Systems Thinking in Communities:

Understanding the Causes of Inactivity, Poor Diet/Nutrition, and Childhood Obesity in Boone and Newton Counties, Arkansas

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Introduction

Healthy Kids Healthy Ozarks is one of 49 community partnerships participating in the national *Healthy Kids, Healthy Communities* program of the Robert Wood Johnson Foundation (www.healthykidshealthycommunities.org). The purpose of this *Healthy Kids Healthy Ozarks* project was to introduce systems thinking at the community level by identifying the essential parts of the Healthy Kids Healthy Ozarks system and how the system influences policy and environmental changes to promote healthy eating and active living as well as to prevent childhood obesity. To accomplish this goal, community partners and residents participated in a group model building session and discussions. The group model building exercises were designed by staff from Transtria LLC and the Social System Design Lab at Washington University in St. Louis, Missouri as part of the *Evaluation of Healthy Kids, Healthy Communities* funded by the Robert Wood Johnson Foundation. These exercises actively involved a wide range of participants in modeling complex systems and provided a way for different representatives (e.g., residents, businesses, schools, civic organizations, government agencies) to better understand the systems (i.e., dynamics and structures) in the community (see the *Healthy Kids, Healthy Communities Group Model Building Facilitation Handbook*, www.transtria.com/hkhc). Overall, the evaluation was designed to assess policy, system, and environmental changes as a result of the community partnerships' efforts to increase healthy eating and active living in order to reduce childhood obesity.

Boone and Newton Counties, Arkansas: Background and Local Participation

Boone and Newton Counties are located within the Ozark Mountains in the mostly rural, northwest area of Arkansas. A population of 36,903 resides in Boone County, with a population of 12,943 in the county seat of Harrison. Harrison is a hub of at least four surrounding counties, providing retail and employment opportunities for its more rural neighbors. Newton County, located almost entirely within the Boston Mountain range has a population of 8,330. In Newton County, the city of Jasper has a population of 466. The populations of Boone and Newton Counties are predominantly Caucasian (96.4%) with 12.2% of families living below the federal poverty line, including 36% of children in Boone County and 35.8% of children in Newton County.[3] More than 35% of Boone County children, 34% of children in Harrison, and 32% of Newton County children are overweight or obese. Contributing to the high rate of childhood obesity in these counties is a lack of access to healthy food, and limited physical activity resources. Boone County is ranked as having only 33% access to healthy food and Newton County is ranked at 27%.

North Arkansas Partnership for Health Education (NAPHE) was the lead agency serving as the community umbrella agency over four additional agencies/organizations: The Hometown Health Initiative, The North Arkansas Regional Medical Center, the North Arkansas College, and the Schmieding Center. NAPHE was the fiduciary recipient of the HKHC grant. Both NAPHE and the Hometown Health Initiative were established approximately 15 years ago. All projects receiving grant funding were the result of a collaborative partnership between NAPHE and Hometown Health Initiative. There was an overall strong community coalition between the lead agency and agencies under the NAPHE umbrella because representative members of each organization in the partnership served on all working and advisory committees.

The Healthy Kids Healthy Ozarks partnership formed working groups including the gardens committee and the trails committee. The trails committee was already in existence prior to HKHC. For efficiency and productivity of partnership and committee members, partners agreed to meet monthly as part of the overall Hometown Health meetings.

Healthy Kids Healthy Ozarks' Priorities and Strategies

The partnership and capacity building strategies of *Healthy Kids Healthy Ozarks* included:

- **Mayor's Council on Trails:** Established in Harrison for over 20 years, the Trails Committee was formalized when a resolution was adopted by the Harrison City Council. The Mayor's Council on Trails played an important role in decision-making and planning efforts around trails and connectivity in Harrison.

The healthy eating and active living strategies of *Healthy Kids Healthy Ozarks* included:

- **Active Transportation:** A trail and sidewalk plan was created and funding was received to build out the Dry Jordan section of the trail that connected the Lake Harrison City recreation area to Downtown Harrison previously divided by a busy state highway.
- **Farmers' Markets:** Increased access to healthy foods for all individuals through the expansion of one market in Harrison and the creation of one new market in Newton County. Additionally, the Senior Farmers' Market Nutrition Program was added to the Harrison market to allow older adults access to healthy food options.
- **Community Gardens:** Established four gardens in a Community Garden Network and supported city policies to allow chickens in residential spaces and space and water for the gardens to be available at no cost.

For more information on the partnership, please refer to the Boone and Newton Counties case report (www.transtria.com/hkhc).

Systems Thinking in Communities: Boone and Newton Counties, Arkansas

"Systems thinking" represents a range of methods, tools, and approaches for observing the behaviors of a system (e.g., family, community, organization) and how these behaviors change over time; changes may occur in the past, present, or future. Figure 1 illustrates a system of policies, environments, local collaborations, and social determinants in Boone and Newton Counties, Arkansas that influence healthy eating, active living, and, ultimately, childhood obesity. This system and the dynamics within the system are complicated with many different elements interacting.

Models, such as Figure 1, provide a way to visualize all the elements of the system and their interactions, with a focus on causal relationships as opposed to associations. Through the model, specific types of causal relationships, or feedback loops, underlying the behavior of the dynamic system, can be identified to provide insights into what is working or not working in the system to support the intended outcomes (in this case, increases in healthy eating and active living, and decreases in childhood overweight and obesity). In system dynamics, the goal is to identify and understand the system feedback loops, or the cause-effect relationships that form a circuit where the effects "feed back" to influence the causes.

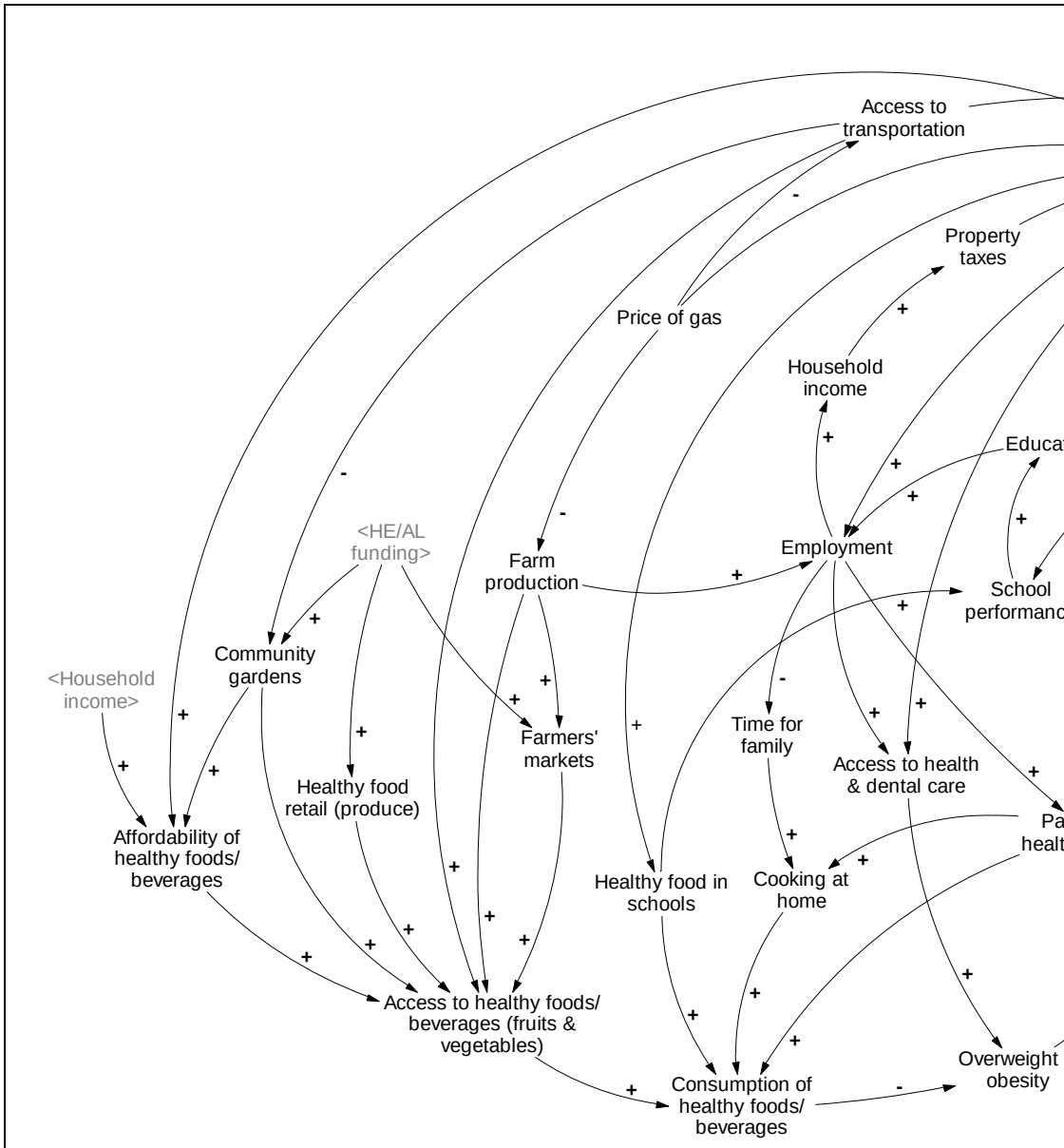
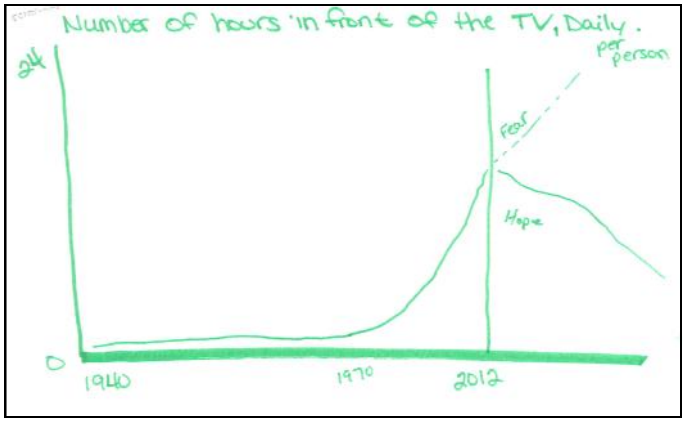


