Systems Thinking in Communities:

Understanding the Causes of Inactivity, Poor Diet/Nutrition, and Childhood Obesity in Rancho Cucamonga, California

This community storybook was developed by Transtria LLC.

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Acknowledgments

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Introduction

Healthy RC 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 RC* project was to introduce systems thinking at the community level by identifying the essential parts of the Rancho Cucamonga, California 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, government agencies, community-based organizations) 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.

Rancho Cucamonga, California: Background and Local Participation

The City of Rancho Cucamonga is a relatively a newer city. Rancho Cucamonga was incorporated in 1977. There is not a designated downtown area per se; Victoria Gardens, an outdoor shopping mall , was identified as the closest type of downtown area within the city. Before incorporating the city, Rancho Cucamonga was part of other cities, such as Ontario and upland, California.

Rancho Cucamonga is located in San Bernardino County, one of the largest geographic counties in the country. The area identified as 'West End' is located from the Fifteen Freeway to the west county line. The 'West End' area of the county is a dense urban and highly populated part of San Bernardino County. Fifty-five percent of the county population resides in the 'West End' area, which is approximately one percent of the geographic size of San Bernardino County.

Rancho Cucamonga has a total population of 165,269, which is majority White (62%). Latino's comprise one-third (34%) of the total population, 9% are African-American, 10% Asian and 12% other.

The City of Rancho Cucamonga is the lead agency for the HKHC grant. The City of Rancho Cucamonga employees 450 individuals to provide services to the approximate 178,000 city residents. Rancho Cucamonga elects four city council members and one mayor who serve a four year term. The City Manager of Rancho Cucamonga is an appointed position, which does not have a term limit.

Three sub-committees formed within the partnership: the nutrition standards sub-committee, the community gardens sub-committee, and the farmers' market sub-committee. The nutrition standards sub-committee meets monthly and reports to the full partnership meeting every three months. The nutrition sub-committee was referred to as the 'worker-bees', in that this group identifies strategies to support the nutrition standards established for the community. Strong leadership with the nutrition standards sub-committee comes from two co-chairs, one who works for the hospital and the other who works for a non-profit agency in the community. The coalition leaders felt that future sub-committees were needed to ensure all efforts are being met to reach their health goals. Future sub-committees proposed were a sub-committee for the breastfeeding wellness initiative and one for community engagement.

Healthy RC's Priorities and Strategies

The partnership and capacity building strategies of *Healthy RC* included:

- **Community Champions:** a group of local resident leaders from Southwest Cucamonga was formed as part of Healthy RC to build capacity and empower resident input in decision-making. The Community Champions played an integral role in creating and passing policies.
- **Youth Leaders:** a program was established, based on success from the Community Champions program, and was designed to engage middle and high school youth in healthy eating and active living efforts.

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

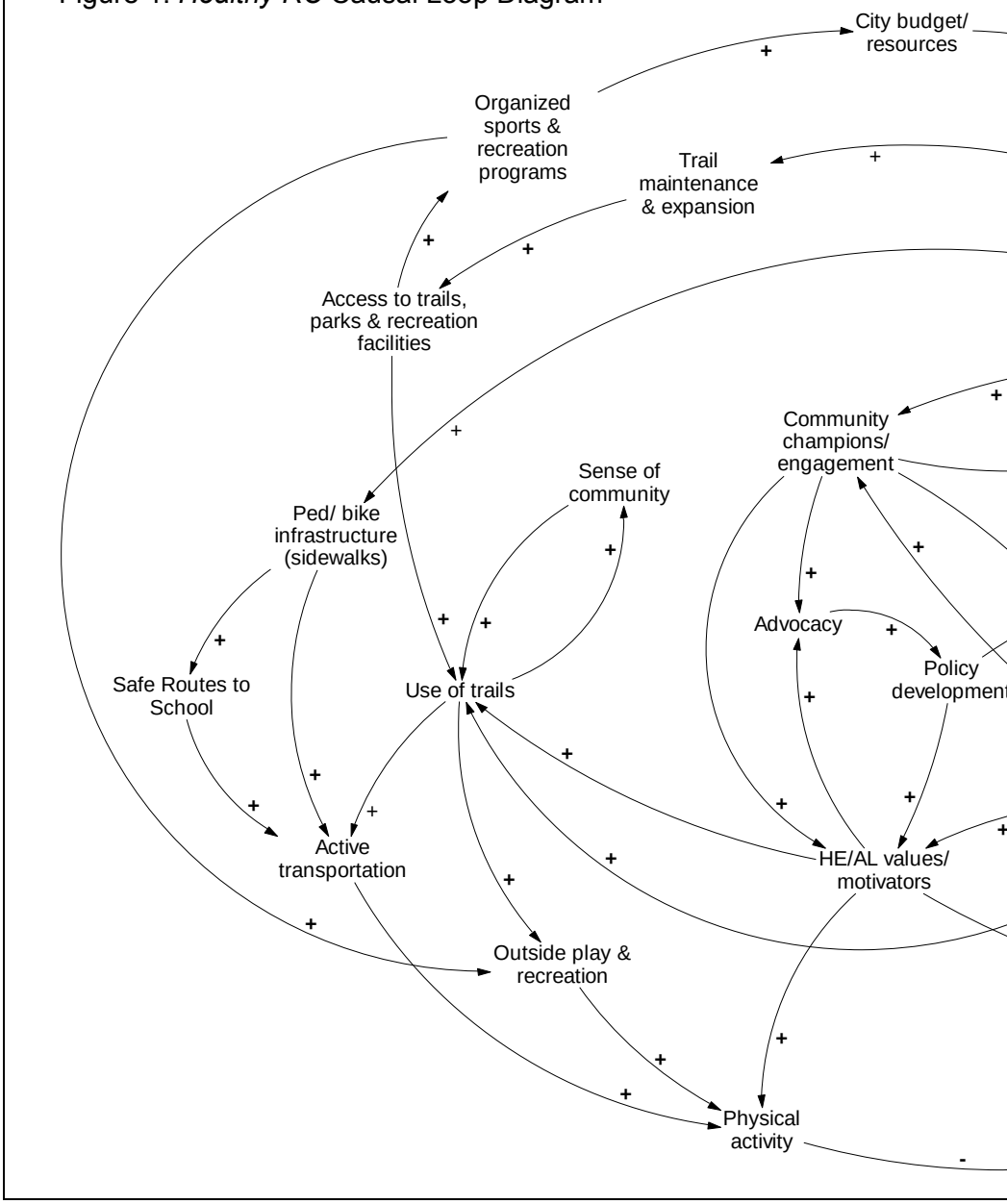
- **Farmers' Markets:** Two farmers' markets were developed in Rancho Cucamonga with access to financial assistance through the Bringing Home Health program. Additionally, a farmers' market development code amendment was passed by the City Council to amend regulations allowing farmers' markets in areas of the city where opportunities for healthy eating were less accessible.
- **Community Gardens:** A Community Garden Development Code was approved by the City Council to amend regulations allowing gardens in areas of the city where opportunities for healthy eating were less accessible. As a result of this code, gardens were developed in housing complexes, schools, and churches.
- **Active Transportation:** A Complete Streets resolution was passed, which resulted in such infrastructure improvements as a pedestrian bridge at the Pacific Electric Trail (PET), a trial head for the PET trail, a bike trail completed along Deer Creek Channel, flashing beacons, sidewalks, and restriped crosswalks, which were installed as part of the Safe Routes to School program.
- **City Healthy Vending:** A Food and Beverage Policy resolution was passed by the City Council requiring that all city facilities implement healthy nutrition standards, which specified that at least 50% of the items in the vending machines must be healthier options.
- **Healthy Corner Stores:** The start of a healthy corner store initiative began with one liquor store providing access to healthy foods.
- **Healthy RC Dining:** Sixteen restaurants participate in providing healthier food options on their menu.

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

Systems Thinking in Communities: Rancho Cucamonga, California

"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 Rancho Cucamonga, California 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.

Figure 1: *Healthy RC* Causal Loop Diagram



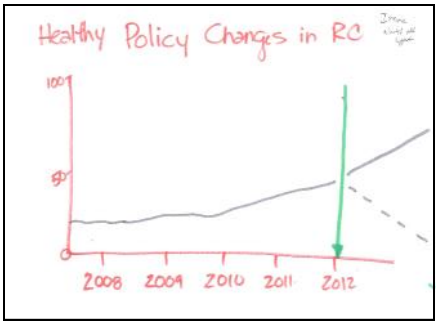
Models, such as Figure 1, provide a way to visualize all the elements of the system and their interactions, with a focus on causal relationships as opposed to associations. Through the model, specific types of causal relationships, or feedback loops, underlying the behavior of the dynamic system, can 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

