The Importance of Systems Thinking to Address Obesity

Diane T. Finegood

Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, BC, Canada

Abstract

Obesity is clearly a complex problem for both the individual and for society. Complex or ‘wicked’ problems have common characteristics such as heterogeneity, nonlinearity, interdependence, and self-organization. As such they require solutions appropriate for complex problems, rather than a reductionist search for the causes. ‘Systems thinking’ provides new ways to consider how to collectively address complex societal problems like obesity, where biology interacts with social, cultural and built environmental factors in infinite permutations and combinations. The systems that give rise to the obesity epidemic function at multiple levels, and there are important interactions between these levels. At any given level, individual actors and organizations matter and system function is optimized when individual and organizational capacity to respond is well matched to the complexity of individual tasks. Providing system supports to help networks of individuals become ‘communities of practice’ and ‘systems of influence’ may also help to accelerate the pace of effective action against obesity. Research efforts need to move away from the relentless search for the specific isolated causes of obesity and focus on solutions that have been shown to work in addressing other ‘wicked’ problems.

Causality, Complexity and the Need for a Paradigm Shift

For many years, the obesity ‘problem’ has been framed within the paradigm that people need to be individually responsible to eat less and move more [1]. While public discourse remains mostly rooted in this paradigm, academic literature has shifted to include recognition of the importance of many social, psychological and physical environment variables in causing obesity. This has helped to move the dialogue somewhat from individual to societal responsibility [2], but
blame is still ascribed in the tone of moral panic which supports the notion that people must be individually responsible for their weight [3].

Obesity research is usually based on conceptual models that have focused more on working out the causes of obesity than on developing solutions, especially solutions appropriate for complex problems. Biological and physiological mechanisms associated with obesity were the exclusive focus of obesity research when the first journal devoted to obesity was introduced in the late 1970s [4]. The deeply held belief of this biomedical focus is that working out the causes of a problem will lead to solutions. This paradigm remained dominant until the late 1990s when papers on population and public health began to appear in the three obesity research journals that existed by that time [4]. The rise in population level research helped to increase the number of identified causes and has opened the door to a discussion of societal level responsibility, but has not yet led to a shift from the basic paradigm that solutions need to be rooted in an understanding of the causes [5].

In the last few years, obesity has been labeled a complex or ‘wicked’ problem [6]. Characteristics giving rise to this complexity include the heterogeneity of our genes and environments, nonlinearities in processes like weight loss, the importance of triggers to sustained behavior change, and the many reinforcing feedback loops that drive individuals towards less healthy behaviors (table 1). Current scientific approaches, especially those rooted in an understanding of the causes, are better suited to problems that are simple or complicated, not ones that are complex. Simple problems have simple solutions based on the causes of the problem and sometimes complicated and complex problems can have simple solutions (or a set of simple solutions), but these solutions need to be based on a systems approach and not necessarily on the causes. As Wagner [7] points out, causality can only be meaningfully defined for systems with linear interactions.

Rittel and Webber [8] suggest we need a different way to approach wicked problems. They suggest that scientific methods have been developed to address

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<tr>
<td>Homogeneous</td>
<td>Heterogeneous</td>
<td>Genes, environments, etc.</td>
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<td>Linear</td>
<td>Nonlinear</td>
<td>Exposures, life course</td>
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<td>Deterministic</td>
<td>Stochastic</td>
<td>Triggers for behaviour change</td>
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<td>Static</td>
<td>Dynamic</td>
<td>Weight loss/maintenance</td>
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<td>Independent</td>
<td>Interdependent</td>
<td>Food production and consumption</td>
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<td>No feedback</td>
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<td>Not adaptive or self-organizing</td>
<td>Adaptive and self-organizing</td>
<td>Makes causality mostly irrelevant</td>
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<td>No connection between levels or subsystems</td>
<td>Emergent</td>
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‘tame’ problems, not ones where the problem cannot be definitively described, where there are no ‘optimal’ solutions, and it is impossible to define a ‘stopping rule’, or to know when the problem is solved [8]. Solutions appropriate for complex problems tend to be more process (as opposed to outcome) oriented and focus on the interactions and interdependencies between individuals, organizations or levels in the system [9].

