

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/279533296>

Useful Theory of Change Models

Article in *Canadian Journal of Program Evaluation* · January 2015

DOI: 10.3138/cjpe.30.2.142

CITATIONS

8

READS

704

1 author:



John Mayne

45 PUBLICATIONS 692 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Revisiting Contribution Analysis [View project](#)



Working with Useful Theories of Change [View project](#)

Useful Theory of Change Models

John Mayne
Ottawa, Ontario

Abstract: *Although theories of change are frequently discussed in the evaluation literature and there is general agreement on what a theory of change is conceptually, there is actually little agreement beyond the big picture of just what a theory of change comprises, what it shows, how it can be represented, and how it can be used. This article outlines models for theories of change and their development that have proven quite useful for both straightforward and more complex interventions. The models are intuitive, flexible, and well-defined in terms of their components, and they link directly to rigorous models of causality. The models provide a structured framework for developing useful theories of change and analyzing the intervention they represent.*

Keywords: *causal links, complex intervention, impact pathways, logic model, results chain, theory of change, theory of reach*

Résumé : *Bien que les théories du changement soient souvent débattues dans la littérature portant sur l'évaluation et qu'il y ait un consensus sur ce qu'est, conceptuellement, la théorie du changement, il n'y a, en réalité, aucun accord au-delà de la définition générale de ce que la théorie du changement comprend, de ce qu'elle démontre ainsi que de la manière dont elle peut être représentée et utilisée. Cet article donne un aperçu de modèles de théories du changement, ainsi que leur développement, lesquels se sont montrés très utiles lors d'interventions tant simples que complexes. Les modèles sont intuitifs, flexibles et bien définis en matière de composantes. De plus, ils sont liés à de rigoureux modèles de causalité. Les modèles fournissent un cadre structuré au développement de théories du changement utiles et à l'analyse de l'intervention qu'ils représentent.*

Mots clés : *liens de causalité, intervention complexe, cheminement d'impact, modèle de logique, chaîne des résultats, théorie du changement, théorie de la portée*

Models depicting how interventions are meant to work are frequently discussed and used in evaluation. See, for example, [Patton \(2008\)](#); [Chen \(2015\)](#); [Rossi, Lipsey, and Freeman \(2004\)](#); [Morra Imas and Rist \(2009\)](#); and [Funnell and Rogers \(2011\)](#). Some of the earlier discussions are by [Suchman \(1967\)](#) and [Bickman \(1987\)](#). However, the terms used to describe these models vary widely, and include *program theory*, *logic model*, *theory of change*, *results chain*, *outcome pathway*, *action theory*, *implementation theory*, and more, with no general

Corresponding author: John Mayne, john.mayne@rogers.com

agreement on terms or meaning. [Funnell and Rogers \(2011\)](#), pp. 15–34) discuss the range of terms used for these models and their histories, as does [Patton \(2008\)](#), pp. 336–340).

I will be using the term *theory of change*. Theories of change have a wide range of possible uses in developing, managing, and evaluating interventions. [Mayne and Johnson \(2015\)](#) discuss using theories of change in

Designing/planning interventions

1. Designing interventions
2. Understanding and agreeing on interventions with stakeholders
3. Identifying and addressing equity, gender, and empowerment issues
4. Ex ante evaluation of proposed interventions

Managing interventions

5. Designing monitoring systems
6. Understanding implementation, managing adaptively, and learning

Assessing interventions

7. Designing evaluation questions, methods, and tools
8. Making causal claims about impact
9. Reporting performance

Scaling

10. Generalizing to the theory, to other locations and for scaling up and out.

In Part 5 of their book, [Funnell and Rogers \(2011\)](#) discuss using theories of change (program theories) in monitoring and evaluation and offer many examples. Some good examples of using theories of change, especially in a planning and designing mode, can be found in [Johnson, Guedenet, and Saltzman \(2014\)](#).

The use of theories of change has been reviewed by [James \(2011\)](#), [Vogel \(2012b\)](#), and [Stein and Valters \(2012\)](#), who all note that while there is general agreement on the big picture about theories of change—models depicting how interventions are supposed to work—there is a proliferation of different interpretations of just what in practice a theory of change entails, how to develop one, and how to depict it.

This article presents and describes a robust and useful model for theories of change for simple and more complex interventions. It first outlines a basic generic theory of change, followed by a discussion of causation in relation to theories of change. Models for more complex multifaceted interventions are then presented, along with a discussion of nested theories of change. The article discusses three possible useful versions of a theory of change, discusses simplifying the models, and offers a few comments about building theories of change. It concludes by summarizing why the models discussed are useful.