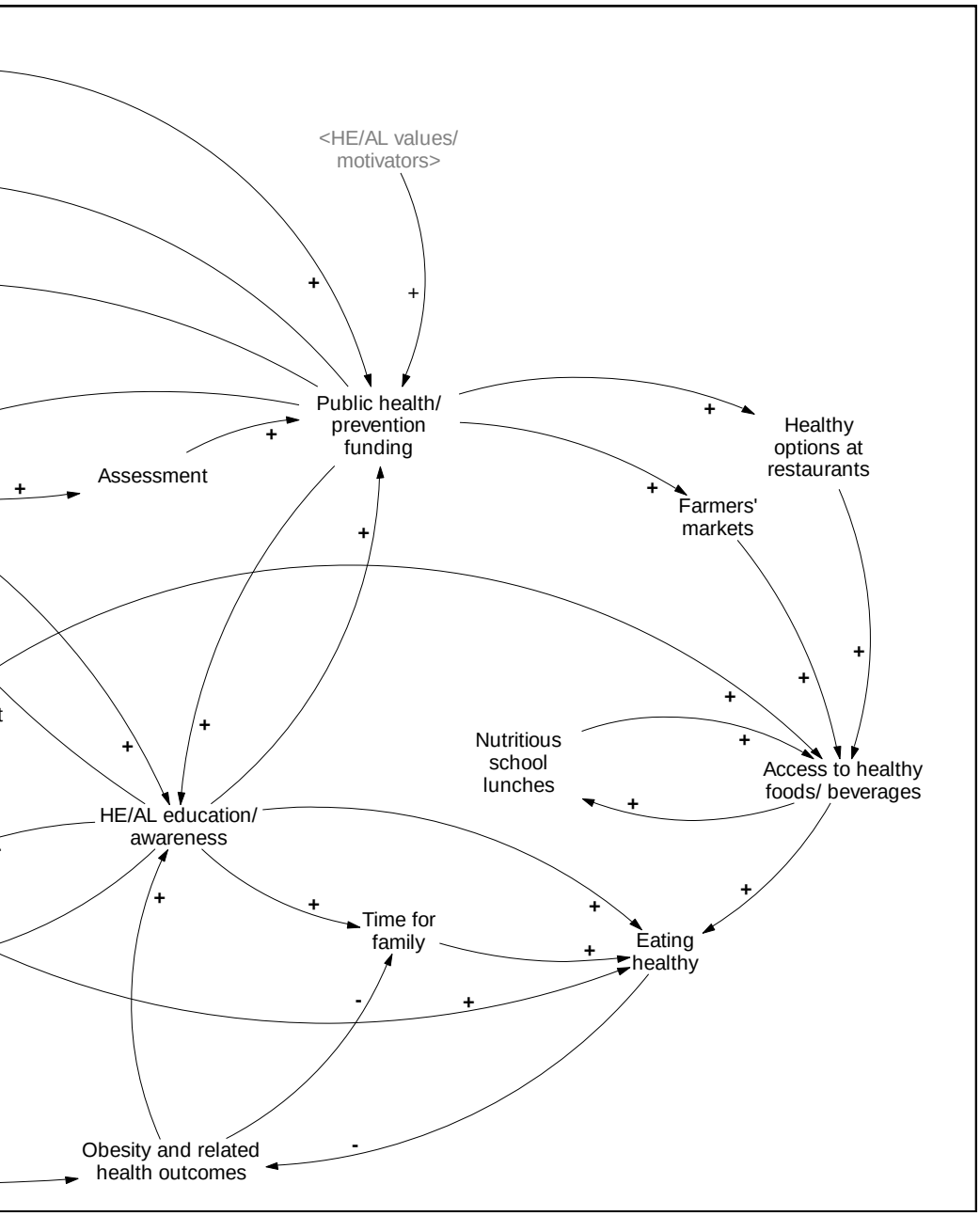
Members of the *Healthy RC* partnership participated in a group model building session in September, 2012 and generated this system. also referred to as a causal loop diagram (Figure 1). Participants in the group model building session included residents and representatives from government agencies and community-based organizations. 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.

<u>Behavior Over Time Graphs</u>

To identify the range of things that affect or are affected by policy, system, and environmental changes in Rancho Cucamonga 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 healthy policy changes, the percent of healthy policy changes has increased since 2007 and the participants hopes that this increase will continue 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 champions/ engagement → assessment → public health/ prevention funding → community champions/ engagement.

What is important to notice is that there are other feedback loops interacting simultaneously to influence or to be influenced by community champions/ engagement. Some variables may increase community champions/ engagement 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 RC* 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 Rancho Cucamonga, California and to stimulate greater conversation related to Rancho Cucamonga's 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 Rancho Cucamonga, California. 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.

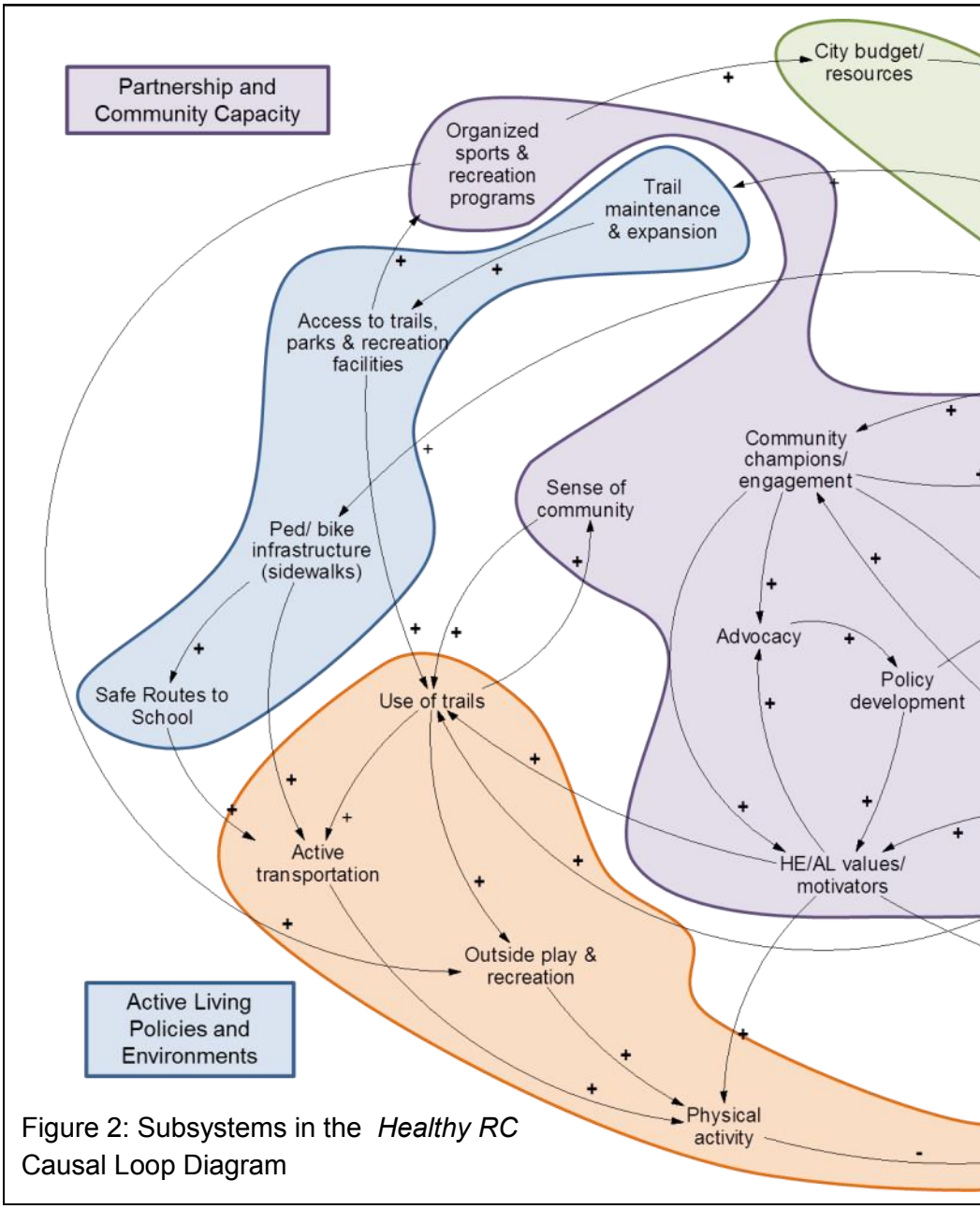


Figure 2: Subsystems in the *Healthy RC* Causal Loop Diagram

<u>Healthy Eating Policies and Environments (Red)</u>

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 six graphs related to policy or environmental strategies (e.g., farmers' markets) or contexts (e.g., nutritious school lunches) that affected or were affected by the work of *Healthy RC*. The variables represent participants' conversations from the behavior over time graph and causal loop diagram exercises.

<u>Active Living Policies and Environments (Blue)</u>

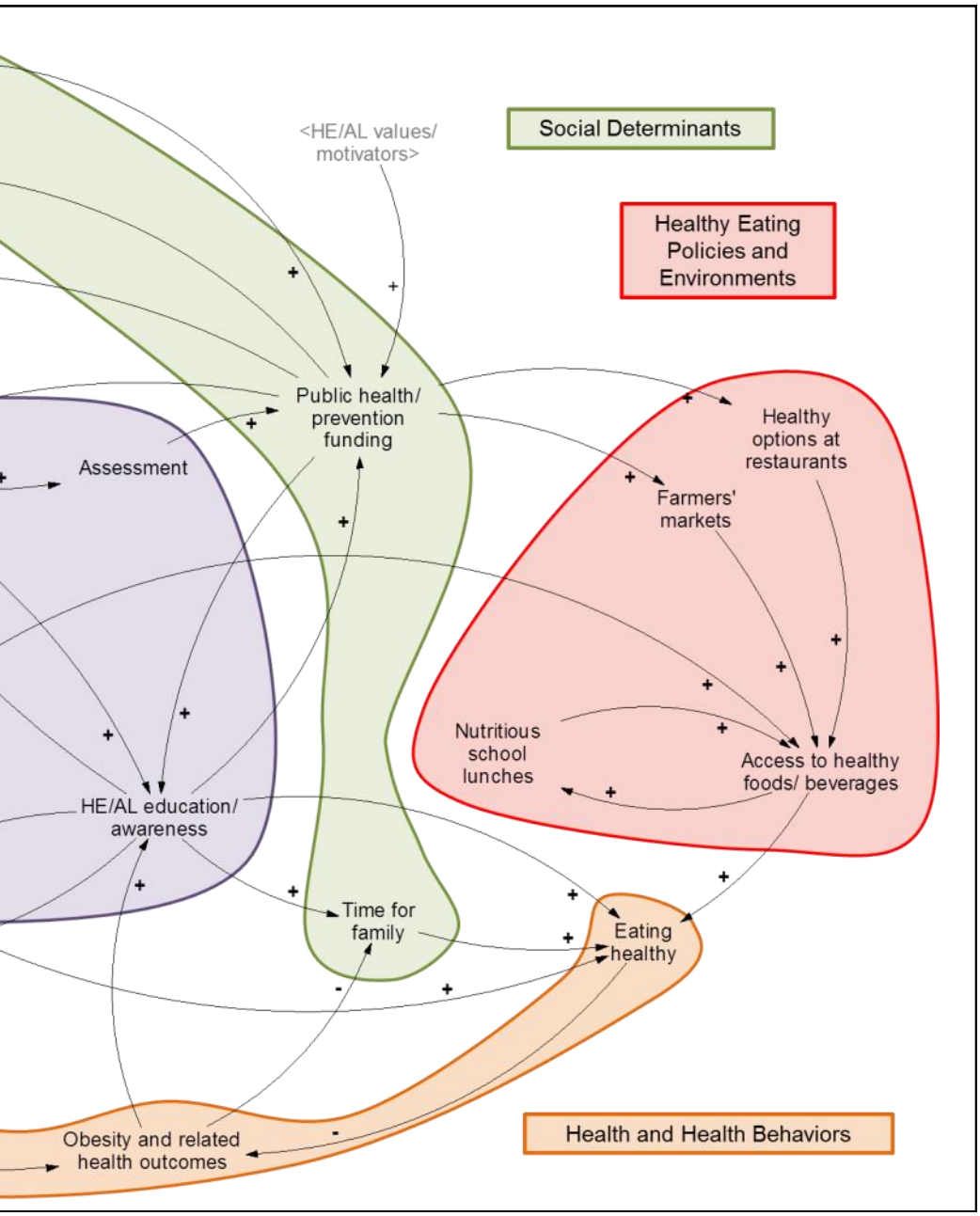
The active living policy and environmental subsystem includes design, planning, construction, and enforcement or maintenance related to access to opportunities for active transportation and recreation. For this topic, the group model building participants developed four graphs related to policy or environmental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