New streams of research rooted in systems thinking are needed to build novel and effective approaches to address obesity and other complex health and societal problems [6]. But achieving this goal will require several fundamental paradigm shifts. We need to focus on solutions rather than the causes of the problems [5], be holistic and integrative rather than reductionist, focus on processes rather than outcomes, and understand both our collective and individual roles and responsibilities.

New Places to Look for ‘Simple’ Solutions to the Obesity Problem

The introduction of the Foresight Obesity System Map in 2007 [10] helped initiate a dialogue about the complexity of obesity and how systems thinking and systems science can help to change the way we approach looking for solutions [6]. The Obesity System Map is a causal loop diagram which helps communicate the complexity of the system as a whole and emphasizes the importance of feedback loops and interdependencies to the development of obesity [10]. The map, a product of a stakeholder engagement process, illustrates many possible connections between important subsystems including food production, social psychology and physical activity environments [11]. The map was built both on available evidence and the experience of the stakeholders involved in its construction; specific linkages may only be relevant to some individuals in the contexts in which they live, learn, work and play.

Common responses to complex problems include despair, retreat, believing the problem is beyond hope and assigning blame [9]. But accepting complexity does not mean we need to give up, rather it means we need to turn to solutions appropriate for complex problems. When viewing solutions from a reductionist paradigm, the natural tendency is to think solutions for complex problems need to be multi-level and comprehensive [12, 13]. There is evidence that comprehensive interventions are more effective, but comprehensive interventions can also overwhelm the systems that support them, the resources available and they are difficult to evaluate [14].

Can accepting complexity help us identify new ‘simple’ solutions? Many systems thinkers, researchers and writers articulate ‘simple’ principles that underlie systems approaches. Bar-Yam [9] reminds us we need to look for solutions in the interactions between a system and its environment, such as the capacity of actors to act relative to the complexity of their tasks. He also suggests that
Interdependencies between processes like cooperation and competition can be used to create the conditions for more collaboration [15]. Meadows and Wright [16] provide insight into solutions appropriate at different levels within a system such as feedback loops, information flows and the goals of the system. Wheatley and Kellner-Rogers [17] suggest that all organizational structures can be considered as networks, and to have impact we need to act locally, connect regionally and learn globally.

**Matching Capacity and Complexity**

Although complex systems often involve multiple subsystems with a myriad of actors and the organizations they work for, one simple principle is that each individual still matters [9], be they the individual at the centre of the Foresight map struggling with weight control or the CEO of a large food company balancing shareholder profits against a growing demand for a healthier food supply. As Bar-Yam [9] points out, what matters is matching an individual or organization’s capacity with the complexity of their environment and specific tasks. If the capacity of an individual is less than is needed to deal with the complexity of their tasks, they are more likely to fail (fig. 1). In contrast, if a person or organization’s capacity exceeds the complexity of their task, they are more likely to succeed. For a large system to function well, a focus on matching capacity and complexity may help.

![Fig. 1. Matching capacity and complexity. When the capacity of an individual or organization is greater than the complexity of their environment (or tasks), the individual or organization will survive. When capacity is less than complexity the individual or organization will fail.](image-url)
While this idea that capacity and complexity need to be well matched is a theoretical construct, it also makes sense intuitively and can be applied directly to thinking about solutions. Rather than asking ‘what are the various biological, social and environmental factors causing obesity?’ it suggests that research should focus on where in the complex system (described for example by Foresight Obesity System map) there are mismatches between capacity and complexity. More importantly, it leads us to consider interventions that reduce complexity (rather than increase it) or increase capacity.

One could argue that the dominant focus on educational approaches to addressing obesity has been an attempt to increase people’s capacity for healthy eating and active living. Yet, the fact that education has largely failed to halt or reverse the epidemic suggests either that the marginal increase in capacity that might derive from an educational approach is insufficient, or that the focus of most educational programs is not actually helping to increase capacity. Different educational targets may be better able to increase capacity, but it is also likely that education is not sufficient to overcome other drivers that make it more complex to act according to what we know [18].

The need to match capacity and complexity also suggests we need to reduce the complexity of healthy eating and active living. Many environmental approaches and the notion that ‘we need to make the healthy choice the easy choice’ are consistent with reducing complexity, but some changes may inadvertently increase complexity. Consider for example the impact of increasing the availability of healthy food choices. Behavioral economists have shown that as the number of choices increase, we are less likely to actually make an active choice and instead will make our decisions by default [19]. For this reason, it is not enough to make the healthy choice an easy choice; we must also make unhealthy choices more difficult or non-existent.