Figure 1: *Healthy Kids Healthy Ozarks* Causal Loop Diagram

Group Model Building

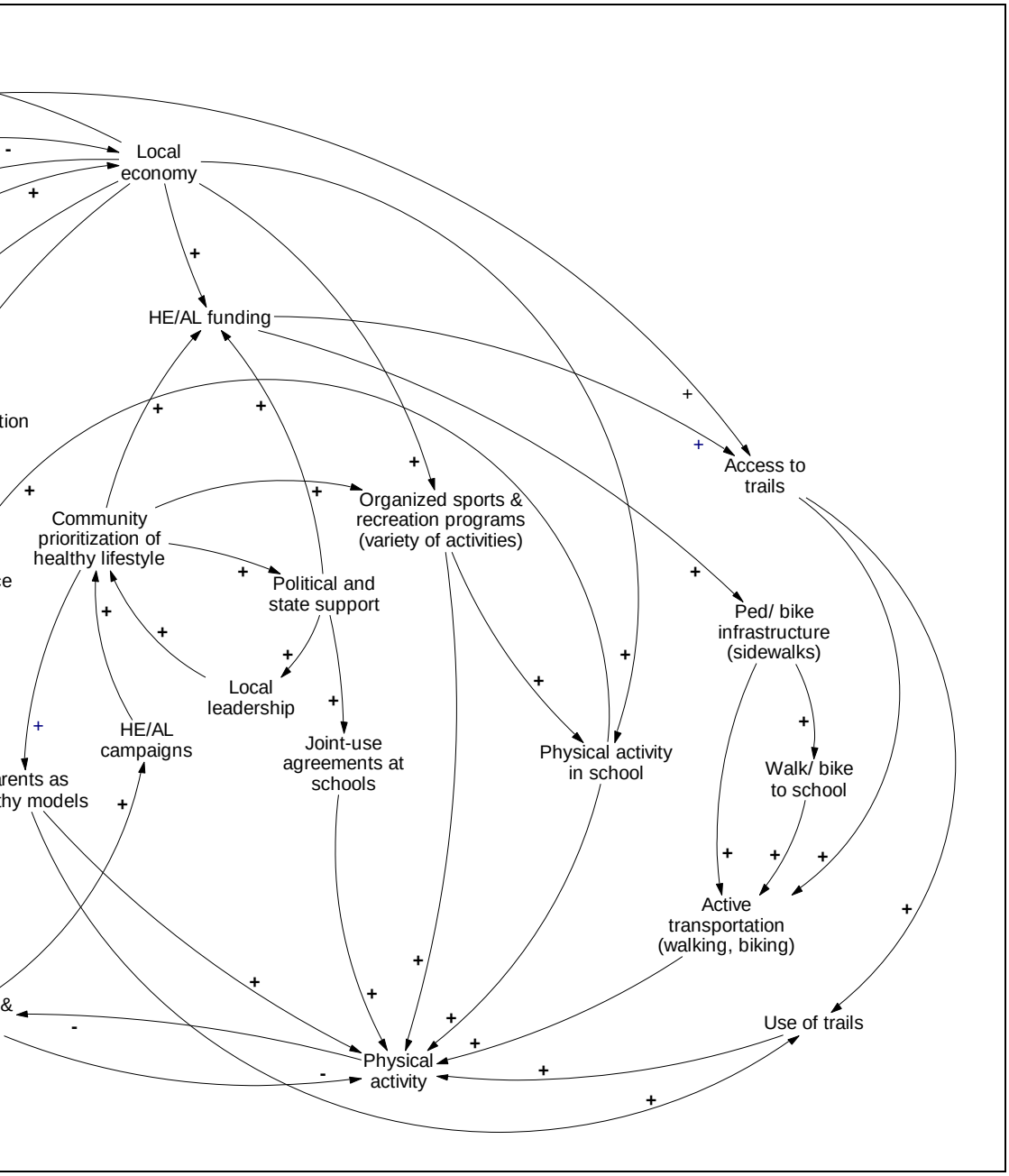
Members of the *Healthy Kids Healthy Ozarks* partnership participated in a group model building session in March, 2012 and generated this system. also referred to as a causal loop diagram (Figure 1). Participants in the group model building session included residents and representatives from businesses, schools, civic organizations, and government agencies. The group model building session had two primary activities: 1) a Behavior Over Time Graph exercise; and 2) a Causal Loop Diagram (or structural elicitation) exercise.



Behavior Over Time Graphs

To identify the range of things that affect or are affected by policy, system, and environmental changes in Boone and Newton Counties related to healthy eating, active living, and

childhood obesity, participants designed graphs to name the influences and to illustrate how the influences have changed over time (past, present, and future). In this illustration for daily hours of television, the number of hours has increased sharply in the last four decades. The participant hopes that this trend will reverse into the future. Each graph is a tool to increase the use of common, specific language to describe *what* is changing in the community as well as *when*, *where*, and *how* it is changing. The graphs capture participants' perceptions of the influence, or variable, and through the graph, the participant tells their story. These perceptions are based on actual data or evidence, or they are part of the participants' lived experience.



Causal Loop Diagram

To examine the relationships among the variables from the behavior over time graphs, participants worked together and with facilitators to develop a causal loop diagram. In Figure 1, the words represent variables of quantities that can increase and decrease over time (i.e., the behavior over time graphs). These variables are influenced by other variables as indicated by the lines with arrows. The lines with arrows represent causal relationships - this is what is known about the system and how it behaves.

One feedback loop is: community prioritization of healthy lifestyle → political and state support → local leadership → community prioritization of healthy lifestyle.

What is important to notice in this example is that there are other feedback loops interacting simultaneously to influence or to be influenced by community prioritization of healthy lifestyle. Some variables may increase community prioritization of healthy lifestyle while other variables limit it. Determining the feedback loop or loops that dominate the system's behavior at any given time is a more challenging problem to figure out, and ultimately, requires the use of computer simulations.

Based on this preliminary work by the *Healthy Kids Healthy Ozarks* partnership, this "storybook" ties together the behavior over time graphs, the participants' stories and dialogue, and feedback loops from the causal loop diagram to understand the behavior of the system affecting health in Boone and Newton Counties, Arkansas and to stimulate greater conversation related to Boone and Newton Counties' theory of change, including places to intervene in the system and opportunities to reinforce what is working. Each section builds on the previous sections by introducing concepts and notation from systems science.

Causal Loop Diagram for the Childhood Obesity System

The causal loop diagram (CLD) represents a holistic system and several subsystems interacting in Boone and Newton Counties, Arkansas. In order to digest the depth and complexity of the diagram, it is helpful to examine the CLD in terms of the subsystems of influence. Because of this project's focus on healthy eating, active living, and childhood obesity, this system draws attention to a number of corresponding subsystems, including: healthy eating policies and environments (red), active living policies and environments (blue), health and health behaviors (orange), partnership and community capacity (purple), and social determinants (green).

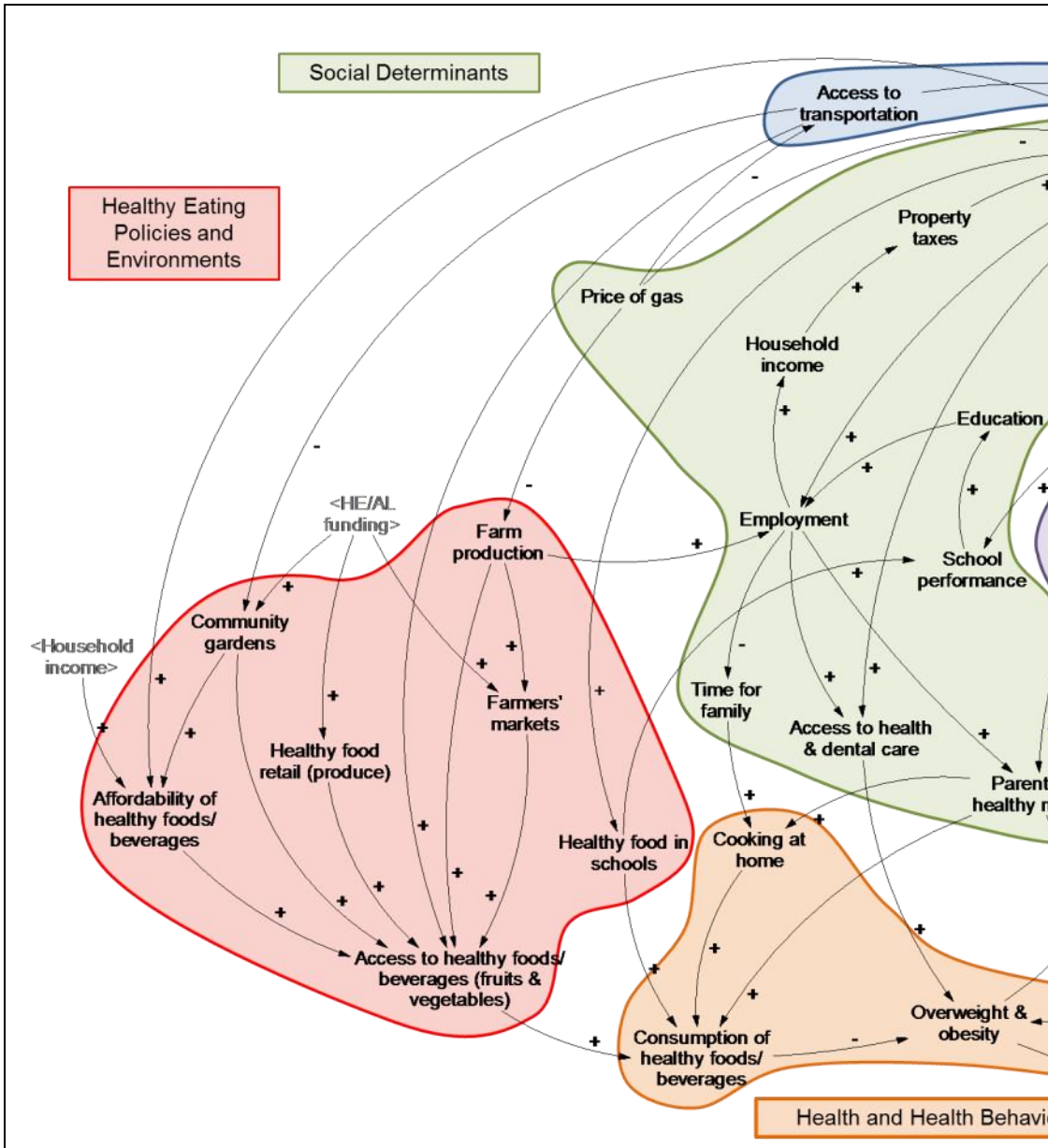


Figure 2: Subsystems in the *Healthy Kids Healthy Ozarks* Causal Loop Diagram

From the group model building exercises, several variables and causal relationships illustrated in Figure 2 were identified within and across subsystems. This section describes the subsystems in the CLD.

Healthy Eating Policies and Environments (Red)

The healthy eating policy and environmental subsystem includes food production, food distribution and procurement , and food retail. During the behavior over time graphs exercise, the participants generated 12 graphs related to policy or environmental strategies (e.g., farmers' markets) or contexts (e.g., farm production) that affected or were affected by the work of *Healthy Kids Healthy Ozarks*. The variables represent participants' conversations from the behavior over time graph and causal loop diagram exercises.

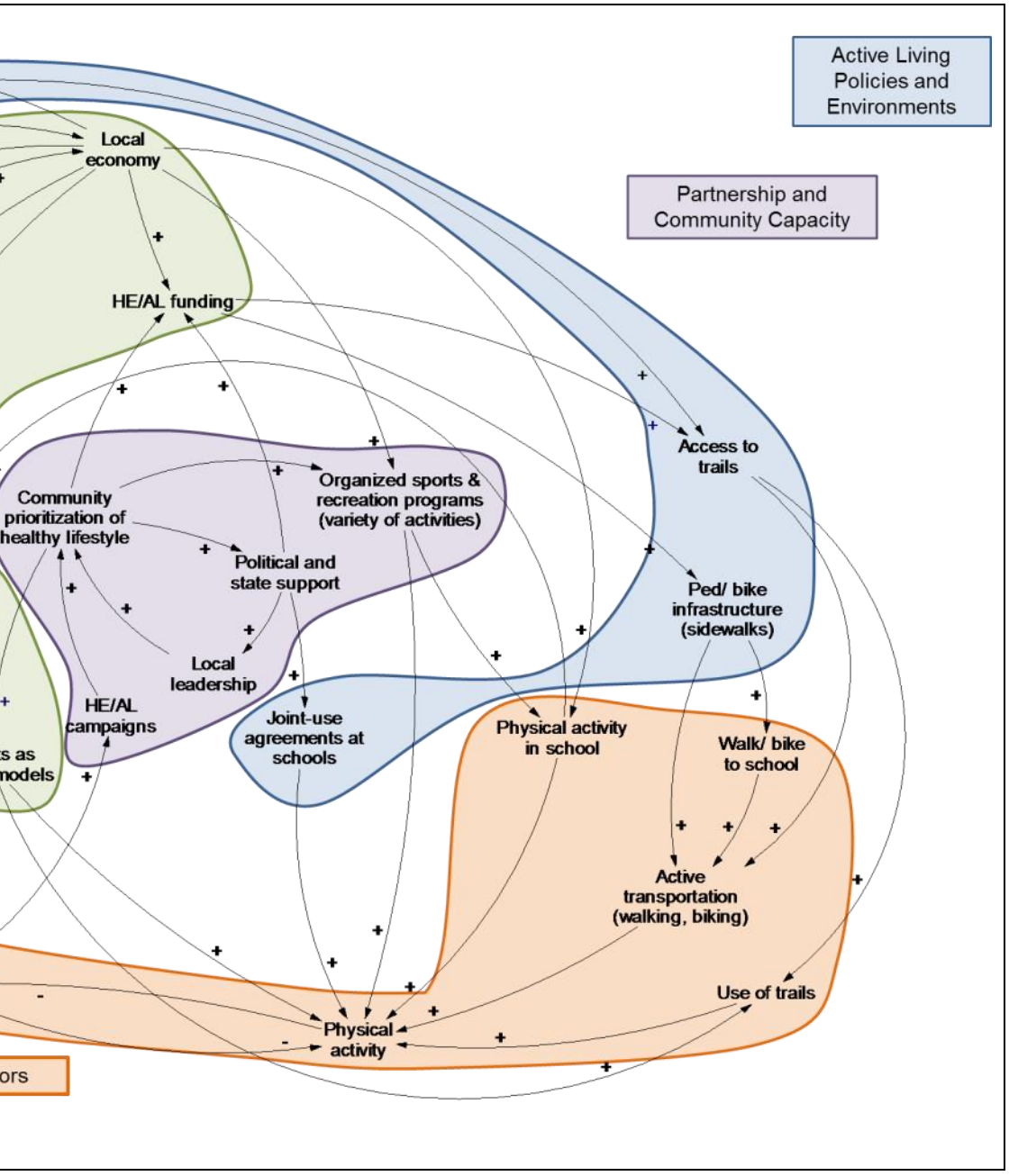
Active Living Policies and Environments (Blue)

The active living policy and environmental subsystem includes design, planning, construction, and enforcement or maintenance related to access to opportunities for active transportation and recreation. For this topic, the group model building participants developed nine graphs related to policy or environmental strategies (e.g., pedestrian/bike infrastructure) or contexts (e.g., access to transportation) that affected or were affected by the partnership's work.