<u>Health and Health Behaviors (Orange)</u>

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., use of trails, active transportation).

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 RC* worked to engage community champions and youth leaders. This subsystem also includes community factors outside the partnership that may influence or be influenced by their efforts, such as sense of community.



Social Determinants

Finally, the social determinants subsystem denotes societal conditions (e.g., public health and prevention funding) and psychosocial influences (e.g., time for family) 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 RC* partners or by other representatives in Rancho Cucamonga, California. 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 RC*. 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.

Active Transportation (Safe Routes to School) Feedback Loop

To simplify the discussion about feedback loops, several loops drawn from the Healthy RC CLD (see Figures 1 and 2) are shown in Figure 3. While the CLD provides a theory of change for the childhood obesity prevention movement in Rancho Cucamonga, California, each feedback loop tells a story about a more specific change process.

Causal Story for Feedback Loop

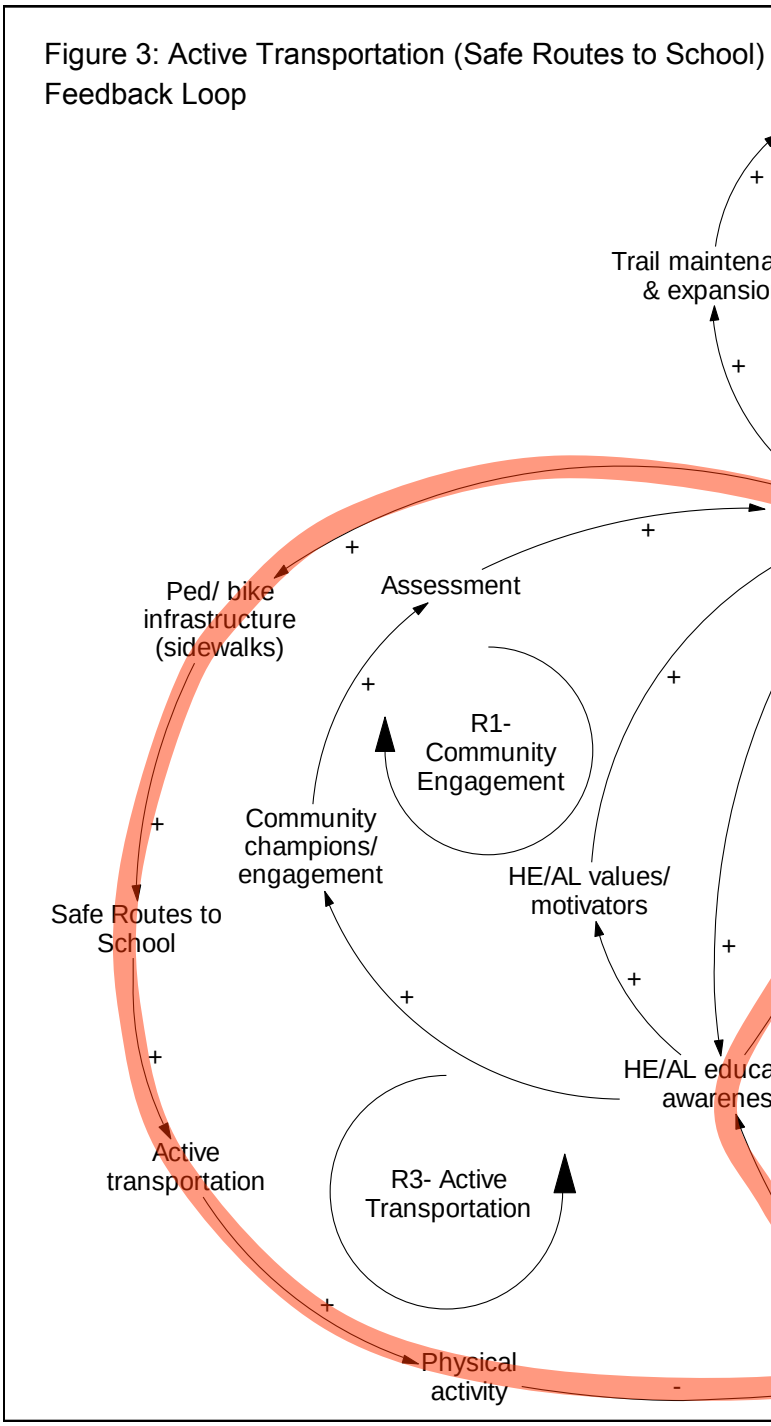
Story A: In this case , the story is about active transportation and Safe Routes to School (red highlighted loop in Figure 3). Rancho Cucamonga, California partners passed a Complete Streets resolution and made several infrastructure improvements (e.g., sidewalks, crosswalks), with many of these installed as part of the Safe Routes to School program. Participants described how improvements to pedestrian and bike infrastructure increases the number of safe routes to school and active transportation, such as walking and bicycling. These transportation choices increase overall physical activity and reduce obesity. In turn, less obesity demands less education and awareness programs for active living as well as less public funding to support active living environments (as these are already funded and in place).

Story B: While the preceding story reflected a positive scenario for Rancho Cucamonga, California, the same feedback loop also tells the opposite story. An absence of pedestrian and bike infrastructure leads to less safe environments for kids to walk and bike to school. As more kids are transported by cars, these children are getting less physical activity and increasing their risk for obesity. Consequently, higher rates of obesity require efforts to increase awareness and education about the benefits of active living in order to stimulate public funding to support active living environments, such as infrastructure for pedestrians and bicyclists.

Balancing Loop and Notation

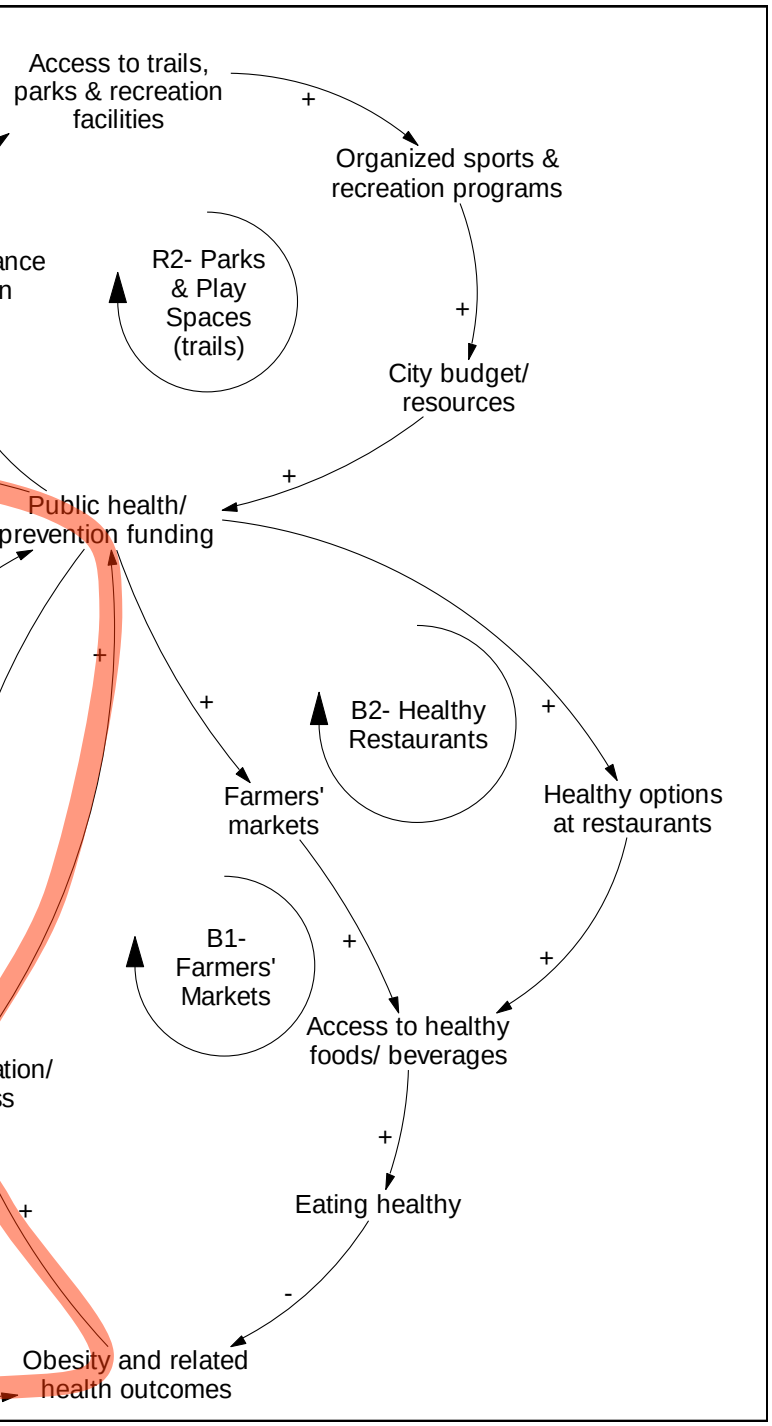
These stories represent a balancing loop, and the notation in the feedback loop identifies it as a balancing loop (see “B3 — Active Transportation” and red highlighted loop in Figure 3). The words represent variables of quantities that increase and decrease as illustrated in the stories above. These 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.

