

Systems Thinking in Communities:

Understanding the Causes of Inactivity, Poor Diet/Nutrition, and Childhood Obesity in Houston, Texas



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Introduction

CAN DO (Children and Neighbors Defeat Obesity) Houston 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 *CAN DO (Children and Neighbors Defeat Obesity) Houston* project was to introduce systems thinking at the community level by identifying the essential parts of the Houston, Texas 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, elected officials, government agencies, community-based organizations, businesses, universities) 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.

Houston, Texas: Background and Local Participation

Houston, one of the largest cities in the United States, is home to over two million ethnically and racially diverse residents. Divided into 88 neighborhoods, *CAN DO Houston* focused its efforts in five neighborhoods, Sunnyside, Fifth Ward, Magnolia Park, Near Northside, and Independence Heights.

- **Magnolia Park:** Magnolia Park is one of Houston's oldest Hispanic neighborhoods. Over 97% of Magnolia Park residents are Hispanic/Latino. The neighborhood is home to Briscoe Elementary and Mason Park.
- **Near Northside:** Near Northside, or Northside Village, is located just north of downtown. Almost 88% of Near Northside residents are Hispanic/Latino. The neighborhood is home to Lyons Elementary, Lyons SPARK Park, and Berry Elementary.
- **Sunnyside:** Sunnyside is located just south of downtown Houston. Historically an African-American neighborhood, over 92% of current Sunnyside residents are African-American. The neighborhood is home to Young Elementary, Sunnyside Park, and Wilmington House Housing Authority Apartments.
- **Fifth Ward:** The Fifth Ward neighborhood is divided by Interstate 10 into two sections, Upper and Lower Fifth Ward. Upper Fifth Ward is predominantly an African-American community. Lower Fifth Ward is smaller than Upper Fifth and is predominately a Hispanic/Latino neighborhood. Fifth Ward is home to Bruce Elementary and Swiney Park.
- **Independence Heights:** The Independence Heights neighborhood has historically been predominately African-American, but has recently seen an influx of Hispanic/Latino residents. Independence Heights is home to Burrus Elementary and Beauty's Garden.

The *CAN DO Houston* partnership was formed in 2008 to bring numerous stakeholders and agencies together to address childhood obesity. Piloted in two neighborhoods, partners found that *CAN DO Houston* served as a successful umbrella organization to bring together organizations and community members to initiate policy and environment change. With over 40 participating organizations, the *CAN DO Houston* partnership worked to mobilize and connect community partners and residents to the resources they need in order to advocate for and implement policy and environment change for healthy eating and active living.

CAN DO (Children and Neighbors Defeat Obesity) Houston's Priorities and Strategies

Community partners identified priority steps needed to increase healthy eating and active living in the targeted neighborhoods, such as increasing the availability of affordable, nutritious foods and increasing

physical activity opportunities for children and families. CAN DO Houston prioritized building community capacity for future advocacy work. The partnership focused on building relationships and engaging community members through programs and education and then encouraging participants to become advocates for healthy eating and active living in their neighborhoods.

The partnership and capacity building strategies of *CAN DO Houston* included:

- **Leadership and Advocacy Training:** CAN DO Houston created a leadership and advocacy program for residents in lower-income neighborhoods. The eight week program focused on advocacy, consensus building and leadership, group collaboration, and communicating and establishing relationships with elected officials and non-elected decision makers. Class participants were challenged to develop a multi-component advocacy project to illustrate the various stages of accomplishing a goal through advocacy. Graduates of the program have gone on to be involved in city-level advisory groups, formed neighborhood-level advocacy groups (i.e. Sunnyside on the Bayou), and became trainers for future programs. Organizations throughout Houston have adopted and implemented the program.
- **Go Healthy Houston Task Force:** The partnership played a key role in the establishment of a new Go Healthy Houston Task Force. CAN DO Houston shaped the Mayor's Resolution to create the task force and serve as a member of the task force. The Go Healthy Houston Task Force was created to recommend and implement specific actions to reduce the incidence of obesity and its health and economic impacts in the City of Houston.

The healthy eating and active living strategies of *CAN DO Houston* included:

- **Farmers' Markets:** Partnering with the Houston Food Policy workgroup, CAN DO Houston prompted the Houston Department of Health and Human Services to accept Electronic Benefit Transfer (EBT) payments at three sites, Sunnyside Multi-Service Center, Magnolia Multi-Service Center, and Legacy Health Clinic in the Fifth Ward. CAN DO Houston coordinated the launch of a mobile farmers' market at Swiney Park in the Fifth Ward and supported the City of Houston in the creation of mobile farmers' markets in Sunnyside and Magnolia Park neighborhoods by recruiting farmers and coordinating promotional activities. The mobile markets may inform additional markets and alternative methods to provide access to fresh produce to people in lower-income, under-served communities.
- **Corner Stores:** CAN DO Houston piloted a corner store initiative in one Sunnyside neighborhood corner store. HKHC funds were used to purchase equipment, signage, and produce for the store. The pilot site, including lessons on produce vendors and EBT/WIC availability, can help to improve the corner store initiative at the current store and to expand to additional stores in Near Northside and Fifth Ward.
- **Community Gardens:** In collaboration with multiple partners, CDH established and expanded community and school gardens and worked to engage residents in gardening in Near Northside, Fifth Ward, Magnolia Park, and Independence Heights. After the initial support by the partnership, the gardens continued to expand and are now sustained by the school staff, students, families, residents, and area organizations.
- **Parks and Play Spaces:** CAN DO Houston created a wellness room with exercise equipment at Lyons Elementary. The partnership established an informal agreement to allow parents and community members to utilize the room after completing volunteer paperwork and equipment training. Lyons Elementary maintains the equipment and the wellness room.
- **Active Transportation:** CAN DO Houston worked to increase access to healthy eating and physical activity opportunities by advocating for city-wide and organizational policy and practice changes.

For more information on the partnership, please refer to the CAN DO Houston case report (www.transtria.com/hkhc).

Systems Thinking in Communities: Houston, Texas

“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 Houston, Texas 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.

Group Model Building

Members of the *CAN DO Houston* partnership participated in a group model building session in September, 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 government agencies, youth and community-based organizations, and advocates. 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 Houston 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 the rate of childhood obesity, the percent of children with obesity has increased since 1980 with a steeper increase over the last 10 to 15 years. The participant hopes that this trend

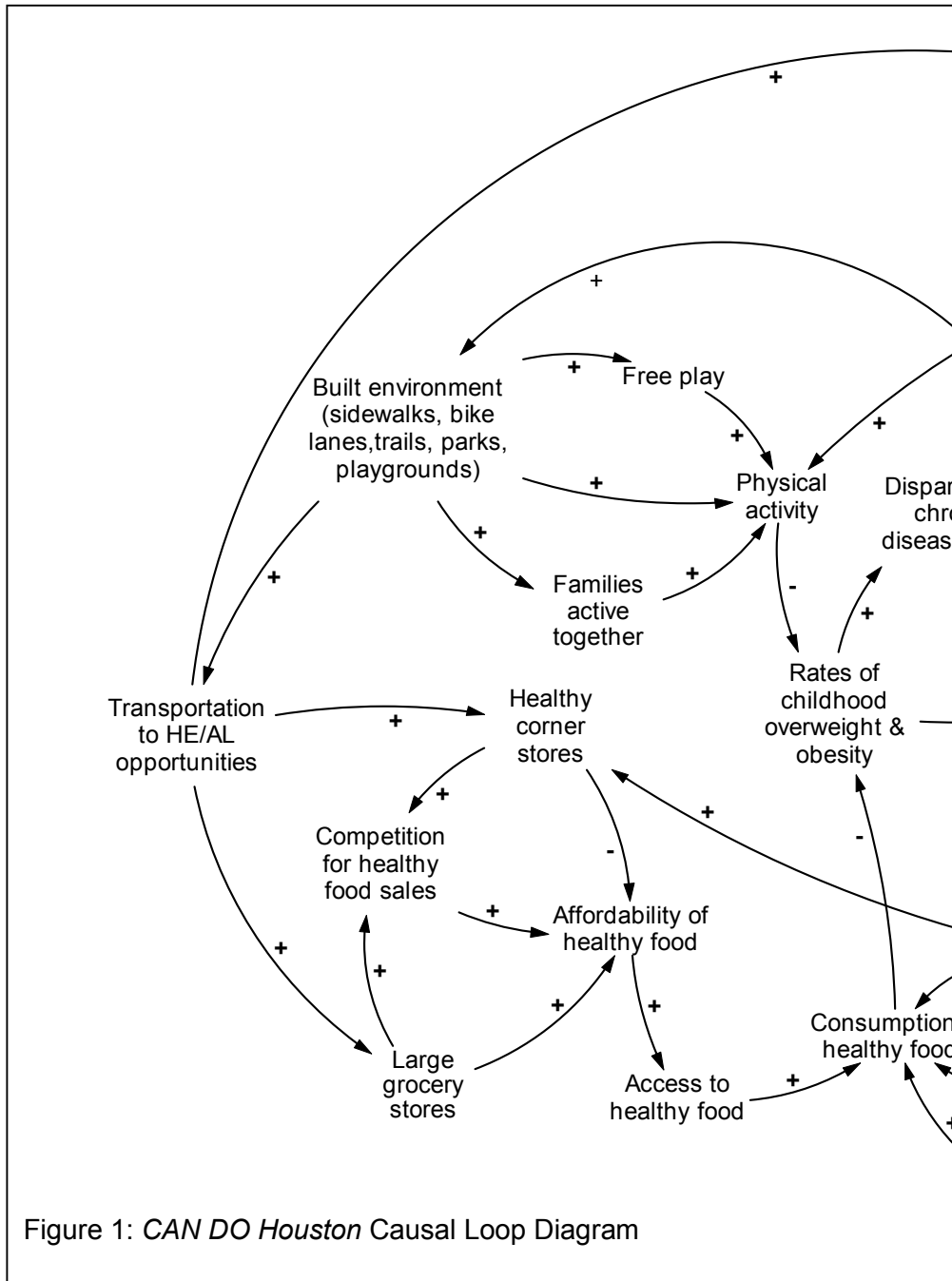
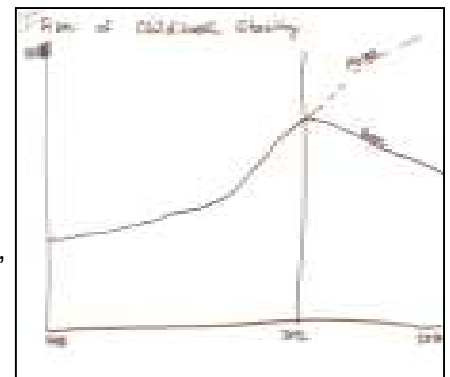


Figure 1: *CAN DO Houston* Causal Loop Diagram



Causal Loop Diagram for the Childhood Obesity System

The causal loop diagram (CLD) represents a holistic system and several subsystems interacting in Houston, Texas. 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).