THEORIES OF CHANGE AND IMPACT PATHWAYS

Let me first define a few key terms. The term *results* is used to include outputs, outcomes, and impacts, where impacts are the final outcomes affecting well-being. The term *intervention* is used here to describe specific activities undertaken to make a positive difference in outcomes and impacts of interest. It covers policies, programs, and projects.

To understand how and if an intervention is working, we need to understand how the activities of the intervention are expected to lead to the desired results—both (a) the causal pathway from activities to outputs to a sequence of outcomes to impacts and (b) the causal assumptions showing why and under what conditions the various links in the causal pathway are expected to work. A variety of terms are used in the literature to describe the causal pathways, including results chains, logic models,¹ and impact pathways. I will use the term impact pathways.

Impact pathways describe causal pathways showing the linkages between the sequence of steps in getting from activities to impact. A *theory of change* adds to an impact pathway by describing the causal assumptions behind the links in the pathway—what has to happen for the causal linkages to be realized. Patton (2008, p. 336) makes the same distinction between logic models and theories of change: “Specifying the causal mechanisms transforms a logic model into a theory of change.” Chen (2015), in Chapter 3, makes a similar distinction. Theories of change are models of how change is expected to happen (*ex ante* case) or how change has happened (*ex post* case).

There are many ways to depict impact pathways and theories of change. Funnell and Rogers (2011) illustrate the broad range. Figure 1 illustrates a basic generic theory of change that has proven useful in several settings. The sequence of boxes in the figure is the associated impact pathway (the results chain), which is discussed first. Figure 1 is a further refinement and improvement of the theory of change model discussed in Mayne (2014).²

Components of an Impact Pathway

Beneficiaries are the target groups whose well-being the intervention intends to improve. These groups might be segmented by income, gender, ethnicity, and/or geographical area. Consider as an example an intervention aimed at improving the nutritional diets of children; the children are the intended beneficiaries. Note that the target groups could include organizations.

In the theory of change model, the activities and results (often labelled as outputs, outcomes, and impacts) are depicted in the boxes:

- *Activities* are actions undertaken by those involved in the intervention.
- *Goods and services* produced are the direct outputs resulting from the activities undertaken. In the nutrition example mentioned above, these might be the innovative education and training material on the benefits of a nutritious diet. In this article, the term *output* is used to refer to these direct goods and services.