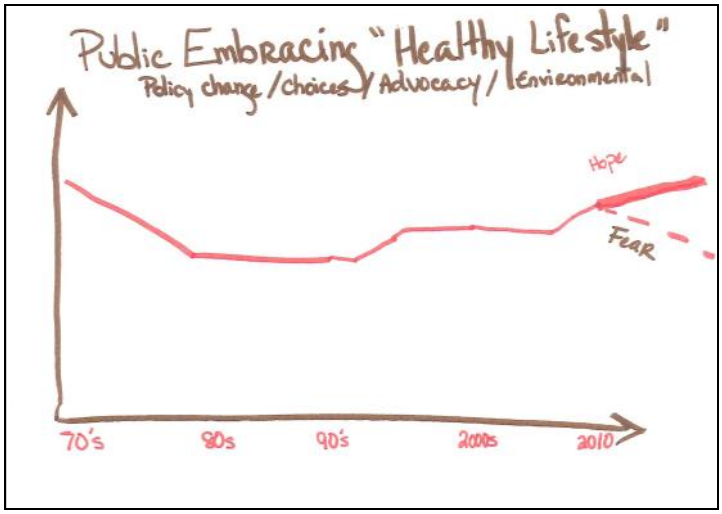
Figure 3: Active Transportation (Safe Routes to School) Feedback Loop



“The fear that I have is, now that we’re losing our funding, we may not be able to keep up with the growth of the community, so percentage-wise, if we’re not able to fund additional facilities, some of those opportunities may decrease.” (Participant)

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.





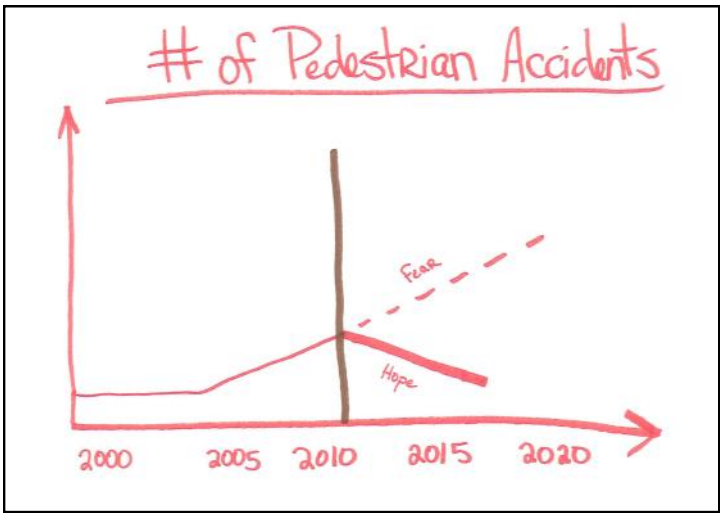
Looking specifically at the "+" or "-" notation, a feedback loop that has an odd number of "-" signs, or polarities in the loop, is considered a balancing loop. Reinforcing loops, with zero or an even number of "-" signs, are another type of feedback loop.

In isolation, this balancing loop represents the influence of pedestrian and bike infrastructure on physical activity and obesity. To understand other influences on these variables, 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.

<u>System Insights for *Healthy RC*</u>

Participants also identified more recent increases in public support for healthy lifestyles in Rancho Cucamonga, California; yet, at the same time, there has also been a steady increase in pedestrian accidents since 2005 (see behavior over time graphs).

From the systems thinking exercises, several insights can inform partners' active transportation strategy. For instance, building on current trend in support of healthy lifestyles and noting the rising number of pedestrian accidents, partners can work to address the waning funding (see quote on previous page) and seek local support to fund these infrastructure improvements.

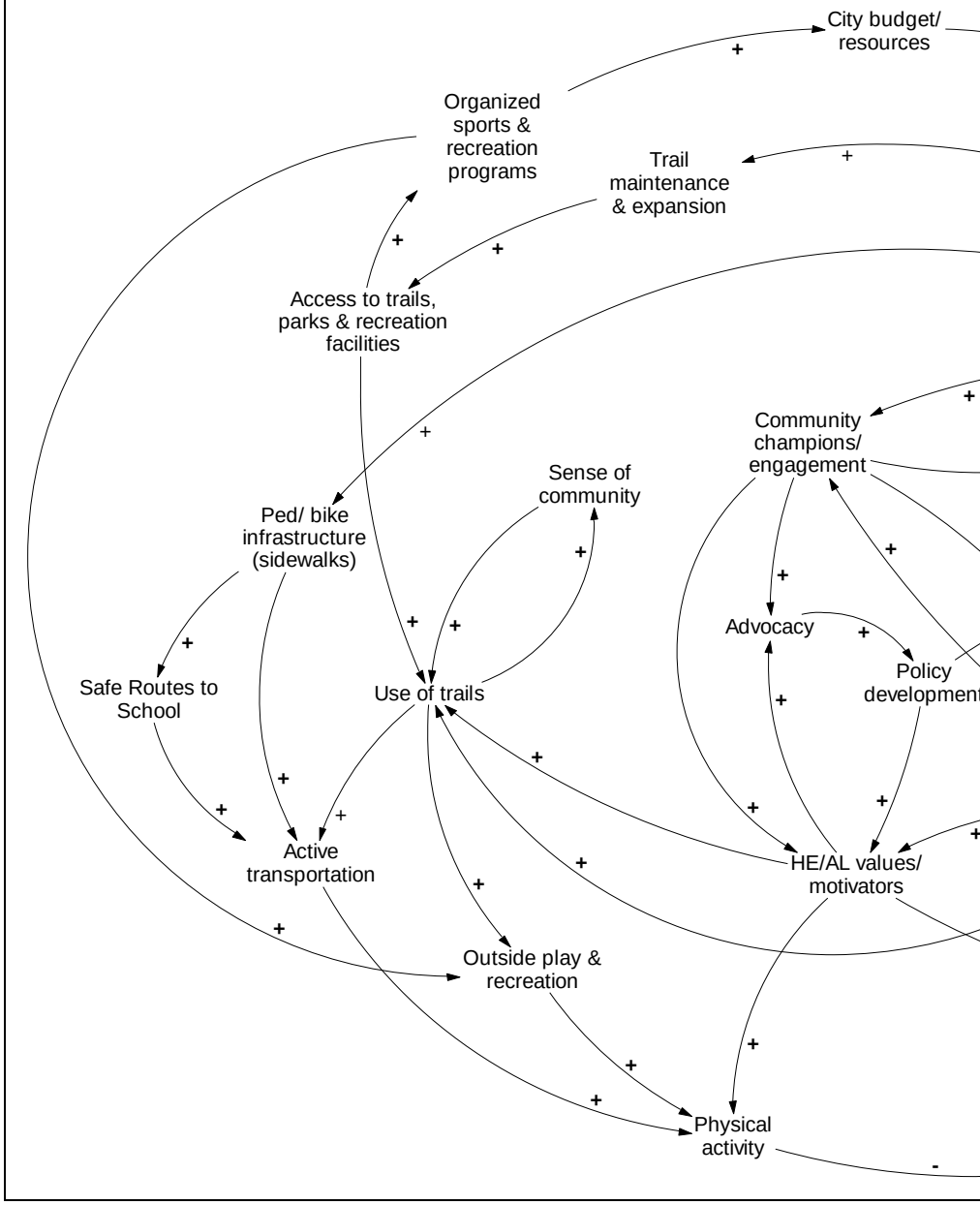


In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including evaluation of pedestrian and bike infrastructure improvements' influence on physical activity and the number of pedestrian accidents.

Opportunities for Systems Thinking in Rancho Cucamonga, California

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 *Healthy RC* partners, this storybook also summarized the healthy eating, active living, partnership and community capacity, social determinants, and health and health behaviors subsystems in the Rancho Cucamonga causal loop diagram as well as an example feedback loop corresponding to the partnership's primary strategies.

Figure 4: *Healthy Rancho Cucamonga* Causal Loop Diagram



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.