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)

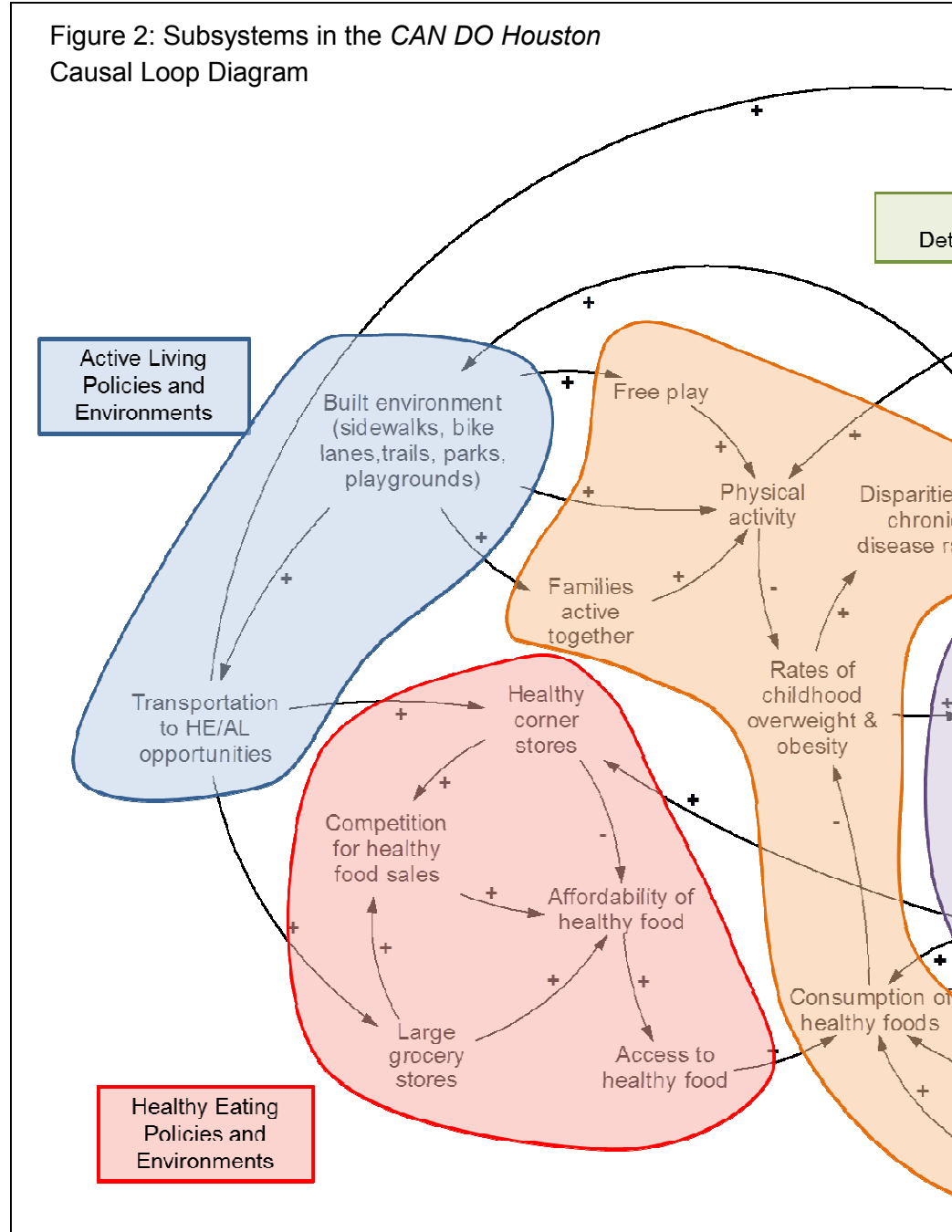
The healthy eating policy and environmental subsystem includes food production, food distribution and procurement, and food retail (e.g., healthy corner stores). During the behavior over time graphs exercise, the participants generated four graphs related to policy or environmental strategies (e.g., large grocery stores) or contexts (e.g., competition for healthy foods sales) that affected or were affected by the work of *CAN DO Houston*. 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 eight graphs related to policy or environmental strategies (e.g., built environment) or contexts that affected or were affected by the partnership's work.

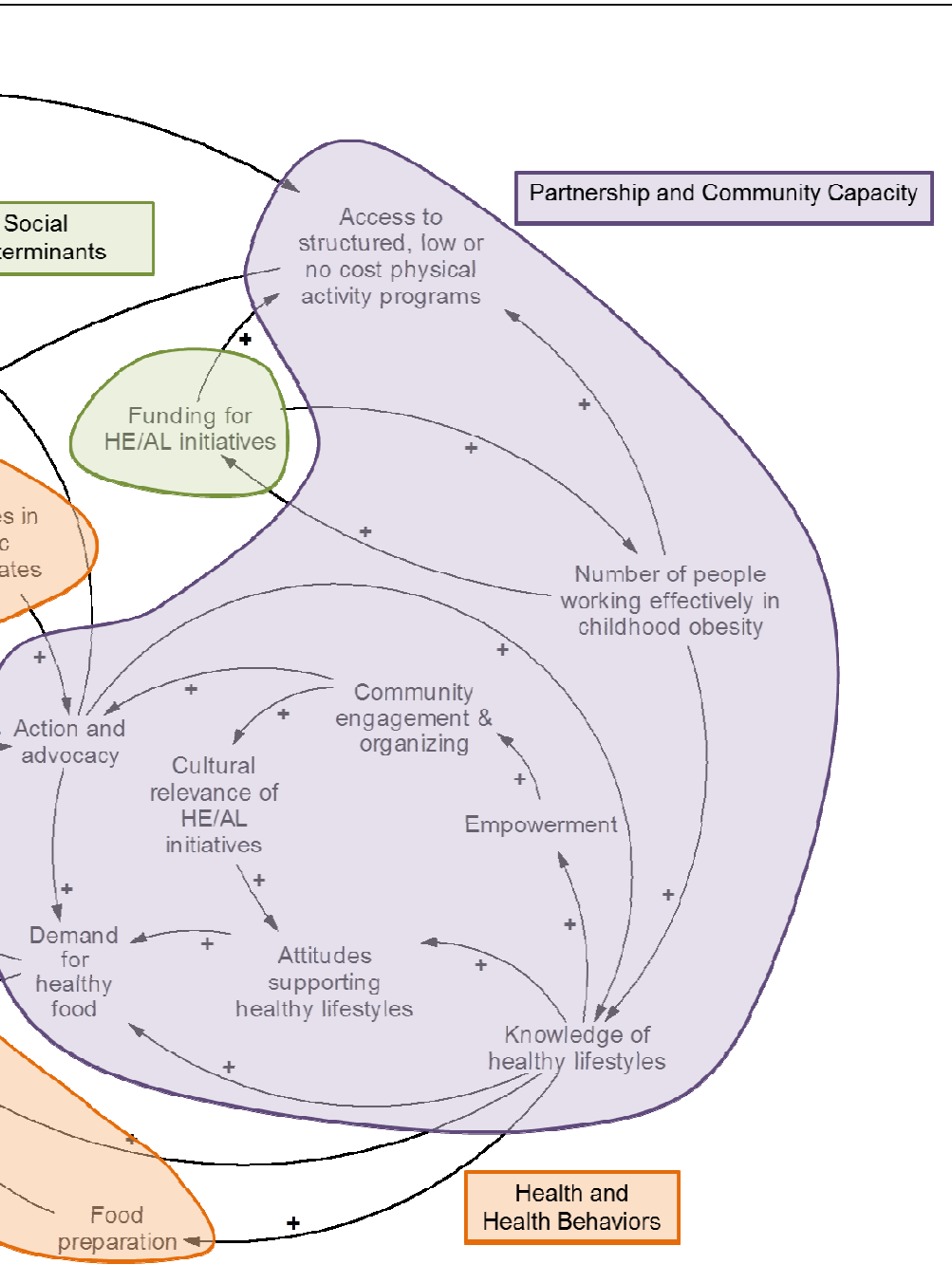
Health and Health Behaviors (Orange)

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., free play, food preparation, families active together).



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, *CAN DO Houston* conducted leadership and advocacy training in order to empower community residents to participate in advocacy initiatives. This subsystem also includes community factors outside the partnership that may influence or be influenced by their efforts, such as attitudes supporting healthy lifestyles or access to physical activity programs.



Social Determinants

Finally, the social determinants subsystem denotes societal conditions (e.g., disparities in chronic disease rates, funding for healthy eating and active living initiatives) and psychosocial influences 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 *CAN DO Houston* partners or by other representatives in Houston, Texas. Using this CLD as a starting place, community conversations about different theories of change within subsystems may continue to take place. For instance, these participants identified interest in understanding more about the relationships among the cultural relevance of healthy eating and active living initiatives and residents' attitudes supporting healthy lifestyles.

The next sections begin to examine the feedback loops central to the work of *CAN DO Houston*. 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.

Go Healthy Houston Task Force Feedback Loop

To simplify the discussion about feedback loops, several loops drawn from the *CAN DO Houston* CLD (see Figures 1 and 2) are highlighted in Figures 3-7. While the CLD provides a theory of change for the childhood obesity prevention movement in Houston, Texas, 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 the GO Healthy Houston Task Force (green highlighted loop in Figure 3). *CAN DO Houston* shaped the Mayor's resolution to create the task force and served as a member of the task force. Participants described how the number of people working effectively in childhood obesity leads to an increase in funding for healthy eating and active living initiatives. In turn, more funding for healthy eating and active living initiatives creates more resources for more people to work effectively on childhood obesity prevention initiatives.

Story B: While the preceding story reflected a positive scenario for Houston, Texas, the same feedback loop also tells the opposite story. When there are fewer folks working effectively on childhood obesity, it is more challenging to obtain funding to support healthy eating and active living initiatives. Consequently, less funding provides fewer resources to engage people in childhood obesity prevention.

Reinforcing Loop and Notation

These stories — pro and con — represent a reinforcing loop, and the notation in the feedback loop identifies it as a reinforcing loop (see “R1 — Go Healthy Houston Task Force” 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 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 reinforcing loop, the effect of an increase or decrease in a variable continues through the cycle and

