A Toolbox for Improving Health in Cities: A Discussion Paper

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A Toolbox for Improving Health in Cities: A Discussion Paper

by

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Executive Summary

In this report, we apply the theory of complex adaptive systems to health in cities. This approach differs from two more traditional approaches: 1. the urban health approach, which focuses largely on vulnerable populations and specific problems within cities, and 2. the healthy cities approach, which focuses mainly on monitoring and improving the urban environment.

Complex adaptive are made up of many individual, self-organizing elements capable of responding to others and to their environment. The entire system can be seen as a network of relationships and interactions, in which the whole is very much more than the sum of the parts. A change in any part of the system, even in a single element, produces reactions and changes in associated elements and the environment. Therefore, the effects of any one intervention in the system cannot be predicted with complete accuracy, because the system is always responding and adapting to changes and to the actions of individuals. Nevertheless, by making many small-scale changes and selecting those that produce the desired effects, individuals and groups may succeed in bringing about, improvements in the system as a whole. At the same time, the tendency of elements within the system to organize themselves offers opportunities to bring about changes that benefit the system.

This view of systems is especially appropriate for looking at health in cities. Cities are enormously complex and changes in one part of a city may produce unforeseen consequences in another. Human health, too, is a product of many factors, each of which interacts with the others, and each of which is subject to change that may affect the overall health of an individual. The web of interactions whereby individuals within cities respond to each other and to the urban environment can be viewed as a complex adaptive system. Therefore improving health in cities is a matter of making numerous small-scale interventions, selecting those that prove to be effective, encouraging self-organization among city dwellers and constantly modifying approaches as the system continually changes and adapts.

The report ends with a case study that shows how the toolbox can be used to analyze and intervene in a complex situation – that of at-risk youth in Southeast Toronto. Wellesley Central Health Corporation already has carried out a study on the needs of this group and the case study builds upon this work. The toolbox offers a new way to think about at-risk youth in the context of their particular community and a new approach to developing interventions that may improve their prospects.
Understanding Health in Cities

The health of city dwellers is a domain in which it is particularly difficult to develop effective interventions. Urban environments have large concentrations of populations with special health concerns, such as drug users, unemployed youth, homeless people, refugees, people with mental illness and persons with physical disabilities, as well as individuals with HIV/AIDS, asthma and tuberculosis. These and other groups generally are found in large numbers only in cities, and their presence produces unique problems.

In addition, cities present challenges (and opportunities) related to greater ethnic diversity, the influence of the built environment, concerns about transportation and mobility, and urban violence. However, in the past, the unique nature of cities and its impact on the health of their residents has not been addressed with appropriate intervention strategies. What is needed is an approach that recognizes the complex nature of health in a complex urban context.

This paper is based on research conducted for Wellesley Central Health Corporation (WCHC) by Health and Everything and the Canadian Urban Institute. The consultants were asked to develop a framework that would guide an urban health initiative by WCHC in Southeast Toronto. The research results can be used by other organizations with a mandate to promote health in cities and, it is hoped, will lead to a new understanding of health in cities.

A complex question

We chose to approach health in cities from the perspective of complex adaptive systems. This approach has a number of important implications for intervention that do not emerge in traditional, mechanistic accounts of cities and health. We believe that our approach can serve as a basis for innovative and effective promotion of the health of urban residents at a variety of levels and in many different forms.

Complex adaptive systems are made up of many individual, self-organizing elements capable of responding to others and to their environment. The entire system can be seen as a network of relationships and interactions, in which the whole is very much more than the sum of the parts. A change in any part of the system, even in a single element, produces reactions and changes in associated elements and the environment. Therefore, the effects of any one intervention in the system cannot be predicted with complete accuracy, because the system is always responding and adapting to changes and to the actions of individuals. Nevertheless, by making many small-scale changes and selecting those that produce the desired effects, individuals and groups may succeed in bringing about improvements to the system as a whole. At the same time, the tendency of elements within the system to organize themselves offers opportunities to bring about changes that benefit the system.
Distinguishing complexity and complication

In understanding complex adaptive systems, it is important to distinguish them from large systems that are not formally complex. Complex adaptive systems are not merely ‘complicated,’ as defined by having a lot of parts. Crucial to the notion of complexity is the fact that the parts of the system interact and change in the face of shifting circumstances, and this change often occurs in ways that could not be deduced from the characteristics of the individual elements in isolation. Thus, for example, an automobile is complicated, but it is not complex in this formal sense. A car possesses thousands of individual parts, but, in general, these parts have limited interactions. One can, for example, change the oil without worrying about altering the behaviour of the headlights, or defrost the windows without affecting tire pressure. Most of the parts are independent of the others.