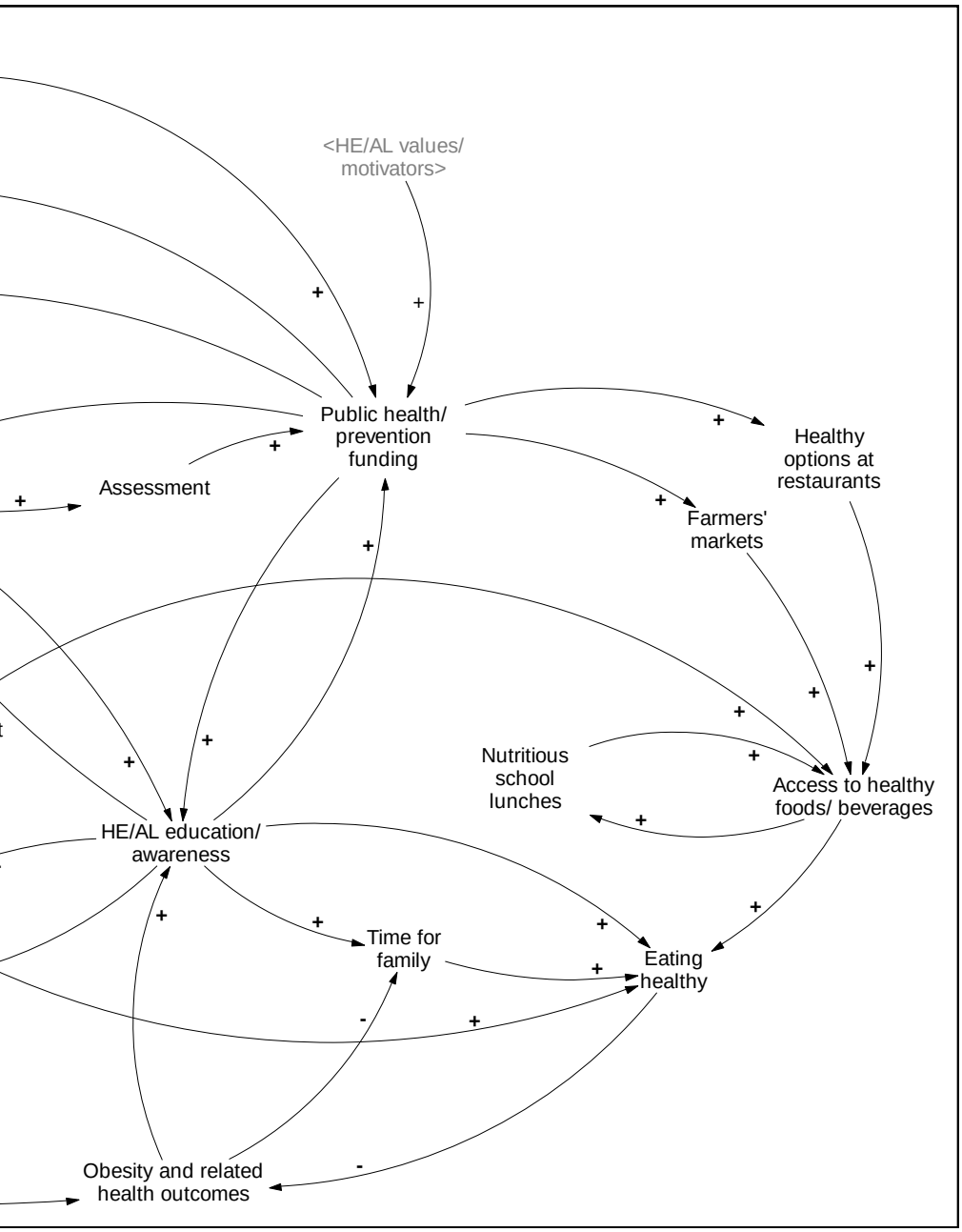
This represented a first attempt to collectively examine the range of things that affect or are affected by policy, system, and environmental changes in Rancho Cucamonga, California to promote healthy eating and active living as well as preventing childhood overweight and obesity.

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

- the participants represent a sample of the *Healthy RC* 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 E) 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; 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 Rancho Cucamonga 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: Photograph of the original version of the *Healthy RC* Causal Loop Diagram
- Appendix C: Original translation of the causal loop diagram into Vensim PLE
- Appendix D: Transcript translation of the causal loop diagram into Vensim PLE
- Appendix E: 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:
Andersen, D. F. and G. P. Richardson (1997). "Scripts for group model building." System Dynamics Review 13(2): 107-129.

Hovmand, P. (2013). Community Based System Dynamics. New York, NY: Springer.

Hovmand, P. S., et al. (2012). "Group model building "scripts" as a collaborative tool." Systems Research and Behavioral Science 29: 179-193.

Institute of Medicine (2012). An integrated framework for assessing the value of community-based prevention. Washington, DC, The National Academies Press.

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/

Richardson, G. P. (2011). "Reflections on the foundations of system dynamics." System Dynamics Review 27 (3): 219-243.

Rouwette, E., et al. (2006). "Group model building effectiveness: A review of assessment studies." System Dynamics Review 18(1): 5-45.

Sterman, J. D. (2000). Business dynamics: Systems thinking and modeling for a complex world. New York, NY: Irwin McGraw-Hill.

System Dynamics in Education Project. (1994). Road maps: A guide to learning system dynamics. Retrieved from http://www.clexchange.org/curriculum/roadmaps/

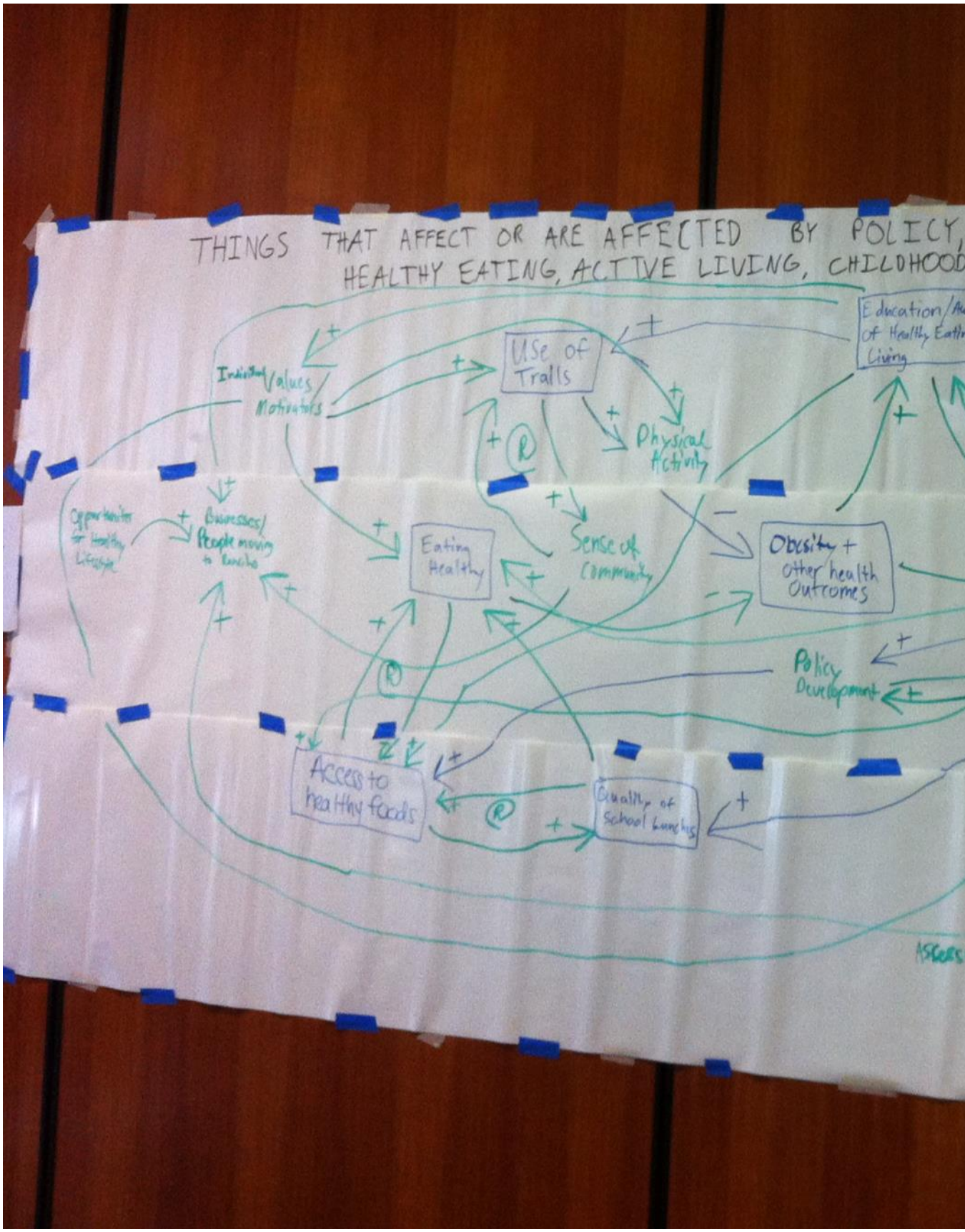
Vennix, J. (1996). Group model building. New York, John Wiley & Sons.

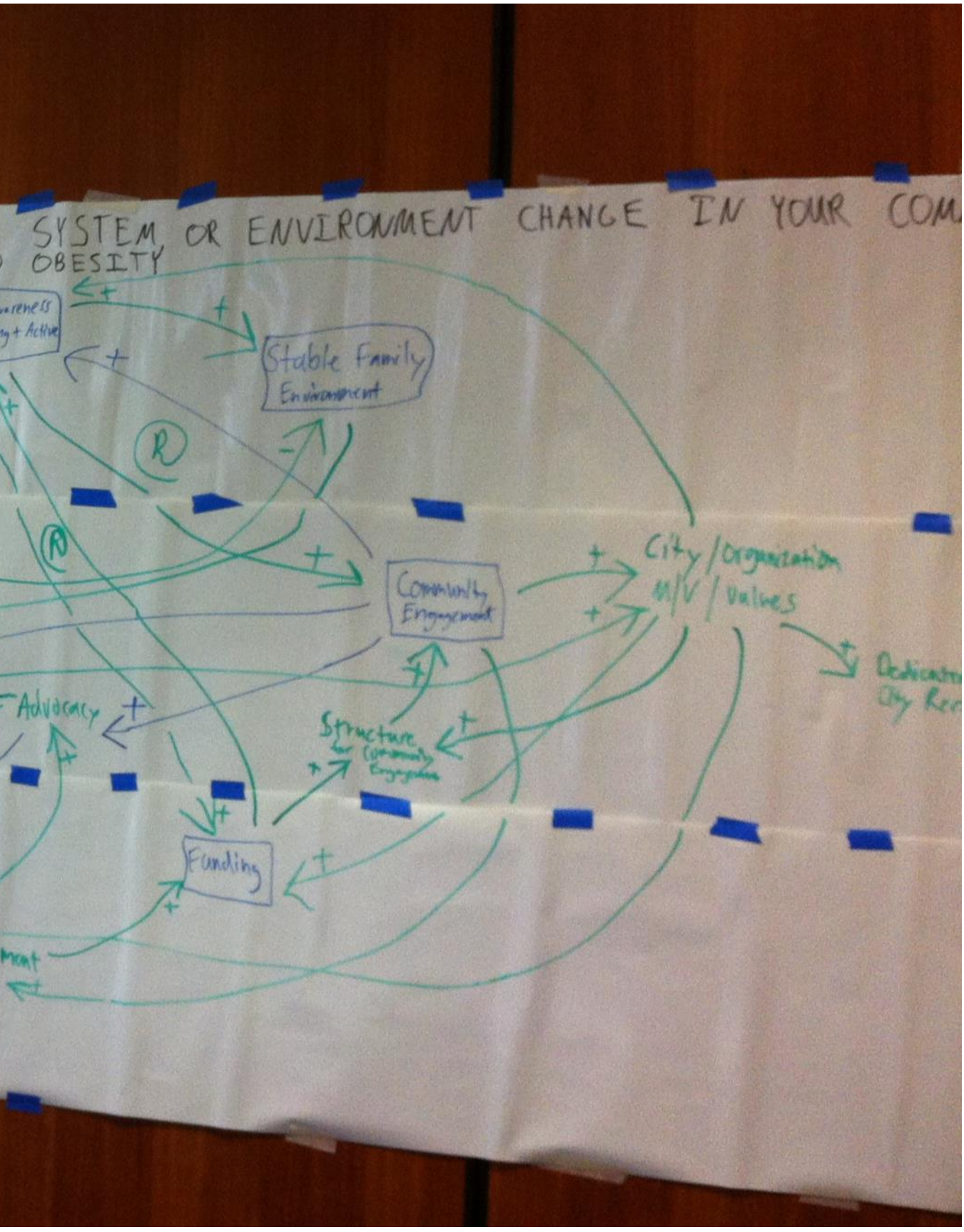
Zagonel, A. and J. Rohrbaugh (2008). Using group model building to inform public policy making and implementation. Complex Decision Making. H. Qudart-Ullah, J. M. Spector and P. I. Davidsen, Springer-Verlag: 113-138.