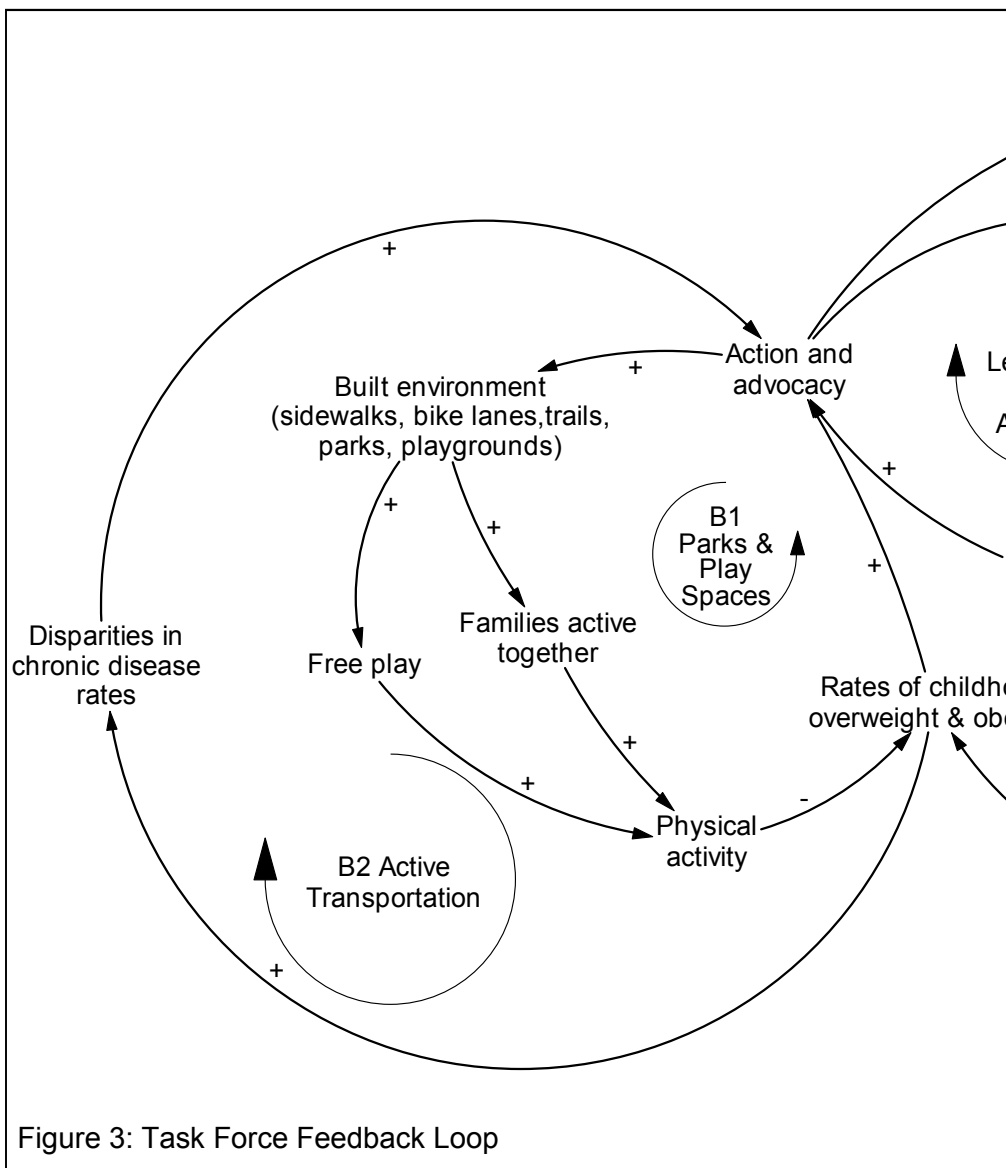


Figure 3: Task Force Feedback Loop

“Sometimes it’s the funding that actually leads back into people who are working effectively for childhood obesity so finding the right people to do this, this stuff is really important. It’s great for the community to rise up and say we need it. Then, once you get it, who’s really going to do it, so if that money can come available, it really goes back to that piece of it.” (Participant)

returns an increase or decrease to the same variable, respectively. Looking specifically at the “+” or “-” notation, a feedback loop that has zero or an even number of “-” signs, or polarities, is considered a reinforcing loop. Balancing loops, with an odd number of “-” signs in the loop, are another type of feedback loop and are referenced in the next sections.

In isolation, this reinforcing loop represents a virtuous cycle in Story A as these assets positively support one another, or a vicious cycle in Story B as these challenges perpetuate a downward spiral. Yet, the influence of the number of people working effectively in childhood obesity likely levels off at some point when the partners have reached all the populations at risk of overweight and obesity. To understand what specifically leads to the leveling off of the number of people working effectively in childhood obesity, it may be helpful for the

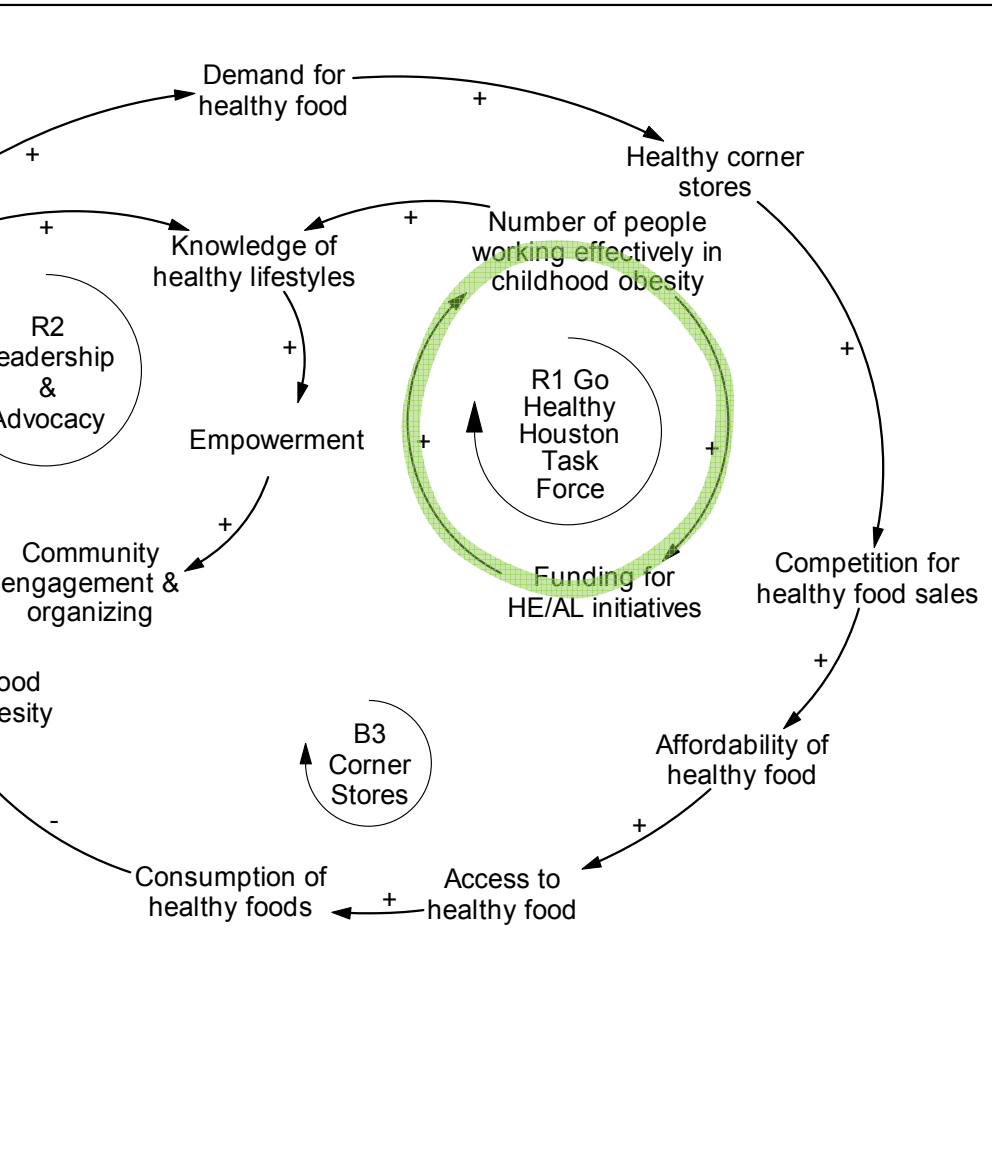
partners in Houston, Texas to consider other variables that influence or are influenced by these folks. In addition, it is important to remember that this reinforcing loop is only one part of the larger CLD (see Figures 1 and 2), and the other loops and causal relationships can have an impact on the variables in this loop.

System Insights for CAN DO Houston

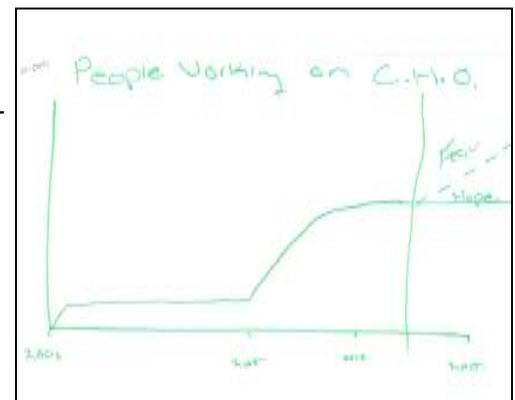
Participants identified a significant increase in the number of people working effectively in childhood obesity since 2000, with an even greater increase since 2005 in Houston, Texas (see behavior over time graph).

From the systems thinking exercises, several insights can inform sustainability of the GO Healthy Houston Task Force, including:

- Identification of a range of local, state, and national funds to support healthy eating and active living initiatives, with a focus on funding sources that may be sustainable over time (e.g., annual city budget allocation for the Go Healthy Houston Task Force).
- Inclusion of partners with funds or other in-kind resources (e.g., volunteers, space, equipment) to



- support the activities of the GO Healthy Houston Task Force.
- Customization of recruitment strategies to enlist traditional and non-traditional partners to engage in various events or activities related to the work of the GO Healthy Houston Task Force.



Advocacy Feedback Loop

Given the introduction to feedback loops and CLD notation in the previous section, this discussion of the feedback loop highlighted in orange in Figure 4 expands on the concepts and notation, and highlights advocacy.

Causal Story for Feedback Loop

Story A: In this loop, increases in action and advocacy lead to greater knowledge of healthy lifestyles among partners and residents in Houston. With more knowledge, people may feel a stronger sense of empowerment to influence positive changes in their communities. This leads to more community representatives getting engaged and organized to affect these changes. With greater representation and involvement of the community, there is more action and advocacy.

Story B: Alternatively, in the absence of action and advocacy efforts, there is less education to influence the general knowledge of healthy lifestyles in the community. In turn, residents may be less empowered to create changes in their circumstances, and, as a result, they may be less likely to get engaged or organized around these changes. As there are fewer community representatives involved, there is less support for action and advocacy.

Reinforcing Loop and Notation

Similar to the task force loop in Figure 3, this loop has all “+” signs or polarities; so it is also a reinforcing loop (see R2—Leadership and Advocacy in Figure 4).

Some of these causal relationships may have more immediate effects (e.g., community engagement and organizing may lead to an instant increase in action and advocacy efforts) and other relationships may have delayed effects (e.g., increases in community knowledge of healthy lifestyles may not affect individuals’ sense of empowerment right away). This delayed effect is noted using two hash marks through the middle of the arrow line (not included in Figure 4).

System Insights for CAN DO Houston

In the behavior over time graphs, participants identified a steady increase in the awareness of physical fitness programs for children in Houston since 1995 as well as an increase in the knowledge of healthy eating habits

“As people become more knowledgeable about the obesity, childhood obesity, people are trying to do the research so I think that it will increase and people will become knowledgeable, my fear is for some, they get frustrated because there’s so many contradictory reports, and so rather than to do something, they just don’t do anything.” (Participant)