Lastly, when we consider variables like our capacity for behavior change and the complexity of the change, it is not enough to only consider the rational components of behavior. Emotional drivers can easily outweigh rationality [18]. As such, it is not enough to make the healthy choice the easy choice; we must also make it the desirable choice [20]. Having more desirable defaults when choices are being made will reduce the complexity of making healthy choices and ensure more individuals have the capacity to succeed.

Leverage Points in Complex Systems
Systems operate at many different levels. With respect to obesity, these levels range from the microscopic (genes and proteins), to the individual (physiology and life course) to the population (local, national, global). Meadows articulated the levels of complex systems in terms of their common characteristics across different kinds of systems and with a specific focus on their potential for changing system behavior, i.e. their potential as leverage points. At one end of the spectrum her leverage points include: (12) numbers (constants and parameters
such as subsidies, taxes and standards) and (11) buffers (the size of stabilizing stocks relative to their flows, e.g. the number of people on earth relative to the number who are born and die each day). Other leverage points include (7 and 8) balancing and reinforcing feedback loops, (4) self-organization, (2) the paradigm or mind-set of the system (the deeply held beliefs) and (1) transcending the paradigm (letting go of beliefs and assumptions about the system). As Meadows points out, the leverage points with the higher numbers are relatively easier to implement, but also are less effective, whereas changing the deeply held beliefs under which a system operates is much harder, but also more effective.

While the 12 leverage points Meadows described provide a helpful framework for a systems approach to complex problems, with 12 levels, this framework was difficult to translate into a tool for planning and/or analyzing intervention approaches [21]. We collapsed the 12 levels into a 5-point intervention level framework (table 2). The 5 levels are paradigm, goals, structure (as a whole), feedback loops/delays, and structural elements, and include all 12 of Meadows levels [22]. With only 5 levels, this framework has the potential to be applicable to a variety of challenges associated with complex problems including understanding how a system operates to assessing the compatibility of actions at different levels of a system and across a range of goals.

Our first application of this framework was to a set of materials provided as pre-conference reading for a meeting on food systems and public health [23]. The actions recommended within these readings that spoke to making food systems healthy, green, fair and affordable were sorted into the intervention level framework [22]. This analysis suggested that some actions to achieve all four goals are compatible, including broad public discussion and implementation of policies and programs that support sustainable food production and distribution. At the level of paradigm and goals, however, the challenge of making healthy and green food also affordable becomes apparent as some actions at some levels may be in conflict.

Current and future uses of the intervention level framework include other analyses of qualitative data, supporting reflective practice to enable cross-sector dialogue, program planning, research and evaluation. As Meadows points out

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<td>Paradigm</td>
<td>Deepest held beliefs</td>
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<tr>
<td>Goals</td>
<td>What trying to achieve</td>
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<tr>
<td>Structure</td>
<td>Information flows, connectivity, trust</td>
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<td>Feedback and delays</td>
<td>Self-regulation, reinforcement and adaptation</td>
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<td>Structural elements</td>
<td>Subsystems, actors, operating parameters</td>
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in her ‘guidelines for living in a world of systems’ it is very important to ‘get the beat of the system’ and to ‘expose your mental models to the light of day’. Recognizing the multiple levels at which a system of interest operates and where the changes are needed is an important step to tackling a complex problem for the good of the whole. Asking questions about what is happening and what needs to change at each level of a system and in the interaction of the levels is a good place to start.

**Influencing Emergence**

Emergence refers to the arising of novel structures, patterns, and properties during the process of self-organization in complex systems [24], and is often thought of as ‘the whole is greater than the sum of the parts’. Bar-Yam [25] defines multiple types of emergence depending on the nature of the relationship between the parts and the whole. ‘Weak’ emergence is the difficult to understand micro-to-macro relationship between the parts and the whole, whereas ‘strong’ emergence can arise either through system constraints or from a global-to-local causality. The Foresight Obesity System map suggests that obesity results from weak emergence of a large number of factors. The map illustrates how more than one hundred different ‘micro’ level variables and their interdependencies give rise to obese individuals. It is also likely that strong emergence contributes to the epidemic of obesity. For example, globalization of the food supply clearly has an effect on local food environments. A better understanding of system constraints and global-to-local relationships could provide new insights into how to influence the emergence of obesity.