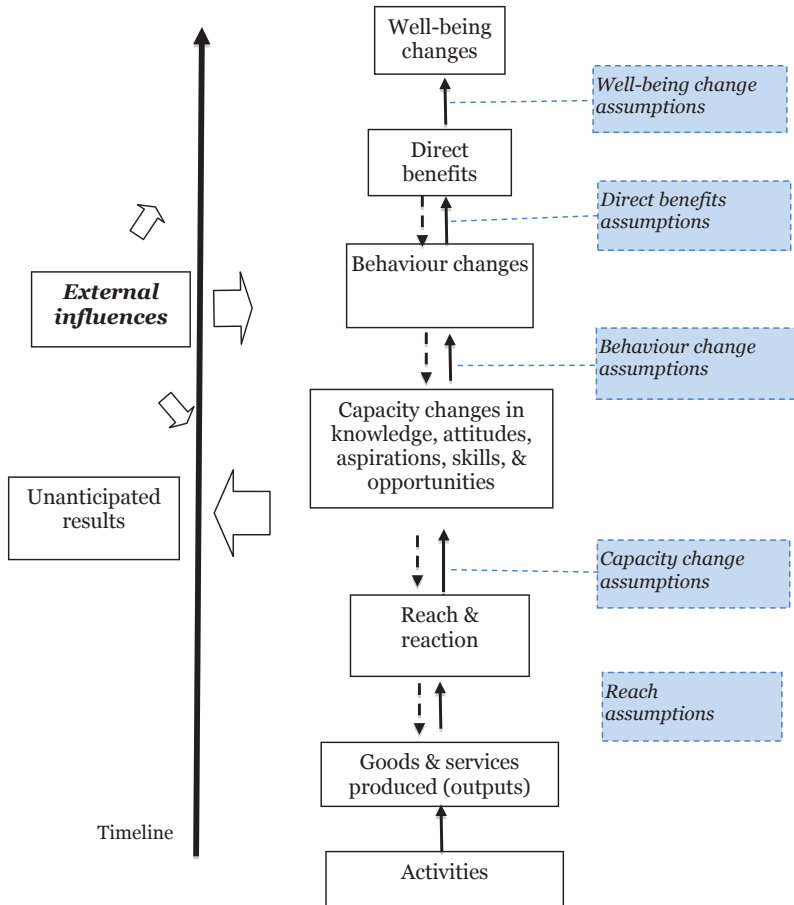


Figure 1. A Basic Generic Theory of Change

- *Reach and reaction* are the target groups who are intended to receive the intervention's goods and services and their initial reaction. In the nutrition example, the reach group would be mothers with children in some geographical region. Reach is important to include as a component in causal pathways. As has been argued, "A lack of explicit thinking about reach in logic models can lead to problems such as narrow/constricted understanding of impact chains, favoring of 'narrow and efficient' initiatives over 'wide and engaging' initiatives and biased thinking against equity considerations" (Montague & Porteous, 2013, p. 177). I have discussed the usefulness of including reach in Mayne (2014).
- *Capacity changes* are the changes in knowledge, attitudes, skills, aspirations, and opportunities of those who have received or used the

intervention's goods and services. As discussed later, all of these changes are needed for new action to be taken.³

- *Behavioural changes* are the changes in actual practices that occur, that is, those in the target reach group do things differently or use the intervention products. In our example, this could be the changes in feeding practices of mothers that occur as a result of the improved knowledge from the training. There typically is feedback between capacity and behavioural changes (such as with acquiring new knowledge and skills by doing).
- *Direct benefits* are the improvements in the state of individual beneficiaries. These could be such things as increased income, increased use of health services, more productive farming, more empowerment, or, in the example, children consuming a more nutritious diet.
- *Well-being⁴ changes* are the longer-term cumulative improvement in overall well-being of individual beneficiaries, such as better health, reduced poverty, and better food security. In our example, the improved diet would contribute to better nutritional and health status.

Note that the causal pathway model in [Figure 1](#) explicitly does not label the sequence of results as immediate, intermediate, and final outcomes (or impacts)—a much more frequently used model, although these labels could be added. Because these commonly used terms have little intuitive meaning, on their own they do not provide much guidance in setting out an impact pathway and, if used, the result is often wasted debate about, for example, whether a result is an immediate or an intermediate outcome. And while I had thought that outputs was a well-defined (as I define above) and widely accepted term, the recent [United Nations Development Group handbook \(2011\)](#) confuses that term as well, defining outputs as goods and services or capacity changes. I am arguing that [Figure 1](#) is a more useful representation of an impact pathway than the more common outcomes-based generic model.

External influences are events and conditions unrelated to the intervention that could contribute to the realization of the intended results. These could include other interventions with similar aims, and/or general economic or social trends. They are not part of the intervention theory of change per se. For example, in the nutrition example, a reduction of the price of vegetables could also account for a portion of an increase in vegetable consumption that is unrelated to the training intervention. Industrial fortification of foods such as sugar or flour could also contribute to explaining an improvement in micronutrient status.

[Figure 1](#) includes *unintended effects*: positive or—more usually—negative unanticipated effects that occur as a result of the interventions activities and results. If these are known possibilities they should be noted. Ex post, unanticipated effects should be actively looked for. Note also that although [Figure 1](#) looks linear, it explicitly allows for *nonlinearity* via the feedback between the various stages. [Figure 1](#) also illustrates a *timeline* of when the anticipated changes can be expected to occur. Timelines even with rough dates are useful addition to impact pathways.

From an Impact Pathway to a Theory of Change

In developing a theory of change, the first step is to develop the impact pathway. But an impact pathway, results chain, or a logic model is not a theory of change. Only when we add the assumptions to the causal links in the impact pathway do we get a theory of change. The *causal link assumptions* shown in the dotted boxes in [Figure 1](#) identify what salient events and conditions have to occur for each link in the causal pathway to work as expected. What is necessary for the causal link to work? What factors are critical to these causal processes? For practical reasons, we only need to consider *salient assumptions*, that is, those that stand out for some reason, that are striking and relevant to the situation. Others, such as the sun rising each day or a revolution not occurring, are not relevant—although *ex post*, a revolution would easily explain why the intervention did not work! Articulating causal link assumptions would entail a mix of prior evidence, stakeholder experience, and social science theory. For example, an assumption in the child nutrition example would be that husbands and mothers-in-law are supportive about what children eat, letting mothers make those decisions.

These causal link assumptions cover all the risks associated with the causal link; each of the assumptions is a risk to the realization of the ToC.⁵ In the nutrition example, risks concerning the availability and affordability of nutritious food would be captured by an assumption that nutritious food is available and affordable.