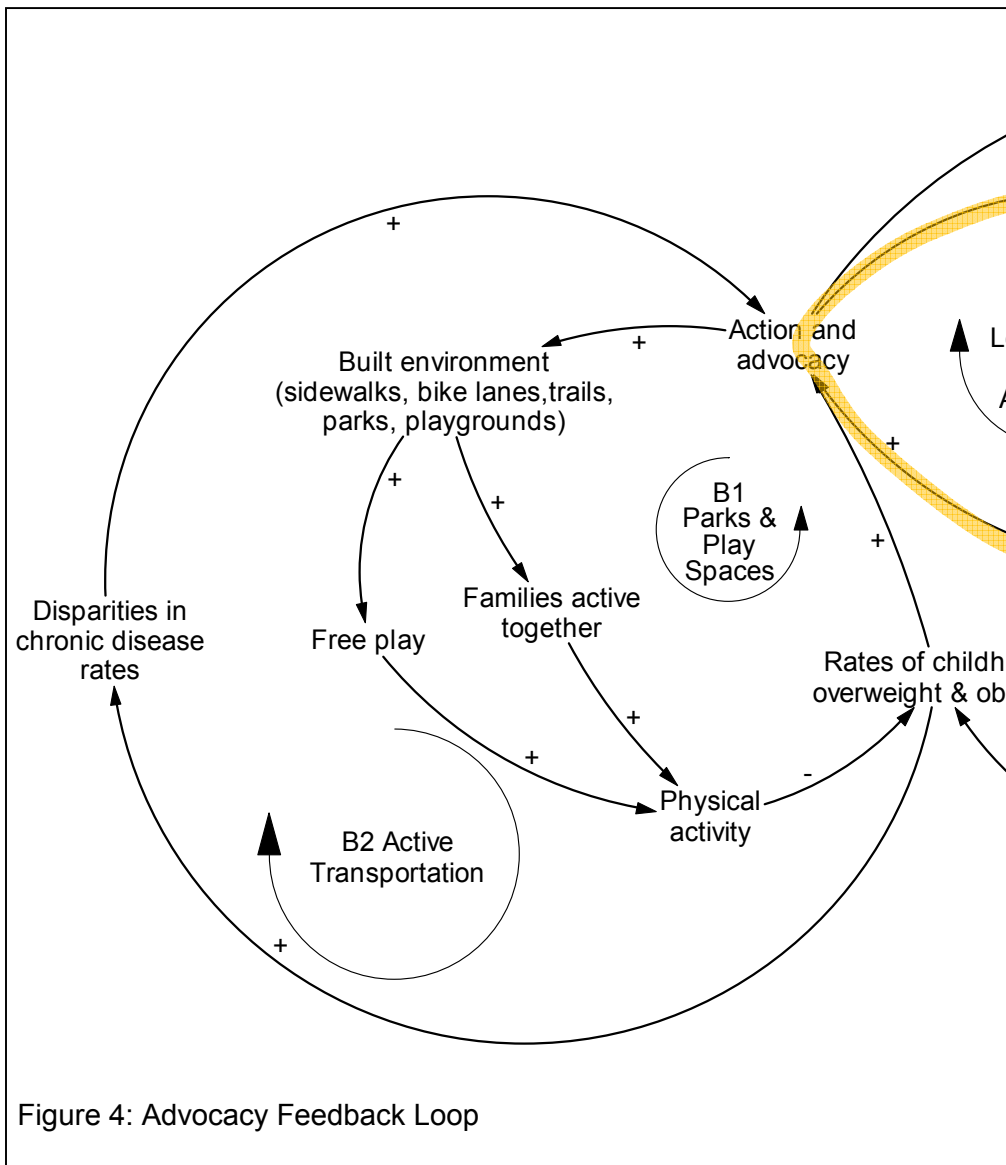
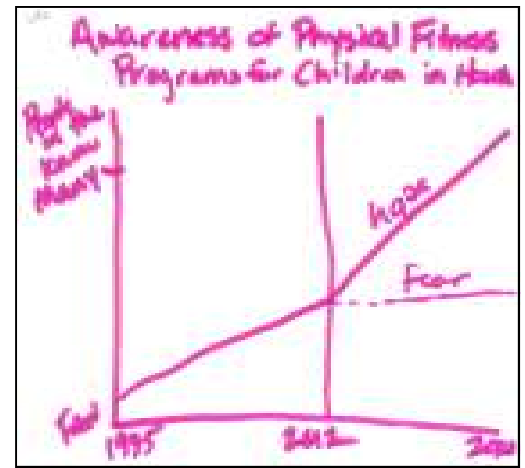
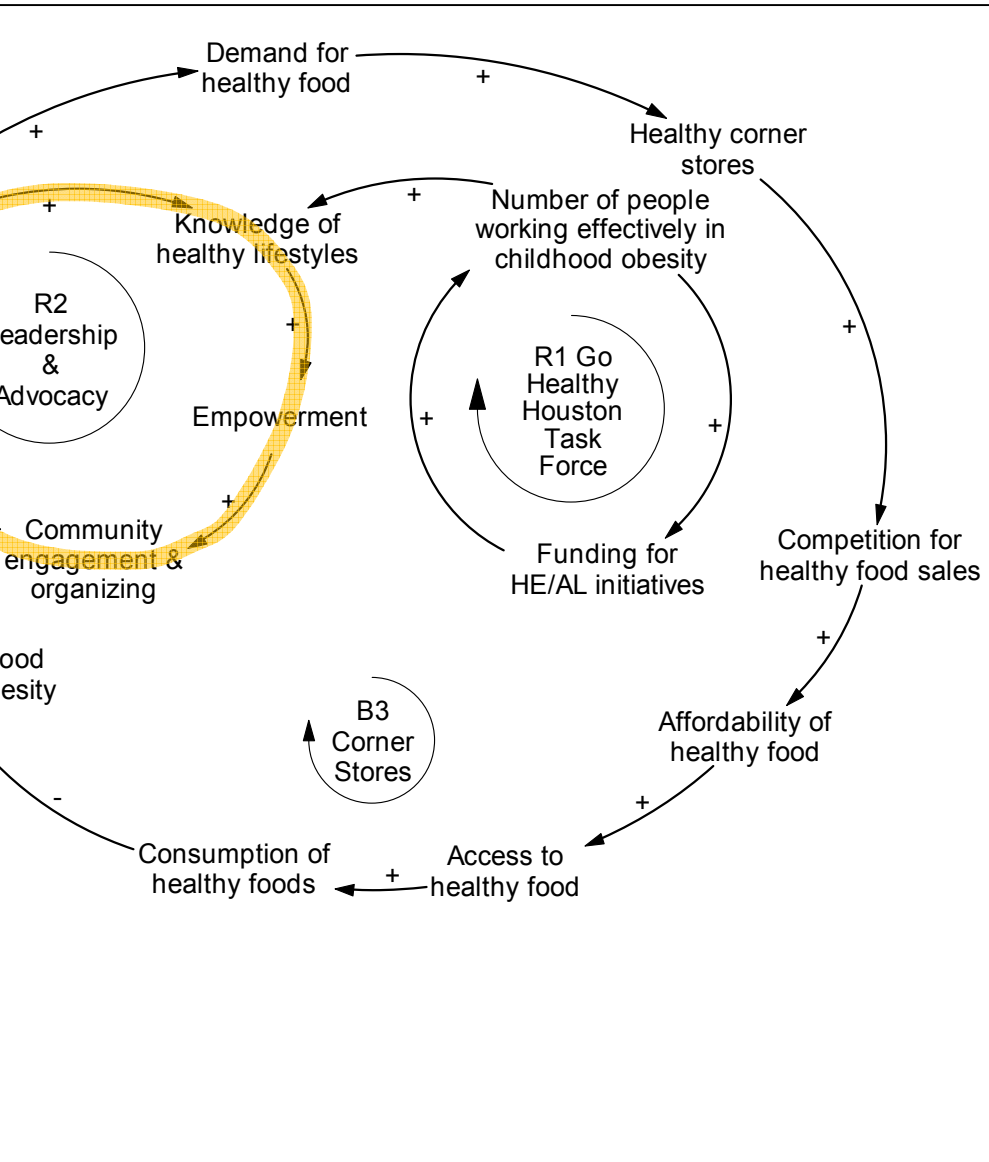


Figure 4: Advocacy Feedback Loop

since 1980 (see illustrations on the top and bottom right of this page).

System insights can inform the partnership's next steps with advocacy, including:

- Incorporation of efforts to increase community knowledge and empowerment may generate more community engagement to bolster advocacy efforts (e.g., programmatic and promotional efforts to complement policy, system, and environmental changes



can enhance overall advocacy).

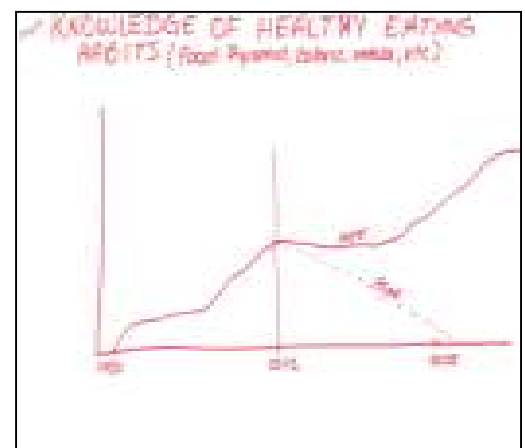
- Non-traditional partners with expertise in community engagement and organizing can enhance more traditional advocacy approaches targeting policy- and decision-makers.

In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including:

- What is the community's knowledge of the problem of overweight and obesity? Nutrition guidelines and healthy eating patterns? Physical activity guidelines (intensity, frequency, and duration)?
- What are some ways to assess empowerment in the community generally and specifically with respect to policy and environmental changes to support healthy eating and active living?
- What evaluation methods and measures can be designed and developed in order to increase

understanding of the influence of community engagement and organizing on particular advocacy strategies or initiatives?

- What evaluation methods and measures can be designed and developed to assess the influence of an increasing number of advocacy initiatives in the community on community knowledge and empowerment?



Parks and Play Spaces Feedback Loop

Highlighted in blue in Figure 5, the parks and play spaces feedback loop represents one of the *CAN DO Houston* strategies to increase active living.

Causal Story for Feedback Loop

Story A: As there are improvements to the built environment leading to a greater number of parks and play spaces, children have places to go to engage in unstructured play. More unstructured play helps to increase overall level of physical activity in the community. With more physical activity, there are also lower rates of childhood overweight and obesity. As a result, there is less of a need for advocacy initiatives centered on increasing the number of parks and play spaces, and, in turn, less need for new parks and play spaces.

Story B: Alternatively, the absence of parks and play spaces limits the places that children can engage in unstructured play, reducing the overall physical activity levels in the community. With fewer children active, rates of childhood overweight and obesity increase, demanding action and advocacy initiatives to alter the built environment to provide more parks and play spaces.

Balancing Loop and Notation

In contrast to the previous loops, this one represents a balancing loop (one “-” sign). As indicated by the name, balancing loops tend to create more of a stable trend over time, as opposed to one that is continually increasing or decreasing. In addition, it includes causal relationships representing more immediate effects (e.g., the amount of free play increases overall physical activity levels), and, potentially, delayed effects (e.g., increases in advocacy result in changes to the built environment).

System Insights for *CAN DO Houston*

In the behavior over time graphs exercise, participants described an increase in improvements to the built environment, including parks and play spaces, to support active living since 1980. At the same time, participants showed a substantial decrease in free play going back to 1970. See the behavior over time graphs here and on the next page.