Wheatley and Frieze [26] suggest ways to influence emergence even in the absence of a deeper understanding of system constraints or causality. They consider that networks are the only form of organization used by living systems and since they are mostly interested in social systems, this frame works well and enables them to describe emergence as ‘the fundamental scientific explanation for how local changes can materialize as global systems of influence’ [26]. They suggest that as a change theory, this approach offers methods and practices to influence emergence and accomplish system-wide changes.

Networks are defined as the first stage in the life cycle of emergence. They tend to be based on self-interest, are self-organized and have fluid membership. The next stage is ‘communities of practice’. These can spring from networks, are also self-organized, but motivation for participation goes beyond self-interest. In communities of practice, people participate to serve their own needs, but also to serve the needs of others; there is an intentional commitment to advance the field of practice and to share learning with a wider audience. The speed with which people exchange knowledge, learn and grow can be rapid in a community of practice. The last stage in the life cycle of emergence is the ‘system of influence’ where efforts and ideas that were expressed by a few suddenly become the norm. Practices developed by courageous communities suddenly become the
accepted standard, and there is no hesitation about adopting these ideas and approaches. This process is illustrated by the rapid rise in smoke-free space legislation following the ‘emergence of passive smoking as a scientific fact’ [27].

Wheatley and Frieze [26] argue that emergence always results in a powerful system that has many more capacities than could ever be predicted by analyzing the individual parts. They suggest that to influence emergence we need to ‘act locally, connect regionally and learn globally’. Given the variable influence of the various factors identified as causally important to obesity [10], the need to act locally makes sense. Only local actors have sufficient knowledge to consider what is important in their community/context and how to implement policies and programs to address obesity and chronic disease prevention. We could influence the emergence of healthier communities by supporting local actors in learning from each other. By creating system supports which enable knowledge exchange of what works in local contexts, we could accelerate the pace of learning and enable networks to become communities of practice and ultimately systems of influence. But emphasizing the value of local knowledge and expert opinion will require a paradigm shift from an evidence-based medicine approach in which the ‘best’ evidence comes from carefully controlled experimental paradigms that do not exist in the real world.

Conclusions

The dominant reductionist paradigm of biomedical research has served us reasonably well for many years in tackling many complicated problems such as diseases caused by single-gene defects. But most of today’s ‘wicked’ problems are complex problems with characteristics that make the reductionist approach, including highly controlled experimental conditions and a search for the causal relationship that stands out even in multiple contexts less helpful. Instead, we must turn to systems thinking and the science of complexity in our search for appropriate solutions. The characteristics of complex systems and the features that are common across most complex problems provide new avenues for obesity research. By shifting the paradigm from a ‘problem orientation’ to a ‘solution orientation’ and by considering the interdependencies between actors and their environments and the possibilities for influencing emergence, we should find more effective solutions to complex societal problems like obesity.

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Disclosure Statement

The author of this chapter does not have any relationships to disclose.

References

Discussion

Dr. Drewnowski: Let me begin by asking you a question about your experience at the Canadian Institutes of Health Research (CIHR) and the emerging interdisciplinary networks in the area of obesity.

Dr. Finegood: Networks and teams are helpful ways to advance obesity research because they create an interface where different disciplines can learn about each other and can bring complimentary skill sets together to work on a problem. At the CIHR, we created several opportunities for multi- and transdisciplinary teams to form and to enable both basic research and research on natural experiments. By creating a competition for funding, we enabled the cooperation of researchers across their usual silos. By supporting research on natural experiments, where the researcher does not have control over the intervention, we have begun to learn more about policy level interventions like the return of PartipAction and the implementation of a physical activity tax credit. Those projects have been fairly effective at emphasizing the value of intervention and interdisciplinary research and giving it a foothold so that it could grow.

Dr. Drewnowski: Our experience was similar in that our work with urban planners and geographers was sparked by a planning grant from the National Institutes of Health for a transdisciplinary exploratory center for obesity research. Putting money on the table is the best way to promote interdisciplinary research between people who would never talk to each other otherwise.