Health and Health Behaviors (Orange)

The subsystem for health and health behaviors includes health outcomes (e.g., obesity), health behaviors

(e.g., healthy eating, physical activity), and behavioral proxies or context-specific behaviors (e.g., cooking at home, use of trails, walk/bike to school).



Partnership and Community Capacity

The partnership and community capacity subsystem refers to the ways communities organized and rallied for changes to the healthy eating and active living subsystems. For instance, *Healthy Kids Healthy Ozarks* community prioritization of healthy lifestyle. This subsystem also includes community factors outside the partnership that may influence or be influenced by their efforts, such as political and state support.

Social Determinants

Finally, the social determinants subsystem denotes societal conditions (e.g., local economy) and psychosocial influences (e.g., parents as role models) in the community that impact health beyond the healthy eating and active living subsystems. In order to achieve health equity, populations and subgroups within the community must have equitable access to these resources and services.

Each one of these subsystems has many more variables, causal relationships (arrows), and feedback loops that can be explored in greater depth by the *Healthy Kids Healthy Ozarks* partners or by other representatives in Boone and Newton Counties, Arkansas. Using this CLD as a starting place, community conversations about different theories of change within subsystems may continue to take place.

The next sections begin to examine the feedback loops central to the work of *Healthy Kids Healthy Ozarks*. In these sections, causal relationships and notations (i.e., arrows, “+” signs, “-” signs) from Figure 2 will be described to increase understanding about how systems thinking and modeling tools can work in communities to increase understanding of complex problems that are continuously changing over time, such as childhood obesity. At the end of this CLD storybook, references to other resources will be provided for those interested in more advanced systems science methods and analytic approaches.

Farmers' Markets Feedback Loop

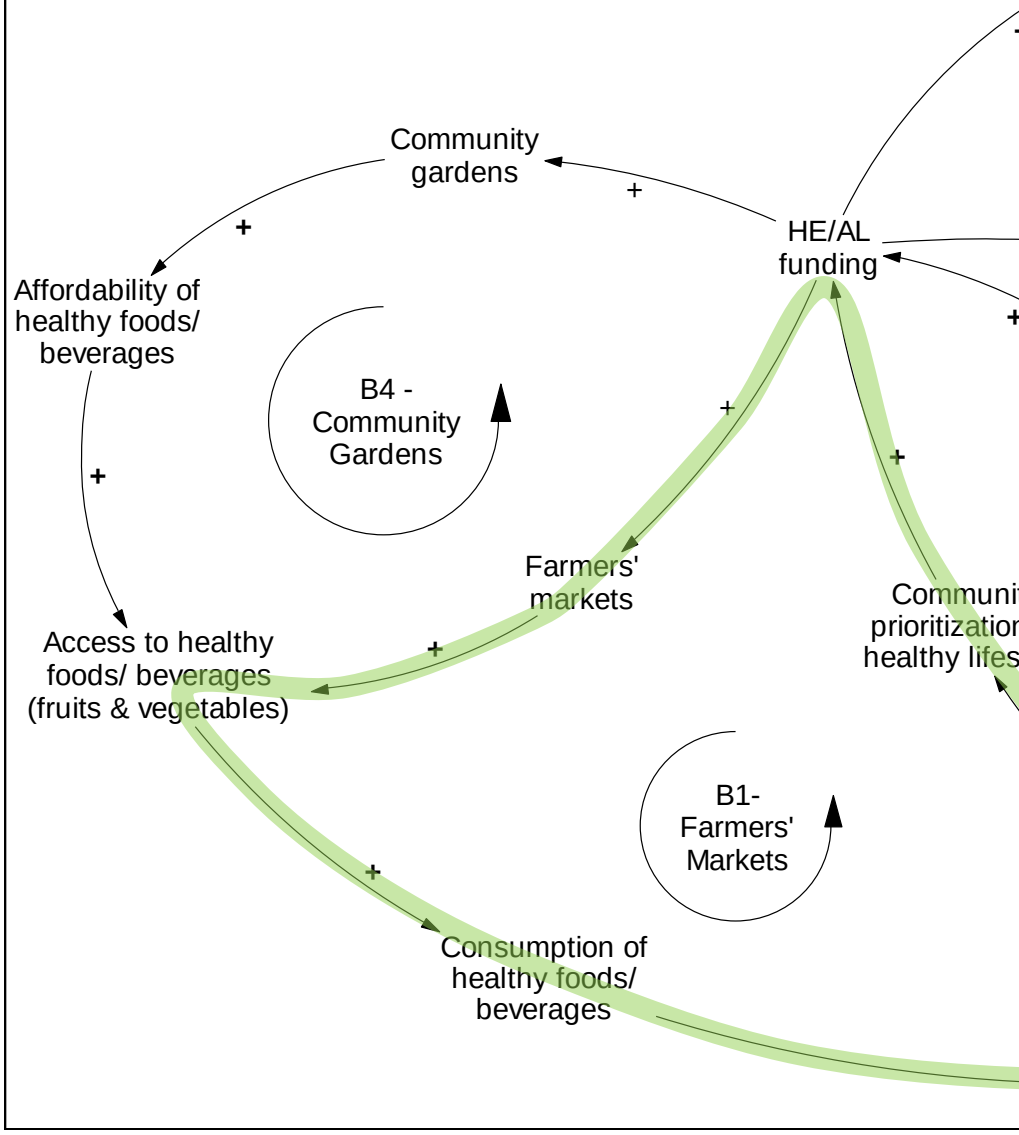
To simplify the discussion about feedback loops, several loops drawn from the Healthy Kids Healthy Ozarks CLD (see Figures 1 and 2) are highlighted in Figures 3-6. While the CLD provides a theory of change for the childhood obesity prevention movement in Boone and Newton Counties, Arkansas, each feedback loop tells a story about a more specific change process.

Causal Story for Feedback Loop

Story A: In this case , the story is about farmers' markets (green highlighted loop in Figure 3). Boone and Newton Counties, Arkansas worked to create and expand markets. Participants described how farmers' markets increase access to fresh produce. In turn, increased access to healthy foods increases consumption of these foods, decreasing overweight and obesity. With lower rates of overweight and obesity, there is less need for healthy eating campaigns and less emphasis on increasing healthy lifestyles (as residents are already eating healthier). This leads to fewer requests to fund new healthy eating initiatives, including those for farmers' markets (e.g., there are sufficient healthy food and beverage vendors).

Story B: While the preceding story reflected a positive scenario for Boone and Newton Counties, Arkansas, the same feedback loop also tells the opposite story. Fewer or no farmers' markets may limit access to fresh produce and lead to less consumption of healthy foods and beverages, increasing rates of overweight and obesity. As a result, healthy eating campaigns will be developed to prioritize improved nutrition. These priorities affect funds directed to healthy eating initiatives, including those for farmers' markets.

Figure 3: Farmers' Markets Feedback Loop



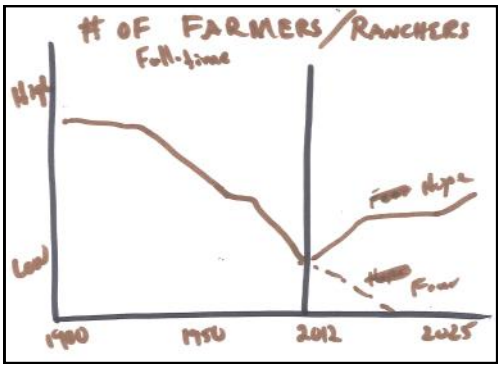
Balancing Loop and Notation

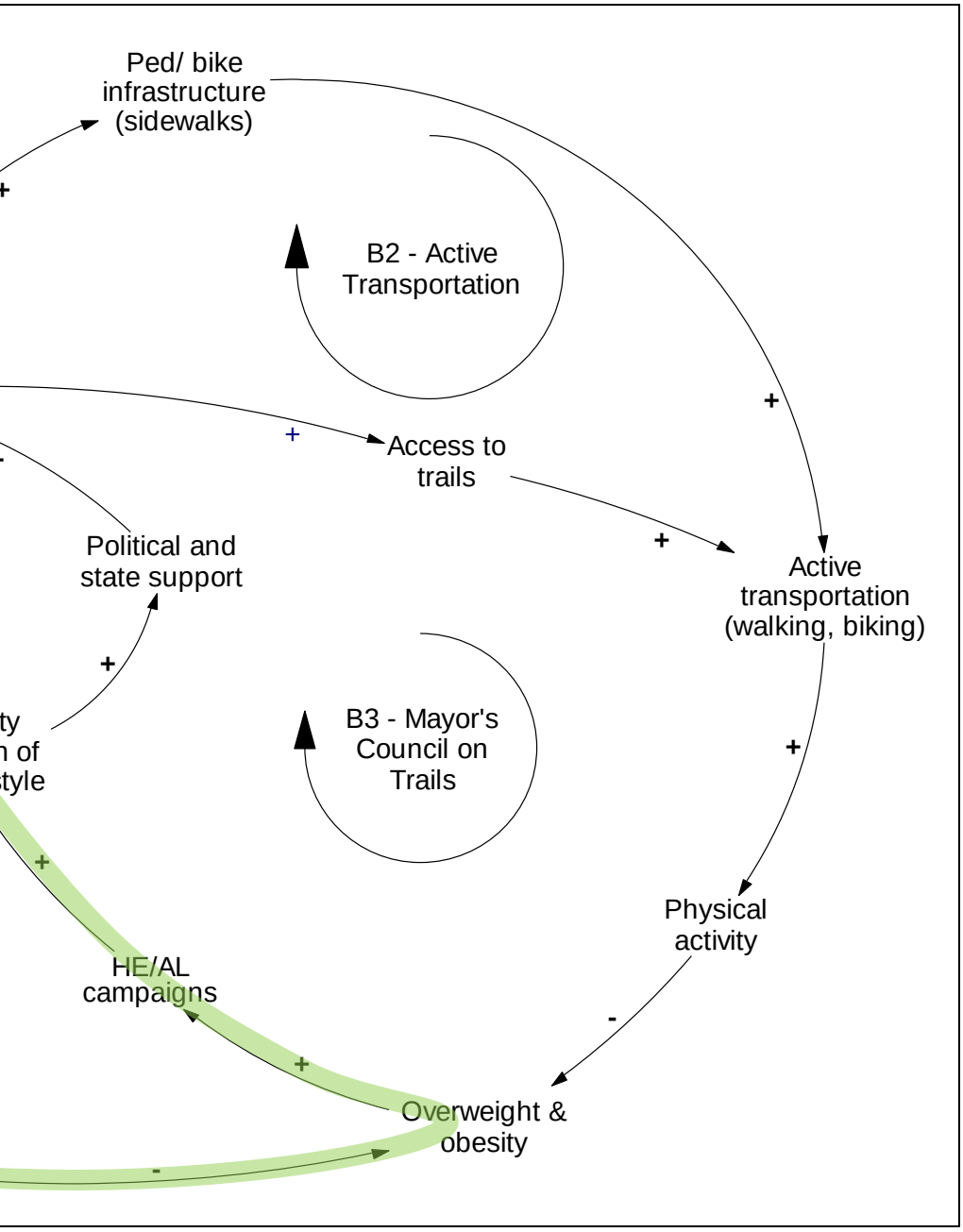
These stories represent a balancing loop, and the notation in the feedback loop identifies it as a balancing loop (see "B1 — Farmers' Markets" and green highlighted loop in Figure 3). The words represent variables of quantities that increase and decrease as illustrated in the stories above. These variables change over time and are influenced by other variables as indicated by the arrows. Each

"One of the reasons we don't have a lot of farmers at the market is because a lot of them are just doing it part-time… because there's not enough money in it, they're not able to make a living off of it, they're not able to pay their rents to whatever their mortgage is, and so they have full time jobs in addition to their farming." (Participant)

arrow represents a causal relationship, and the plus and minus signs on the arrows indicate whether or not the influence of one variable on another variable (1) increases/adds to (plus or "+" sign), or (2) decreases/removes from the other variable (minus or "-" sign). These signs are referred to as polarities.