- *Reach assumptions:* The assumptions are the events and conditions needed to occur if the outputs delivered are to reach and be positively received by the reach groups. These could include such things as that the delivery of outputs actually reaches the intended audience and the outputs are seen as acceptable and worth considering. A key risk here is that the reach group is not the “right” group, as in the case of the child nutrition intervention directed at mothers when they do not in fact make decisions about who gets what food, as well as actually reaching all of the intended target group and not, for example, just those who self-select.
- *Capacity change assumptions:* These assumptions are the events that need to occur and the conditions that need to change if the outputs that reach the target populations are to result in changes in their knowledge, attitudes, skills, aspirations, and opportunities, that is, their capacity to do things differently. These could include such things as the outputs being understood, realistic, culturally acceptable, seen as useful, commensurate with the prior abilities and values of the target population, seen as relevant to the reach group, and so on.
- *Behaviour change assumptions:* These assumptions are the events and conditions needed to occur if the changes in the capacities of the target groups are to result in actual changes in their practices. These could

include such things as financial capacity to make the practice changes, acceptance by others (such as peers, social, cultural and religious leaders, family) to make the changes, the practice changes shown to be useful, the policy or natural environment allowing the practices to be adopted, access to needed assets and supplies, and so on.

- *Direct benefits assumptions:* These assumptions are the events and conditions needed to occur if the practice changes are to be realized as a direct benefit to the conditions of the targeted beneficiaries. These could include such things as change practices result in a net increase in income, routine use of health services, involvement in decision-making, and so on. In the nutrition example, there may be an assumption that the only change in the diet is the one recommended by the training program. If the improved practices (e.g., more vegetables) are incorporated but then other foods are reduced, the expected benefit may not occur.
- *Well-being change assumptions:* The assumptions are the events and conditions that need to occur if the direct benefits are going to lead to changes in the well-being of the beneficiaries. For example, if children consume a better diet and if they have access to basic health care and improved sanitation, they will improve their nutritional and health status. If as a result of the intervention women begin to play a greater role in food consumption decisions and if the intervention is seen as successful, this could contribute to a change in gender norms that empowers women.

Note that these causal link assumptions are not descriptions of the causal link. A description of a causal link in [Figure 1](#) (the solid arrows) would be, for example, that the changes in knowledge skills and so on (capacity) will result in the expected behaviour changes in actual practices. Causal link assumptions explain how and why the causal link works.

Bringing about changes in behaviour can be quite challenging and has been the subject of much research. [Darnton \(2008\)](#) reviews much of this literature. A typical model is the NOA (needs, opportunities, and abilities) model in [Gatersleben and Vlek \(1998\)](#). It posits that behaviour change is brought about by motivation and behaviour control (agency). In turn, motivation results from needs and opportunities, and agency from opportunities and abilities. All these elements are captured in the generic theory of change (knowledge, skills, aspirations, attitudes, and opportunities) with different terms, albeit not in as much causal detail. But the research suggests that the causal package for behaviour change needs to include *each* of these components. Some are what the intervention aims to change in terms of capacity. Others would be captured as relevant in the behaviour change causal link assumptions. In the nutrition example, it can be safely assumed that mothers do want to improve the health of their children (motivation) and that the intervention aims to provide the opportunities and abilities.

It can be useful to recognize two different types of capacity and behavioural changes. The first are incremental or *additional changes* to the current state, such as learning new techniques and skills or adopting new practices. These are relatively easier to bring about than more *fundamental changes*, such as thinking about problems differently or changing current practices. In the nutrition example, if what is required is acquiring new food products for children, this is an additional practice that is relatively straightforward. On the other hand, if the practice change required is a redistribution of food among household members, then this changes how food was distributed previously and raises power issues. It is a fundamental change and likely considerably more difficult to bring about; thus the associated causal link assumptions would need to be more robust and challenging.

The discussion so far has been in deterministic terms (e.g., an assumption is either necessary or it is not). However, we may want to reflect the probabilistic nature of causality. Mahoney (2008, p. 421) argues that “a treatment is a cause when its presence raises the probability of an outcome occurring in any given case.” He introduces the useful ideas of probabilistically necessary causes—“factors that usually or almost always have to be present for the outcome to occur”—and probabilistically sufficient causes—“a cause that much of the time on its own will produce the effect” (pp. 425–426). For many interventions being evaluated, these are more realistic interpretations of necessity and sufficiency.

Thus the causal link assumptions can be thought of as *likely necessary* assumptions, events and conditions that almost always have to occur for the causal link to work.

Setting out assumptions for a theory of change can be confusing because there are different types of assumptions associated with an intervention. In particular, in addition to the causal link assumptions discussed above, there are also *rationale assumptions* that identify the underlying hypothesis or premise on which the intervention is founded, such as the assumption that informing household decision-makers about the benefits of nutrition for their children will change their behaviour and result in children getting a better diet. It would be expected that the rationale for most interventions would be based on some prior evidence and experience.

