of the prosperous zip-codes.²⁹ Overall, African-Americans have a higher rate of poverty than non-Hispanic white persons.³⁰ The table below shows the difference in poverty rates between non-Hispanic whites and non-Hispanic blacks in Shelby County.³⁰ This poses a threat to the public health because being African-American and impoverished are both risk factors for diabetes and the majority of the population in Memphis are non-Hispanic black.

Table 2.1- Poverty Rate and Income by Race in Shelby County. Obtained from the 2018 Poverty Fact Sheet.³⁰

Shelby County			
2017	Overall	Non-Hispanic White	Non-Hispanic Black
Population Size	920,373	335,419	500,033
Median Household Income	\$ 61,501	\$ 71,926	\$ 37,164
Mean earnings	\$ 74,498	\$ 107,649	\$ 51,324
Percent Mean Earnings Larger than Median Household Income	21%	50%	38%
Overall Poverty Rate	18.8%	8.0%	25.4%
Child (Under 18) Poverty Rate	30.2%	7.9%	39.3%
Poverty Rate for People 18 to 64	15.9%	9.1%	20.7%
Poverty Rate for People 65+	10.5%	4.9%	17.9%

In 2015, the rate of diabetes in Shelby County was 12% compared to that of the nation which was 9.4%.^{31,32} To coincide with that, the Memphis and Shelby County Health Brief claimed one person a day dies from diabetes.³³ In Shelby County, around 90% of the people with diabetes are overweight or obese.³³ Along with that, 31% of the population had difficulty affording food and many zip-codes in Memphis are considered food deserts.³³ They are not only considered food deserts, but food swamps, considering Shelby County has 73 fast-food restaurants and only 20 grocery stores per 100,000 people.³³ The latest Community Health Improvement Plan released by Shelby County stated that Shelby County's prevalence of poverty, child poverty, Diabetes Mellitus, diabetes screening, obesity, fast food restaurant concentration, low food access, and low income population with low food access were all higher than the national average.³⁴ Type 2 diabetes is a large problem, especially in underprivileged areas where access to resources for a healthy diet and lifestyle is scarce. In America, diabetes rates are disproportionate between races. The rate of diagnosed diabetes is 7.4% among non-Hispanic white people and 12.7% among non-Hispanic black people.³² In the nation, non-Hispanic African Americans have the second highest rate of diagnosed diabetes second to American Indians/Alaskan Natives.³² The mortality

rate due to diabetes for black and white individuals in Memphis is drastically different as well, 44% and 16% respectively.^{33,34} This is noteworthy considering that the majority of Shelby County’s population is African-American.

In Memphis, health inequality becomes apparent when examining disparities between zip-codes. Zip-codes within Memphis vary in life expectancy, disease frequency, disease mortality, poverty, and race.³⁵ In Shelby County, as one moves west, zip-codes decline in health and wealth.³⁵ The figures below demonstrate how as poverty increases, so does diabetes mortality rate.³⁵ There are also figures that look very similar to these that represent emergency visits due to diabetes and mortality rates due to diabetes, stroke, heart disease, and cancer.³⁵ This indicates that there is overall disease disparity within Memphis. A risk factor for most of these diseases is poor diet quality from which we could infer is possibly due to poverty.

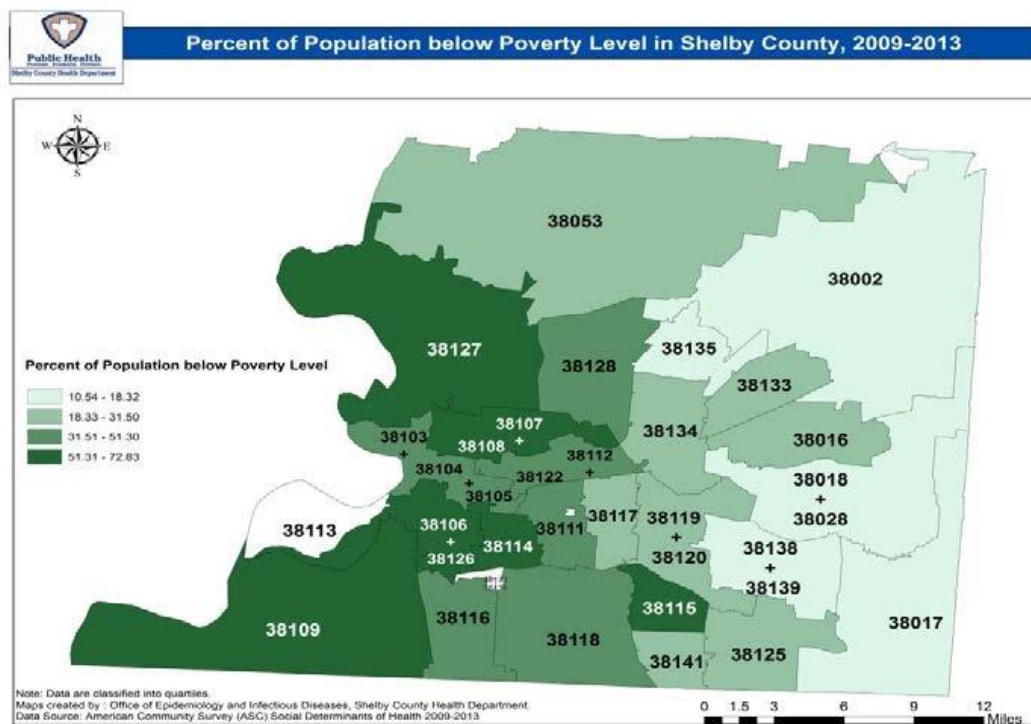


Figure 2.1- Percent of Poverty in Shelby County by Zip-code.³⁴

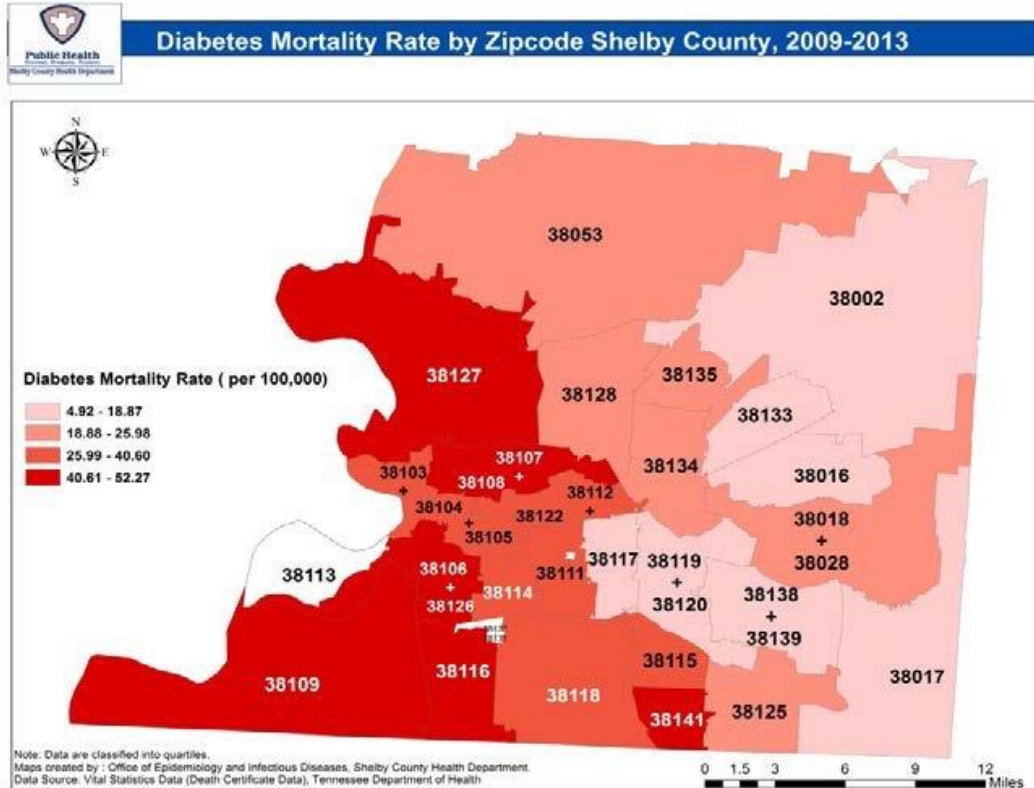


Figure 2.2- Diabetes Mortality Rate in Shelby County by Zip-code³⁴

Memphis Tilth serves zip-codes that have higher rates of poverty and disease, specifically 38126. Life expectancy in the 38126-zip-code is just above 68 years, whereas in the 38117-zip-code, the life expectancy is around 81 years.³⁵ Moreover, six out of ten people who live in the 38126-zip-code are impoverished.³³ In the late 1990's, data were gathered that showed the median household income in the 38126-zip-code was around \$5,000, whereas the 38139-zip-code, which is approximately 13 miles away, averaged around \$80,000.³⁶ This is dated information and this wealth gap has hopefully closed some, but generally disparities such as this persist throughout time and do not disappear in only 20 years. As one could expect, where there are wealth gaps there are frequently health disparity gaps that exist as well.

Increased access and affordability to healthier food options would help lower-income areas work towards becoming healthier and lowering disease rates. Along with access and affordability there needs to be education on healthy food options—what it is and how to prepare it—and food-related disease—what it is and how to prevent it.