In a balancing loop, the effect of the variables tend to create more of a stable trend over time, as opposed to one that is continually increasing or decreasing. This effect continues through the cycle and returns a stabilizing influence to the original variable, respectively.





Looking specifically at the "+" or "-" notation, a feedback loop that has an odd number of "-" signs, or polarities, is considered a balancing loop. Reinforcing loops, with an even number of "-" signs in the loop, are another type of feedback loop.

In isolation, this balancing loop represents the influence of farmers' markets on consumption of healthy foods and beverages and overweight and obesity. To understand other influences on these variables, it is important to remember that this balancing loop is only one part of the larger CLD (see Figures 1 and 2), and the other loops and causal relationships can have an impact on the variables in this loop.

<u>System Insights for *Healthy Kids Healthy Ozarks*</u>

Participants also identified a decrease in the number of full-time farmers and ranchers in Boone and Newton Counties, Arkansas (see behavior over time graph).

From the systems thinking exercises, several insights can inform this partnership's farmers' markets strategy. For instance, efforts to increase the number of full-time farmers and ranchers may increase the feasibility of creating or expanding farmers' markets and, in turn, increase access to healthy foods and beverages in the area.

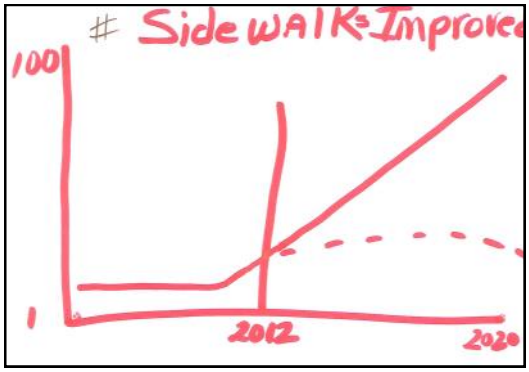
In addition to system insights, systems thinking can also help to pose key questions for assessment and evaluation, including the need to assess factors that have caused a decline in the profitability of farming and ranching for local food producers.

Active Transportation Feedback Loop

The feedback loop highlighted in orange in Figure 4 reflects the same concepts and notation, and highlights active transportation. Like the farmers' markets loop in Figure 3, this loop also has one "-" sign or polarity; because this is an odd number, it is still a balancing loop (see B2—Active Transportation in Figure 4). Similar to the previous loop, this one shows how changes in overweight and obesity affect campaigns, priorities, and funding, with the exception that the focus here is on pedestrian and bike infrastructure and its influence on active transportation, physical activity, and overweight and obesity.

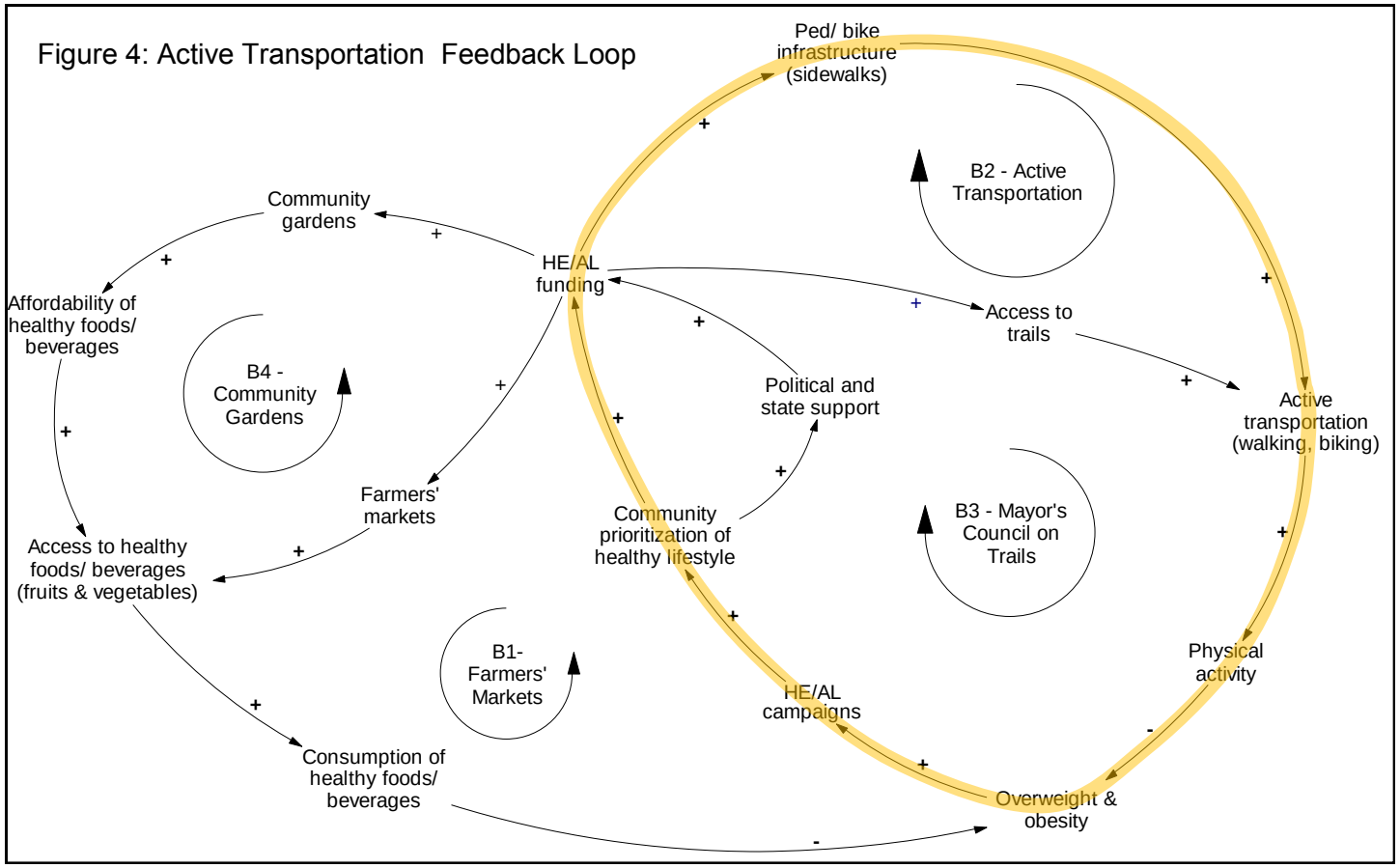
Some of these causal relationships may have more immediate effects (e.g., increases in active transportation leading to more physical activity) and other relationships may have delayed effects (e.g., more pedestrian and bike infrastructure affecting greater active transportation). This delayed effect is noted using two hash marks through the middle of the arrow line (not included in Figure 4).

In the behavior over time graphs, participants identified the need to increase sidewalk improvements (see illustration) and partners have been working to build trails to support bicycling and walking. According to the loop in Figure 4, these infrastructure changes cause people to walk and bike for transportation; yet, as described by the quote below, the automobile also decreases active transportation at the same time. Exploration of how these infrastructure changes affect overall physical activity requires system insights from factors that increase and decrease active transportation.



"The number of people hiking, walking, and biking... And I started in the 50's because I was a youngster in the 50's and I remember the culture then; everybody had a bike, everybody walked to school, and people, young people, did not have automobiles then, and a lot of times their families did not have them either. So, we did more naturally. That has gone down over time, and I see a trend now to build trails to encourage walking and encourage biking." (Participant)

Figure 4: Active Transportation Feedback Loop

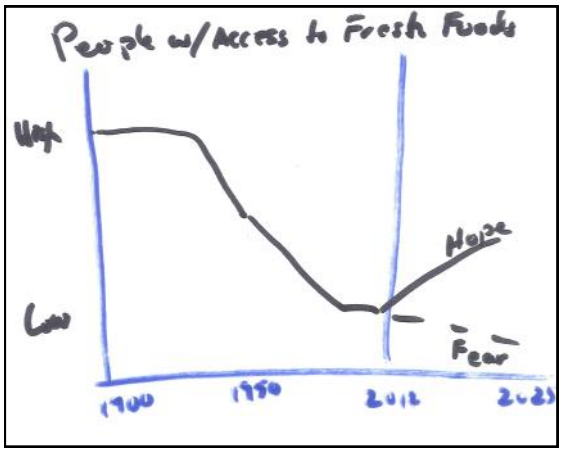


Community Gardens Feedback Loop

Highlighted in red in Figure 5, the community gardens feedback loop represents one of the *Healthy Kids Healthy Ozarks'* strategies to increase healthy eating in Boone and Newton Counties, Arkansas. Like the previous loops, this is a balancing loop (one "-" sign).

In addition, it includes causal relationships representing more immediate effects (e.g., affordability of healthy foods and beverages increasing access to these products), and, potentially, delayed effects (e.g., higher rates of overweight and obesity increasing healthy eating and active living campaigns).

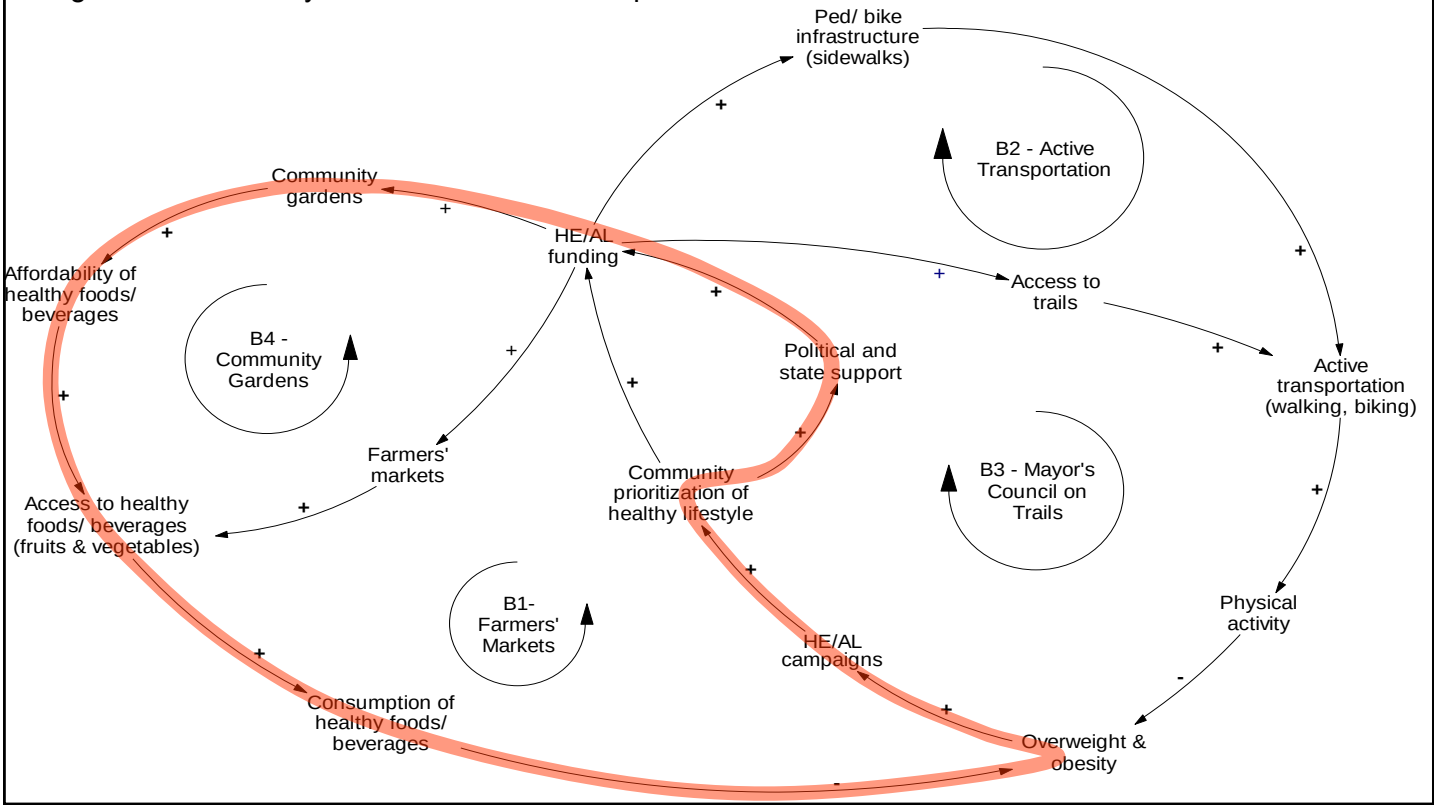
In the behavior over time graphs exercise, participants described a decrease in people with access to fresh foods with the hope that this access will increase into the future (see illustration).