Figure 2 sets out the theory of change for the nutrition example.⁶ Although the nutrition example is not based on an actual case, see White (2009) for a discussion of just such an intervention in Bangladesh.

I am arguing that in most interventions *each* of these components of the generic theory of change—activities, outputs, capacity changes, behavioural changes, direct benefits, and well-being change, along with the associated causal link assumptions—can be, and should be, identified and thought through when developing impact pathways and theories of change. The structure of the model forces one to consider just how it is expected that the intended results will be brought about: What is the causal process at work and what does it take to make it happen? *The model is a framework for analyzing how an intervention works.*

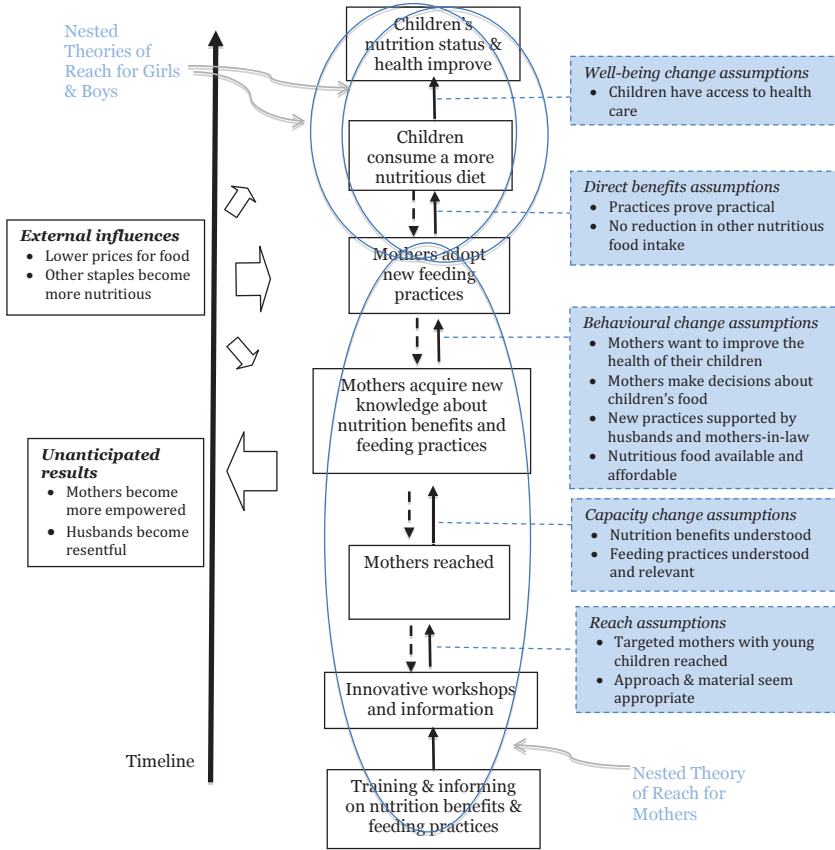


Figure 2. A Nutrition Intervention Theory of Change

THEORIES OF CHANGE AND CAUSAL PACKAGES

Theories of change represent how and why it is expected that an intervention will contribute to an intended result. But it is clear that rather more than the intervention activities are needed; also needed is the realization of the causal assumptions. The intervention activities are rarely the sole cause of a result. The theory of change depicts a *causal package* of activities plus assumptions that together are expected—are sufficient—to contribute to the intended results. [Cartwright and Hardie \(2012\)](#) call these assumptions *support factors*: events and conditions needed to bring about a contribution to the effect of a cause. The expectation is also that the intervention activities in particular are an essential—a necessary—part of this sufficient causal package. That is, without the intervention activities, realization of the causal link assumptions would not be sufficient to make a contribution. The intervention activities can then be said to be a *contributory*

cause to the results. In these terms, a *theory of change* is a model of the intervention as a contributory cause; it is a model of the causal package showing just how the contribution to the results are to be brought about. Mayne (2012) discusses contributory causes and causal packages in the context of theories of causation, and in particular INUS causes.⁷

The theory of change is a model of the *contribution to* and not cause per se of the intended result, because there may be other external factors also contributing to the intended results, as noted in the external influences box. Only if there are no external influences at work is the theory of change a model of causation. As with an intervention, an external influence usually does work just on its own, but rather as part of another causal package that might include some of the supporting factors in the intervention causal package. External influences can have positive or negative effects on the level of results attained. Depending on the strengths of the intervention, the external influences may explain some or all of the observed results. Significant negative effects, that is, risks that could undermine the intervention's theory of change, are included in the causal link assumptions.