Memphis Tilth's mission is to cultivate collective action for an economically sustainable, socially equitable, and environmentally sound local food system. They are located in the zip-code 38126, which mentioned earlier is one of the lowest income areas and is right in the heart of where a large portion of health inequality is happening. Memphis Tilth addresses access, affordability, and education. One way it does this is through their kitchen and garden classes. To address the barrier of education, they hold gardening and kitchen classes for free. They teach participants how to identify and prepare fresh produce, how to sustainably garden, and how to hopefully change lifestyle habits to ones that are healthier and will not lead to disease. Within the class, they are most often given produce to take home and are equipped with ways to grow their own food, which address access to healthier options. Lastly, Memphis Tilth promotes affordability and access by providing education on resources such as Fresh Savings, which doubles SNAP benefits when used on fresh produce, and also accepting Fresh Savings at the various farmers markets they attended. The participants also have access to the garden that they are taught in after class hours to harvest produce to take home. Another sector within Memphis Tilth is Bring It Food Hub. Each week, this program gathers various farm-fresh produce and products that are locally-sourced in the Memphis area. Bags of these goods are then delivered to persons who subscribe for them. Subscribers also have the option to fund an extra bag to be delivered to a person in need within Memphis. In the year 2015, Shelby County even named Memphis Tilth, which was called Grow Memphis at that time, a Community Partner.³⁴ Their tactic was to increase food access and awareness of the local food system with social determinants of health and health disparity being a crosscutting priority.³⁴

Within Memphis Tilth there are various sectors that benefit different populations. There is the Community Kitchen and Garden Elective that is a part of Advance Memphis Work Life program and funded by the Tennessee Department of Health initiative called Project Diabetes. This kitchen and garden class focuses on the population within the zip-codes: 38126, 38106, 38104, and 38117. They promote physical activity through gardening while also enhancing the built environment them and creating greater access to healthy food. The classes also increase participant knowledge and competency in recognizing and preparing vegetables so that vegetable consumption can increase and

result in healthier food choices that lead to lower rates of disease, specifically type 2 diabetes. Memphis Tilth also has a partnership with Alpha Omega Veterans Services (AOVS) that reaches out to displaced veterans. Memphis Tilth similarly provides garden and kitchen classes where participants grow and cook produce from the farm to increase vegetable consumption. AOVS is not funded by Project Diabetes and therefore the programming does not have to be as stringent in preventing type 2 diabetes. AOVS's primary focus is on generally promoting holistically healthy lifestyles. Additionally, AOVS teaches the participants to create a value-added product from the garden that they can create and then sell at local farmers markets. Memphis Tilth is also contracted to St. Jude where they provide staffing and an on-site garden. This garden mainly grows fresh produce for St. Jude's cafeteria and farmers market. Lastly, there is the Bring It Food Hub, which is mentioned in the previous paragraph.

Project Description

This experience was comprised of various projects that benefited the Garden and Kitchen Elective and AOVS. The projects entailed creating educational infographics for kitchen and garden classes that explain the benefits, growing, and cooking techniques for different seasonal produce; an educational infographic describing the importance of hand-washing; an educational infographic explaining the physical and psychological benefits of gardening; lesson plans to be used in the future and ones that were personally taught to the community kitchen class; and lastly creating a short PowerPoint for the Garden and Kitchen Elective showing the need for Project Diabetes to the community from the data that was gathered on health disparity within Memphis.

First, five different infographics were created displaying different autumn vegetables. These contained information on growing, nutrition, and preparation of each vegetable. The vision of the produce infographics is that they would reinforce the information that was taught in class in an easily understandable and engaging way so that program participants will be able to reproduce what is taught in their homes. The goal was also to empower participants toward making lasting changes to their diet and lifestyle that would lead toward healthier and disease-free lives.

There was also an infographic created about handwashing. This was strategically created to communicate the risks poor handwashing practices and to relate handwashing practices to things that participants cared for, such as income and family. Some of the participants in the class have a very low interest of changing lifestyle habits just for the sake of being healthy. Therefore, connecting handwashing to things that they already care for promotes optimal handwashing practices through utilizing the health belief model. This infographic was also to reinforce what was being taught in class to promote lasting change.

The last infographic created was to illustrate the wholistic benefits of growing food. This included information on the physical, social, and mental benefits of growing food, which would be relevant to veterans that AOVS serves who have been through various forms of trauma such as war and homelessness. The goal of this infographic was to show some possible benefits of growing food and instill a desire in the participants to obtain those benefits. The infographic gave precise and brief information on the benefits of farming so that the participants could ask further questions to AOVS's garden Community Garden Organizer, who is currently studying such things. All of the infographics were then evaluated through a questionnaire that was created to further develop the effectiveness of them.

Along with the infographics there were also lesson plans made and taught. One lesson was over type 2 diabetes for the Kitchen and Garden Elective funded by Project Diabetes. This lesson had two parts: the first was an introduction to type 2 diabetes while the second was an in-depth lesson on type 2 diabetes. The lesson covered what was physiologically occurring in a healthy body versus one with type 2 diabetes. The differences in glucose and insulin transport was covered along with various ways type 2 diabetes can be prevented through diet and lifestyle. This included looking at nutrition labels, visually showing how much added sugar is recommended daily, and also visually showing how much added sugar one participant was consuming daily. During this lesson there were visuals, some videos, and a lot of questions and conversation. A PowerPoint was not used. This method was chosen because when surveying the class in weeks prior I understood the participants to engage in conversation and participate in the class when they were spoken to in a conversational manner. Some of participants in

the class also had low literacy levels, therefore visuals and pictures were used to fully convey what was being taught.

Additionally, a lesson plan based around fermentation, probiotics, and kombucha was created. This was on request of an AOVS staff member who was doing a couple of lessons on alternative medicine. This staff member was fully aware that most of the research on probiotics and kombucha is in its infancy and some of it is even debated. With that in mind, the lesson was created with scholarly journal articles found and resources from a class taken in the past.

Lastly, a short PowerPoint presentation on the need for Project Diabetes and Community Kitchen Elective was created. This was made by gathering various resources on the health and poverty disparity within Memphis and showing the need for intervention in those areas with increased disease and poverty. This will be utilized in various community outreach events that Memphis Tilth attends.

Learning Objectives

A learning objective of mine was to gain an understanding of how a non-profit organization functions and shadow the many roles and personnel within the organization. This will benefit my future by having a better understanding of community needs and how to practically meet them within an organization, specifically a not-for-profit. I also learned how policies and the structure of the community affect citizens' health and how non-profit organizations work to better public health. This was learned through working closely with Project Diabetes and the Kitchen and Garden Elective. My understanding furthered on the relationship between state and non-profit when I was able to read over the Project Diabetes grant and then witness the classes and the material being put into action. I also attended a meeting with the Garden and Kitchen Elective employees and an official from Tennessee's Department of Health about the Project Diabetes grant. They spoke of results thus far from the class and questions that the Department of Health official had. This was beneficial for me to understand how Memphis Tilth recorded their progress and to hear the questions and understand how funding was granted and renewed.

Another objective was to learn about the unique structure of the community and the social inequalities that lie within and to understand how those work to undermine health of certain persons. Memphis Tilth specifically works with target zip-codes with higher rates of poverty and diabetes. In my experience and research on these different zip-codes, I learned more on how living in areas such as these directly affect diet-quality and thus affect the health of the people. One of my projects was centered around finding health data from Memphis in different zip-codes. I did this by researching health disparities and also reaching out to different contacts to find relevant data about this topic. Some findings were then put into a presentation to be used for different events promoting Project Diabetes and Memphis Tilth. My understanding of the community and the people's unique challenges then deepened when I attended the kitchen classes and also taught one class. I saw how concepts of healthy eating were foreign to participants of the class and some vegetables were even unfamiliar to them. This could be due to many things but based on the prior research done; low-income living, low access to full-scale grocers, and no education on diet and disease prevention are factors that play a huge role.

I also wanted to learn how to translate and communicate knowledge to a variety of audiences, including people involved in the classes that Memphis Tilth offered, along with partners and funders. This is very useful for my future, seeing as I will have to communicate knowledge to a wide array of audiences and convey information for different reasons; such as furthering health with a lower-income population or talking with stakeholders about being a part of a farm-to-table initiative or a wellness coalition. I also learned how to communicate with different people to obtain knowledge. Carrying out research to collect data on the health disparities between zip-codes required me to contact different persons who first acquired the data. This was helpful for the future because I will need to obtain information and statistics from people in the past and use it to help further the public's health. To more effectively communicate to the persons that are served by Memphis Tilth I created different infographics. Some are explaining different vegetables; how to cook them, nutrition information, and growing information. There are also a couple that are explaining the benefits of hand-washing and the benefits of growing your own food. I altered these infographics to spark interest in that

particular population. For example, the farming infographic has therapeutic benefits that would be beneficial for displaced veterans. Another way that I learned how to communicate knowledge to a variety of audiences was to create lesson plans and teach the Community Kitchen Elective about type 2 diabetes. In all these things I kept in mind ways that participants engaged with material, reading levels, and prior knowledge they may have. I was able to deliver relevant material to them in a way that was engaging and comprehensible with the goal of empowering them to create lasting change in their lives.

Activities

1. Managed the Memphis Tilth booth at 2019 King Day – 1/21/19
2. Attended Staff and Board of Directors retreat – 1/19/19
3. Attended Community Kitchen classes – throughout semester
4. Shadowed Community Garden Site Coordinator – 1/18/19
5. Shadowed AOVS Community Garden Organizer – 1/17/19
6. Shadowed Community Garden Organizer – 1/15/19, 1/16/19
7. Shadowed AOVS Community Kitchen Coordinator – 1/23/19
8. Shadowed Community Kitchen Coordinator – 1/10/19, 1/14/19
9. Taught introduction to Community Kitchen Elective – 3/21/19
10. Taught lesson Community Kitchen Elective – 3/28/19

Chapter 3 - Results

According to general guidelines that were created for nutritionists based on the stages of change; in the action phase it is recommended to provide self-help materials and refer to educational programming for behavioral skill training.³⁷ A study that focused on reducing vegetable-intake disparity among lower-income adults found that through nutritional education they could bridge the vegetable intake gap within Japanese adults.³⁸ The study claimed that improving self-efficacy, or the perceived control over a behavior, is essential for behavior change.³⁸ With these things in mind, I created materials for Memphis Tilth that would increase self-efficacy in program participants through providing educational programming for behavioral skill training and infographics as materials for self-help. The content of these infographics was chosen by the staff of Memphis Tilth according to the perceived needs of their program participants and the lesson material that is already taught. The first project was to make infographics to communicate nutrition and health knowledge in a way that was easily understandable. The infographics were over five different vegetables grown in the fall, handwashing, and the benefits of farming. See Appendix 1.