Partners' efforts to increase the number of community gardens also increases the amount of free, fresh fruits and vegetables. Therefore, the gardens increase the affordability, and, consequently, the accessibility of produce, particularly for those who have limited resources to purchase foods and beverages. Complemented by other strategies designed to increase access to healthy foods and beverages, such as farmers' markets, community gardens can contribute to the consumption of healthy foods and beverages, and, in turn, reductions in overweight and obesity.

"I know that, with my family, we never had fresh foods until I left home and lived in co-ops in Austin and we had fresh vegetables and started some grocery stores, and so in about 1975-80 things started to get better, my health started to get better, and it has caught on in more places. My fear is that we're going to continue not eating the fresh vegetables. And, I see that across the nation in the early 2000's we started getting more access." (Participant)

Figure 5: Community Gardens Feedback Loop



Opportunities for Systems Thinking in Boone and Newton Counties, Arkansas

This storybook provided an introduction to some basic concepts and methods for systems thinking at the community level, including: causal loop diagrams, variables, causal relationships and polarities, and reinforcing feedback and balancing feedback loops, among others. For the *Healthy Kids Healthy Ozarks* partners, this storybook also summarized the healthy eating, active living, partnership and community capacity, social determinants, and health and health behaviors subsystems in the Boone and Newton Counties' causal loop diagram as well as three specific feedback loops corresponding to the partnership's primary strategies.

This causal loop diagram reflects a series of conversations among partners and residents from 2011 to 2013. Some discussions probed more deeply into different variables through the behavior over time graphs exercise, or causal relationships through the causal loop diagram exercise.

This represented a first attempt to collectively examine the range of things that affect or are affected by policy, system, and environmental changes in Boone and Newton Counties, Arkansas to promote healthy eating and active living as well as preventing childhood overweight and obesity.

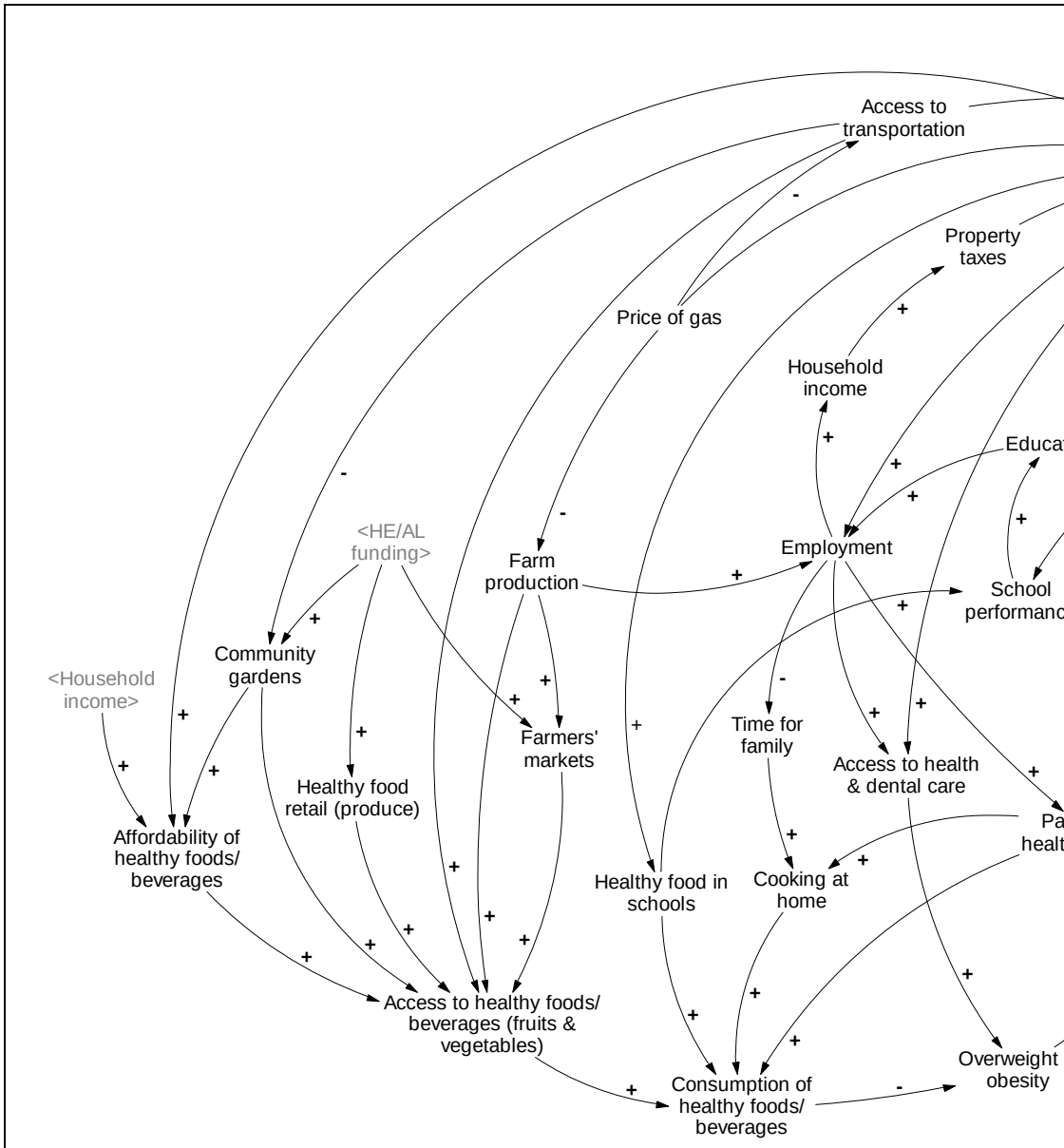


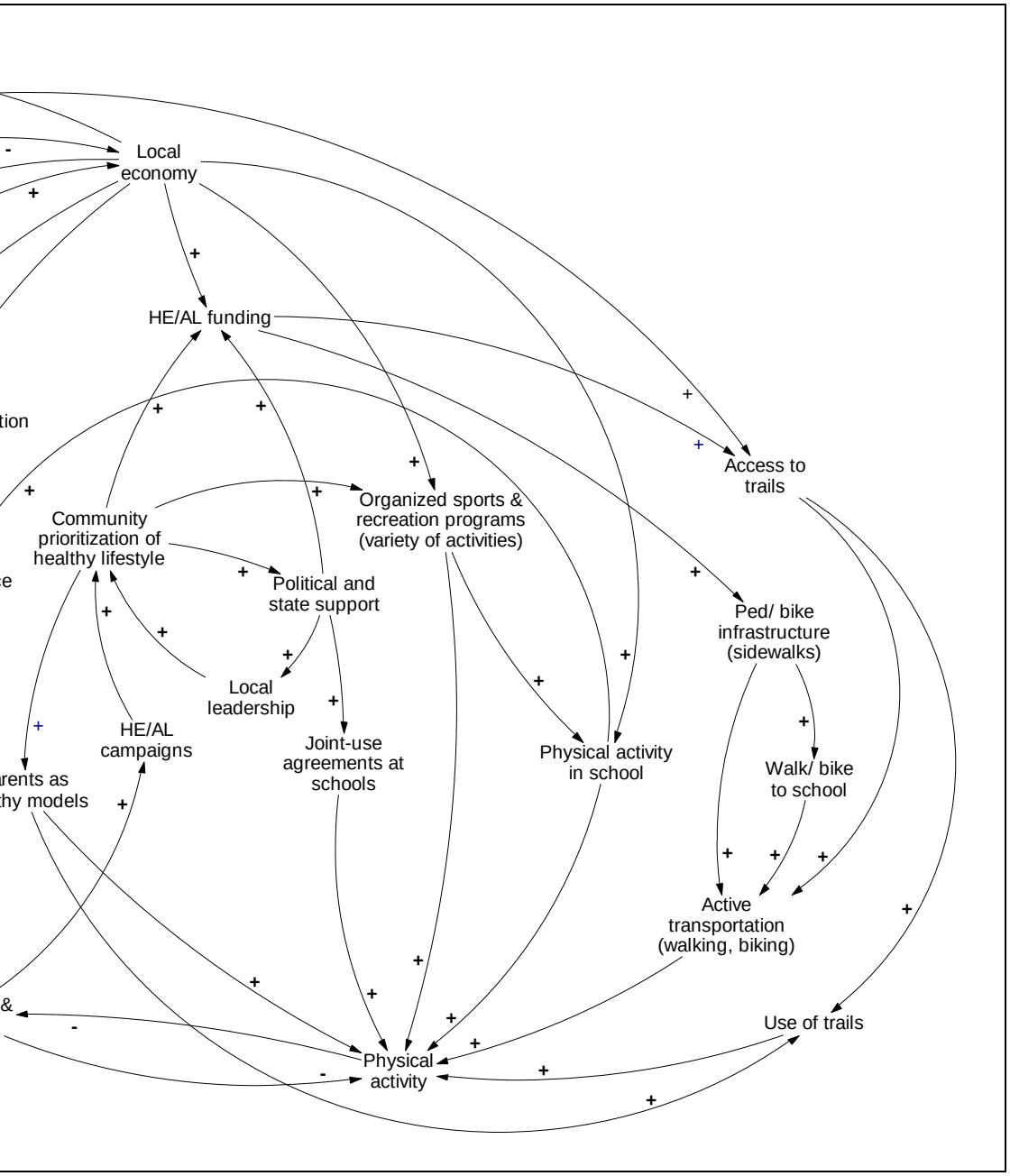
Figure 6: *Healthy Kids Healthy Ozarks* Causal Loop Diagram

Yet, there are several limitations to this storybook, including:

- the participants represent a sample of the *Healthy Kids Healthy Ozarks* partners (organizations and residents) as opposed to a representative snapshot of government agencies, community organizations, businesses, and community residents;
- the behavior over time graphs and the causal loop diagram represent perceptions of the participants in these exercises (similar to a survey or an interview representing perceptions of the respondents);
- the exercises and associated dialogue took place in brief one- to two-hour sessions, compromising the group's capacity to spend too much time on any one variable, relationship, or feedback loop; and
- the responses represent a moment in time so the underlying structure of the diagram and the types of feedback represented may reflect "hot button" issues of the time.

Much work is yet to be done to ensure that this causal loop diagram is accurate and comprehensive, for example:

- having conversations to discuss existing feedback loops to ensure that the appropriate variables and relationships are represented accurately;



- reviewing the behavior over time graphs (see also Appendix D) to confirm that the trends reflect common perceptions among residents and compare these trends to actual data;
- revisiting variables removed because they were not part of feedback loops, including crime and violence, suburban sprawl; perceptions of safety; schools in neighborhoods; car use/ driving; sedentary job; screen time; fast food restaurants; availability of sugar sweetened beverages; consumption of unhealthy foods/beverages; substance use; academic curriculum; population density; community as healthy role models; and
- starting new conversations about other variables (behavior over time graphs exercise) or relationships (causal loop diagram exercise) to add to this diagram.