Dr. Finegood: By creating competition at the right level, you create cooperation at the next level down. Think sports teams and leagues, the most competitive team in the league has the most cooperative players. This systems idea can be used in the research funding domain to stimulate cooperation, but also elsewhere in government.

Dr. Bray: We had a program in place, briefly, where we had the police department, the university system, and government people with all of us donating our time. The mayor was actually quite engaged in community wide health. The program was really comprehensive, but the problem was that it wasn’t self-sustaining. There are a lot of people who acknowledge that obesity is a complex problem and there are people who want to participate. But those of us, who want to do it, can’t do it endlessly without some sort of support and somehow that self-sustaining component is often not there.

Dr. Finegood: Many of us understand that obesity is a big complex problem, and we need to address many different facets of it. Our reductionist mindset has led us to huge and comprehensive solutions and those are very hard to self-sustain. But if we shift our mindset a little bit and zero in on integration and integrative structures, without trying to be comprehensive in everything we do, then we can be more self-sustaining and

adaptable. This is where supporting emerging networks can be helpful; by taking people who are on the ground doing things separately and making strategic connections, you enhance the ability of the structures to function. You do not necessarily make people do more, but by making strategic links you begin to move from a network to a ‘community of practice’ and ultimately to a ‘system of influence’. These are things that we can do if we get away from the mindset that everything has to be done together in one big effort. Does that make sense?

**Dr. Bray:** Yes it does, and I also think that sustainability has to also be part of the plan.

**Dr. Finegood:** If we are thinking that the solution to a complex problem lies in working out the reasons for the problem, linking these causes to their specific outcomes and then intervening at the cause, then we are ignoring the potential for intervention through integrative approaches. The path to workable solutions through working out the causes of a problem is slow and very costly due to its complexity. I believe that simple, more sustainable solutions can be developed within whatever resources the actors bring to the table if the focus for the group is problem solving around their shared goals and integrative processes.

**Dr. Rosenbaum:** But doesn’t the importance of working out causality depend on what your goal is? Isn’t it different when your goal is ‘health improvement’ as compared to ‘reducing body fatness’, not that the two are necessarily separate? Isn’t causality important to work out treatment as compared to prevention? It's like looking for ways to treat measles or for ways to prevent it, that's the question. I guess the official topic of this session was prevention, so I was thinking that causality is very important. Prevention and treatment are completely different problems.

**Dr. Finegood:** There probably are differences in the importance of working out causality for prevention and treatment. Tom Robinson argues that we will speed up the finding of effective solutions if we test hypotheses not about the ‘causes of the problem’, but instead we focus on the ‘causes of the solutions’. Both health improvement and reducing body fatness are complex problems and chasing causality in both cases isn’t necessarily all that helpful. And yes, there probably are differences between prevention and treatment outcomes for variables like physical activity or the nature of the food environment.

**Dr. Rosenbaum:** The relationship between food and physical activity is very different in someone at their usual weight than in somebody who is reduced weight. I like your idea of capacity and complexity because I think that the kind of physical activity that is necessary to lose weight may well be beyond the capacity of most of us. We just can't do it, we don't have the time, and we don't have the capacity.

**Dr. Finegood:** This really strikes me as being a view about the individual. The difference between prevention and treatment may apply to an individual. But the same argument about capacity and complexity also applies to the food environment. I don’t think that the changes that we need to make in our food environment are going to be different for obesity prevention and obesity treatment necessarily. So, in that sense I don’t think they are different. It depends on what level you are at as to whether that distinction is important or not.

**Dr. Rosenbaum:** I would say that they are very different. In one case, your body is fighting against you in terms of treatment; there are a million things that fight against
you. In the case of prevention, your body has not yet begun to fight, so it’s a different arena.

**Dr. Finegood:** I personally understand that relationship and dynamic completely having lost 35% of my body weight and kept it off for more than a decade now. What I would argue is this. If I had started being more physically active and eating a healthier diet before I gained the weight, I probably would not have gained it. I am not sure that the behaviors that I needed or would have undertaken would have looked that different to me. Yes, I have to work harder at it now because I gained the weight, but the behaviors that I need to make are not necessarily different from those that I could have started earlier. Perhaps I would not have had to work so hard at it. I apologize for this being an anecdotal response.