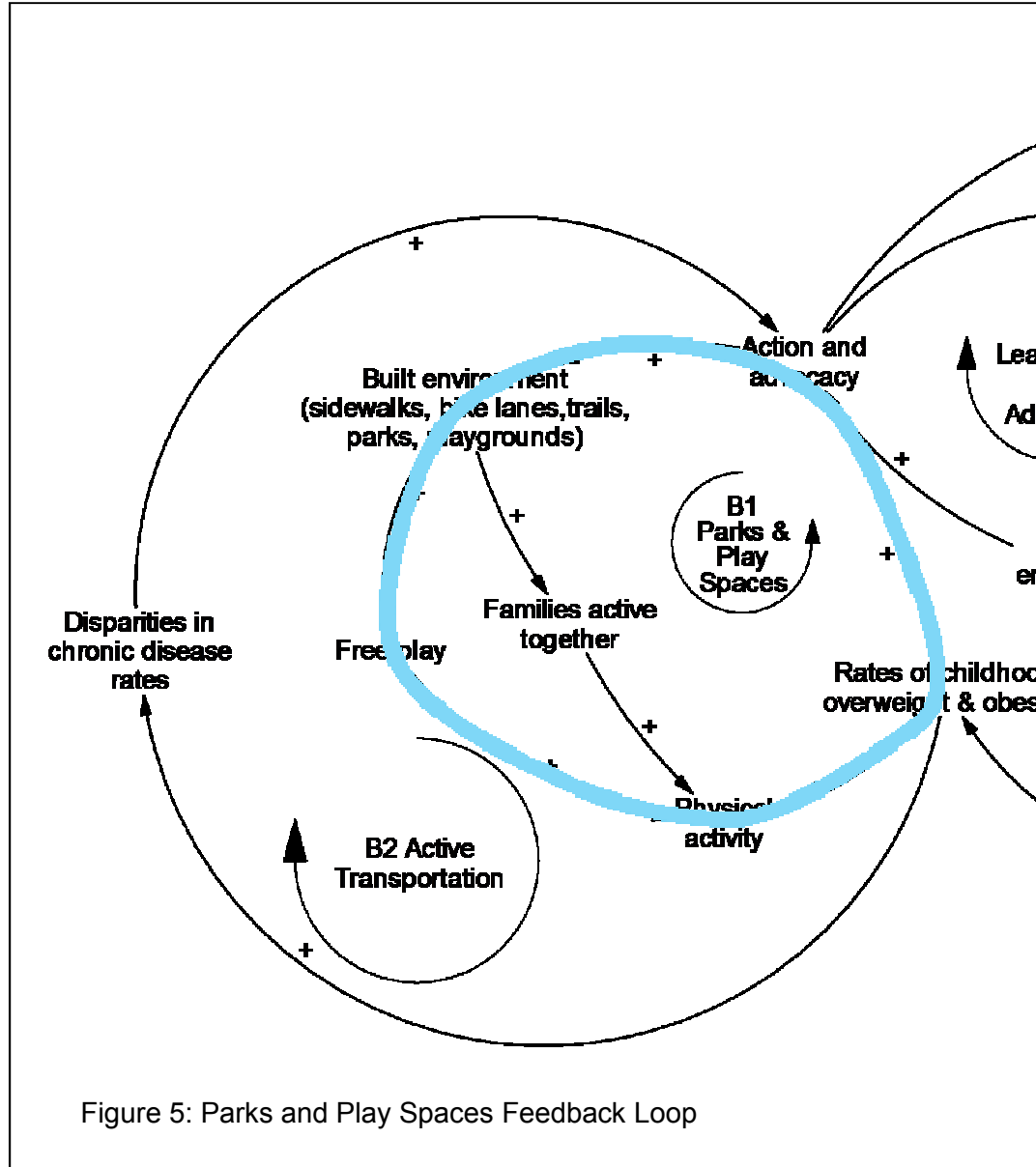
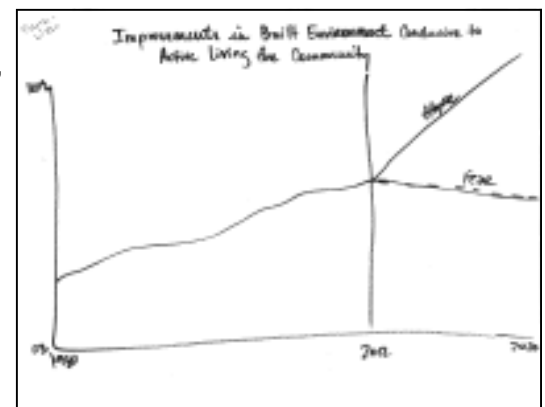
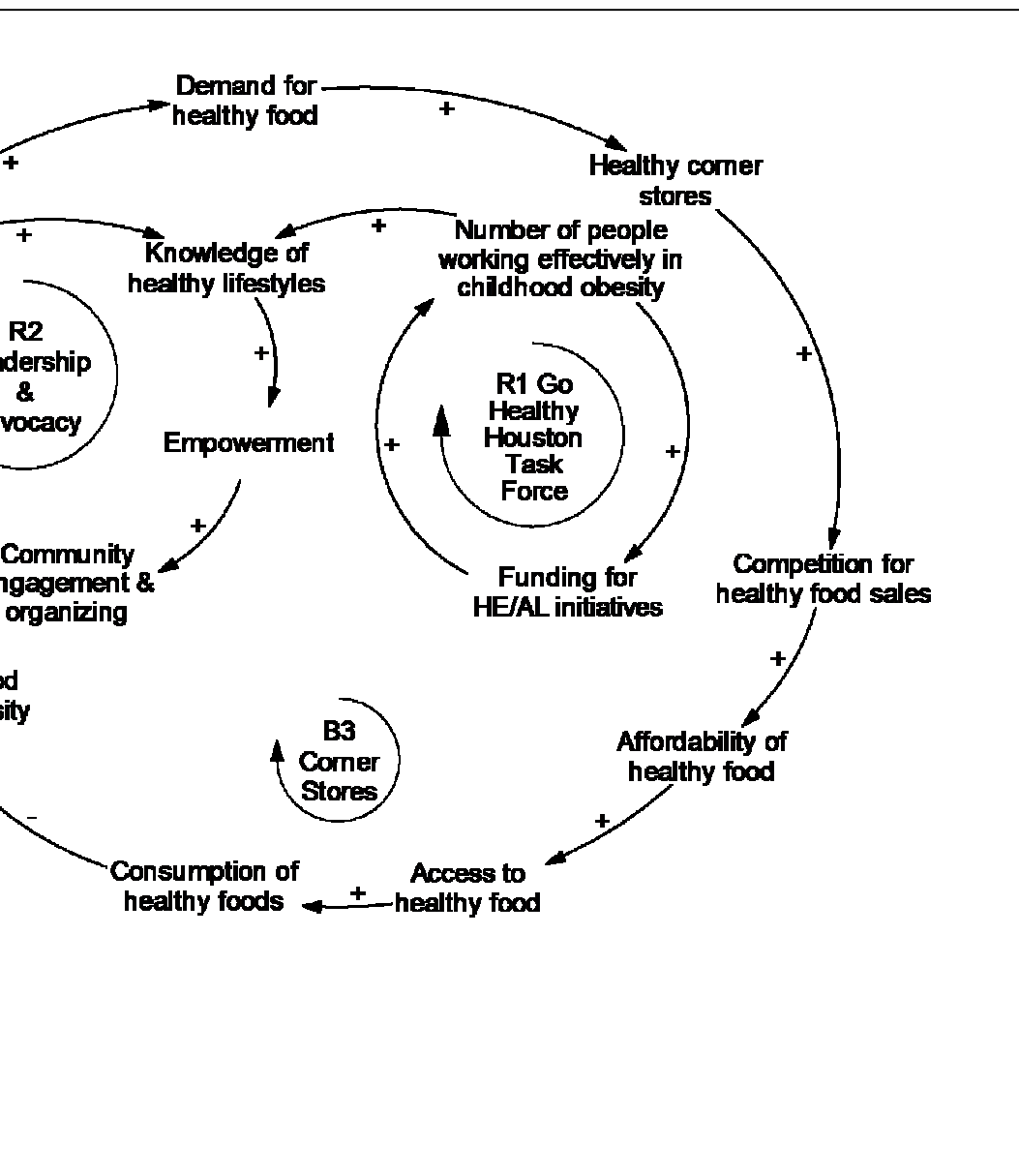


Figure 5: Parks and Play Spaces Feedback Loop



System insights for the partnership's parks and play spaces efforts include:

- Having access to parks and play spaces can provide the natural or built environmental spaces for kids to engage in free, unstructured play. Yet, participants also identified the necessary ingredient of having parental or adult supervision, and how this supervision is missing in many cases today resulting in children being instructed to stay indoors (see quote on previous page).
- Given the significant decline in the amount of free play, there is a significant demand for ways to increase adult supervision of children in parks and play spaces outside of organized sports and recreation programs.



In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including:

In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including:

- What are the optimal numbers and types of parks and other public recreation facilities for a neighborhood or urban area?
- What facilities are used by what groups in the community (e.g., children, adolescents, people in poverty)?
- What characteristics of parks and play spaces promote unstructured, free play among youth and families?
- What are the primary factors that have led to a substantial decline in the number of youth who engage in unstructured, free play?

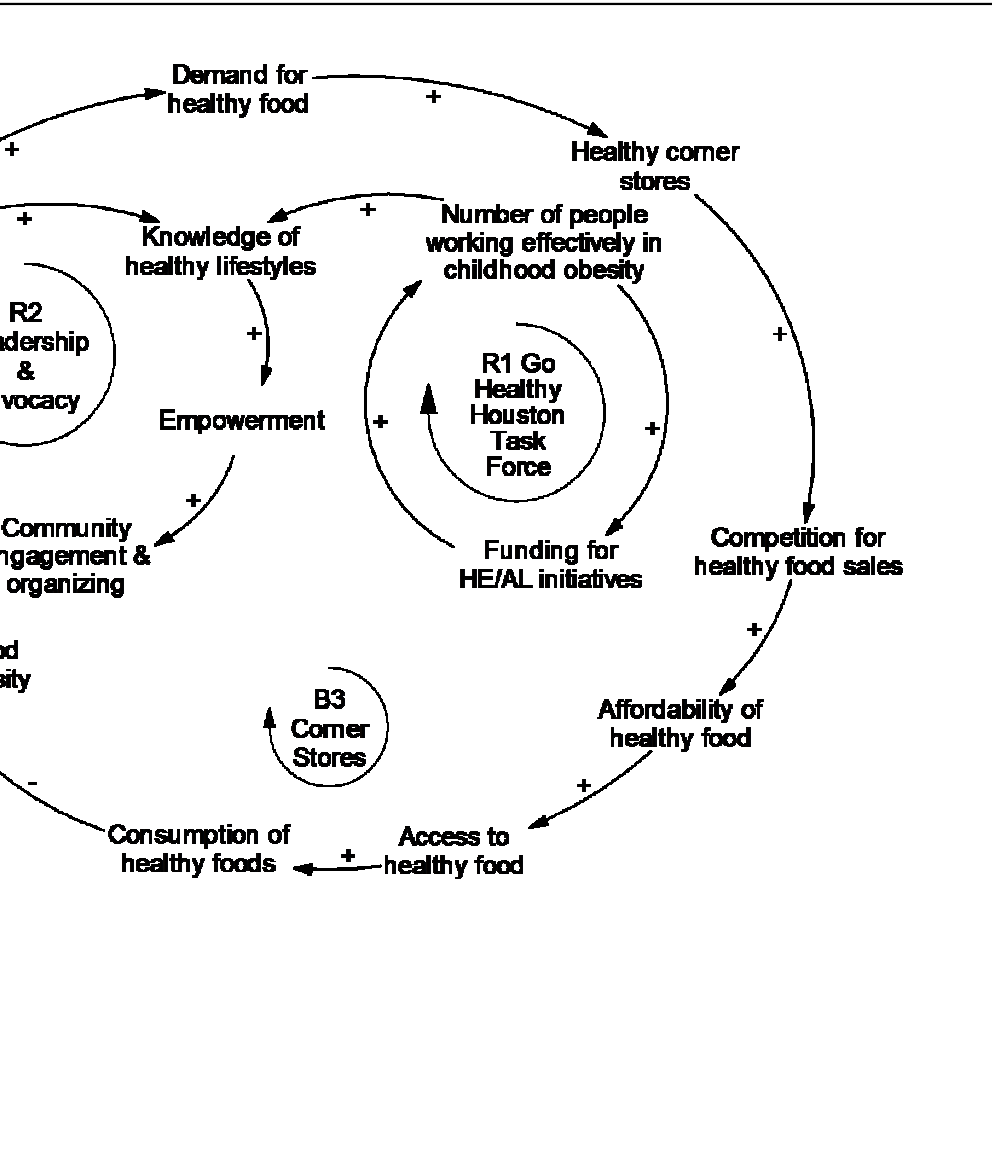
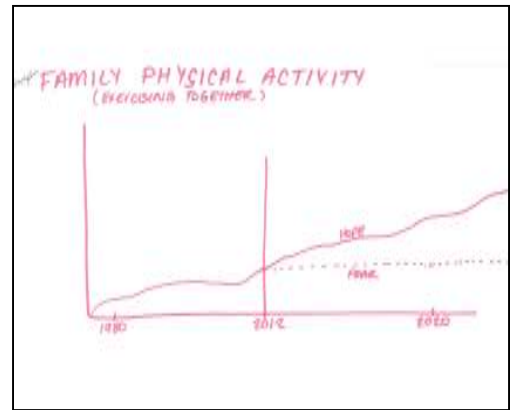
“When I was a child, most families had a stay at home parent who could supervise, even from a distance, free play and that’s rare now. You’re told to ‘go home and play video games until I get home from work’. Or, ‘to stay inside and don’t go out.’” (Participant)



transportation (e.g., sidewalks, bike lanes) and it appears that Houston is approaching or at approximately 50% of the infrastructure that is necessary throughout the area.