Appendix A: Behavior Over Time Graphs Generated during Site Visit

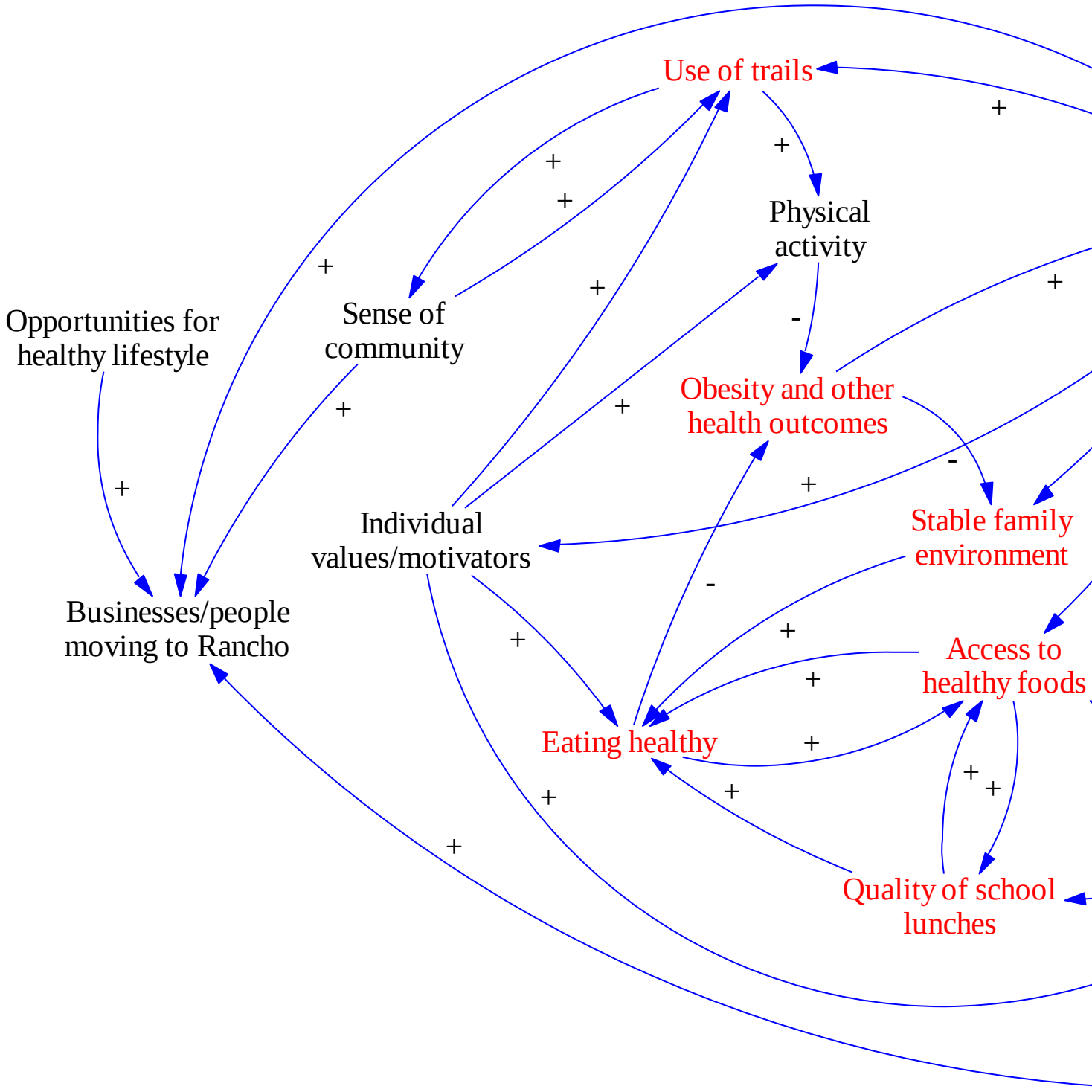
Rancho Cucamonga, California: *Healthy RC*	
Categories	**Number of Graphs**
Active Living Behavior	2
Active Living Environments	2
Funding	2
Healthy Eating Behavior	3
Healthy Eating Environments	3
Marketing and Media Coverage	0
Obesity and Long Term Outcomes	4
Partnership & Community Capacity	2
Policies	3
Programs & Promotions (Education and Awareness)	7
Social Determinants of Health	3
Total Graphs	**31**

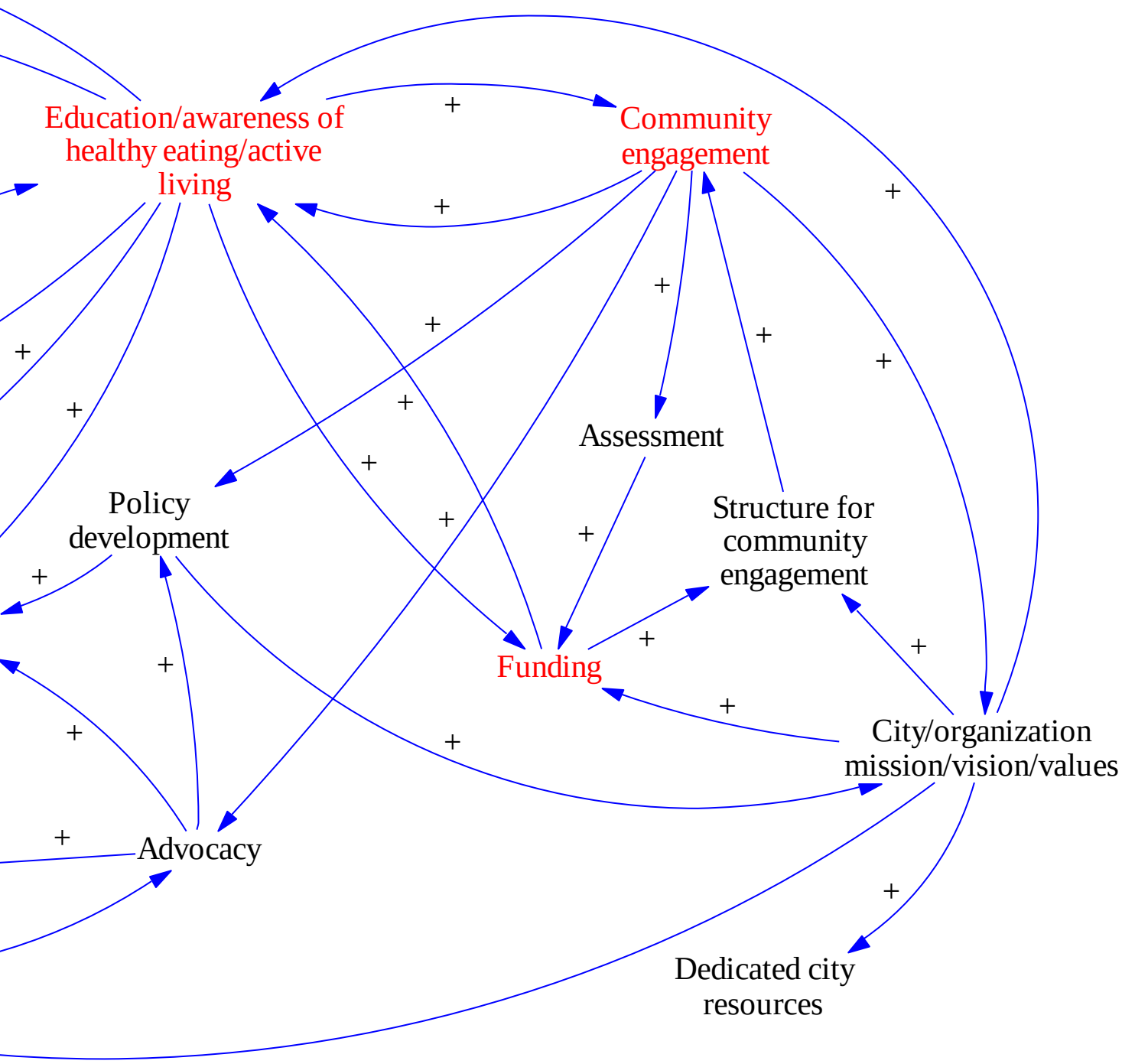
Appendix B: Photograph of the Original Version of the *Healthy RC* Causal Loop Diagram