By contrast, the rise of the automobile as a popular mode of transportation produced massive and unforeseen changes in society and human settlements. Not only did mobility increase, but other changes occurred as well: Huge resources had to be devoted to road construction; suburban living was made practical, with all its positive and negative effects; pollution from cars affected health; a new source of traumatic injury – auto accidents – appeared; teenagers were given a new freedom, with a huge impact on youth culture; and so on. The physical function of an individual automobile is relatively simple to describe and understand, but the way in which millions of automobiles interacted with society produced effects that were not easily predictable.

Complicated systems are amenable to simplification, to reduction into smaller parts. Complex systems are heavily interconnected, and cannot be analyzed in the same fashion. This does not mean that it is impossible to intervene in complex systems. However, the approach to intervention is very different from that used in systems that are merely complicated.

Let us now consider cities and health as complex adaptive systems.

Cities are complex

Most traditional approaches to understanding the urban environment have been useful within narrow limits, but almost invariably they have failed to capture the full range of city dynamics. However, recent developments in the science of complex adaptive systems offer a better explanation of how cities work, and how to intervene in them.

In trying to explain what cities are and how they work, many people have resorted to metaphors. The city has been likened to a marketplace, a fortress, a garden, a theatre, a machine. Each metaphor says something about the city, but none adequately captures the many different ways in which the city functions. Nor is it possible to create a more accurate representation of what the city
is simply by ‘adding up’ or combining various metaphors. The different perspectives offer views that are competing rather than complementary. Although these various metaphors may all be ‘true,’ they are not necessarily compatible.

Metaphors for city life affect the way we believe that cities can be changed. It is arguable that the use of narrow perspectives on what cities are and how they work is responsible for the failures of so-called ‘rational’ city planning. Exponents of the rational approach tend to assume that planning outcomes are predictable and that if the system is manipulated in the appropriate way, predetermined results will ensue. This view of cities as static, predictable entities that respond to interventions in calculable ways, or as the passive recipients of interventions rather than dynamic systems that actively respond to change, has time and again been shown wanting.

Jane Jacobs, one of the most influential recent thinkers on cities and their development, proposes a view of cities as organic entities, which differs markedly from the vision of cities as static entities of narrow purpose. For Jacobs, cities are self-organizing entities – structures and functions arise without the need for external controls. This organization occurs at both the macro and micro levels. At the macro level, cities develop as economic drivers, playing a fundamental role in the national economy. At the micro level, streetscapes and communities are defined by local forces, and well-functioning neighbourhoods will arise spontaneously under the right conditions.

Furthermore, Jacobs believes that interventions in urban development must respond to local circumstances. Successful strategies for change in cities will not succeed unless the context of the local area is understood. ‘One-size-fits-all’ interventions, delivered in a top-down fashion, are doomed to failure.

When we view cities as complex adaptive systems, we can appreciate more of their particular characteristics. For example:

**Self-organization**

City structures often develop without the need for official intervention. Faced with difficulties or failures in the urban environment, individuals may not wait to have the problem addressed by formal authorities, but instead will gather like-minded citizens to develop solutions outside the formal political system. Such organization is especially true in urban health. Despite the existence of a central planning capacity, non-predictable gaps in services will always occur. Fortunately, if allowed to do so, individuals and groups will come forward to fill these gaps.
Dynamic interactions

Cities are not static and passive, but are constantly changing and responding to change. Individuals within cities are in constant contact with the natural, built and social environments. These environments influence the individual and individuals influence their environments. The relationship is not one of determinants acting on people, but rather of people and their environments interacting.

Multiple viewpoints

A single view of cities has limited use. Cities legitimately can be described in a variety of ways, many of which may conflict with each other. In addition, people within a city take on a wide variety of roles: as citizens, members of various communities, users of services, consumers of products and so on. Each city inhabitant leads both an individual and a communal life.