System insights for the partnership's active transportation efforts include:

- Environments with infrastructure for pedestrians and bicyclists can increase the number of families being active together. Sidewalks



and bike lanes — along with traffic calming and other safety measures — create opportunities for families to choose transportation modes that are more active and less sedentary (e.g., driving a car).

- Families spending more time together in physically active pursuits encourages more active lifestyles for children.
- Improvements to the built environment to support active living facilitate healthier lifestyles over time, although maintenance and security in these environments may be key to the success of these approaches.

In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including:

- What types of trips are made by car, bike, and foot in Houston?
- What streets have accommodations for pedestrians, bicyclists, and drivers? Are they safe for all users?
- What characteristics of the

infrastructure for pedestrians and bicyclists support families being active together (e.g., safety concerns for children in active transportation)?

- What are unintended benefits of families being active together (e.g., improvements in family dynamics and relationships, children learning to better navigate their environments)?

Corner Stores Feedback Loop

In yellow in Figure 7, the strategy feedback loop represents one of the *CAN DO Houston* strategies in corner stores to increase healthy eating in Houston, Texas.

Causal Story for Feedback Loop

Story A: Here, the increase in the number of healthy corner stores in the area increases competition for sales of healthy foods. Due to this competition, food vendors in the area are likely to increase the affordability of healthy foods in order to fair well in the local market. As healthy foods become more affordable, they are also more accessible to all populations in the Houston area regardless of income status. This enables more local residents to purchase and consume healthy foods, and, after some time, reduces rates of childhood overweight and obesity. As these rates decline, there is less need for advocacy initiatives striving to increase local demand for healthy foods in order to increase the number of healthy corner stores.

Story B: The alternative interpretation of this loops is that the lack of healthy corner stores leads to less of a competitive local market for healthy foods and less incentive to reduce the costs of healthy foods. With higher expenses for healthy foods, they are less accessible to the general population and likely result in less consumption of healthy foods, and, consequently, higher rates of childhood overweight and obesity. With these higher rates, more advocacy efforts are needed to increase demand for healthy foods in order to increase the number of healthy corner stores.

Reinforcing Loop and Notation

Like the previous two loops, this one also represents a balancing loop (one “-” sign). It also includes causal relationships representing more immediate effects (e.g., affordability of healthy food increasing access to healthy food), and, potentially, delayed effects (e.g., the demand for healthy foods increasing the number of healthy corner stores).

System Insights for *CAN DO Houston*

In the behavior over time graphs exercise, participants described a very steady and high rate of food deserts in lower-income areas of Houston since 2000. In addition, participants illustrated a very low number of

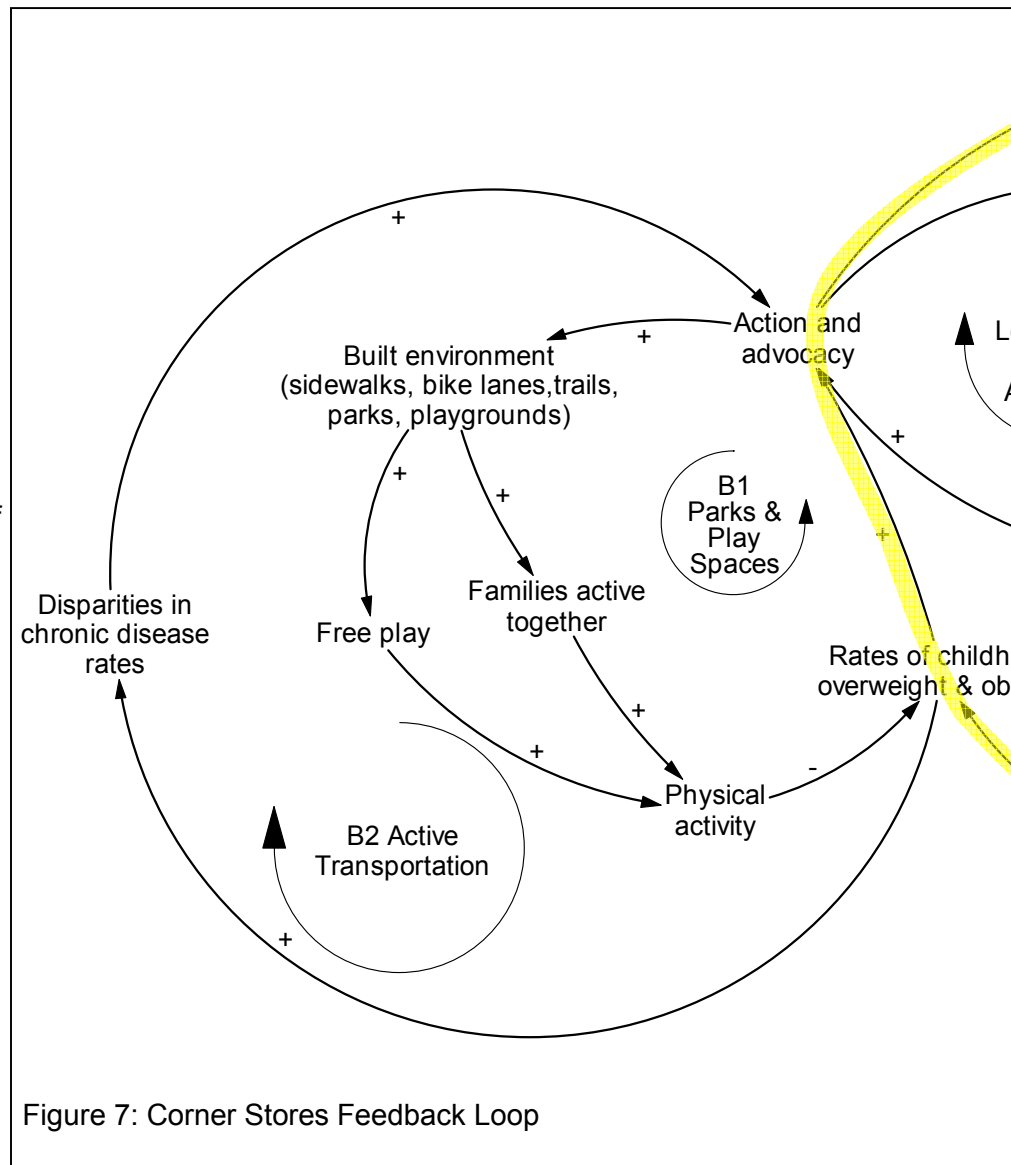


Figure 7: Corner Stores Feedback Loop

“I don’t eat beef or pork, and when I made that decision, I realized that it’s more expensive to eat healthy and then I don’t live in an inner-city neighborhood, but to find healthy choices, you know, that taste good and that my children will eat and things like that, I have to drive and then it’s not always financially feasible for me to buy those things.” (Participant)

Opportunities for Systems Thinking in Houston, Texas

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, reinforcing feedback loops, and balancing feedback loops, among others. For the *CAN DO Houston* partners, this storybook also summarized the healthy eating, active living, partnership and community capacity, social determinants, and health and health behaviors subsystems in the Houston causal loop diagram as well as five 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 Houston, Texas to promote healthy eating and active living as well as preventing childhood overweight and obesity.

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

- the participants represent a sample of the *CAN DO Houston* 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

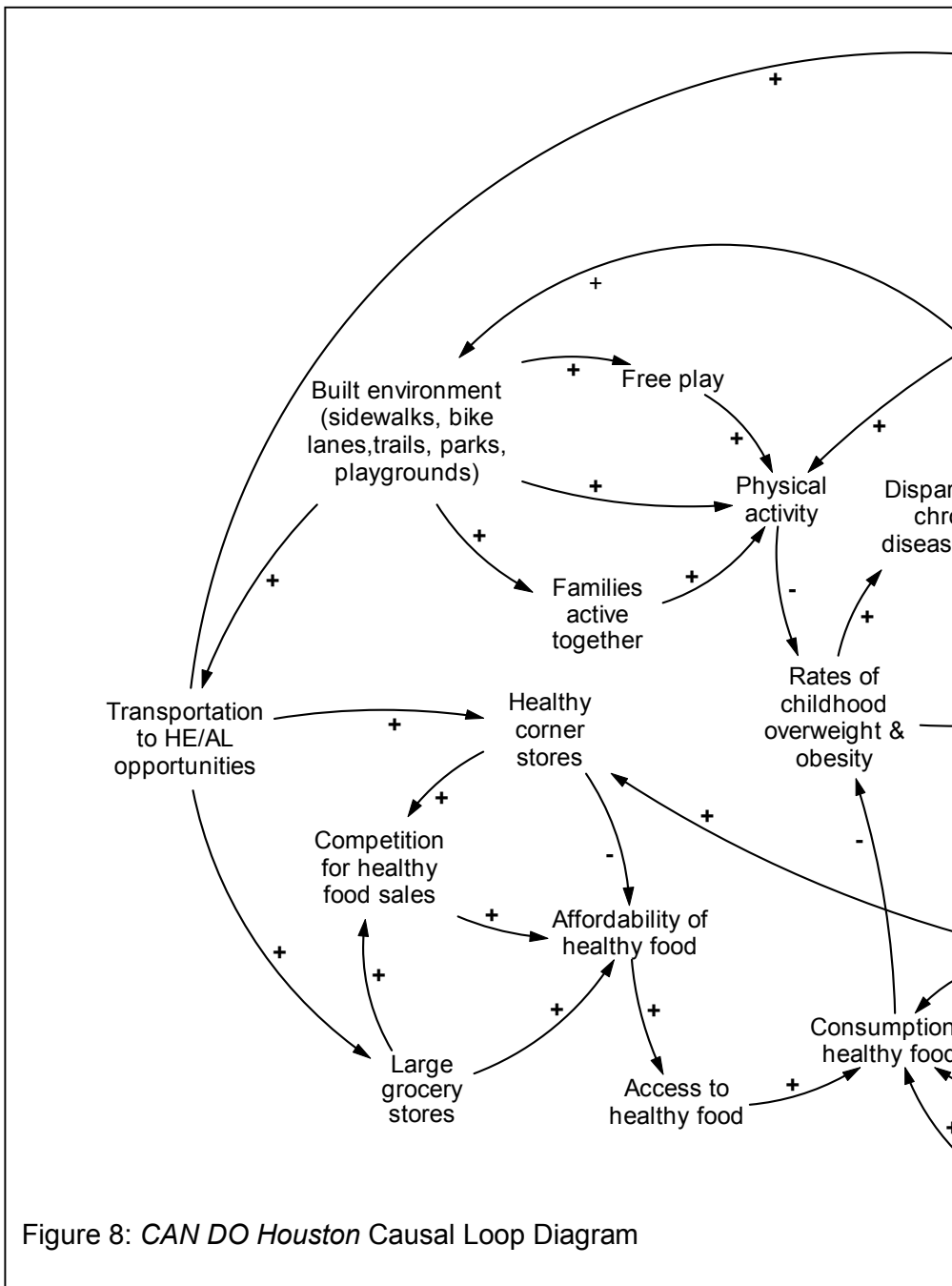


Figure 8: *CAN DO Houston* Causal Loop Diagram

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:

Andersen, D. F. and G. P. Richardson (1997). "Scripts for group model building." System Dynamics Review 13(2): 107-129.