**Dr. Goran:** The real challenge here is how to convey what we know about this very complex problem in simple terms. How do we provide relevant information to the Mayor of Houston to address obesity locally? What this demonstrates is not only that obesity is a complex issue but that the solution is going to be very specific to the contextual factors of a community, and you alluded to that slightly. It seems like the next step would be to come up with strategies for communities to seriously address the obesity problem rather than just apply a simple band aid which is typically what happens. So what do we need to do to make that move?

**Dr. Finegood:** That is about influencing emergence, which is an important point. What is coming out of this conversation is that the action needs to be at the local level. Hopefully we are starting to understand the importance of contextual factors. When we get to community-based participatory research, the community becomes incredibly important in determining what is going to happen next. If you talk to anybody who has done this kind of community engagement research, you will find that they often go in there with their own preconceived notions about what changes need to be made based on the best available evidence, and they come out doing something very different. Sometimes, the community accepts projects that increase physical activity, or the community isn’t ready to talk about physical activity depending on where they are. Instead, they want to talk about the fact that they can’t afford to exercise, they have got to work 3 jobs, and they don’t have time.

A part of the argument here is that we set aside causality for a moment and recognize that what we have to do is act locally and learn and figure out the best ways to engage with people. We can help to guide their solutions, but they are the ones that are going to generate them, and all that data that we have collected are not necessarily going to be all that helpful. We already know a lot. Maybe if we didn’t know anything about the causes, I might not be standing up here being a bit provocative. But we do know a lot, and we could apply a fair amount of what we know already to help communities take action in their own environments. And there are some other major problems; for example, lots of us don’t live in places where we even perceive that we are in a community, we don’t know our neighbors.

**Dr. Drewnowski:** I have a comment here about the use of data. I think local communities want local data. Although we do know a lot, local communities don’t know enough about themselves. The moment you present them with maps saying this is the extent of problem, this is where you live and this is where the supermarket is, things change. Maps are very telling and local politicians prefer to use local data from 5 miles down the road as opposed to national statistics.
Dr. Finegood: I didn’t tell you anything about the CAPTURE Project, which is another half of my life at the moment. CAPTURE stands for a Canadian Platform To increase Usage of Real-world Evidence. It is an effort to build a system to support the collection, sharing, and use of practice-based or real-world evidence. It is intended to support communities and people on the ground. The goal is to figure out what data would help them and then use that data to figure out what they want to do. If we were better at doing that kind of work, then we could solve some of these problems without necessarily spending huge amounts of money. It is the people on the ground that need to explore the diversity of ideas and come together to figure out what is possible with the resources they have and in the context that they are in.

Dr. Drewnowski: One way to provide helpful data is to aggregate obesity statistics by political district. The moment you do that, it becomes somebody’s responsibility. It’s just another way of analyzing geographic data but everything changes because now it can be brought to the attention of politicians and policy makers. So, it’s one way of making best use of local data.

Dr. Bray: There is no way that obesity prevention or intervention projects can depend on an endless flow of money. They have to be community oriented, it has to be something intrinsic to the program itself, and it probably will need to arise from the community.

Dr. Barclay: I think there has been at least one reasonably successful multisectorial collaboration which started in France (EPODE: http://www.epode-european-network.com). Although it hasn’t been able to reverse obesity, it has been able to stabilize obesity in children. The program brings together players from government, education, and industry, etc.

Dr. Finegood: Funded if I am not mistaken by Nestlé, is that correct?

Dr. Barclay: Nestlé is one of the co-founders.

Dr. Finegood: It’s a good example of what can happen if you can engage people at multiple levels and in multiple sectors.

Dr. Drewnowski: I have a question for you based on your experience as a former head of a research institute. We have heard about various aspects of science at the individual level and environmental level; we have heard about the microbiome, inflammation, the brain, and the environment. Based on the people in this room, who would you put together with whom and why to create an emerging network?

Dr. Finegood: What I would say to that is it’s not up to me because it’s not a command and control kind of problem. If I can create the competition that stimulates cooperation then it’s up to the people in the room to figure out who they can work with and what makes the most sense. I have led enough multidisciplinary research teams to know that it’s a challenging thing to do. It takes time for people to learn each other’s language. The important thing is to create the opportunity and to give them the time and maybe financial support. But there are some multidisciplinary questions and problems that we do need to resolve.