Emergent characteristics

A city is not just a very large village, or even a large collection of villages. The scale of a city produces phenomena and institutions that are not present in smaller population groupings (few villages, for example, have symphony orchestras, mass transit or homeless people). Influences on a city may therefore produce different effects, depending upon their scale. The effects of interventions do not just ‘scale up,’ and small-scale interventions may not work in larger contexts (as can be seen, for example, in urban transit). In addition, the elements of a city come together to produce something more than the component parts. The characteristics of a neighbourhood are different from, and not just the sum of, the individual elements of houses, streets, parks and shops. What makes a neighbourhood work, or not, is not the result of its particular parts, but rather, of the complex interactions of the individual elements.

Critical nature of local conditions

The local context can make a huge difference in the effect of any intervention. As has been frequently demonstrated, importing programs or policy initiatives from other cities or areas within a city without adapting them to the local context is a recipe for failure.
Non-predictability of interventions

Because cities are dynamic, interactive and self-organizing, they change in ways that seem at times to be unpredictable. This unpredictability also applies to the effects of policy initiatives and interventions, which often do not seem to generate the results that ‘rational’ planning would anticipate.

These characteristics of cities fit well with the theory of complex adaptive systems. By understanding how such systems work in general, one can begin to formulate effective interventions. Health, too, shares some of these abstract features.

Health is complex

Just as it takes sophisticated conceptual tools to fully understand cities, it takes careful analysis to appreciate the domain of health. Most concepts of health fall into one of three categories: (1) biomedical concepts that focus on the body as an organism; (2) epidemiological concepts that stress the role of the environment in health; or (3) sociological concepts that recognize the importance of complex interactions between the two.

The third category has been underemphasized so far, but in fact leads to a more dynamic picture of health in which the quality of the interaction between an individual and his or her social context is a major contributor to health. Positive interactions, such as in good spousal relationships, tend to improve health while negative interactions, such as those between certain workers and excessively controlling workplaces, harm health. Health is a function of the non-linear interaction of many forces.

Our changing understanding of health affects the entire health field. Much of medical science is struggling to shift itself from a deterministic, mechanistic, organic focus on the state of the individual body to a more interactive, less deterministic practice that recognizes the importance of a broad range of influences on health. Hospitals and other health care organizations are trying to define their role beyond repairing the organism.

Recently, more and more determinants of health have been identified and health care researchers have come to appreciate their complex interactions with each other and with health status. They include:

- Physiological factors: the cardiovascular, immune, muscular and endocrine systems as well as body weight and height. Medical research has produced a vast literature that identifies physiological indicators of health and illness. Tests determined areas of normalcy and those of elevated risk of illness.
Psychological and behavioural factors: stress, personality, and health-promoting and health-damaging behaviours. Thomas McKeown and others argued that individual behaviours and lifestyle were more responsible for health and illness than direct treatment of physiological conditions [Mclachlan and McKeown 1971]. These views had a significant impact on the Lalonde Report [Department of National Health and Welfare 1974].

Sociodemographic factors: age, ethnicity, gender, location. Census information and statistical tools have shown that these factors are indicative of significant differences in health status.

Socioeconomic status: education, income, occupation, family wealth, economic mobility, perceived status, childhood status, material possessions, national income distribution. Recently, the development of more longitudinal databases accompanied by powerful computers and ever more sophisticated statistical analysis have allowed population epidemiologists, such as those sponsored by the Canadian Institute for Advanced Research, to identify gradients in health that accompany socioeconomic status and to propose policies to reduce health inequalities.

These factors are not mutually exclusive. A person’s lifestyle, for example, is not independent of his or her socioeconomic environment, which is why the impact of health education about tobacco, for example, varies in different social settings. An individual who is surrounded by family members, friends and co-workers who smoke may continue to smoke even though he or she knows that it is unhealthy. Such interactions between the determinants suggest that the outcome of interventions cannot always be predicted accurately. Moreover, unforeseeable events can affect the health not only of individuals but of entire populations. These observations suggest the value of approaching health through the lens of complexity.