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Meadows, D. (1999). Leverage points: places to intervene in a system. Retrieved from <http://www.donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

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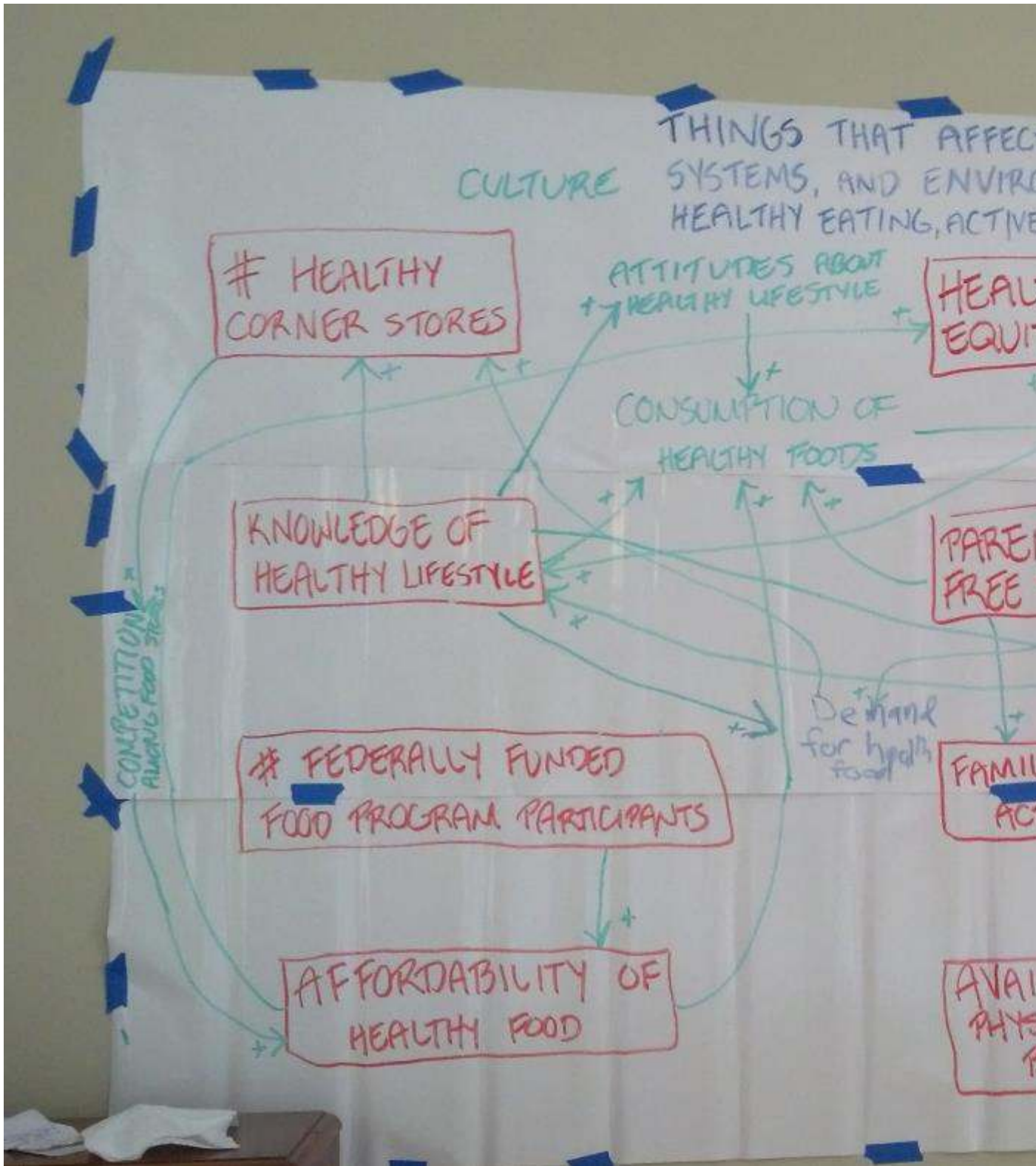
Vennix, J. (1996). Group model building. New York, John Wiley & Sons.

Zagonel, A. and J. Rohrbaugh (2008). Using group model building to inform public policy making and implementation. Complex Decision Making. H. Qudart-Ullah, J. M. Spector and P. I. Davidsen, Springer-Verlag: 113-138.

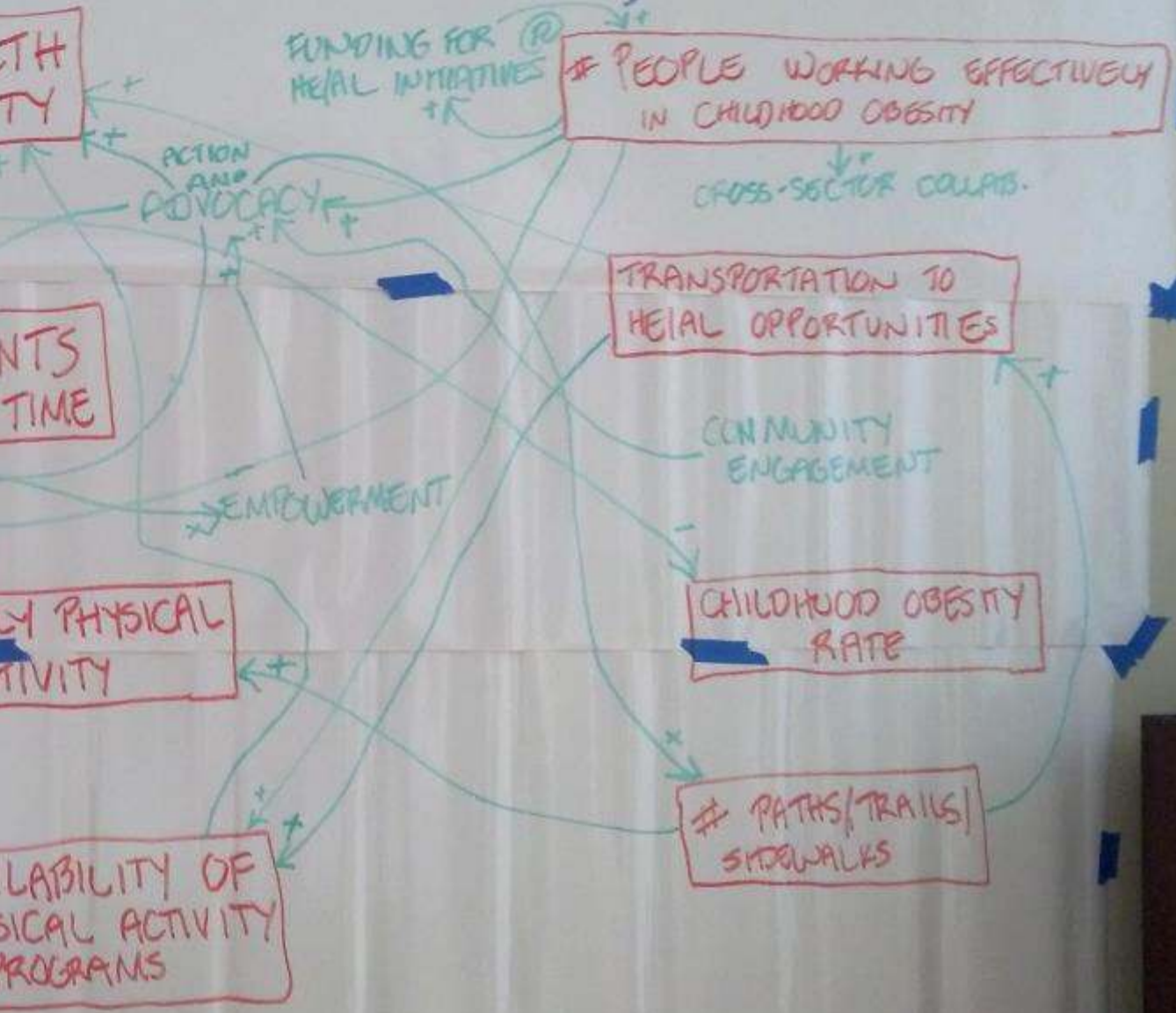
Appendix A: Behavior Over Time Graphs Generated during Site Visit

Houston, Texas: CAN DO Houston	
Categories	Number of Graphs
Active Living Behavior	6
Active Living Environments	2
Funding	0
Healthy Eating Behavior	1
Healthy Eating Environments	3
Marketing and Media Coverage	0
Obesity and Long Term Outcomes	3
Partnership & Community Capacity	1
Policies	2
Programs & Promotions (Education and Awareness)	5
Social Determinants of Health	1
Total Graphs	24

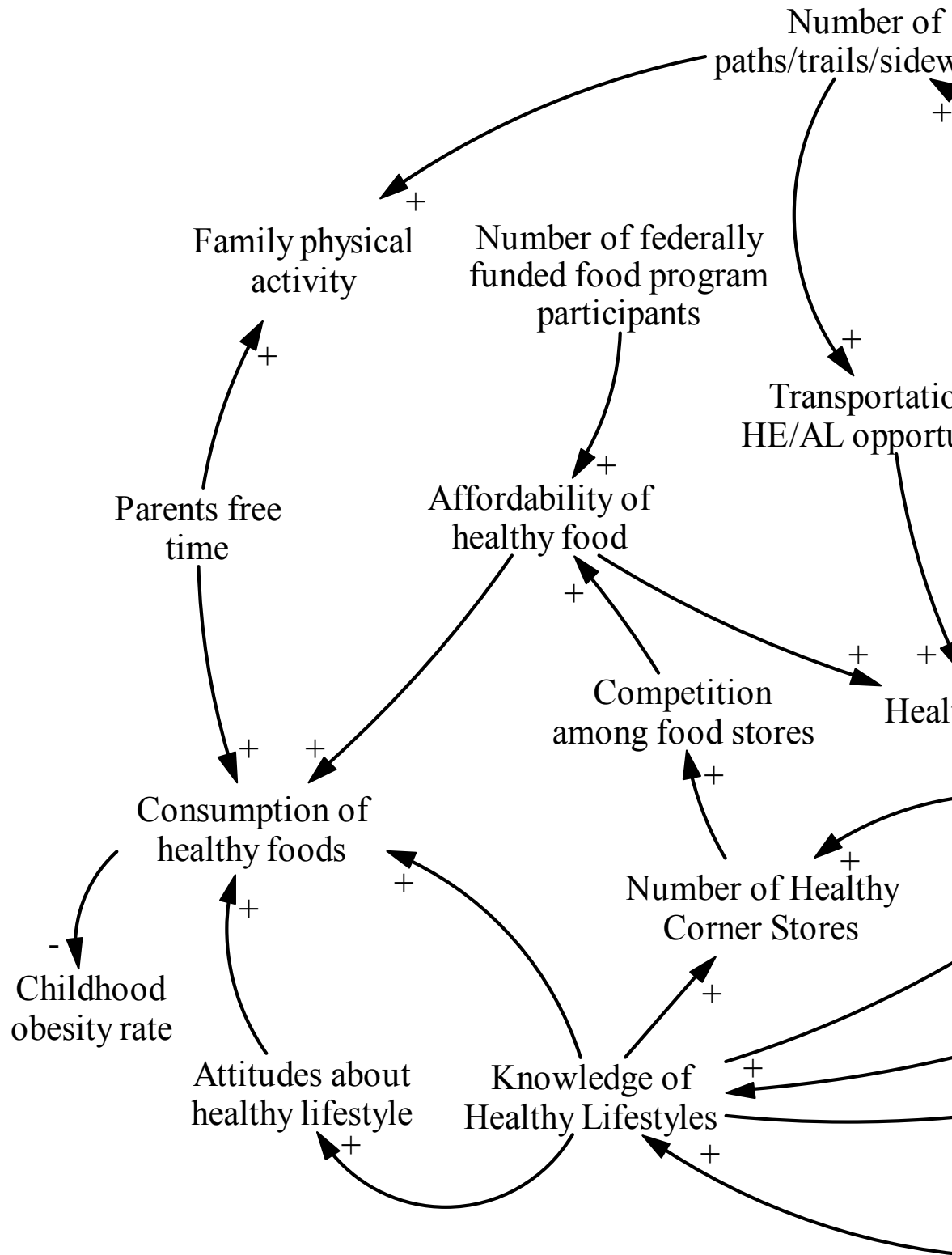
Appendix B: Photograph of the Original Version of the CAN DO Houston Causal Loop Diagram