A short questionnaire was developed to gather feedback and evaluate the content, readability and cultural sensitivity of the infographics. Program participants, professionals, and staff at Memphis Tilth completed the questionnaire. The questions in this survey were developed after reading an article that evaluated the validity and reliability of nutrition education tools.³⁹ The evaluation questionnaires can be found in Appendix 4. After consulting with an advisor, a section was added to the questionnaire that allowed for comments. This proved useful in improving the infographics in various ways to better meet the needs of the target audience. For example, a survey that was completed by a nutrition professional indicated that the target audience may not know what collagen is. There were also grammatical corrections that were mentioned, such as omitting the word “needed” after “Percent of Daily Value”. Based on comments in the surveys, the infographics were revised to be more effective.

The surveys came in with positive results from participants and professionals. The vast majority of the answers on all surveys pertaining to all seven infographics were “yes”, which is positive and shows them to be effective. Not only were the audience’s needs better met through these surveys, but I gained skills on developing educational materials for the future. The tables below illustrate the variety of reviewers and the feedback results and comments they gave.

Table 3.1- Reviewers for Produce Infographics

Reviewer	Job Title	Degree/Credentials
1	Extension Associate, Extension Nutrition Program	MS, RD
2	Graduate Assistant	RD
3	Assistant Professor	PhD, RD
4	Instructor	MPH, RDN
5	AOVS Community Kitchen Organizer	ABD, History PhD
6-8	Program Participant	

Table 3.2 – Results from Produce Infographic Survey to Professionals

Question	Yes	No	Related comments
1. Does the handout convey the material in an easy-to-read and engaging manner?	5		
2. Does the handout convey the material in an easy-to-read and engaging manner?	5		They were easy-to-read and appealing.
3. Is the infographic relevant for the target audience?	5		
4. Is the infographic culturally appropriate?	5		I believe so. A variety of vegetables are covered, also. Yes, if most of the veterans are white.
5. Are the words used in the infographic common and frequently used and do not contain jargon?	4	1	Reword/Eliminate beta-carotene and collagen
6. Does the handout contain positive messages, such as “do this”, rather	5		

than negative messages, such as “don’t do that”?			
7. Is the handout organized in a logical way?	5		Some are easier to follow than others
8. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	5		Is it necessary to contain daily % value?
9. Is the reading level of the infographic appropriate for the target audience?	5		
10. Does the content promote evidence-based practices and if it over nutrition, is it consistent with Dietary Guidelines for Americans?	5		
11. Do you have any comments or suggestions for improvement?			<ul style="list-style-type: none"> • Recommend reviewing for consistency of verbiage • Cauliflower handout: consider varieties of cauliflower include ** rather than can be grown in *** • Consider a different preparation method or sauce in place of hot sauce • Overall, I like the format with the Turnip best, I think it’s easy to glance through and contents are organized. • Is it necessary to credit photo right underneath the picture, instead of the bottom of infographic? • Broccoli: Regarding Vitamin C and immune function, human studies are conflicting-this is actually not that well established. Suggest replacing with something related to its antioxidant function. • Taken all together they are a little busy but if they are being looked at one-at-a-time they are great.

Table 3.3 – Results from Produce Infographic Survey to Program Participants

Question	Yes	No	Related comments
1. Does the handout reinforce what you learned in the kitchen and garden classes?	3		
2. Is the handout easy-to-read and engaging?	3		
3. Does the information on this handout entice you to eat more vegetables in your diet?	3		
4. Is this handout relevant to your life?	3		
5. Can you relate with the information in this handout?	3		
6. Are the words used in the handout common and frequently used?	2	1	"collagen"?
7. Does the handout contain positive messages, such as "do this", rather than negative messages, such as "don't do that"?	3		
8. Is the handout organized in a logical way?	3		
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	3		
10. Is the handout easy to read and understand?	3		

Table 3.4 – Reviewers for Farming Infographic

Reviewer	Job Title	Degree/Credentials
1	AOVS Community Garden Organizer	Clinical Rehabilitation M.S. candidate
2	Community Garden Organizer	M.P.S.
5	AOVS Community Kitchen Organizer	ABD, History PhD
6-8	Program Participants	

Table 3.5 – Results from Farming Infographic Survey to Professionals

Question	Yes	No	Related comments
1. Does the handout reinforce the materials taught in the kitchen and garden classes?	3		
2. Does the handout convey the material in an easy-to-read and engaging manner?	3		
3. Does the handout convey the material in an easy-to-read and engaging manner?	3		
4. Is the infographic relevant for the target audience?	3		
5. Is the infographic culturally appropriate?	3		
6. Are the words used in the infographic common and frequently used and do not contain jargon?	3		
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?	3		
8. Is the handout organized in a logical way?	3		
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	3		
10. Is the reading level of the infographic appropriate for the target audience?	3		
11. Does the contain evidence-based literature?	3		
11. Do you have any comments or suggestions for improvement?			“I think it is informative, intriguing, and very relevant to the AOVS population”

Table 3.6 – Results from Farming Infographic Survey to Program Participants

Question	Yes	No	Related comments
1. Does the handout reinforce what you learned in the kitchen and garden classes?	3		
2. Is the handout easy-to-read and engaging?	3		

3. Does the information on this handout entice you to want to go receive the benefits of growing food?	3		
4. Is this handout relevant to your life?	2	1	
5. Can you relate with the information in this handout?	3		
6. Are the words used in the handout common and frequently used?	2	1	
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?	3		
8. Is the handout organized in a logical way?	3		
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	3		
10. Is the handout easy to read and understand?	3		

Table 3.7 – Reviewers for the Handwashing Infographic

Reviewer	Job Title	Degree/Credentials
1	AOVS Community Garden Organizer	Clinical Rehabilitation M.S. candidate
2	Community Garden Organizer	M.P.S.
5	AOVS Community Kitchen Organizer	ABD, History PhD
6-11	Program Participants	

Table 3.8 – Results for the Handwashing Infographic Survey to Professionals

Question	Yes	No	Related comments
1. Does the handout reinforce the materials taught in the kitchen and garden classes?	3		
2. Does the handout convey the material in an easy-to-read and engaging manner?	3		

3. Does the handout convey the material in an easy-to-read and engaging manner?	3		
4. Is the infographic relevant for the target audience?	3		
5. Is the infographic culturally appropriate?	3		
6. Are the words used in the infographic common and frequently used and do not contain jargon?	3		
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?	3		
8. Is the handout organized in a logical way?	3		
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	3		
10. Is the reading level of the infographic appropriate for the target audience?	3		
11. Does the contain evidence-based literature?	3		
11. Do you have any comments or suggestions for improvement?			“Very informative and motivating. Easy to read and engaging.” “Directionality is confusing with the arrows”

Table 3.9 – Results for the Handwashing Infographic Survey to Program Participants

Question	Yes	No	Related comments
1. Does the handout reinforce what you learned in the kitchen and garden classes?	6		
2. Is the handout easy-to-read and engaging?	6		
3. Does the information on this handout entice you to want to wash your hands more?	6		
4. Is this handout relevant to your life?	6		

5. Can you relate with the information in this handout?	6		
6. Are the words used in the handout common and frequently used?	6		
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?	6		
8. Is the handout organized in a logical way?	6		
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?	6		
10. Is the handout easy to read and understand?	6		

An introductory session and a lesson on type 2 diabetes were created for the Community Kitchen and Garden Elective. These can be found in Appendix 2. Based on entry interviews done for the elective, there was very little health and nutrition knowledge held by participants when entering. The goal was to come in and teach what diabetes is and how to prevent or manage it through diet and lifestyle. I also wanted to give them an idea of their sugar intake so that when they graduate the program, they will have a better understanding of how to eat to avoid or manage their diabetes. The internship ended prior to the participants’ exit interviews; thus, I was not able to attend them, but based off of conversation after the class and review questions, the participants seemed to have a much better idea of what type 2 diabetes was and how to prevent it. Illustrations, such as the added sugar one, also had them astonished and talking about their sugar intake after class was over.

The fermentation lesson plan for AOVS and the outreach PowerPoint for Project Diabetes were reviewed by the Community Kitchen Coordinator for AOVS and the Community Kitchen Coordinator for Project Diabetes, respectively. These were reviewed and critiqued throughout the creation of the deliverables to make certain they were developing as anticipated. It was key for me to work closely with the staff in making these products because they would be the ones presenting them either to their

class or to the community. This was useful in teaching me collaboration with a team and clear communication to obtain specific products and goals.

Chapter 4 - Discussion

Going into this experience, I possessed a very narrow view of the need for public health assistance in Memphis. I knew there were lower-income areas and food injustice within those areas, but I was not well-educated on the extent of this injustice. I was also unaware of the severe health disparity between the zip-codes within Memphis. There is much need for public health intervention in the zip-codes where the rates of poverty, food insecurity, food deserts, hospitalization, and diabetes are disproportionately higher. Fortunately, the organization that facilitated my field experience focused on reducing disparities within these zip-codes.

My first endeavor with the organization was to gather data regarding the socioeconomic factors and health outcomes of zip-codes within Memphis. I was not conducting my own research but rather collecting all the data that currently exists. A limitation was accessing some of these resources and discovering whether the resources were credible. I overcame this barrier by reaching out to various people. For example, I contacted the author of an article to ask for the source of a statistic. Once in contact with them I was led to the organization that held the original information. I also contacted people from the Shelby County Public Health department to access data. After compiling some of the data into a presentation for the Garden and Kitchen Elective, I was able to understand the need for increased education and access related to food and food-related illness within Memphis, specifically in the 38126- zip-code.