In addition, different subgroups in Boone and Newton Counties may use this causal loop diagram to delve in deeper into some of the subsectors (e.g., healthy eating, active living) or feedback loops, creating new, more focused causal loop diagrams with more specific variables and causal relationships.

Use of more advanced systems science methods and analytic approaches to create computer simulation models is another way to take this early work to the next level. The references section includes citations for resources on these methods and analytic approaches, and it is necessary to engage professional systems scientists in these activities.

Please refer to the Appendices for more information, including:

- Appendix A: Behavior over time graphs generated during site visit
- Appendix B: Original translation of the causal loop diagram into Vensim PLE
- Appendix C: Transcript translation of the causal loop diagram into Vensim PLE
- Appendix D: Behavior over time graphs not represented in the storybook

References for Systems Thinking in Communities:

Group model building handbook:
Hovmand, P., Brennan L., & Kemner, A. (2013). Healthy Kids, Healthy Communities Group Model Building Facilitation Handbook. Retrieved from http://www.transtria.com/hkhc.

Vensim PLE software for causal loop diagram creation and modification:
Ventana Systems. (2010). Vensim Personal Learning Edition (Version 5.11A) [Software]. Available from http://vensim.com/vensim-personal-learning-edition/

System dynamics modeling resources and support:
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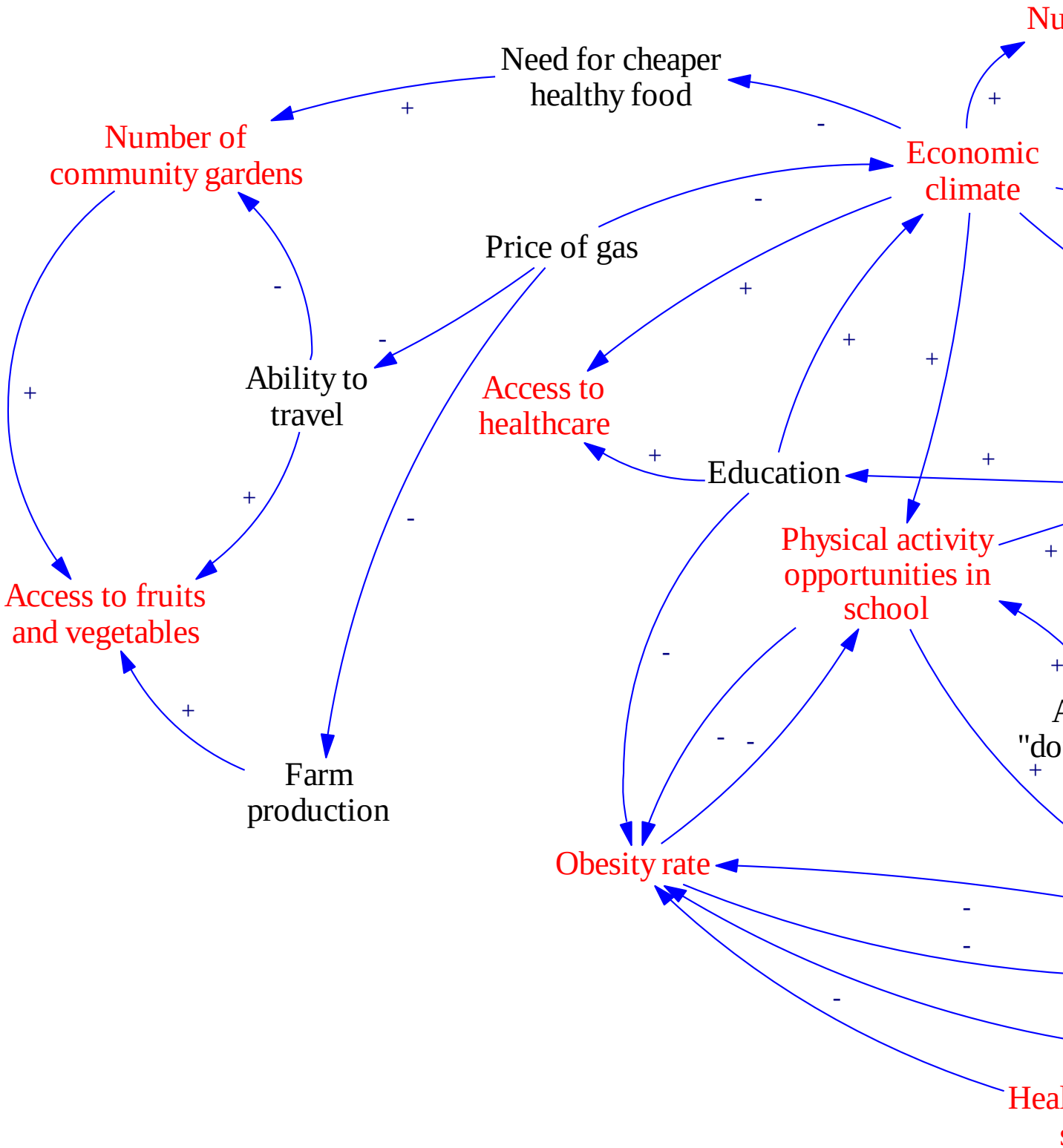
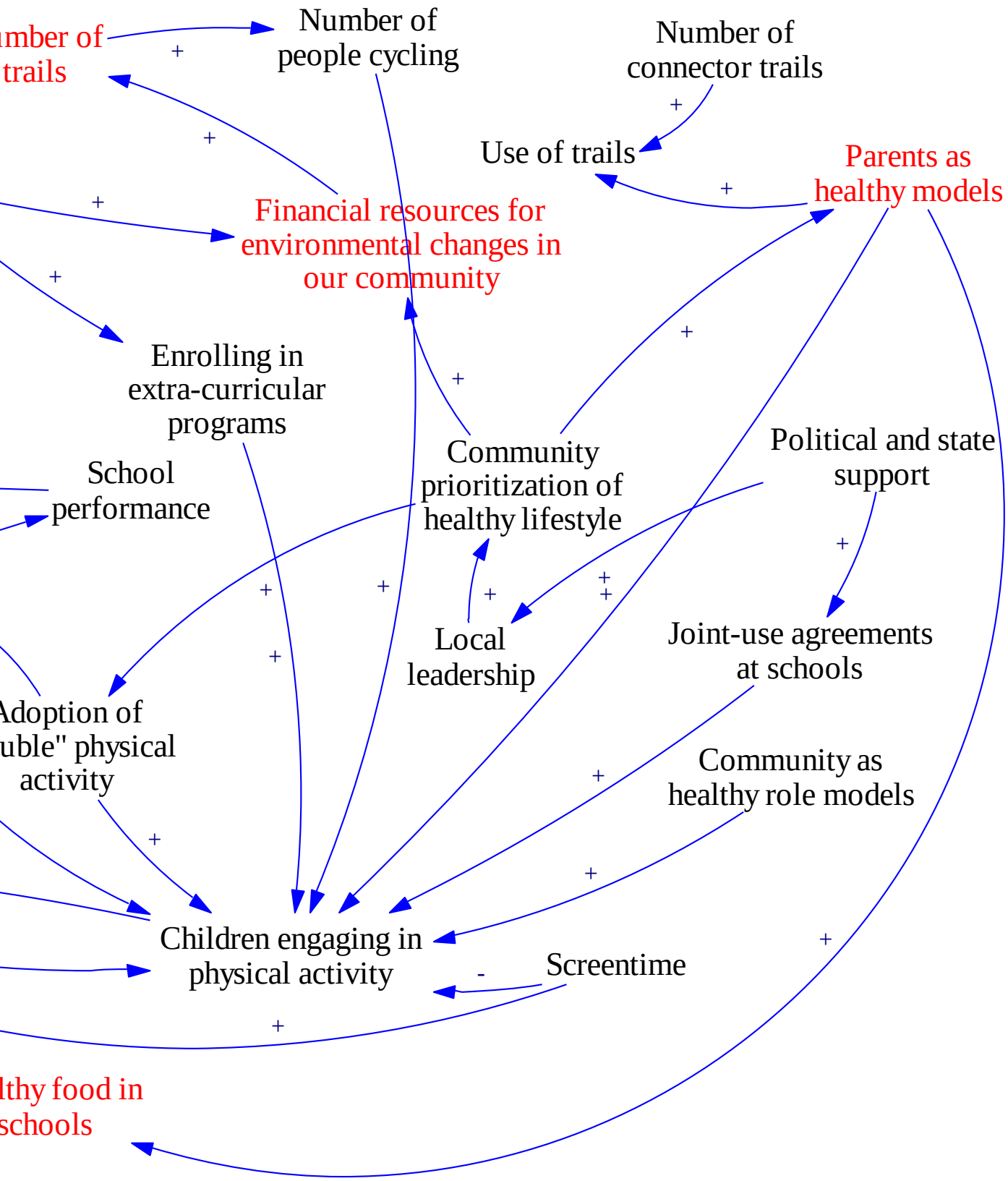
Appendix A: Behavior Over Time Graphs Generated during Site Visit

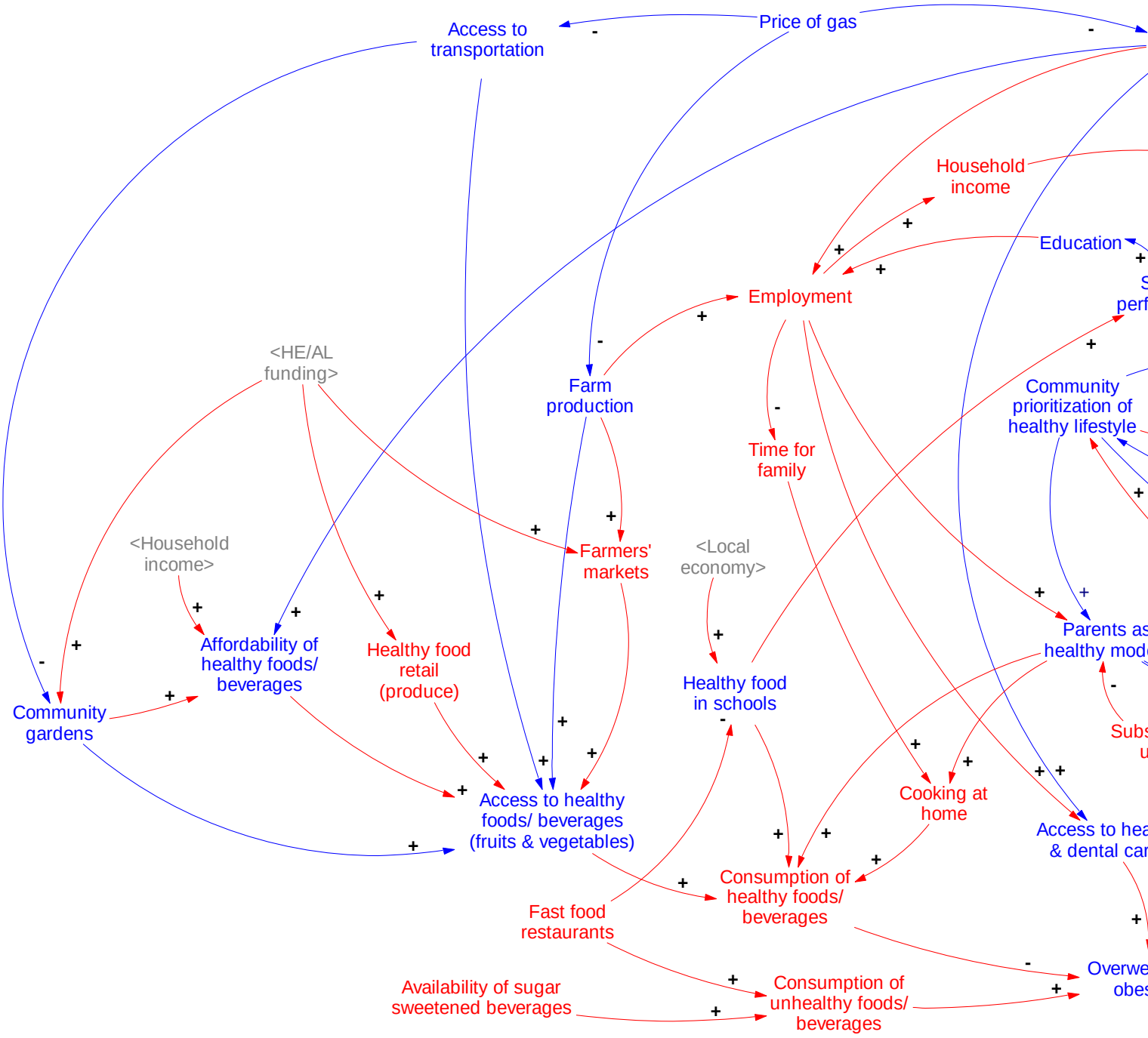
Community: *Healthy Kids Healthy Ozarks*	
Categories	**Number of Graphs**
Active Living Behavior	8
Active Living Environments	1
Funding	3
Healthy Eating Behavior	4
Healthy Eating Environments	8
Marketing and Media Coverage	0
Obesity and Long Term Outcomes	5
Partnership & Community Capacity	1
Policies	2
Programs & Promotions (Education and Awareness)	1
Social Determinants of Health	8
Total Graphs	**41**