**Health in Cities: Three Approaches**

Since both cities and health are complex, it should not be surprising that health in cities shares their complexity. Two perspectives on this domain, the populations-and-problems-centred ‘urban health’ approach, and the environmentally focused ‘Healthy Cities’ approach, have tried to capture the complexity inherent in cities, but fall short of fully describing the implications of this complexity. We have proposed a ‘Health in Cities’ model, which takes the strengths of these other perspectives, and grounds them in the theory of complex adaptive systems.
The ‘Urban Health’ approach

A traditional way to view health in cities is to target particular problems or groups for intervention. Homeless people, refugees, HIV/AIDS sufferers, people with chronic mental health problems and elderly people living in poverty, while not unique to cities, are more concentrated there.

The focus of this approach to health within the urban context is primarily on identifying and understanding vulnerable communities (for example, the socially disadvantaged or drug users), or particular diseases or syndromes that are of concern primarily in cities (such as AIDS, tuberculosis or asthma). This approach recognizes that many factors are involved in the health of urban residents, but, in general, focuses on specific problems. However, communities and groups with health concerns compete for limited money and services, so interventions directed at certain groups may inadvertently lead to reduced attention to other communities.

The ‘Healthy Cities’ approach

The influential ‘healthy cities’ approach emphasizes the way that the city environment (conceived very broadly) influences the health of residents. This approach explicitly acknowledges the diversity and interconnectedness of the many elements of urban living. It is a holistic approach that assumes that everything within a community is connected, and therefore cities need to get many sectors involved in developing public health policies. The Healthy Cities Project of the World Health Organization specifies the following features of a healthy city:

- A clean, safe, high-quality physical environment (including housing quality).
- An ecosystem which is stable now and sustainable in the long term.
- A strong, mutually supportive and non-exploitative community.
- A high degree of public participation in and control over the decisions affecting one’s life, health and well being.
- The meeting of basic needs (food, water, shelter, income, safety and work) for all the city’s people.
- Access to a wide variety of experiences and resources within the possibility of multiple contacts, interaction and communication.
- A diverse, vital and innovative city economy.
- Encouragement of connectedness with the past, with the cultural and biological heritage, and with other groups and individuals.
- A city form that is compatible with and enhances the above parameters and behaviours.
- An optimum level of appropriate public health and sick care services accessible to all.
- High health status (both high positive health status and low disease status).
One of the key features of the healthy cities approach is its recognition of the importance of interactions between individuals and the natural, built and social environment. Individuals are not just passive, narrowly defined entities, but interact with the city in many ways. By optimizing these interactions, both individual and community health can be improved. This emphasis on the interactive nature of health, and its determination through multiple factors, is an important feature of this approach.

Although cities that participate in Healthy Cities initiatives work to improve general environmental factors that potentially affect all city residents, they tend to downplay the importance of particular problems and vulnerable groups. What is needed is a model that captures both the urban health and healthy cities approaches, and that also provides a strong theoretical basis for intervention.

Health in Cities: an example of a complex adaptive system

Health in cities involves multiple groups with multiple health needs and potentially competing interests connected in a non-linear fashion to multiple urban environments, each of which interacts with the groups and individuals within those groups. In order to develop effective health interventions within this complex web, what is needed is an approach that recognizes both the particular vulnerabilities and problems faced by specific populations within the urban environment, but also addresses the effects of the urban environment upon all city residents.

The Urban Health and Healthy Cities approaches focus almost exclusively on the problems typical of urban settings. This narrow focus on problems ignores the strengths and assets of an area, population or situation. The potential exists to improve urban dwellers’ health using the positive features of cities (such as relatively easy communication among residents, the existence of large groups with similar interests, the ability to organize and mobilize concentrated populations or the strong regulatory context of cities). These advantages are not found in other environments (such as rural settings) and, when used correctly, can maximize the success of interventions.

Looking at cities, at human health and at health in cities as examples of complex adaptive systems offers the opportunity to bring together the useful insights of the Urban Health and Healthy Cities perspectives, while avoiding some of their drawbacks.