In the beginning of this internship, I shadowed multiple people within Memphis Tilth and was able to meet people who were utilizing the resources provided by Memphis Tilth by attending the community kitchen classes and touring the AOVS sites. By interacting with the participants of the class and the Memphis Tilth staff, I gained a better understanding of the barriers that individuals face when trying to live healthier lives. I observed how many of them were unable to change their diets and reduce disease because of lack of knowledge about disease (specifically type 2 diabetes) and healthy diet and lifestyle practices. I was then able to witness how education was empowering people to make positive lifestyle changes. This was being done through education on diabetes and how to prevent and manage it. Participants were instructed

on topics such as how to read nutrition labels, avoiding excess sugar intake, and other practices to help navigate healthy food choices. Participants of the class were exposed to different fruits and vegetables with the goal of increasing fruit and vegetable consumption. Another goal was to increase the participants competency in gardening and preparing these vegetables in simple and healthy ways. Along with education, participants' food access also increased by giving them bags from the Bring It Food Hub. The garden that participants are taught from is located in their neighborhood and is open to participants at any time, thus also increasing food access. Another goal of this class was that these skills would not only positively impact their health and reduce food-related disease but impact the health of their families and communities as well. There were a couple of women in the kitchen class associated with Project Diabetes who I frequently had conversation with that either had children or were living with their family and taking care of all of the children in the household. This meant that they prepared meals for their family and controlled a large portion of what their family ate. In the Project Diabetes class, participants were often encouraged to think about sharing the knowledge learned in class with their families and impacting their communities to better health.

Another barrier that participants faced in carrying out healthy eating and lifestyle choices is low literacy levels. This is one of the reasons that the infographics over various topics were of use to this population. This low literacy rate was also kept in mind for the methods used in creating and teaching the lesson plan on type 2 diabetes. The material was over type 2 diabetes, the prevalence of it, how the body physiologically changes to be insulin-resistant, and how it can be prevented and managed with diet. This lesson contained much conversation and interaction, which had the participants engaged and ready to learn. There were also many visuals used in the lesson. One visual was illustrating the difference of how a healthy body functions versus one with type 2 diabetes via pictures and models drawn on the white board. Additionally, two short videos were shown over diabetes to reinforce what was taught on the white board. There was also an illustration to example how much added sugars could be consumed in drinks. The participants were physically shown how much added sugar was recommended, how much added sugar was in a Coca-Cola and orange juice, and the

equivalent of what one participant was drinking a day in added sugar. This was done by putting as much processed white sugar in empty cups as were in the chosen drinks. To promote interaction, a participant volunteered to measure out one of the cups of sugar. This was very shocking for them to see and then relate back to diabetes risk. Overall, the staff and I were satisfied with how the lessons turned out and thought that the participants came away with a much better understanding of what diabetes was and what they can change in their diet to help prevent it.

Infographics were also made with the intended audience in mind. They were bright, well-organized, with simple images, and contained minimal words so that they would be enticing. They also contained information that is useful in improving health but not overly complex so that the information can be retained and put into practice. The information on these infographics was also previously taught in class. One of these infographics was over hand-washing. After speaking with the staff at Memphis Tilth it was stated that there was a desire for a hand-washing infographic that illustrated normal handwashing practices, while also trying to include information that would draw the audience's interest and make them personally care about washing their hands. With further discussion, it was decided that participants would personally care for money/income and family. The infographic explained that poor handwashing practices would lead to sickness, which leads to days missed at work, and thus loss of income. Information was also included on how family may be affected by also getting sick and thus leading to more healthcare costs, such as purchasing medicine. Statistics on the percentage of disease caused by poor handwashing practices were also included from the Center of Disease Control. The results from the questionnaires given to participants and professionals displayed that the infographics were well-received. This infographic was hung in the community kitchens so that the participants would be reminded of the benefits. A copy of the infographic would also be useful near handwashing sinks and being sent home with the participants the day that handwashing is discussed.

For the AOVS and the Kitchen Elective class, five infographics were created displaying five different produce items that are grown in the fall. These include broccoli, carrots, cauliflower, bok choy, and turnips. The produce items were all vegetables that could be grown in the Memphis Tilth gardens. The infographic for each vegetable

contained information on which months to grow the produce and how to care for it, which came from knowledge of the gardeners. The infographics also contained a couple of preparation methods that came from methods that participants were taught in class. These were mainly on ways to cook the vegetables, such as roasting. The infographics also contained some nutritional information from the USDA and how those specific vegetables benefit health. With that being said, The Garden and Kitchen Elective is funded by Project Diabetes whereas the AOVS team exists to serve the displaced veterans. This means that the kitchen elective was specifically geared toward preventing or managing diabetes, whereas the AOVS kitchen did not have to be as stringent. One can see this by shadowing the two classes or looking at the cookbooks that each class creates. AOVS tries to cater to their population by taking Southern foods that the participants consume frequently and give them healthier options. Consequently, that is why one can see some different preparation methods (such as adding hot sauce to cauliflower) in the produce infographics, because they were trying to cater to the populations at AOVS as well as the kitchen elective. The goal for the produce infographics is to reinforce what the participants had been taught in class and empower them to take this information to their communities and make lasting change in the way they eat. These infographics would be useful to give to participants one-at-a-time to take home after discussion about that vegetable. They should be distributed this way because the surveys stated that they would be overwhelming and “busy” if they were put together in a display. The surveys also showed that once changes were made according to the suggestions, the infographics could be useful in conveying knowledge to that population.

Before the internship, I was ignorant of the poor health status of displaced veterans within Memphis. By shadowing the AOVS staff and visiting the AOVS sites, I gained an understanding of what is being done to serve displaced veterans and their unique needs. Memphis Tilth is partnering with AOVS by creating a community garden and hosting community kitchen classes. One of my projects was to create an infographic that would describe the benefits of farming, including the therapeutic benefits. This was created to cater to veterans because of the trauma that they have experienced, both from serving in the U.S. Armed Forces and being homeless. There is

wide variety of benefits included in this infographic, from the way that growing food can increase diet diversity to the way that it could help with depression. The goal is that the short and precise information in the infographic would lead to curiosity and deeper conversations with the AOVS garden organizer, along with increased participation in the garden to reap the benefits mentioned in the infographic. In the surveys given to the participants about this infographic, one participant claimed that the words were not familiar. This could be a result of wanting to promote in the participants a sense of curiosity. Overall, the AOVS garden organizer and I decided that putting some unfamiliar words would make participants more interested to learn and that each participants' willingness and desire to learn differs. From the results of the surveys, I would conclude that this infographic would be useful when given to the participants of the AOVS garden class. It is best given out in the class so that when the participants read through it, they have someone in-person who can be there to answer questions and promote conversation about each topic. The participants can then immediately receive the benefits that the infographic claims by going to the garden and working with the AOVS garden organizer.

As mentioned, the AOVS kitchen and garden classes have slightly different needs than the Garden and Kitchen Elective. The AOVS class also has more freedom in the curriculum and therefore there is a week of teaching about alternative medicines. Because of this I was able to create a lesson plan about fermentation, probiotics, and kombucha. This was drawn from various sources that I cited, some of which is from research that is in its infancy. This was deemed satisfactory by the AOVS kitchen coordinator because one of the goals of this lesson was to expand the participants view of health, food, and medicine. This lesson will be utilized by the AOVS kitchen organizer in opening up the veterans' minds and giving them an introduction into how bacteria effects gut health and letting them explore alternative medicine.

In total, my experience was very well-rounded and I was able to do a variety of different projects. I communicated knowledge to a variety of people in different ways with the goal of increased self-efficacy and behavior change toward healthier lifestyles. Overall, my work has furthered the educational materials at Memphis Tilth and furthered the knowledge of the Garden and Kitchen Elective participants.

Chapter 5 - Competencies

Student Attainment of MPH Emphasis Area Competencies

Table 5.1 Summary of MPH Emphasis Area Competencies

MPH Emphasis Area: Public Health Nutrition		
Number and Competency		Description
1	Information literacy of public health nutrition	Examine the acquisition of public health nutrition knowledge and skills and evaluate how to select information efficiently and effectively for public health practice.
2	Compare and relate research into practice	Examine chronic disease surveillance, policy, program planning and evaluation, and program management.
3	Population-based health administration	Develop and examine the administration of population-based food, nutrition and health services.
4	Analysis of human nutrition principles	Examine epidemiological concepts of human nutrition in order to improve population health and reduce disease risk.
5	Analysis of nutrition epidemiology	Critique nutritional epidemiological research design methods.

1. Information literacy of public health nutrition

This competency was attained by gathering data on the food and public health climate of Memphis and investigating the different needs between zip-codes. I spoke with staff and shadowed classes to see the specific individual need. Based on class observations, participants in the kitchen elective did not have adequate diabetes knowledge, in that they were not aware of what type 2 diabetes was or how to prevent it. I then taught a lesson about diabetes to inform the participants and increase their literacy of diabetes knowledge. Infographics were also created to provide to program participants with the

purpose of equipping them with knowledge to increase self-efficacy in increasing vegetable consumption and habits such as handwashing. Information on the infographics was chosen based on knowledge that the participants were lacking and goal takeaways of the class.

2. Compare and relate research into practice

During this internship I gathered data on the health climate of lower-income neighborhoods within Memphis to understand the community's largest health challenges. This was to help the program planning of the Community Kitchen and Garden Elective that was funded by the Project Diabetes grant and to aid in evaluating the program to see if it is meeting the needs of the population. There was also research done showing the strong association between lower-income populations and higher risk for type 2 diabetes. I then created audience-appropriate content to educate program participants on type 2 diabetes to increase self-efficacy and reduce rates of diabetes within low-income neighborhoods. This literature also furthered Memphis Tilth's programming via adding educational materials.

3. Population-based health administration

By attending meetings and shadowing the professionals within the different areas of Memphis Tilth, I was able to examine the administration of population-based food, nutrition and health services. To assist in the development of the administration of services, I provided community data to better equip the organization with knowledge about its target populations. To foster partnerships, an outreach presentation was developed to explain the needs and benefits of the community kitchen and garden to the community at large. Additionally, I developed the kitchen class by creating and teaching educational material. I also was given the opportunity to observe a meeting with the Tennessee Health Department discussing the Kitchen and Garden Elective, which is funded by the Tennessee Health Department's Project Diabetes grant. This meeting was to evaluate the effectiveness of the kitchen and garden class to determine if its funding will be renewed. This was done by assessing the qualitative data collected

throughout the 3-year cycle, recorded mostly through entry and exit surveys and interviews.