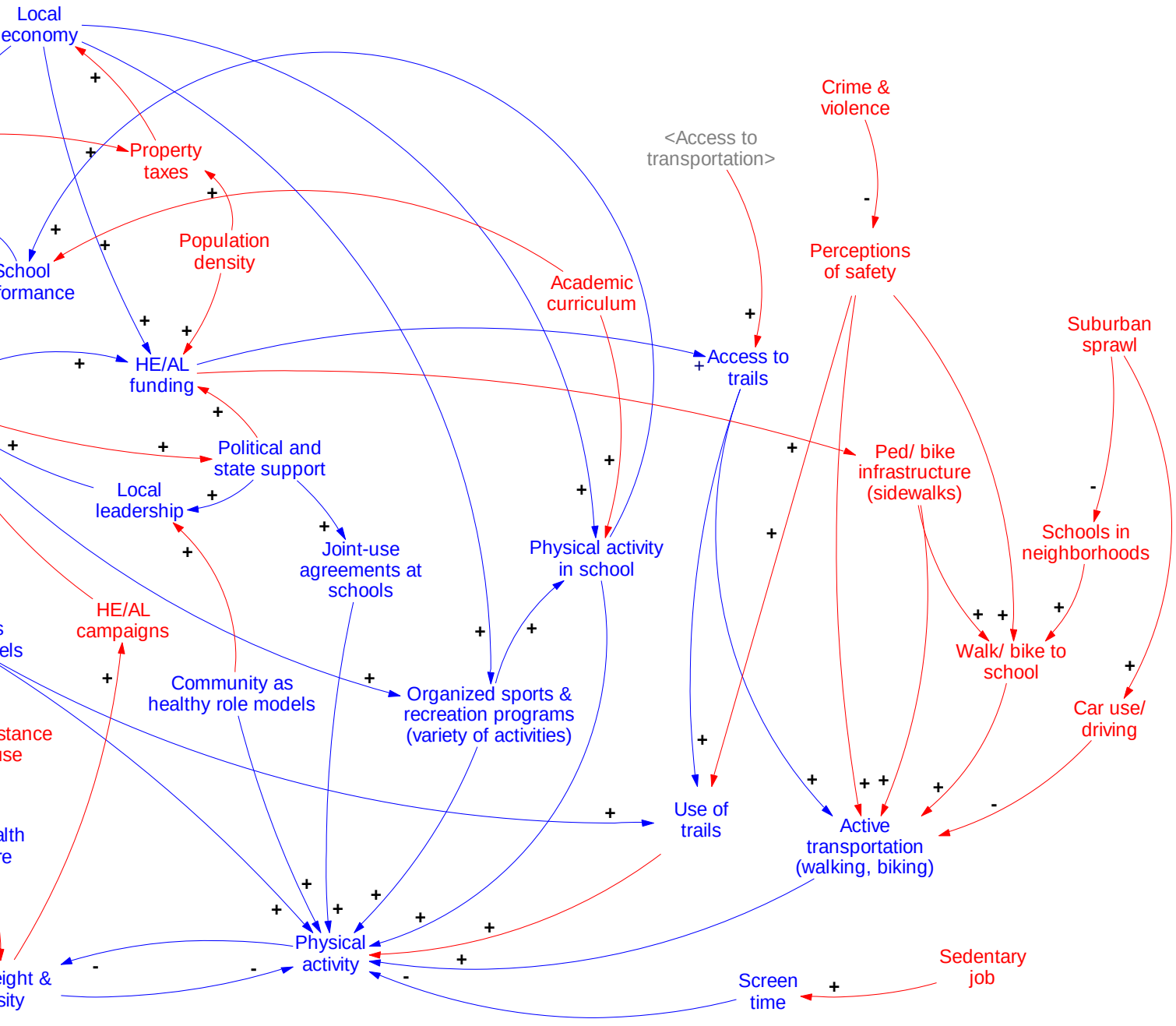
Appendix B: Original Translation of the Causal Loop Diagram into Vensim PLE



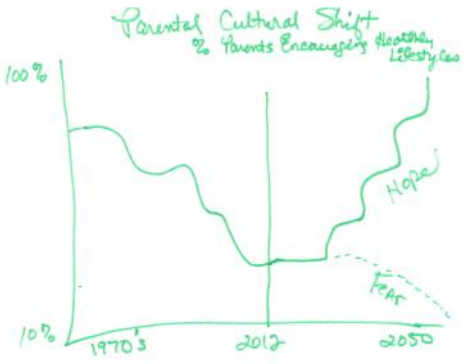

mber of
trails
Number of
people cycling
Number of
connector trails
Use of trails
Parents as
healthy models
Financial resources for
environmental changes in
our community
Enrolling in
extra-curricular
programs
Community
prioritization of
healthy lifestyle
Political and state
support
School
performance
Local
leadership
Joint-use agreements
at schools
doption of
uble" physical
activity
Community as
healthy role models
Children engaging in
physical activity
Screentime
lthy food in
schools

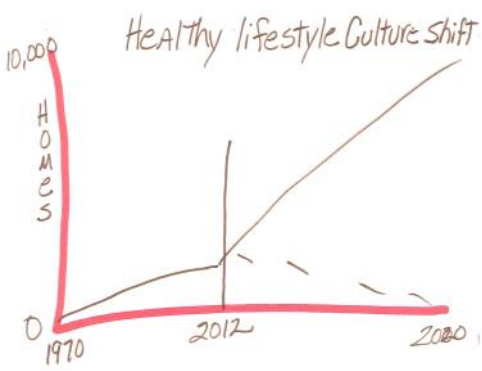
Appendix C: Transcript Translation of the Causal Loop Diagram into Vensim PLE

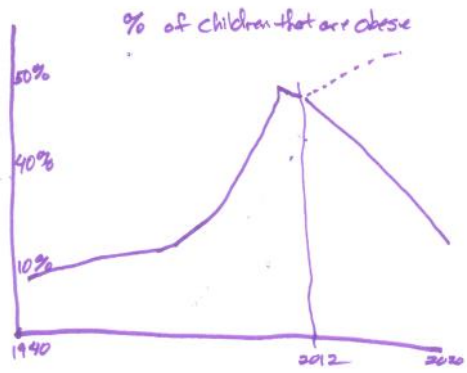


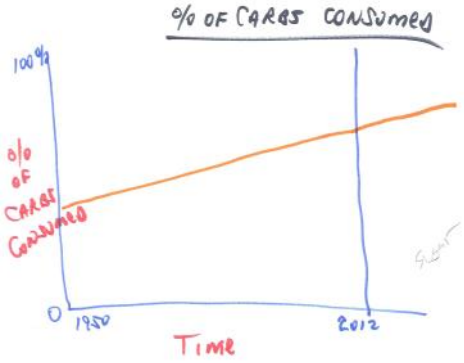

Local economy
Property taxes
School formance
Population density
Academic curriculum
<Access to transportation>
Crime & violence
Perceptions of safety
Suburban sprawl
HE/AL funding
Access to trails
Political and state support
Local leadership
Joint-use agreements at schools
Physical activity in school
Ped/ bike infrastructure (sidewalks)
Schools in neighborhoods
HE/AL campaigns
Community as healthy role models
Organized sports & recreation programs (variety of activities)
Walk/ bike to school
Car use/ driving
Use of trails
Active transportation (walking, biking)
Physical activity
Sedentary job
Screen time

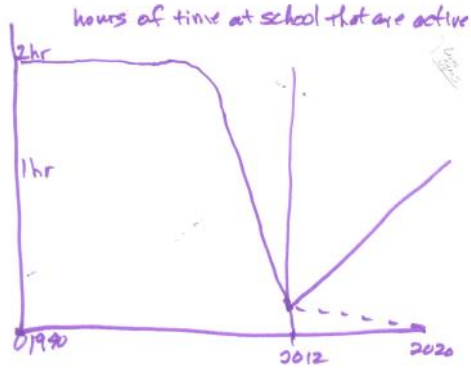
Appendix D: Behavior Over Time Graphs not Represented in the Storybook