All complex systems are made up of multiple individual elements, each of which interacts dynamically over time with other individual elements and with the environment. These interactions can change the behaviour of the individual elements, as their actions are not static and fixed, but rather shift or adapt in the face of changing circumstance. As collections of individual elements interact, their behaviours can organize spontaneously, as they work together to achieve some desired state or to solve a particular problem.
Because so many elements are interacting dynamically and responding separately to changes in their immediate conditions, the global behaviour of such systems is unpredictable – they are much more than the ‘sum of their parts.’ Small changes in a local context can produce changes in behaviour of numerous elements, that in turn will influence other, more distant parts of the system at times generating widespread changes from small, local perturbations.

**The Health in Cities Toolbox**

We believe that viewing cities and health as complex adaptive systems has important practical implications for intervening in the health of urban residents. We have begun to identify tools for such intervention and are continuing to develop them.

1. **Gather information**

   Because understanding local conditions is vital to intervening in complex systems, accurate information about the context of a problem is the first step toward developing a strategy to remedy it. Acting without this understanding in complex systems often can make a situation much worse. Moreover, identifying and understanding positive as well as negative features is necessary for full comprehension of a given problem. Understanding the local strengths and assets that can be brought to bear on a problem can be of enormous assistance in developing appropriate solutions.

2. **Respect history**

   Unlike traditional mechanistic systems, adaptive systems are shaped by their past, and a knowledge of this history may suggest constraints on or opportunities for what can be done in the future. Understanding the history of the people or communities involved in any intervention will provide a clearer picture of what interventions are possible or likely to succeed.

3. **Consider interaction**

   Health is not just a function of the individual’s biological characteristics, but is profoundly affected by interactions with the natural, built and social environments. These factors must be considered when developing approaches to health in cities. However, these elements do not just have an ‘impact’ on individual health, but interact with the individual and with each other in complex and often unpredictable ways, and change over time as the entire system adapts. Thus, the language of ‘determinants’ of health, with its suggestion of mechanistic, linear, one-way relationships, constant over time, may be misleading.
4. Promote variation

Introducing many different, small-scale interventions for the same problem offers greater hope of finding an appropriate and effective solution (or solutions) than a single, top-down, ‘rationally-planned’ approach. Promoting a variety of possible interventions may sound inefficient, but this approach is highly effective when a system is unpredictable, as health in cities often is. However, it is critical to understand and accept that many interventions will ‘fail.’ Such failures should not be viewed as failures of the overall way of understanding the system – this is simply a feature of how one develops successful interventions in complex adaptive systems.

5. Conduct selection

Although most complex systems produce a variety of solutions to particular problems, these possible solutions undergo selection by the system (e.g., natural selection in species or consumer preference in the market). Over time, as the experience is repeated, more and more effective solutions are identified. Likewise, for interventions in health in cities, a beneficial strategy would include evaluating performance of potential solutions, and selecting the best candidates for further support and development.

6. Fine-tune processes

In complex systems, which change over time and respond dynamically to outside forces, it is necessary to constantly refine interventions through a continual process of variation and selection. Thus, the process of intervening in complex adaptive systems in any meaningful way will always be an iterative one. There is no one final best approach that can be permanently adopted, no single efficient or effective way of intervening that will always work. Because the system is constantly changing, it is necessary to continue adjusting and adapting the interventions to keep them current and useful.

7. Encourage self-organization

Complex adaptive systems often spontaneously generate solutions to problems without external input or formally organized interventions. This feature is evident in health in cities, where grassroots, self-funded groups often arise to address what they see as pressing health issues through service delivery or advocacy. This self-organizing quality is a ‘free good’ that can be valuable in producing innovative and novel approaches to problems.
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A Case Study in Applying the Toolbox

How do these tools work in practice? To demonstrate the way in which our suggested approach differs from more conventional approaches to intervening in health in cities, we applied the tools to a real initiative undertaken by Wellesley Central Health Corporation (WCHC) but have fictionalized the results to preserve confidentiality.

WCHC was concerned about Toronto’s underfunded educational system and the dramatic reduction of resources for youth. The WCHC board decided to sponsor a Youth Project to respond to the impact of these problems on a particularly vulnerable group – young undereducated men, some of whom have serious psychosocial problems and/or other illnesses. The WCHC board began by recommending a study to identify the most critical health issues involved, particularly those related to mental health and addictions. It suggested that the project members talk to key informants and organize focus groups.