4. Analysis of human nutrition principles

I was able to observe the societal structure of the low-income neighborhoods and examine how they do not enable the underprivileged with access to healthy foods or education healthy eating practices. There are no structures in place to educate and empower people towards healthier lives, thus chronic disease is persisting. To improve population health and reduce disease risk there needs to be improved access, affordability, and education. My field experience was performed at Memphis Tilth, which addresses these three areas. In my experience, I got the opportunity to shadow people in positions who deal directly with persons who are underprivileged of poor health. I also examined the connection between low SES status, poor diet, and disease through many credible sources. With this and my past nutrition and health education, I was able to educate the population in depth on type 2 diabetes so that during the rest of the class they would understand why vegetable-consumption and preparation is important. The infographics then reinforced different vegetables that when consumed would not lead to further disease risk.

5. Analysis of nutrition epidemiology

I evaluated many articles researching and correlating diabetes and socioeconomic status. At the same time, I was able to witness the impact that socioeconomic status is having on diabetes in lower income areas. I was also collecting data on the zip-code Memphis Tilth is in and comparing the morbidity and mortality rates, poverty statistics, etc. of places that are wealthier with plenty of resources. Putting epidemiological research alongside the nutrition and disease climate of Memphis was informative on why there is health equity and steps towards eradicating it. Educating the lower-income population is a step towards increasing health and lowering disparity. To further Memphis Tilth's educational materials, I created lesson plans and infographics, along with infographic questionnaires. I was able to utilize credible epidemiological research to create materials for Memphis Tilth. There was also epidemiological research showing

how others having educated this population in the past. This research did not have all of the same circumstances as I did, for example one article was over web-based training. Another difference is that I was requested to create infographics over certain subject matter Memphis Tilth staff perceived as a need of their program. Therefore, there was freedom in how I presented the information and what the details were, but the overall themes were chosen based on request of the staff.

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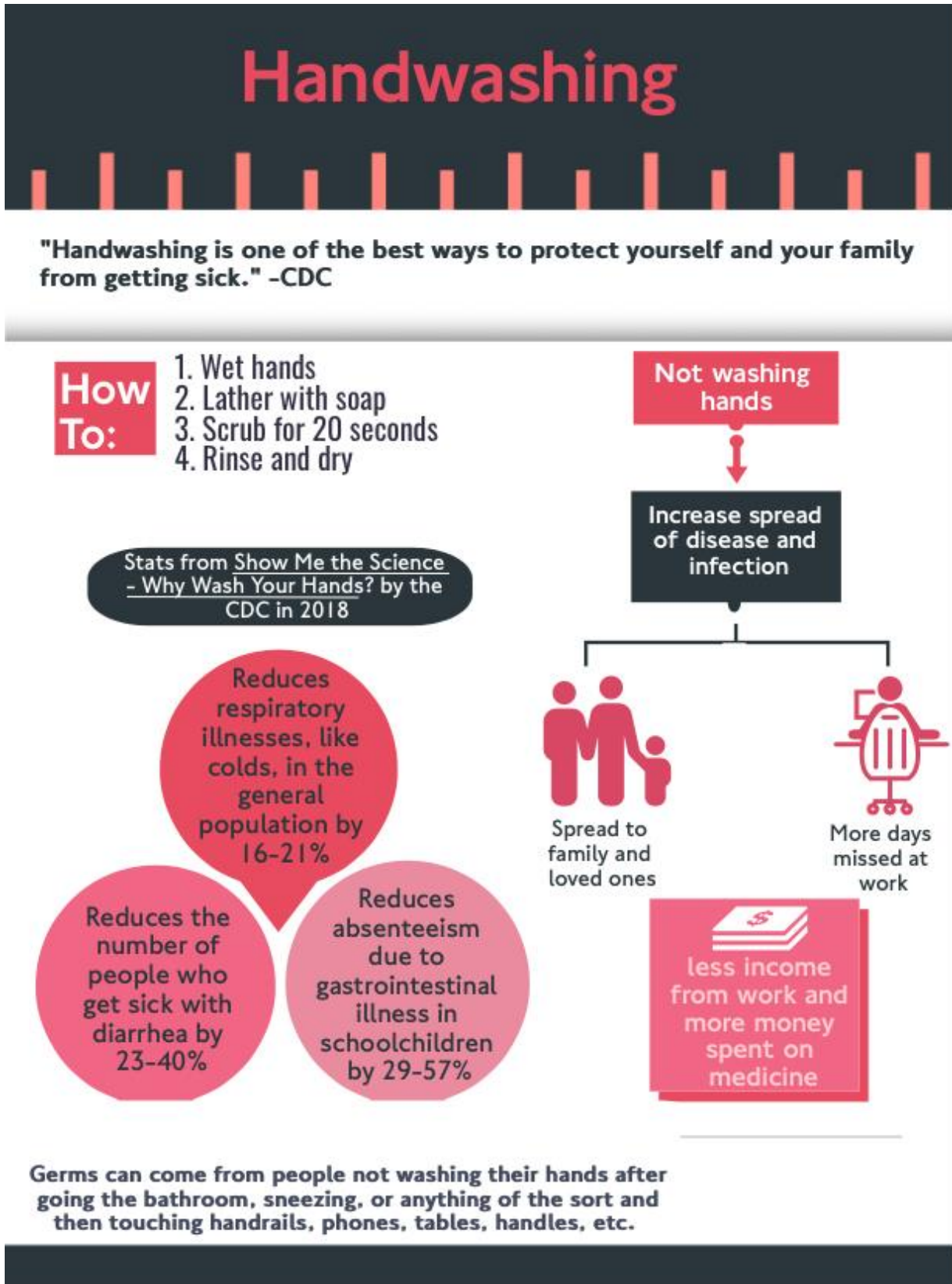
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Appendix 1: Infographics



Bok Choy



<https://www.healthyingredient.com/recipes/269700306/sesame-cruste-s-ole-with-baby-bok-choy-and-wild-rice/>

**Related to broccoli,
brussels sprouts,
and cabbage!**

Grown in the fall
45-50 days
till mature



**originated in
China**

Nutrition (% of daily value)



Carbs	Vit C	Vit A	Fat
0%	52%	62%	0%

Ways to Prepare:

1. Steamed
2. Grilled
3. In soup
4. In stir-fry

Cauliflower

GROWING



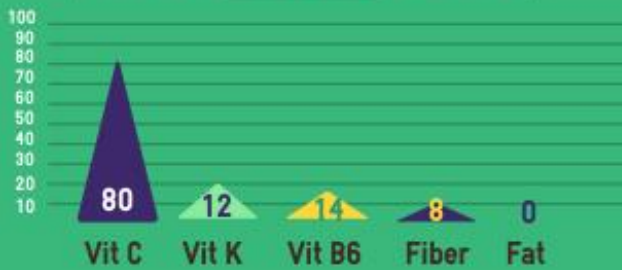
FEBRUARY - MAY
AUGUST - NOVEMBER

full sun 

best when seeds are started 4-5 weeks before transplanting to the garden around 2 feet apart.

HARVEST AROUND 10-12 WEEKS AFTER TRANSPLANT

Percent of daily value



Only 5% of America consumes the recommended amount of fiber each day

Source: Oughton, D., & Fall-Randerson, P. (2016). Closing America's Fiber Intake Gap: Communication Strategies From a Food and Fiber Summit. American journal of lifestyle medicine, 11(1), 85-95. doi:10.1177/1559827615588879



Vitamin C

increases iron absorption

wound healing

antioxidant

helps form muscles and blood vessels

CAULIFLOWER CAN BE PURPLE, GREEN, AND ORANGE DEPENDING ON THE VARIETY!

Roast in the oven.
Optional: Toss in buffalo sauce after roasting.



Steam and mash with a little garlic to make imitation mashed potatoes



the carrot



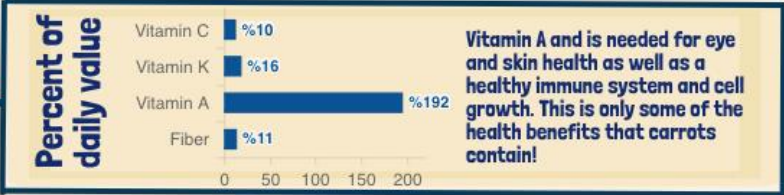
growth

Grow between October and July

Harvest 85 - 135 days after planting



nutrients



preparation

Raw

Roast

Stew

Turnips



<https://snaped.fns.usda.gov/seasonal-produce-guide/turnips>



<https://snaped.fns.usda.gov/seasonal-produce-guide/turnips>

"Turnip Winter"

turnips were a staple in Germany in the winter between 1916 and 1917, during the first World War, when there was a potato shortage.

growth

March - May
August - October



harvest 4-6 weeks after planting

nutrients

cholesterol free- good for heart health

Contains antioxidants that protect cells from damage

preparation

roast



shred into coleslaw



stew



Tip: use the top greens just as you would collard or mustard greens!