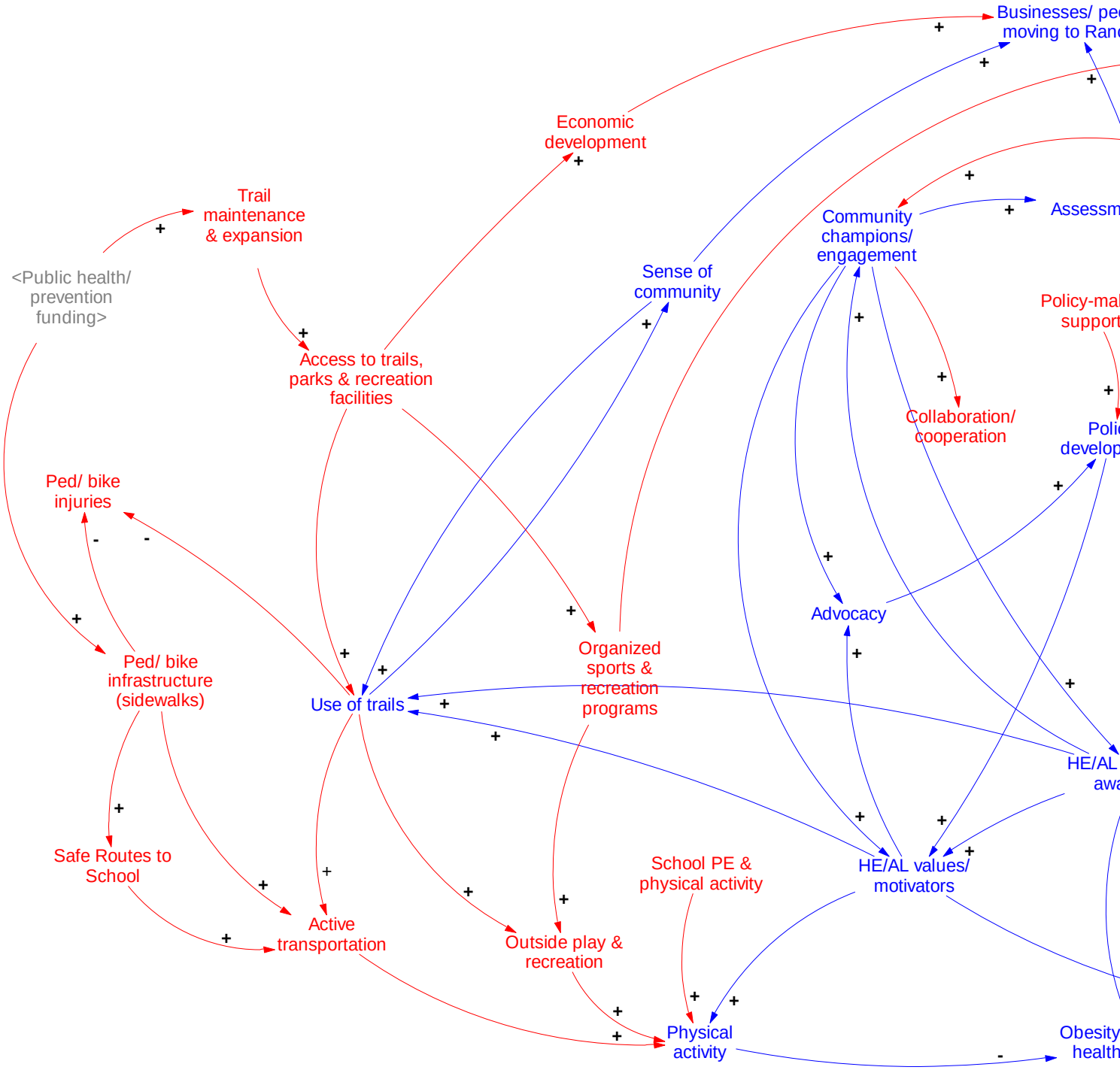

SYSTEM OR ENVIRONMENT CHANGE IN YOUR COM
OBESITY
Stable Family Environment
Community Engagement
City / Organization
Values
Advocacy
Structure
Funding
R
R

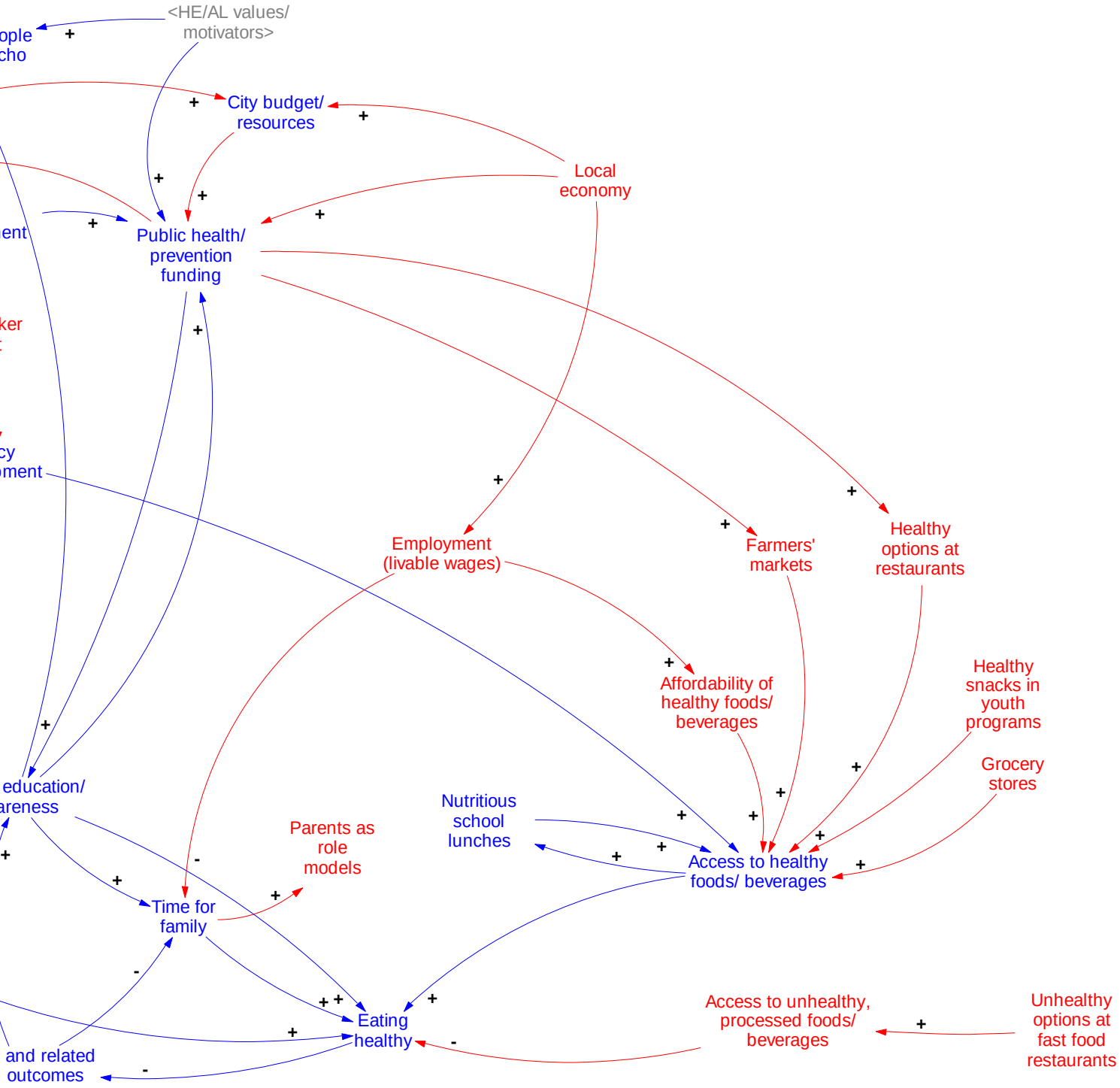
Appendix C: Original Translation of the Causal Loop Diagram into Vensim PLE



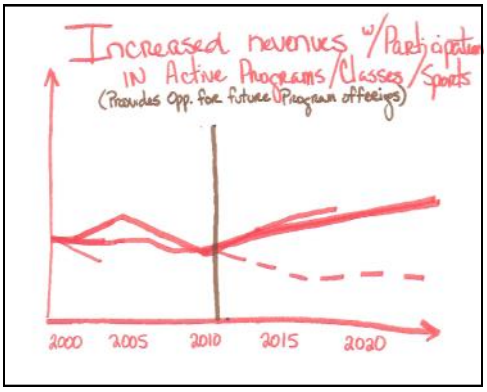

Education/awareness of healthy eating/active living
Community engagement
Assessment
Policy development
Structure for community engagement
Funding
City/organization mission/vision/values
Advocacy
Dedicated city resources
+

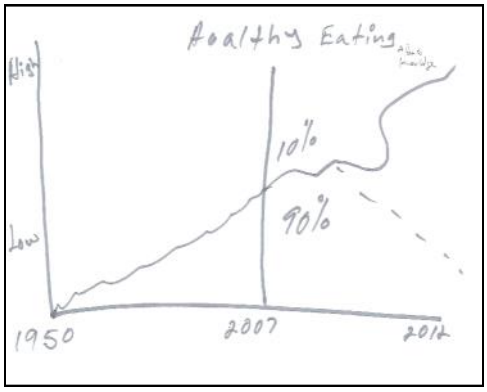
Appendix D: Transcript Translation of the Causal Loop Diagram into Vensim PLE