Findings of research on youth

Two researchers carried out more than 30 in-depth interviews with experts, community institutions and residents of the area under consideration in Toronto. The interviews focused on poverty, poor nutrition, unsafe schools and the lack of recreational opportunities for youth, and highlighted the need to ‘break the cycle’ of poverty, violence and unemployment, and the importance of keeping youth in school. The study concluded by pointing out that each geographic area or school district has its own specific needs. The report identified two distinct groups in need of support:

1. Those between the ages of 11 and 13 were said to be especially vulnerable. They suffered from low self-esteem, and faced a difficult transition into adolescence. They were felt to be at risk of turning to cigarettes, drugs or alcohol, or of being victims of bullying. This group often had minimal parental support and few services were available to help them.

2. Those between the ages of 14 and 17 needed support to keep them in school. They were at risk of depression, drug abuse, teen pregnancy, homelessness and involvement in criminal activity or gangs. In their case, parental support was often absent and few services were available to help them.

The study suggested establishing a community drop-in centre that would be open before and after school and on weekends. It would offer wide-ranging programs, be staffed by skilled workers, and be connected to school boards, parental groups, local organizations and the resources of the City of Toronto.
The WCHC’s Urban Health Committee also held focus groups with young people to elucidate their concerns and to determine useful modes of intervention. These focus groups confirmed the earlier findings and supported the proposal for a drop-in centre. The participants added that the centre should not be located in a school.

The study also recommended a focus on a particular area of Toronto that we will call “Jackson Heights.” This is an area largely made up of high-rise apartment buildings in central Toronto that is home to more than 30,000 people and includes one of the most densely populated square blocks in North America. Many of the households in the area have very low incomes or rely on social assistance. The study noted the following characteristics of the area:

- 49 percent of population is made up of immigrants.
- 40 percent of population speaks a language that is neither English nor French.
- There is a large refugee population from Sri Lanka and other countries.
- Many refugees and their children have directly experienced violence in their home country.
- There are fewer services in Jackson Heights than in other predominantly low-income areas of Toronto.

Finally, the report identified an existing organization, the Jackson Heights Youth Centre, which provides some support to the youth of the area and could provide an operational base for further programming, including research and evaluation, but was seriously in need of financial and research support.

Using the information from this report, we decided to apply the toolbox to get a slightly different perspective on the area and to identify potential interventions that might benefit the youth of the area.

**Applying the toolbox to the case study**

1. **Gather information**

Gather data about local conditions:
- Who lives here?
- What are the demographic characteristics of the population?

Capture local strengths as well as weaknesses:
- What are the local problems and issues?
- Which populations are most at risk?
- What are local assets that might be used to help?
This stage of the inquiry has been largely completed. All that remains is to identify the local assets that can be used to help address local problems (this is a type of research known as ‘appreciative enquiry’). Communities like Jackson Heights are not merely a collection of problems needing a solution. They also have valuable assets. To focus only on problems means that important parts of the community are overlooked. Ignoring the assets of a complex environment can also mean that an intervention may inadvertently harm those assets. Most members of complex social environments want to make things better. This asset should be identified as interventions are considered.

2. Respect History

Work hard at understanding local history and culture:
- What particular values are important to this community?
- Are there any taboos that should be considered?

Interpret possible interventions in light of specific local circumstances:
- What would people really like to do?
- What issues would galvanize this community?

The work done so far already has identified some of this information, such as the high incidence of refugees, many with direct personal experience of violence. Their attitudes towards violence may have a strong bearing on how violence in the community is dealt with. Less obvious issues are also worth exploring. For example, it is probably worth finding out how people in the area, especially children, have adapted to the high density of the neighbourhood. This might have implications for a number of interventions, including those related to violence.

3. Consider Interactions

Recognize interactions that already exist:
- How do people help each other in the community?
- What are the vicious cycles that make things worse?
- Are there virtuous cycles that might make things better?

Consider how possible interventions might interact:
- How might they affect the identified issues?
- How might they affect other issues in the community?
- Are they feasible?

The identification of issues and needs among youth in the community is a strong basis for developing a more complex view of the interactions that occur. This immediately suggests other
questions about interventions. For example, when families do provide support for youth, how do they do so in this community? How would one go about strengthening families’ capacity to provide such support? How could older youth help those younger than themselves?