Broccoli

native to the
mediterranean

Cooking



raw or in
salad



saute or steam

Growth

- Time of year:
Feb-May or
August-November
- water regularly
- full sunlight
- start seed indoors
for a month

Nutrition

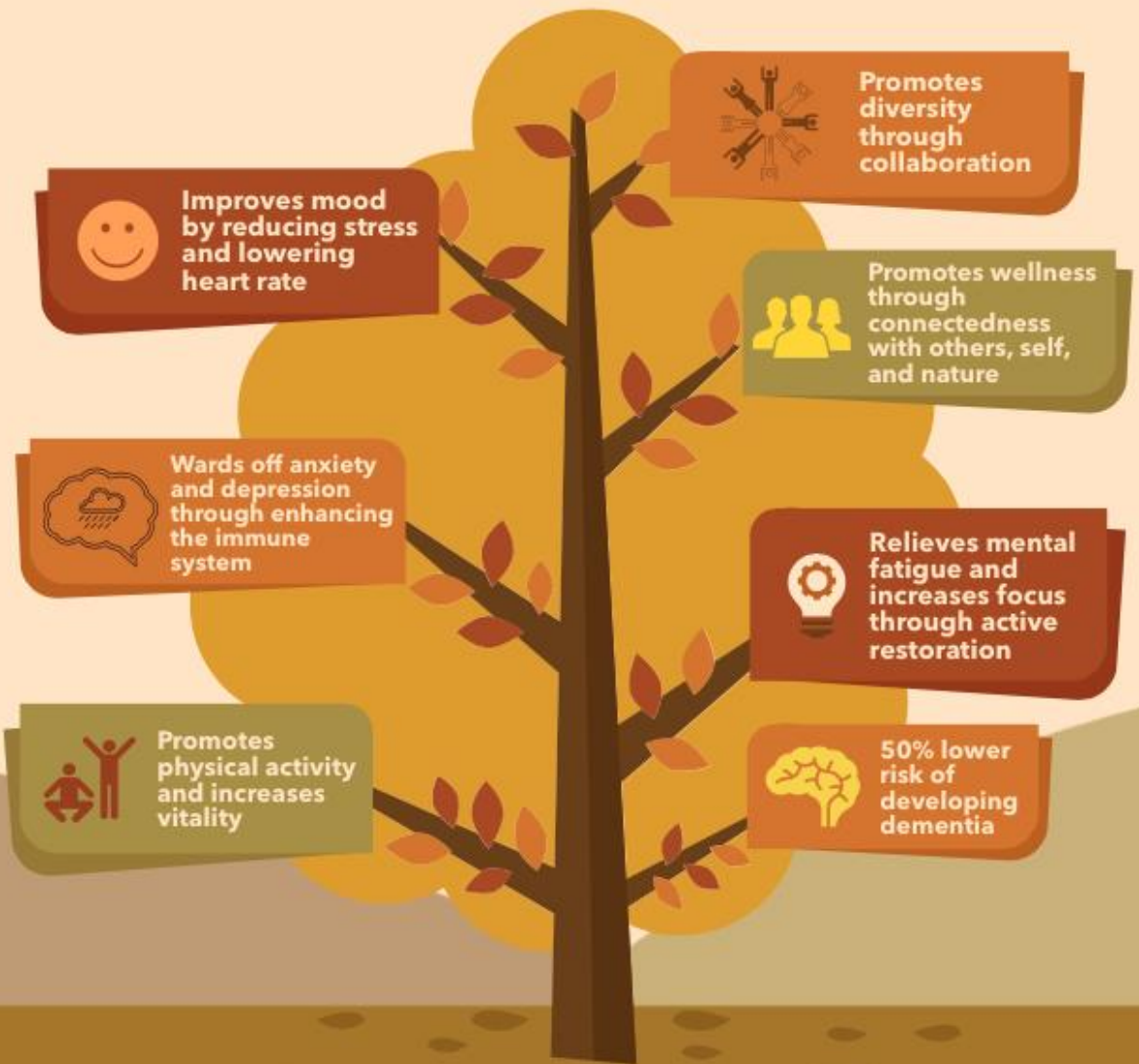
Percent of daily
value

Vit A	<div style="width: 18%;"></div>	18
Fiber	<div style="width: 15%;"></div>	15
Vit C	<div style="width: 220%;"></div>	220

Broccoli also contains
antioxidants which help
prevent damage to our
cells!

THERAPEUTIC FARMING

There is something special about growing your own food. Gardening and farming, no matter the scale, takes a person back to their primitive roots and can be a healing reprieve from this industrialized world.



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Appendix 2: Lesson Plans

Introduction to Type 2 Diabetes

1. Ask if they know what diabetes is?
2. Essentially it is when your blood sugar is too high because body isn't using the sugar like it should.
 - a. Very much oversimplifying- go into more next week
3. Ask if they know of anyone who has type 2 diabetes?
4. Prevalence
 - a. We live in "diabetes belt" where health impact of diabetes is about 50% more than the rest of the nation.
 - b. 1 in 3 people in Shelby County have Type 2 Diabetes
 - c. 13% of Tennessee has diabetes and ~161,000 have it but don't know it.
5. There are some scary statistics about diabetes if it gets too severe.
 - a. Leading cause of blindness and amputation
 - b. Increases risk of heart and kidney failure
 - c. 7th leading cause of death
 - d. A person/day dies in Shelby County from diabetes
6. BUT we can prevent diabetes in different ways. There are a lot of lifestyle things we can change- big ones include diet and physical activity, which is what we will be focusing on in this class!
7. https://www.youtube.com/watch?v=thd_sH4rgeY

Type 2 Diabetes Lesson

- We will be specifically talking about type 2 diabetes.
- Terms
 - o **Glucose**- sugar in the blood. Needs to get in your cells to produce energy, also brains main source of fuel. Type 1 is where there is not enough of the hormone,
 - o **Insulin**- hormone secreted by the pancreas. This helps the glucose get into the cell.

- Draw **illustration** on white board of how healthy body functions
 - o Food goes through digestive tract and gets broken down to go into blood stream
 - o Pancreas secretes insulin in bloodstream
 - o Insulin has to run through the blood along with glucose to allow the glucose to get into the cells
 - o As blood sugar levels drop so does secretion of insulin

- **Type 1 diabetes**
 - o It used to be called juvenile-onset diabetes because it often appears in childhood
 - o Cannot prevent- it is an autoimmune disease (body attacks the insulin-producing cells in pancreas so a person does not have enough insulin)
 - o Count carbs from food and have insulin pumps
 - o Pancreas does not secrete enough insulin

- **Type 2 diabetes**
 - o 90-95% of diabetes
 - o Person's body is resistant to their insulin.
 - o Glucose doesn't get into the cell and it stays in blood, which is why you here diabetics have high blood sugar.

- Draw **illustration** how body with Type 2 diabetes works
 - o Food goes through digestive tract and gets broken down to go into blood stream
 - o Pancreas secretes insulin in the bloodstream
 - o Insulin runs through the blood BUT
 - o The insulin-receptor on the cell that allows the glucose receptor to surface no longer works so glucose does not get into the cell but remains in the blood
 - o Blood sugar stays high and can damage arteries and organs

- <https://www.youtube.com/watch?v=JAjZv41iUJU>
 - o Watch until 1:34
- <https://www.youtube.com/watch?v=oDOVXww7sSE>
 - o Start at :40 and go until end

- Some symptoms
 - Increased thirst
 - Frequent urination
 - Blurred vision
 - Slow-healing sores
 - Extreme hunger

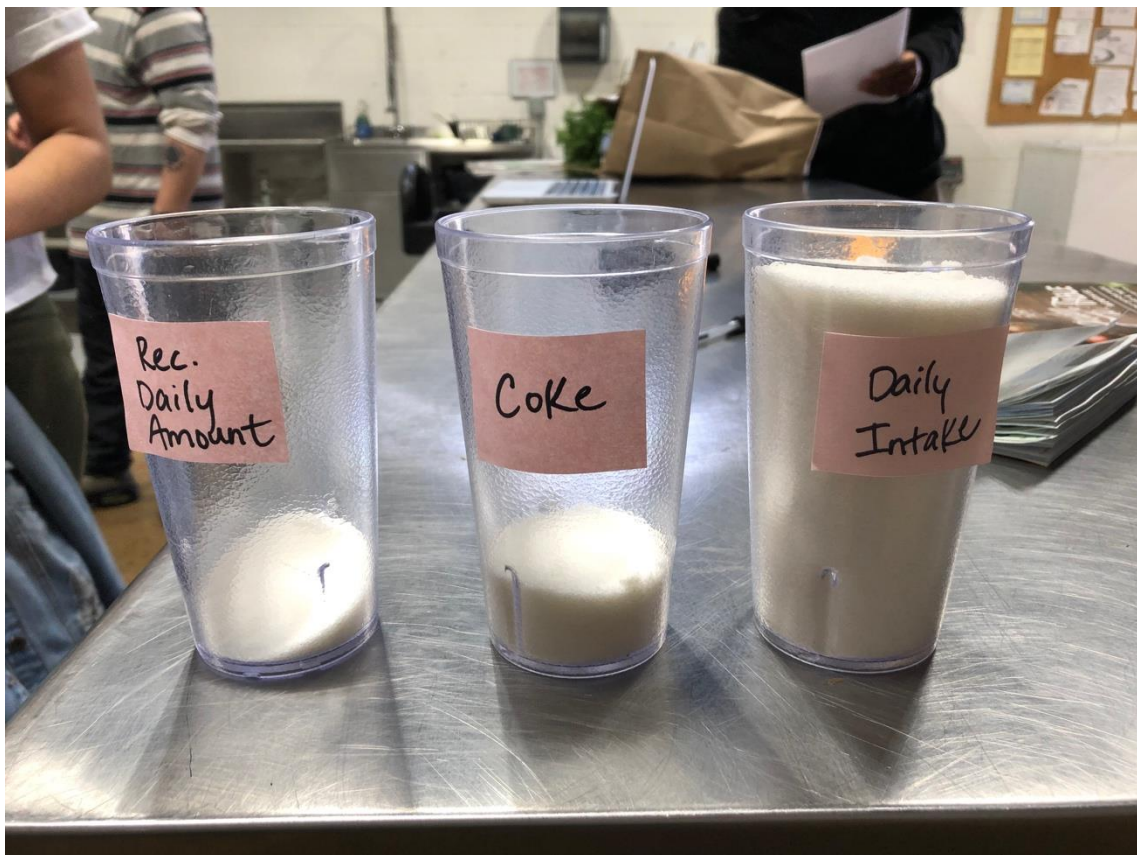
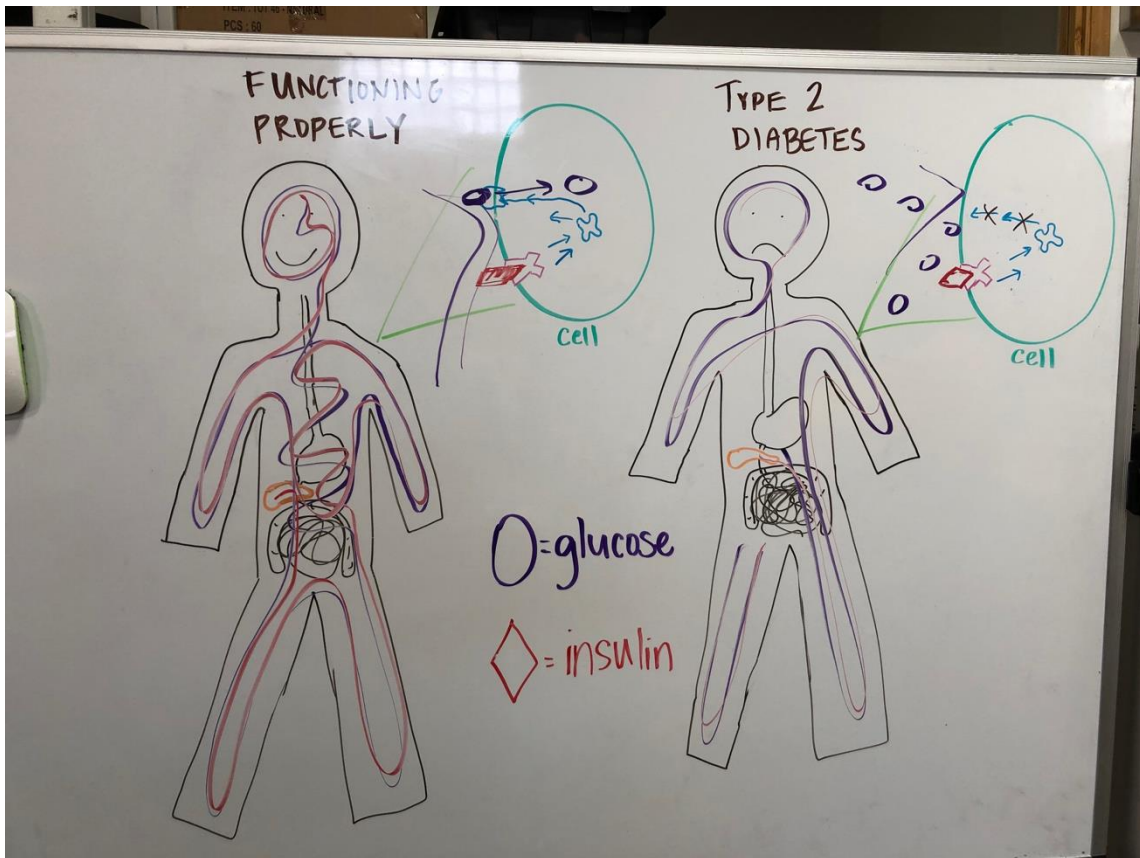
Prevalence