In probabilistic terms, we can speak of *likely sufficient* to describe the sufficiency of the intervention causal package, meaning that, in this case, the causal package most likely produced a contribution to the observed result. To show that the intervention is a contributory cause is to show that the intervention's causal package is likely sufficient, and that the intervention is itself a likely necessary element of the sufficient package.

In discussing theories of change, it is useful to *distinguish the ex ante* from the *ex post case*. Ex ante, there is a need to speak of probabilistic causes and likely sufficiency. Ex ante, one has a *postulated or prior theory* of change setting out the argument that if the intervention is implemented as designed and if the assumptions associated with the ToC hold, then the intended contribution to the results will be realized. It sets forth the assumed reality and complexity of the intervention. It is a prediction of effectiveness.

Ex post, you are verifying that the theory of change did occur with evidence on the results and assumptions that were realized. When you make a causal claim, you know which factors were at work and whether something in addition was at play. If you conclude that the package was likely sufficient, here it means that you recognize that you may have missed something in your analysis, but that reasonable people would conclude that the causal package was indeed sufficient. Ex post you are testing the ex ante causal hypothesis. As noted, ex post you are likely to be able to identify if there were other external influences at work. If there were none, then the intervention causal package can be said to have caused the observed result, not just contributed to it.

The intervention itself is one among several causal factors in the causal package necessary to bring about change. In that sense, all are equal. Yet our interest is on the intervention as an instrument of change—activities deliberately done to get or continue change happening where adequate change was not happening

before. We can ask ex post what *role* the intervention played in bringing about the changes. We may expect that at a minimum the intervention acts as a *trigger* to start the causal chain. In such cases, an intervention can be said to be a *principal contributory cause*. In other cases, the intervention might see itself as playing a more modest supporting role, joining others in an already ongoing process, *enhancing* a change process already underway so that better or more timely results are achieved (Mayne, 2008).

MULTIFACETED SUFFICIENT INTERVENTIONS

Although there is a lot in Figure 1, it was referred to as a “basic” generic theory of change. This is because it only shows one actor undertaking activities, and the model may suffice for many straightforward interventions. But for many, more complicated interventions, this is generally not the case. To make a difference, an intervention needs to engage and work with a variety of other intermediaries—delivery partners, governments, the private sector, and NGOs—and influence their behaviour. The theory of change shown in Figure 1 identifies a possibly wide range of causal link assumptions that need to occur if the direct benefits and well-being changes are to be realized. Leaving these to chance may not be an option, and the intervention should work with relevant intermediaries, including delivery partners, to try to make sure that the intermediaries undertake actions to ensure (or go a long way to ensuring) that the numerous causal link assumptions are brought about. These *supporting activities* carried out by the intervention actors are in addition to its main or core activities. We can thus speak of the *core intervention* and the *overall intervention*. In an agriculture research for development intervention, the core intervention is the research activities, while those plus engagement supporting activities that are carried out to get the research used constitute the overall intervention. In other cases, there are no identifiable core or main activities, and the intervention works with a variety of partners to collectively deliver a sufficient set of activities.

Typically, these causal link assumptions can cover a range of events or conditions that create an *enabling environment* for the intervention activities to contribute to well-being. This results in a much more *multifaceted* overall intervention but with the aim of ensuring that it is *sufficient*: that the collection of (core) intervention efforts, its engagement activities, and the resulting actions by intermediaries are sufficient to contribute to the expected benefits and well-being changes. That is, the set of engagement activities are aimed at ensuring that the causal link assumptions—the support factors—are realized.

We can still ask if the core intervention was a principle contributory cause, that is, did it play a trigger role in getting change started. And in the multifaceted sufficient contexts, the intervention will also involve other subsequent supporting actions taken along the causal pathway to *sustain* the causal pathway. Thus, we would like to assess whether the core intervention is a triggering contributory cause and a sustaining contributory cause.

A strong causal claim about a multifaceted sufficient intervention would be that the intervention was a principal contributory cause of the relevant observed results. That is,

The intervention was a necessary component of a package of causal factors that together were sufficient to contribute to an observed result. In other words, *the intervention made a difference*. In addition, the intervention played a key role; it was the trigger that initiated the chain of events and through its supporting activities sustained the chain of events that contributed to the observed results.

Figure 3 illustrates the generic theory of change for this more complex, indeed *multifaceted sufficient intervention*.⁸

In building a ToC, it can be useful to identify the degree of control one has or might have over the causal link assumptions. Assumptions can be labelled as [O], over which the intervention has no or very little influence; [I], where the intervention can (should) have an influence, direct or indirect; or [C], where the intervention should be able to directly control. This helps to identify where additional supporting actions might be useful to better ensure the assumptions are realized and hence the risks to the intervention minimized, perhaps leading to a multifaceted intervention.