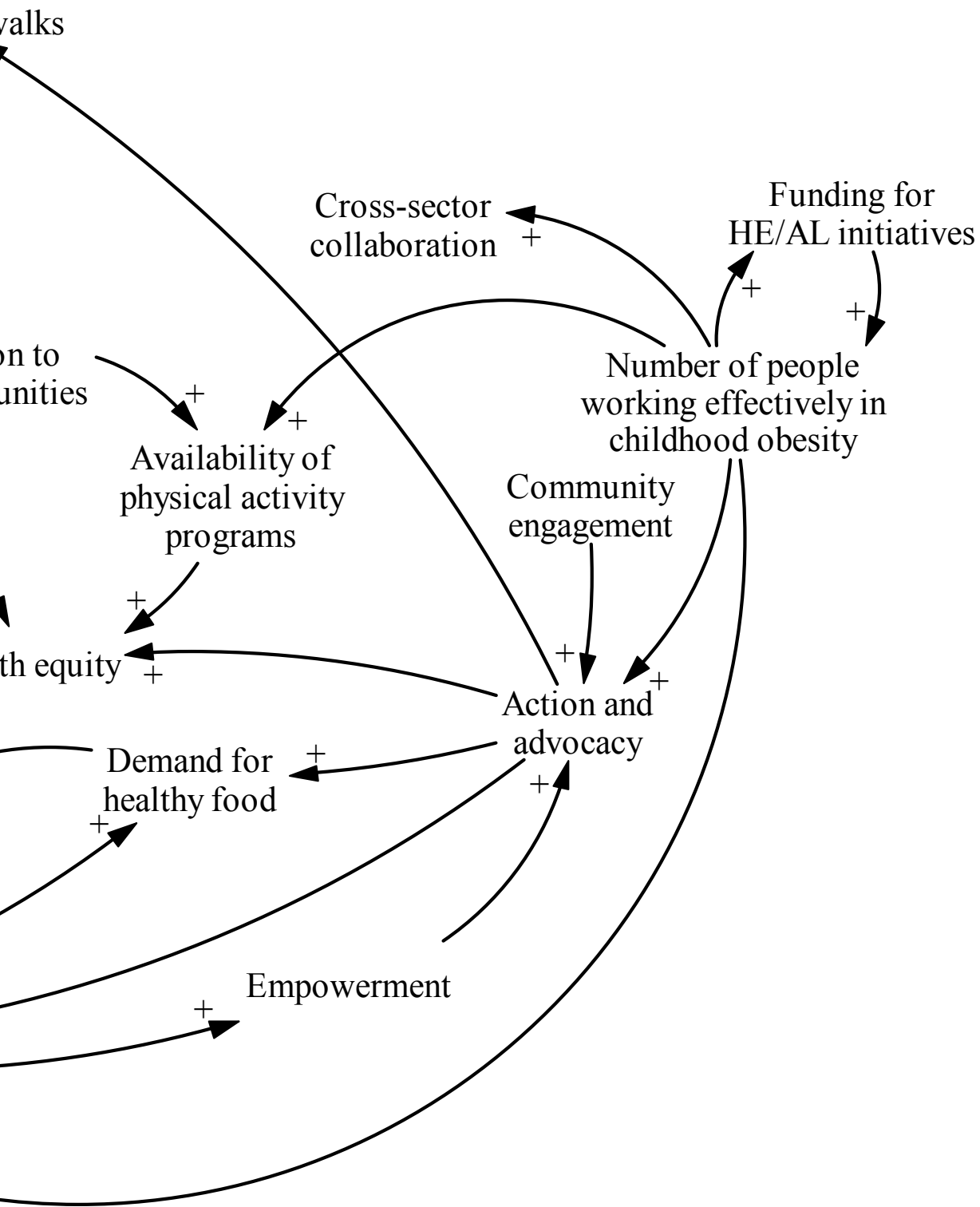


...T OR ARE AFFECTED BY POLICY,
...NMENT CHANGE (RELATED TO
...E LIVING, AND CHILDHOOD OBESITY)

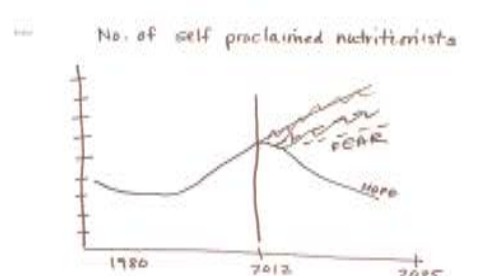
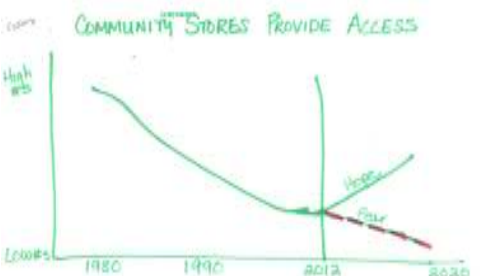
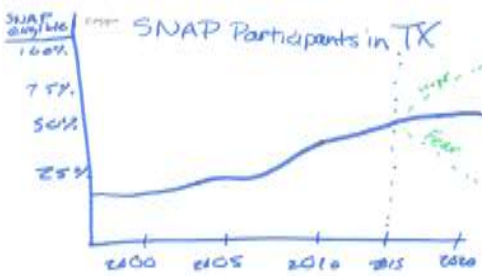
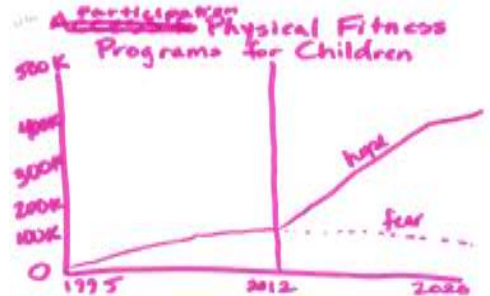
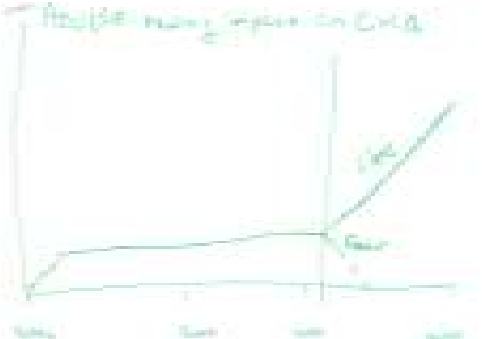
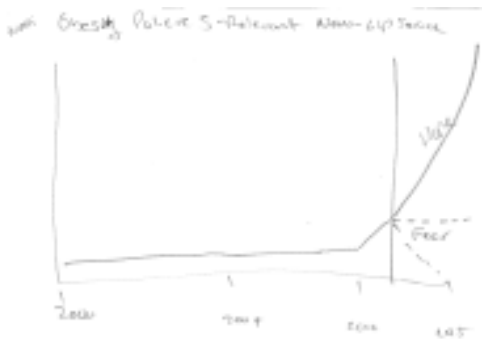
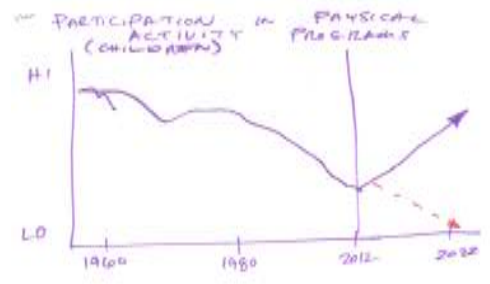
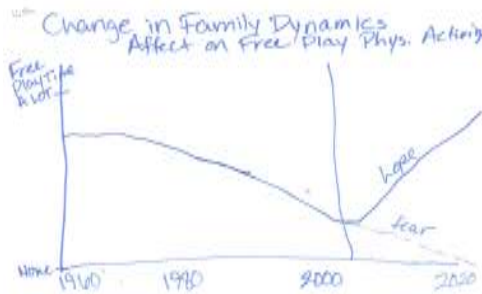
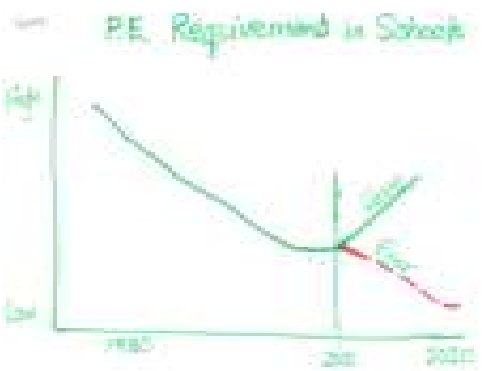
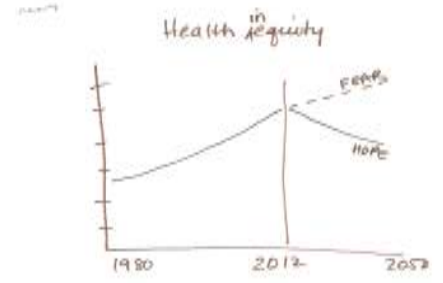
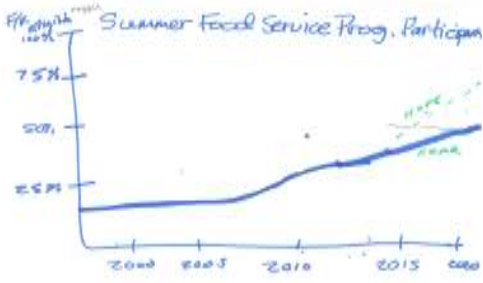


Appendix C: Original Translation of the Causal Loop Diagram into Vensim PLE

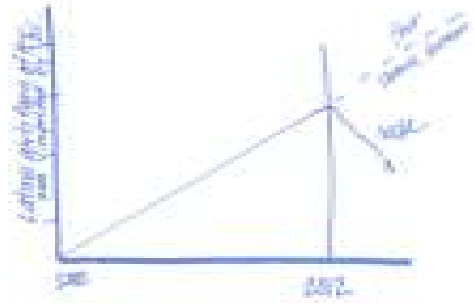




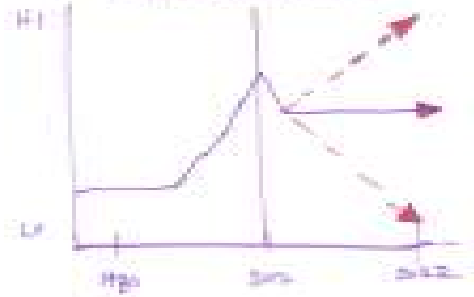
Appendix E: Behavior Over Time Graphs not Represented in the Storybook



Access to After-School
Sports and Programs



Participation in
Low-Intensity Activities



% of Obese/Overweight Children