- 7th leading cause of death
- 1.5 million Americans are diagnosed every year
- \$327 billion is total cost of diagnosed diabetes in the US in 2017
- 1 in 3 adults in Shelby county have diabetes

What now?

- Eat Healthy
 - Focus on eating fruits, veggies, whole grains
 - Avoid saturated fats
 - Unhealthy fat. Trans fat is also in this category. Look at nutrition label
 - Avoid processed sugars
 - 6 teaspoons (25 grams) for women and 9 for men
 - Illustrate how much sugar is in pop- 39 g. Info from: <https://www.coca-colaproductfacts.com/en/faq/sugar/how-much-sugar-in-coke/>
 - Illustrate how much sugar is in Kroger brand (popular grocery store) orange juice-21 g. Info from: <https://www.kroger.com/p/kroger-original-pulp-free-100-orange-juice/0001111050658>
 - Illustrate how much sugar one of them drinks per day from survey done last class.
- Physical activity
 - Try to get 30 minutes a day of moderate physical activity. It is recommended to get 150 minutes per week. Moderate physical activity could even be working in the garden!

End of class- students head to the garden



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Kombucha/Probiotic Lesson Plan

Lesson Objective	<ul style="list-style-type: none"> • Students explore alternative medicine • Students learn concepts of probiotics and fermentation • Students investigate medicinal benefits of kombucha and learn how to make it
Essential Question(s)	<ul style="list-style-type: none"> • How do probiotics link to gut health? • What is the connection between fermentation and probiotics?
New & Familiar Vocabulary	<ul style="list-style-type: none"> • Probiotics • Fermentation • Kombucha • Microorganisms
Assessment	<ul style="list-style-type: none"> • Next class, when collecting final batch of Kombucha, discuss what they remember and how they can apply it.
Materials Resources Setting	<p><u>Materials</u></p> <ul style="list-style-type: none"> • Stove • Pot for boiling water • Large stirring spoon • Gallon glass pitcher • Coffee filter (or some other breathable fabric such as cheesecloth or paper towel) • Rubber band • Filtered water • 4 tea bags • 1 cup sugar • 16 oz kombucha starter • Scoby <p><u>Resources</u></p> <ul style="list-style-type: none"> • https://www.med.umich.edu/pfans/_pdf/hetm-2017/0717-fermentedfoods.pdf • Yan, F., & Polk, D. B. (2011). Probiotics and immune health. Current opinion in gastroenterology, 27(6), 496–501. doi:10.1097/MOG.0b013e32834baa4d • Kechagia, M., Basoulis, D., Konstantopoulou, S., Dimitriadi, D., Gyftopoulou, K., Skarmoutsou, N., & Fakiri, E. M. (2013). Health benefits of probiotics: a review. ISRN nutrition, 2013, 481651. doi:10.5402/2013/481651 • Trinetta, V., & Yucel, U. (n.d.). WelcomeFood FermentationFDSCI 810. Lecture presented at FDSCI 810, Manhattan. • Trinetta, V., & Yucel, U. (n.d.). Lab Activity: Kombucha Project 810. Lecture presented at FDSCI 810, Manhattan.

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Setting

- Kitchen and classroom

Fermentation

- What is that?
 - Anaerobic metabolic process of deriving energy from organic compounds such as glucose
 - First done by Sumarians when created beer- fermented wheat. Happened on accident from the enzymes in their saliva when they shared a cup.



- Why ferment foods?
 - Preservation
 - Extend shelf-life
 - Nutritional Value
 - Flavor
 - Economic value
- Examples of fermented foods
 - Sauerkraut
 - Beer
 - Wine
 - Kimchi
 - Miso
 - Tempeh
 - Cheese
 - Meats such as summer sausage
 - Yogurt
 - Kefir (first made this by storing in leather bags and the stitches in the bag had yeast and bacteria on them which fermented it)
 - Kombucha
- Different bacteria, yeasts, and molds are used to convert products to fermented food
 - Examples:
 - *Penicillium* makes brie or Roquefort cheese
 - *Aspergillus* makes soy sauce
 - *Pediococcus acidilactus* used in meat production (this one is cool because it's a bacteriocin, which is a peptide that these bacteria make and it kills bacteria that are genetically similar. This is important because listeria is similar and very harmful)

- Some fermentation processes produce microbes which classify as probiotics—most commonly some yogurts.
 - Some products go through heat or filtering that do not allow this to happen

Probiotics

- Probiotic means “for life”
- It is live microorganisms/bacteria that are intended to benefit health
- Bacteria or microorganisms has always been in your gut and probiotics promote the bacteria that is beneficial for your health
- Different microbial species (such as *Lactobacillus acidophilus* which is in the genera *Lactobacillus*) determine the health benefits that come from probiotics. This can also vary from person-to-person because of how genes play a role.
- Probiotics MAY help our bodies function by... (these have been researched but much further research needs to be done to verify. Some of the studies done need to be tested on human subjects as well to verify results.)
 - Digesting food
 - Outcompetes undesirable bacteria
 - Helps gut create barrier for undesirable bacteria and inhibits their growth
 - Produce vitamins.
 - Improve immunity
 - Prevent allergy symptoms or lactose intolerance
 - Prevent or alleviate diarrhea
 - Helps liver function
 - Alleviate depressive symptoms
 - Helps with type 2 diabetes
 - Ease Irritable Bowel Syndrome symptoms

Kombucha

- Sugared tea that is fermented by a symbiotic culture of bacteria and yeast (aka scoby)
- Scoby feeds on the sugar in the tea and almost doubles in size each batch (so you can give some to a friend)
- Produces probiotics which can be beneficial for health (as stated above)
- “This beverage is composed of some probiotics such as acetic acid bacteria and lactic acid bacteria in addition to tea polyphenols, sugars, organic acids, ethanol, water soluble vitamins, and a variety of micronutrients produced during fermentation” -article by Fu, Yan, Cao, Xie, & Lin

Middle	<p>Lab Activity/ Make Kombucha!!</p> <ul style="list-style-type: none"> • Be sure to clean all supplies being used • Steep the 4 tea bags in 60 oz of boiling water for an hour. • Remove the tea bags • Add sugar and stir until completely dissolved • Add cold water to mixture until it reaches 86-90 degrees Fahrenheit • Add scoby and kombucha starter • Put the coffee filter on the top with rubber band to seal it (if that will not work cover with a breathable fabric) • Sit it in a warmer place where it will not get disturbed for a week. • Once finished; with sterilized hands, place scoby with some of the kombucha in another container (scoby should have grown) to make next batch with. • Pour into bottles and seal in the refrigerator to store. <p>*Note: Kombucha can be made out of black, green, oolong, or white tea. You can even put one tea bag of herbal or fruit tea to mix up the flavor. Make it your own!</p>
End	<ul style="list-style-type: none"> • Wash up and maybe try other fermented products that would be new and have a variety of different flavor profiles and functions

Appendix 3: PowerPoint

Project Diabetes & the Community Kitchen



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1

Why?