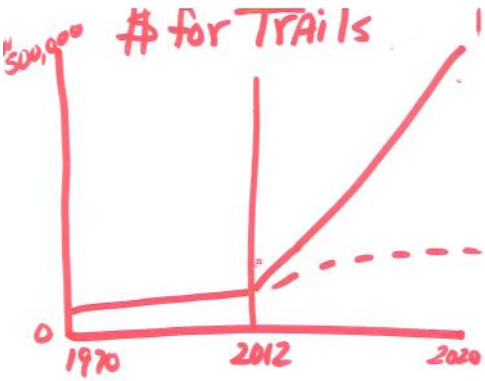


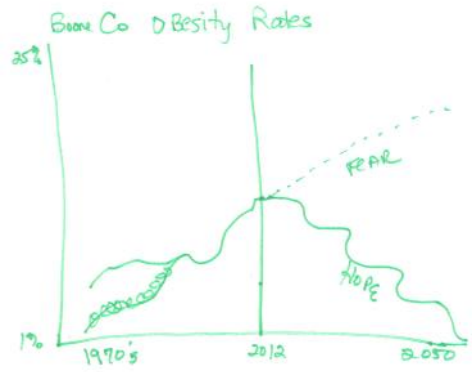


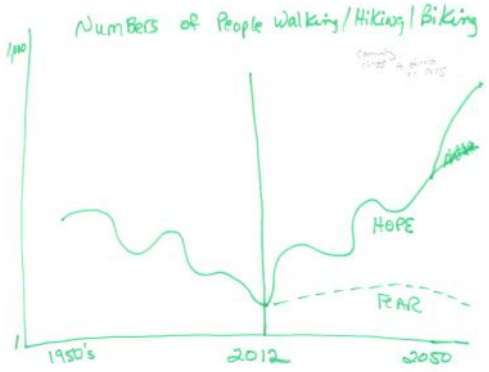


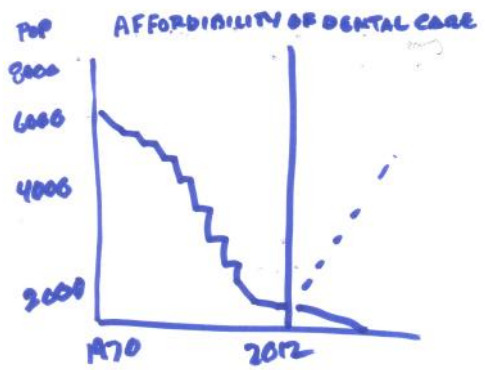


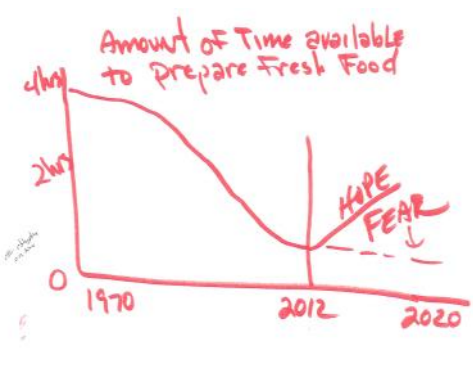


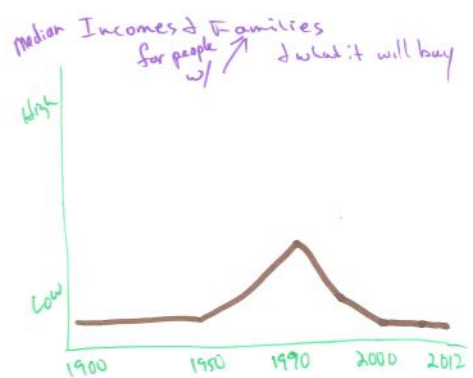


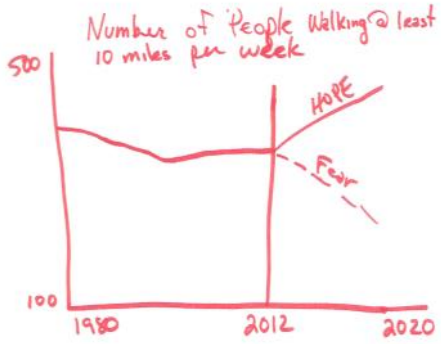


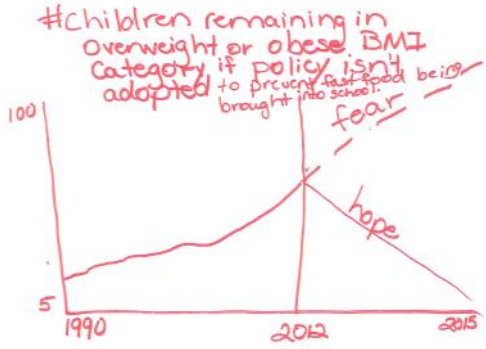


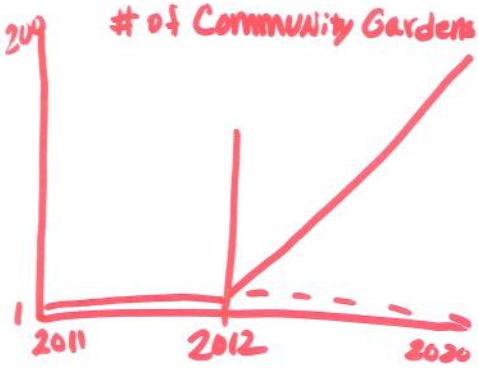


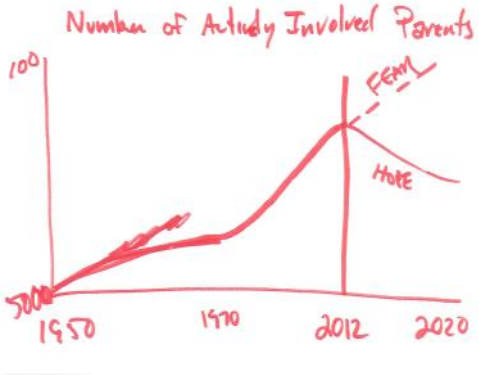


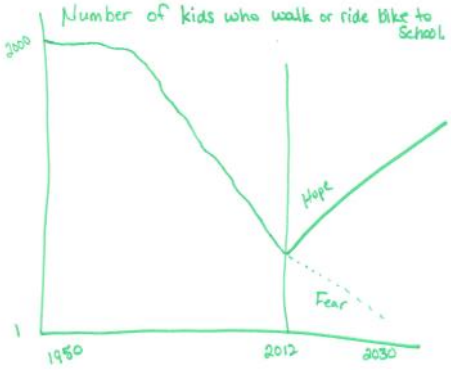


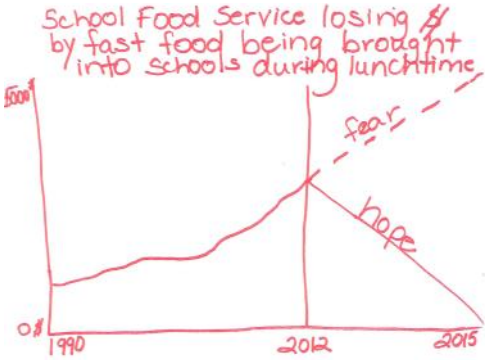

Number of People Walking @ least 10 miles per week
500
100
Hope
Fear
100
1980
2012
2020

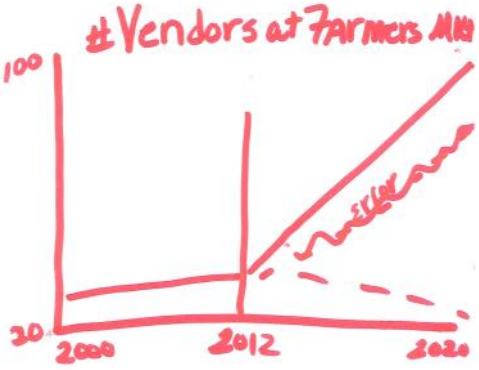

#Children remaining in Overweight or obese BMI Category if policy isn't adopted to prevent fast food being brought into school.
fear
100
hope
5
1990
2012
2015

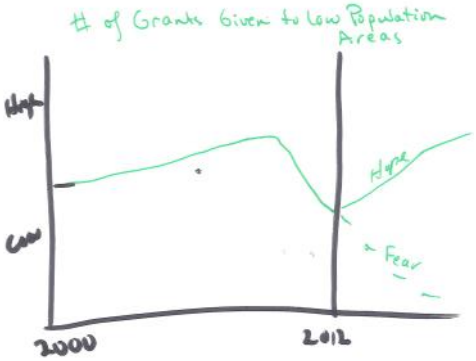

# of Community Gardens
200
1
2011
2012
2030

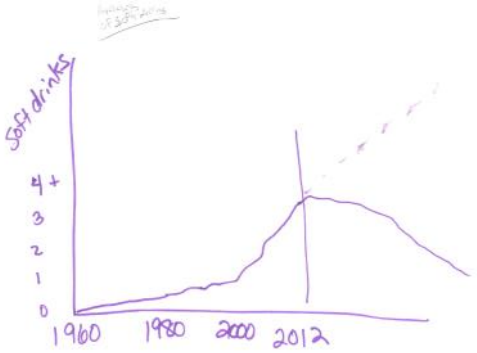

Number of Actively Involved Parents
100
Fear
Hope
1950
1970
2012
2020

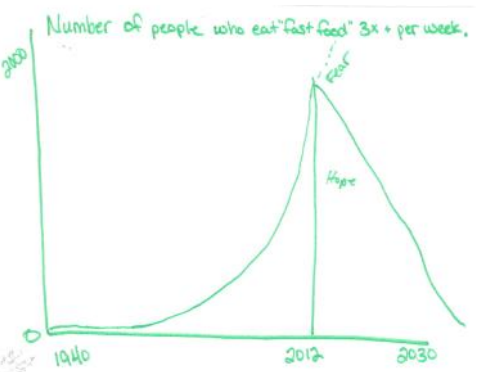

Number of kids who walk or ride bike to School
Hope
Fear
1
1950
2012
2030

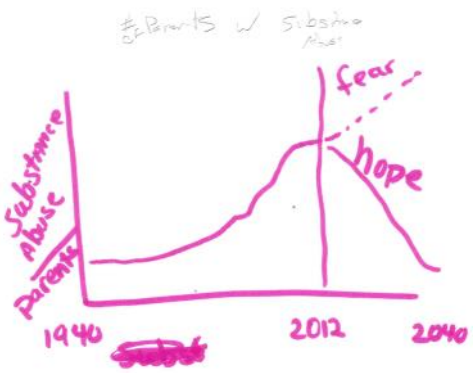

School Food Service losing $ by fast food being brought into schools during lunchtime
fear
hope
1990
2012
2015

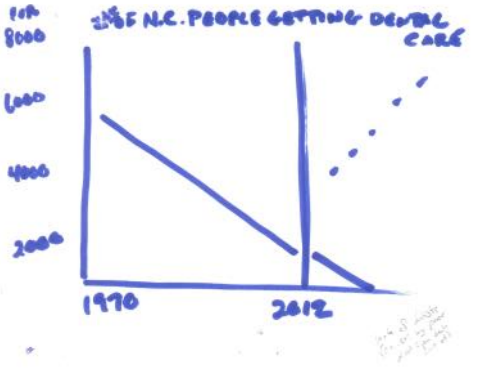

Vendors at Farmers Mkt
100
20
2000
2012
2020

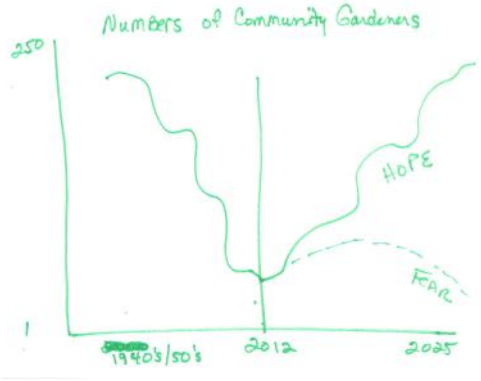

# of Grants Given to low Population Areas
Hope
Fear
2000
2012

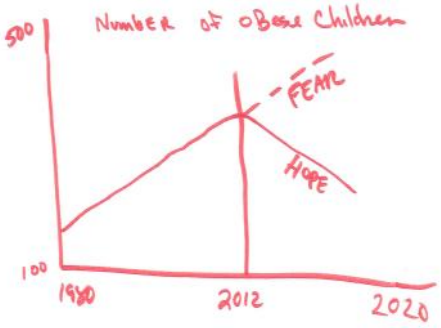

Soft drinks
4+
3
2
1
0
1960
1980
2000
2012

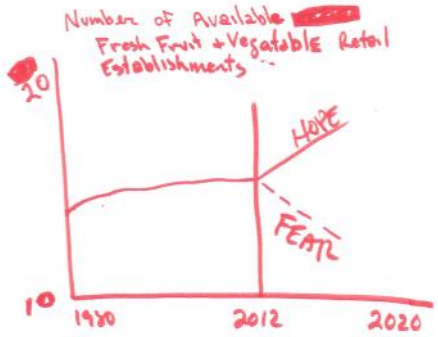

Number of people who eat "fast food" 3x + per week.
Hope
0
1940
2012
2030

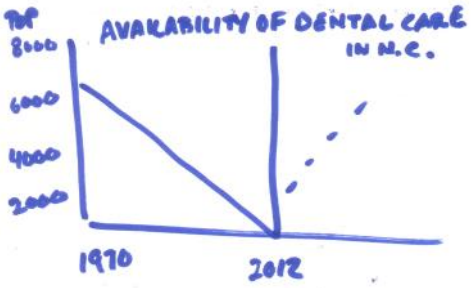

Substance Abuse
Parents
fear
hope
1940
2012
2040

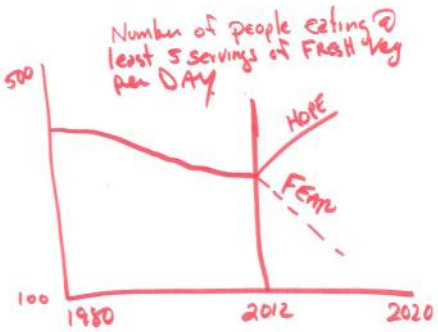

% of N.C. People getting dental care
8000
6000
4000
2000
1970
2012

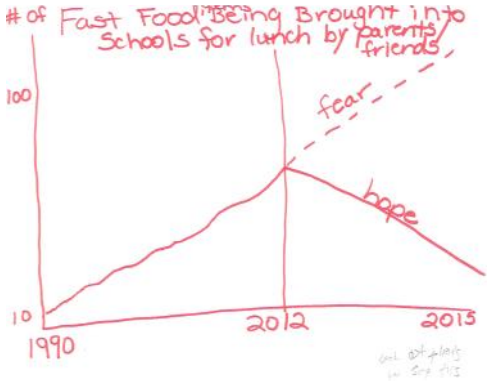

Numbers of Community Gardeners
250
1
HOPE
FEAR
1940's/50's
2012
2025


Number of Obese Children
500
100
FEAR
HOPE
1980
2012
2020


Number of Available Fresh Fruit + Vegetable Retail Establishments
20
10
HOPE
FEAR
1980
2012
2020


AVAILABILITY OF DENTAL CARE IN N.C.
TSP
8000
6000
4000
2000
1970
2012


Number of people eating @ least 5 servings of FRESH Veg per DAY
500
100
HOPE
FEAR
1980
2012
2020


# of Fast Food being Brought into Schools for lunch by parents/friends
100
10
fear
hope
1990
2012
2015