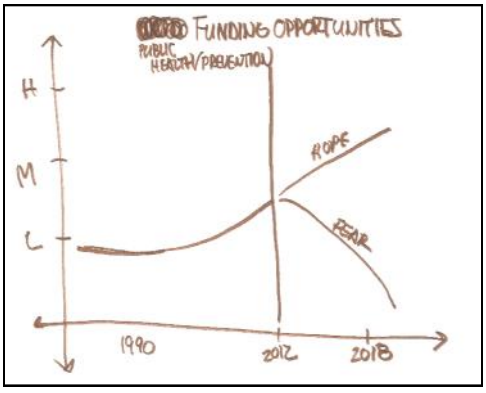


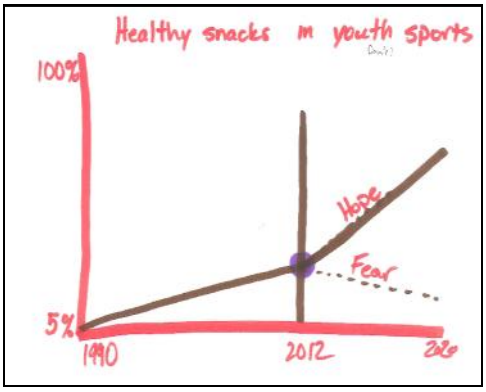

<HE/AL values/ motivators>
City budget/ resources
Local economy
Public health/ prevention funding
Employment (livable wages)
Farmers' markets
Healthy options at restaurants
Affordability of healthy foods/ beverages
Healthy snacks in youth programs
Grocery stores
education/ areness
Nutritious school lunches
Parents as role models
Access to healthy foods/ beverages
Time for family
Eating healthy
Access to unhealthy, processed foods/ beverages
Unhealthy options at fast food restaurants
and related outcomes

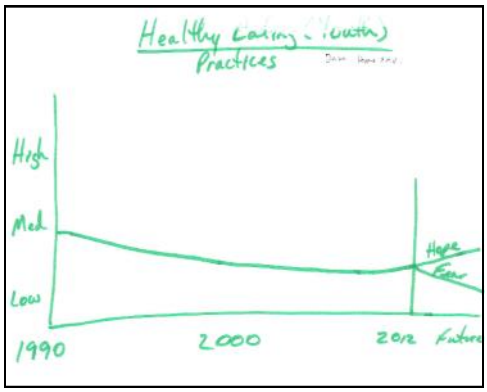
Appendix E: Behavior Over Time Graphs not Represented in the Storybook

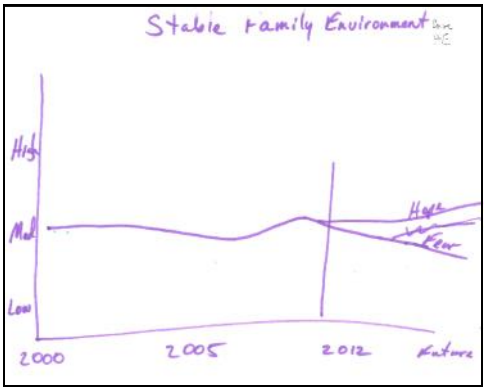


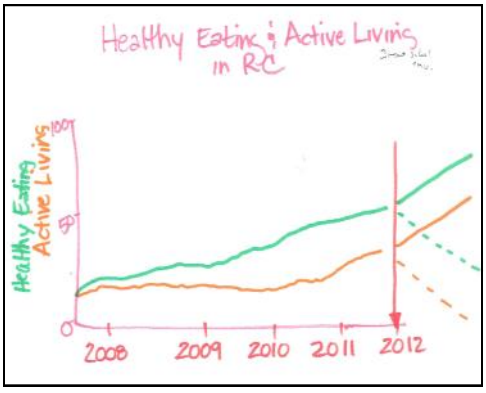


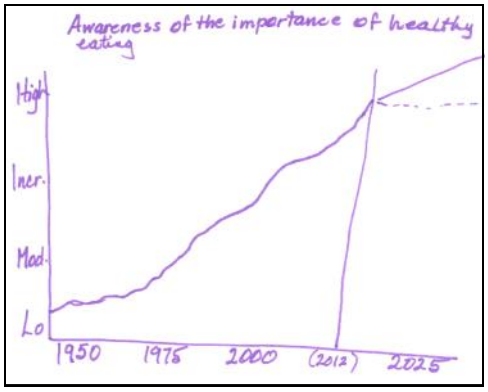


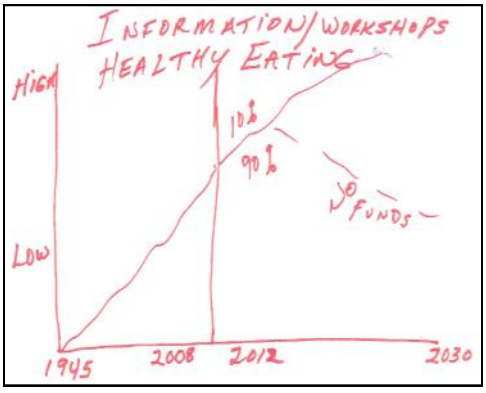


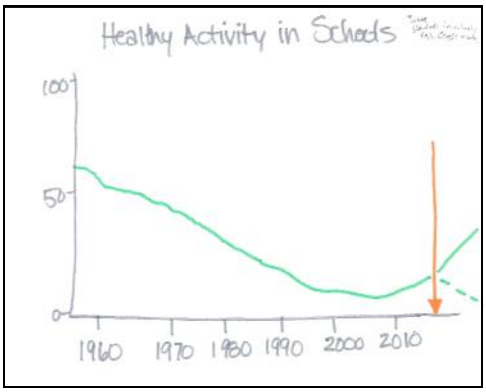


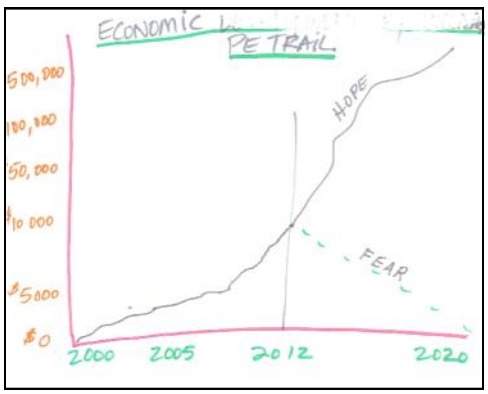


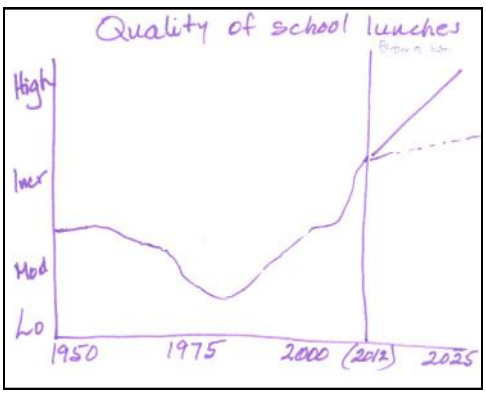


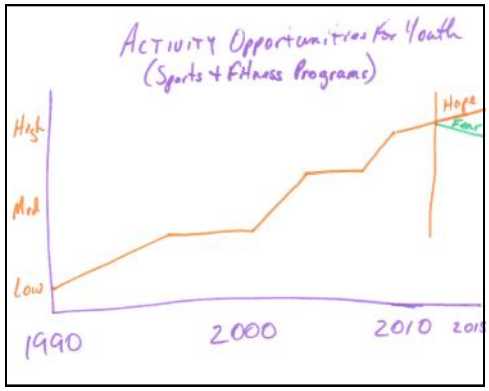


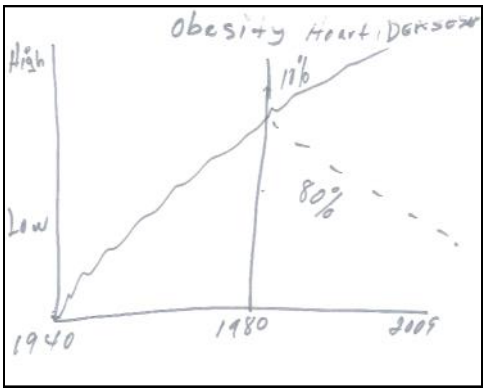


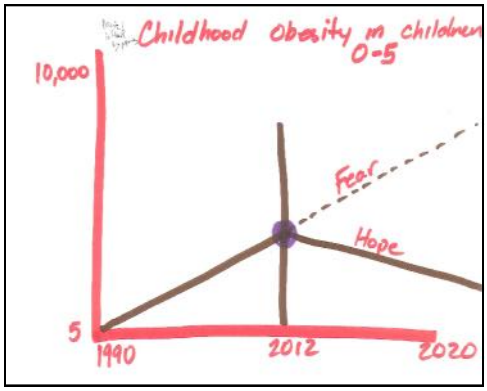


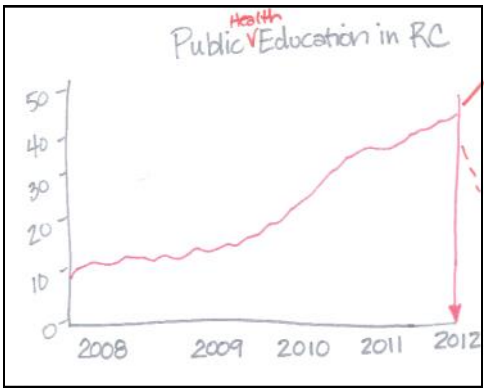


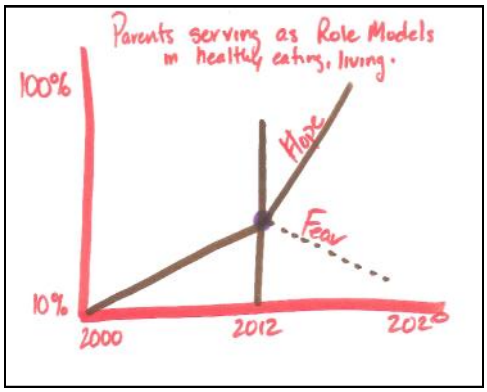



Activity Opportunities for Youth
(Sports + Fitness Programs)
High
Mid
Low
Hope
Fear
1990
2000
2010


Obesity Heart Disease
High
Low
11%
80%
1940
1980
2005


Childhood obesity in children
0-5
10,000
5
Fear
Hope
1990
2012
2020


Public Health Education in RC
50
40
30
20
10
0
2008
2009
2010
2011
2012


Parents serving as Role Models
in healthy eating, living.
100%
10%
Hope
Fear
2000
2012
2020