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2

Economic Hardship Index (EHI)

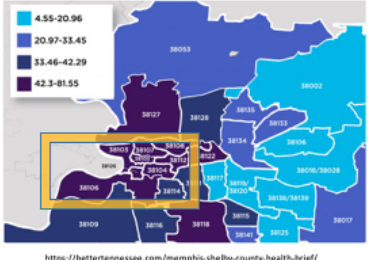
“Where you live affects your health. Social determinants of health are mostly responsible for health disparities: unfair and avoidable differences in health status of different groups.”

– Better Tennessee’s Memphis & Shelby County Health Brief



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Economic Hardship Index (EHI) in Shelby County



- A higher score indicates more hardship
- Memphis Target zip codes: 38126, 38104, 38112, and 38106


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<https://bettertennessee.com/memphis-shelby-county-health-brief/>

Target zip code 38216

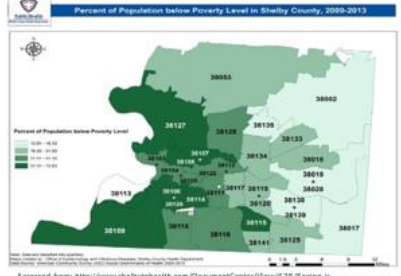
- 6 out of 10 live in poverty
- 8 out of 10 children live in poverty
- Median household income is around \$5,000 compared to that of a house in the zip-code 38139 which is around \$80,000

– Better Tennessee’s Memphis & Shelby County Health Brief



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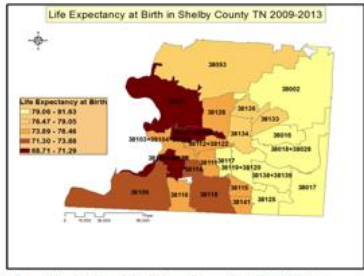
Percent of Population below Poverty Level in Shelby County, 2009-2013



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[Accessed from: http://www.shelbyhealth.com/Documents/Census132_Census130_Poverty_Parameters_of_the_Economic_Poverty_Level_and_Health_in_Shelby_County_TN14](http://www.shelbyhealth.com/Documents/Census132_Census130_Poverty_Parameters_of_the_Economic_Poverty_Level_and_Health_in_Shelby_County_TN14)

Life Expectancy at Birth in Shelby County TN 2009-2013



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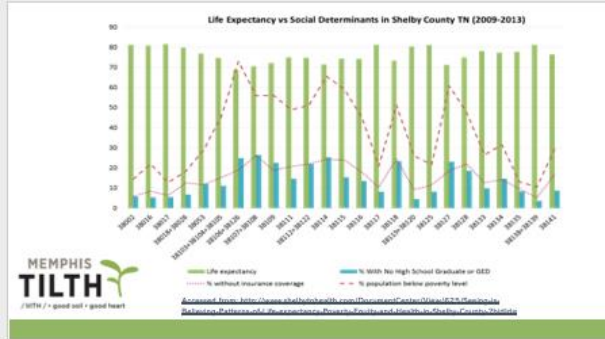
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Life expectancy at Birth in Shelby County TN

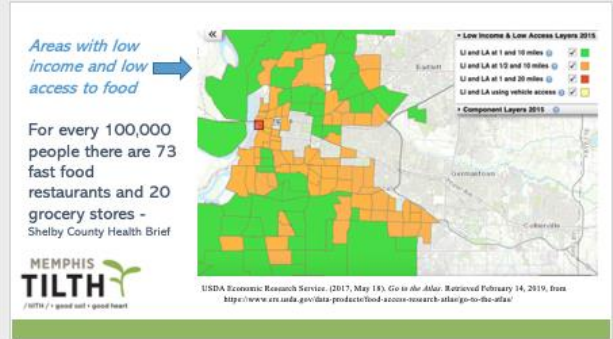


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[Accessed from: http://www.shelbyhealth.com/Documents/Census132_Census130_Poverty_Parameters_of_the_Economic_Poverty_Level_and_Health_in_Shelby_County_TN14](http://www.shelbyhealth.com/Documents/Census132_Census130_Poverty_Parameters_of_the_Economic_Poverty_Level_and_Health_in_Shelby_County_TN14)



9



10

Type 2 Diabetes

In Shelby County...

- 1 in 3 people have diabetes
- 1 person/day dies from diabetes
- 3rd most common disease
- 7th leading cause of death

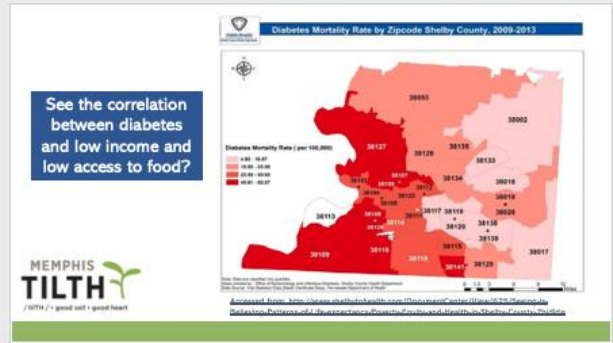
— Better Tennessee's Memphis & Shelby County Health Brief

In Tennessee...

- 9 out of 10 people are also overweight or obese

— Better Tennessee's Health brief: Diabetes in Tennessee

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That's where we come in!

Serve the under-privileged areas with low access

- Zip codes 38126, 38106, 38104, & 38112

Educate on...

- ✓ How to prepare fresh produce
- ✓ What diabetes is and how it affects health
- ✓ How to read nutrition labels
- ✓ Making positive changes to eating habits

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Appendix 4 : Questionnaires Evaluating Infographics

Infographic Feedback for Produce – Professional

1. Does the handout convey the material in an easy-to-read and engaging manner?
 - a. Yes
 - b. No

2. In your opinion, will the handout promote the consumption of vegetables (in the produce infographics) or will it promote a certain practice (such as the hand-washing and farming infographic)?
 - a. Yes
 - b. No

3. Is the infographic relevant for the target audience?
 - a. Yes
 - b. No

4. Is the infographic culturally appropriate?
 - a. Yes
 - b. No

5. Are the words used in the infographic common and frequently used and do not contain jargon?
 - a. Yes
 - b. No

6. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?
 - a. Yes
 - b. No

7. Is the handout organized in a logical way?
 - a. Yes
 - b. No

8. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?
 - a. Yes
 - b. No

9. Is the reading level of the infographic appropriate for the target audience?
 - a. Yes
 - b. No

10. Does the content promote evidence-based practices and if it covers nutrition, is it consistent with Dietary Guidelines for Americans?
 - a. Yes
 - b. No

11. Do you have any comments or suggestions for improvement?

Infographic Feedback for Farming and Handwashing - Professional

1. Does the handout reinforce the materials taught in the kitchen and garden classes?
 - a. Yes
 - b. No
2. Does the handout convey the material in an easy-to-read and engaging manner?
 - a. Yes
 - b. No
3. In your opinion, will the handout promote the consumption of vegetables (in the produce infographics) or will it promote a certain practice (such as the hand-washing and farming infographic)?
 - a. Yes
 - b. No
4. Is the infographic relevant for the target audience?
 - a. Yes
 - b. No
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 - b. No
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7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?
 - a. Yes
 - b. No
8. Is the handout organized in a logical way?
 - a. Yes
 - b. No
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?

- a. Yes
- b. No

10. Is the reading level of the infographic appropriate for the target audience?

- a. Yes
- b. No

11. Does the content contain evidence-based literature?

- a. Yes
- b. No

Infographic Feedback for Produce - Audience

1. Does the handout reinforce what you learned in the kitchen and garden classes?
 - a. Yes
 - b. No
2. Is the handout easy-to-read and engaging?
 - a. Yes
 - b. No
3. Does the information on this handout entice you to eat more vegetables in your diet?
 - a. Yes
 - b. No
4. Is this handout relevant to your life?
 - a. Yes
 - b. No
5. Can you relate with the information in this handout?
 - a. Yes
 - b. No
6. Are the words used in the handout common and frequently used?
 - a. Yes
 - b. No
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?
 - a. Yes
 - b. No
8. Is the handout organized in a logical way?
 - a. Yes
 - b. No
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?
 - a. Yes

b. No

10. Is the handout easy to read and understand?

a. Yes

b. No

Infographic Feedback for Handwashing - Audience

1. Does the handout reinforce what you learned in the kitchen and garden classes?
 - a. Yes
 - b. No
2. Is the handout easy-to-read and engaging?
 - a. Yes
 - b. No
3. Does the information on this handout entice you to want to wash your hands more?
 - a. Yes
 - b. No
4. Is this handout relevant to your life?
 - a. Yes
 - b. No
5. Can you relate with the information in this handout?
 - a. Yes
 - b. No
6. Are the words used in the handout common and frequently used?
 - a. Yes
 - b. No
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?
 - a. Yes
 - b. No
8. Is the handout organized in a logical way?
 - a. Yes
 - b. No
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?
 - a. Yes

b. No

10. Is the handout easy to read and understand?

a. Yes

b. No

Infographic Feedback for Farming - Audience

1. Does the handout reinforce what you learned in the kitchen and garden classes?
 - a. Yes
 - b. No
2. Is the handout easy-to-read and engaging?
 - a. Yes
 - b. No
3. Does the information on this handout entice you to want to go receive the benefits of growing food?
 - a. Yes
 - b. No
4. Is this handout relevant to your life?
 - a. Yes
 - b. No
5. Can you relate with the information in this handout?
 - a. Yes
 - b. No
6. Are the words used in the handout common and frequently used?
 - a. Yes
 - b. No
7. Does the handout contain positive messages, such as “do this”, rather than negative messages, such as “don’t do that”?
 - a. Yes
 - b. No
8. Is the handout organized in a logical way?
 - a. Yes
 - b. No
9. Does the handout contain short paragraphs (60 or less words) with easy-to-read font?
 - a. Yes

b. No

10. Is the handout easy to read and understand?

a. Yes

b. No