Using the nutrition example, Table 1 illustrates the type of *ex ante causal link analysis* that can be undertaken. Each of the assumptions in Figure 2 is assessed

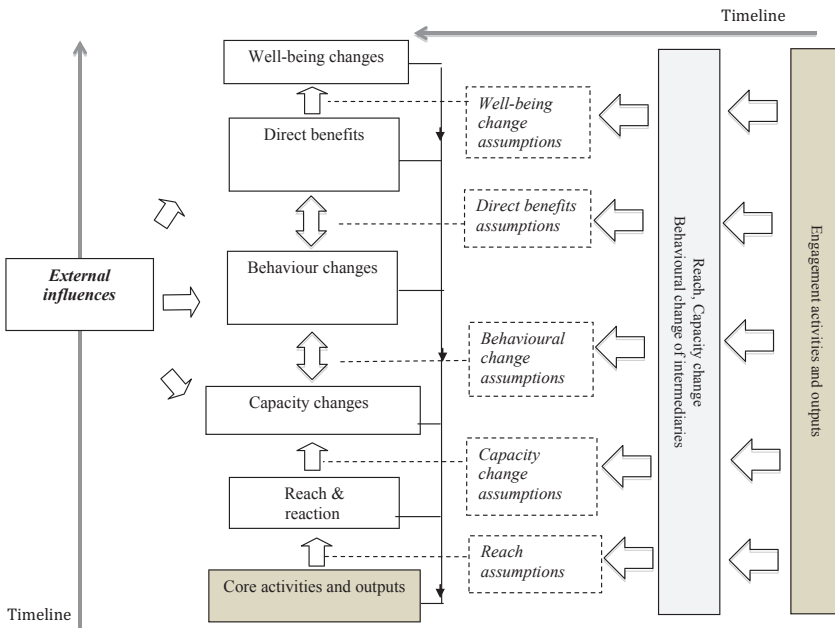


Figure 3. A Basic Theory of Change for Multifaceted Sufficient Interventions

Table 1. Analysis of Nutrition Intervention Causal Link Assumptions

Causal link assumptions	Degree of control	Supporting actions needed beyond core activities
A1 Reach Assumptions		
• Targeted mothers with young children reached	Medium [I]	Intervention needs to know its target population and how to reach them. <i>Action: Likely requires outreach efforts.</i>
• Approach and material seems appropriate	High [C]	Requires good planning and knowing the specific context.
A2 Capacity Change Assumptions		
• Nutrition benefits understood	High [C]	Requires good planning and knowing the specific context.
• Feeding practices understood and relevant	High [C]	Requires good planning and knowing the specific context.
A3 Behavioural Change Assumptions		
• Mothers want to improve the health of their children	n/a	Can be assumed.
• Mothers make decisions about children's food	Unknown	Would require knowledge of the specific context.
• New practices supported by husbands and mothers-in-law	Low [I]	<i>Action: Need for engagement with husbands/mothers-in-law on need for better nutritional diets for children.</i>
• Nutritious food available and affordable	High [C]	A prerequisite for the intervention. If not likely available, need a different type of intervention such as subsidies.
A4 Direct Benefits Assumptions		
• Practices prove practical	Medium [I]	<i>Action: Could require monitoring to see if practices do prove practical in the specific context.</i>
• No reduction in other nutritious food intake	High? [C]	Should be part of the training: don't stop consuming other nutritious food. But, risk exists that husbands and mothers-in-law in the poor households will insist on substituting. <i>Action: Need to engage with husbands/mothers-in-law.</i>
A5 Well-being Change Assumptions		
• Children have access to health care	?? [O]	Would probably just be assumed. If health is a major problem, then might question the intervention.

as to the degree to which the intervention could undertake efforts to strengthen the likelihood that the assumption will materialize.

In the example, it may be that husbands and/or mothers-in-law are not likely to support their wives making decisions about who gets what food. Then, in order for the intervention to work, some form of education of husbands and mothers-in-law about the benefits of a nutritious diet for their children is needed. The intervention agency may need to get others, perhaps an NGO, more accustomed to dealing with culture and gender issues to engage with husbands and mothers-in-law to influence their behaviour. Figure 4 illustrates the resulting multifaceted nutrition intervention.