4. Promote Variation

Identify previous interventions:
• Which have succeeded in the past? Why?
• Can we build on previous successes?
• Which failed? Why?
• Can we learn from and correct previous failures?

Identify many different potential small interventions:
• What interventions could be ‘seeded’ in the current situation?
• How can they be tried out on a small scale?

The analysis so far considers major interventions, such as the services and support provided by the Jackson Heights Youth Centre. The particular interventions in that context as well as in the community could easily be broadened by suggesting programs which allow the older youth to support and help younger ones. Programs that enlist older youth to help increase the safety of younger children or act as coaches, trainers or mentors would do this. Similarly, programs might be suggested that provide opportunities for youth to help others in the community while developing useful skills. A good example is training adolescents to volunteer in day cares or help care for older people.

5. Conduct Selection

Consider which interventions should be seeded:
• Which interventions have multiple consequences?
• Which interventions have been suggested by youth themselves?

Allow interventions time to demonstrate success or failure:
• Which interventions are taking off?
• Which are dying on the vine?

Develop evaluation procedures that include the participants:
• How do youth think they benefited from the interventions?
• How do they think others benefited from them?
Gather data that is independent and considers outcomes:

- What are some independent measures of success?

There already has been an initial process of selection. The identification of an existing successful program that can be nurtured is an excellent example of how to intervene. Ongoing selection of options will continue, although keeping an observant eye on interventions without meddling is a difficult role for funders to play. Allowing programs and interventions the space and resources to succeed or fail on their own is an option: If people stop coming, then the program has failed. If it is always full, it has succeeded. Natural selection in species, or consumer preference in the market, are examples of this kind of selection. A beneficial strategy includes evaluating the performance of potential solutions, and selecting the best candidates for further support and development.

6. Fine-Tune Processes and Interventions

Improve interventions with members of the community:

- What ideas do youth have to improve interventions?
- What ideas do their families have?

Adjust interventions as circumstances change:

- How can programs adjust to changing circumstances?
- What are the opportunities for new programs in these changed circumstances?

Since complex systems change over time and respond to outside forces, it is necessary to constantly refine interventions. As solutions are tried and evaluated, they are modified so that they remain current and context-appropriate. Thus, intervening in complex adaptive systems in any meaningful way will always involve constant fine-tuning. There is no one final best approach that can be permanently adopted and no single most efficient or effective way of intervening that will always work. Because the system is constantly changing, it is necessary to continue adjusting and adapting the interventions to keep them current and useful.

7. Encourage Self-Organization

Identify the areas in which self-organization has occurred:

- Have there been spontaneous and unplanned responses to issues?
- What are they?
- Have they been encouraged or discouraged? How?

Identify obstacles to self-organization:

- How can these obstacles be eliminated or reduced?
Complex adaptive systems often spontaneously generate solutions to problems without external input or formally organized interventions. This feature is evident in urban health, where grassroots self-funded groups often form to address what they see as pressing health issues. This self-organizing quality can be valuable in developing innovative and novel approaches to problems. In finding ways to intervene in urban health, it is important to recognize the benefit of such self-organization and to facilitate it rather than block it. The development of the Jackson Heights Youth Centre seems to have been at least partly self-organized. A decision to support it would reduce obstacles to its continued existence.

This very brief case study shows how the toolbox for health in cities can be applied to specific situations. Other urban issues could be approached in this way, using the toolbox as a guide to more comprehensive thinking about health in cities.

Conclusion

Cities are enormously complex and changes in one part of a city may produce unforeseen consequences in another. The web of interactions whereby individuals within cities respond to each other and to the urban environment can be viewed as a complex adaptive system. Human health, too, is a product of many factors, each of which interacts with the others and each of which is subject to change that may affect the overall health of an individual. Therefore, improving health in cities is a matter of making numerous small-scale interventions, selecting those that prove to be effective, encouraging self-organization among city dwellers, and constantly modifying approaches as the system continually changes and adapts.

The model we propose, based on the theory of complex adaptive systems, is being considered by several health care providers and organizations, who have found it a useful way to look at health in cities. We hope that other organizations will find it helpful in their efforts to improve health.
References