Dr. Drewnowski: I think you are right; it’s a question of time and trust. At one point granting agencies had a list of bullets saying that you must have one person from this area and one person from that area.

Dr. Finegood: Forcing it doesn’t work that well. People have to know each other. This was a technique used at CIHR over the years. Sometimes what you get are researchers going to people in government on the day that the grant is due saying: will you sign this letter of support. That is not what I call authentic engagement. But at other times, you
will get people who have already spent time engaged with collaborators in different sectors and want to bring the shared experience to the funding table. But it’s hard to do. Money helps and leadership helps, and after that you have got to let people self-assemble.

**Dr. Rolls:** Can you think of examples where competition has created cooperation that has given us better food?

**Dr. Finegood:** The problem on the food side is that there is such a negative atmosphere for cooperation right now. If you follow any social media and you follow the people who are well connected like Marion Nestle and others, then you get the idea that collaborating with the food sector is dangerous.

**Dr. Rolls:** What about within the food sector?

**Dr. Finegood:** Within the food sector, I probably don’t have enough knowledge. I don’t have a good example that comes to mind. But I am going to be debating this topic about collaboration with the food industry next week at The Obesity Society with Dr. Yoni Freedhoff who feels that it’s wrong to collaborate with the food industry because you give them the credibility of your academic or your organizational brand and all they are doing is making more money based on your credibility. I will tell a quick story about collaboration on physical activity in Canada. We had the 2010 Olympics in Vancouver, and Coca Cola had the rights to the 2010 torch relay. Coca Cola wanted to get kids engaged and get them physically active and they could have just gone out and developed the program by themselves, not that they have any expertise about what works. Instead, they partnered with ParticipAction, a not-for-profit organization to develop this program. Maybe they did that because ParticipAction had the expertise to help them develop something that was evidence based, but outsiders assumed that the only motive was to get the credibility of the ParticipAction brand. It’s very hard to collaborate, and that’s the reason why I have held three meetings to have this discussion around how to build trust to address obesity.

**Dr. Rolls:** I wonder if within a food company you could have scientists competing to come up with the best-selling and profitable healthy products and so leverage that kind of development.

**Dr. Finegood:** So, a competition to create the healthiest product – that’s an interesting idea. I wonder to what extent that might be going on in Pepsico for example which is trying hard to shift its portfolio. It must be challenging for the CEO of a food company that wants to shift their portfolio to healthier products. If the products don’t sell, the shareholders will not be happy. We consumers are an important part of this feedback loop. If we don’t shift our eating habits and actively make healthy choices, then we cannot expect them to be available in the marketplace.

**Dr. Drewnowski:** That goes to the heart of the sustainability issue because those changes need to be sustainable, which means consumers have to work with the food industry and with food environment to make changes in the long-term. Together, the consumer and the supplier need to both understand what is both healthy and desirable.

**Dr. Finegood:** I wonder how many companies went broke during the Atkins craze because a lot of companies shifted their food portfolio to sell low carbohydrate food and now few people are buying it. It’s quite conceivable that a lot of companies went broke because they responded to consumer demand.

**Dr. Bray:** I think that I shouldn’t say this in a meeting sponsored by a nutrition company, but there may be depending on the company as much effort at developing the
image of a healthy food as there is developing the actual healthy food. Subway has done an excellent job of marketing themselves as a supplier of healthy food and created a health halo for their products, but not all of their sandwiches are in the same healthy category.

Dr. Finegood: I am not going to stand up here and defend the food industry for its practices because many of those practices are questionable, and yet I would defend them for wanting to sell their food. If we want to stay in our corners and not have conversations about this, how can we support the shift that the companies need to make, the iterative gradual shifts that they need to make in order to deliver a much healthier food supply that is honestly healthy and is not just capitalizing on the apparent demand for healthy food? One of the things that we need to do is to get our government policies to change.

Dr. Johnson-Askew: I would like to know what role you think systems modeling has as we approach this very complex problem of obesity.

Dr. Finegood: One thing systems modeling can do is to help us integrate the data we do have so as to create a better understanding of the big picture, although there is a part of me that thinks it's just the way reductionist scientists need to go about addressing a complex problem. Josh Epstein answers the question of ‘why model?’ with many different points about how it improves the rigor of our consideration of fact and assumption, helps us test predictions, and can illuminate core dynamics and uncertainties.