Ex ante causal link analysis can also be used to a priori assess the extent to which there is empirical evidence to support each link in a ToC. In many

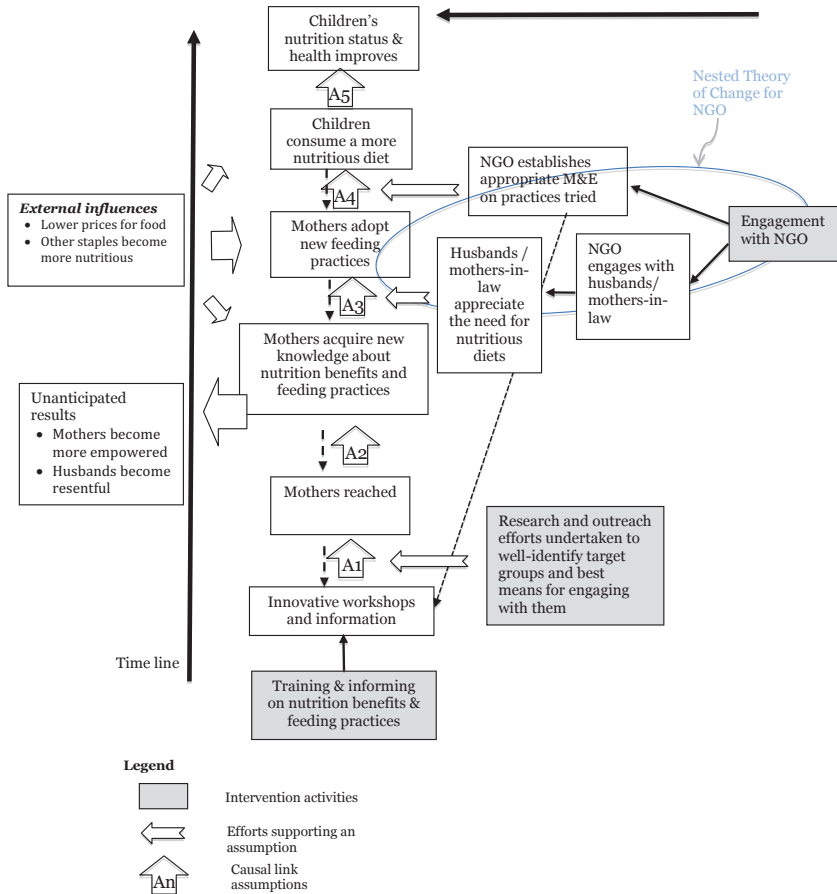


Figure 4. A Multifaceted Nutrition Intervention

cases it is likely that indeed there are supporting prior research and evaluation findings that support some of the causal links, and equally it is often the case that such prior evidence is weak or not existing. The latter case would suggest that some new research be undertaken to better confirm the causal link before implementing the initiative and/or that the assumptions for these links be carefully monitored as the intervention is implemented. This type of causal link analysis is discussed by [Mayne and Johnson \(2015\)](#) and by [Johnson, Mayne, Grace, and Wyatt \(2015\)](#).

As interesting, of course, is *ex post causal link analysis* of a theory of change, determining the extent to which a causal link and its assumptions have occurred and a credible causal claim be made. This is the essence of contribution analysis ([Mayne, 2008](#); [Mayne, 2012](#)).

DEALING WITH MESSY INTERVENTIONS

[Figures 1](#) and [3](#) could be seen as targeting one group of beneficiaries, such as children in the nutrition example ([Figure 2](#)). However, interventions often have several target groups in mind (such as mothers and children) and/or subgroups within a general group (such as boys and girls). For multifaceted sufficient interventions ([Figure 3](#)), there are usually several different intermediaries (governments, organizations, and partners) targeted. For these multitargeted interventions, one approach would be to try to develop a theory of change that captures all these activities on the various target groups and the resulting result sequences, capturing the links among the various pathways. However, developing and setting out such a model other than as an overview—which is helpful—can be quite challenging, and the resulting quite messy theory of change model can become cumbersome and hard to work with, either in terms of explaining the intervention or for helping design the evaluation.

Nested Theories of Change

Instead, it would be much more useful to develop a subtheory of change for each key target group—a *nested theory of change* or *theory of reach*⁹—recognizing that these theories of reach may interact with each other in bringing about the desired results. [Figure 2](#) shows nested theories of reach (the oval shapes) for mothers and for girls and boys—boys might be treated differently than girls, and having theories of reach for each would ensure a focus on these differences.

[Figure 4](#) identifies the nested theory of change for NGOs in the nutrition example, which is illustrated in [Figure 5](#). The assumptions in the NGO theory of change ([Figure 5](#)) are ones that the NGO should be able to control or strongly influence. [Figure 6](#) illustrates nested theories of reach for the generic multifaceted sufficient intervention. Nested theories of change offer a way to break down a more messy theory of change into something more understandable and practical.

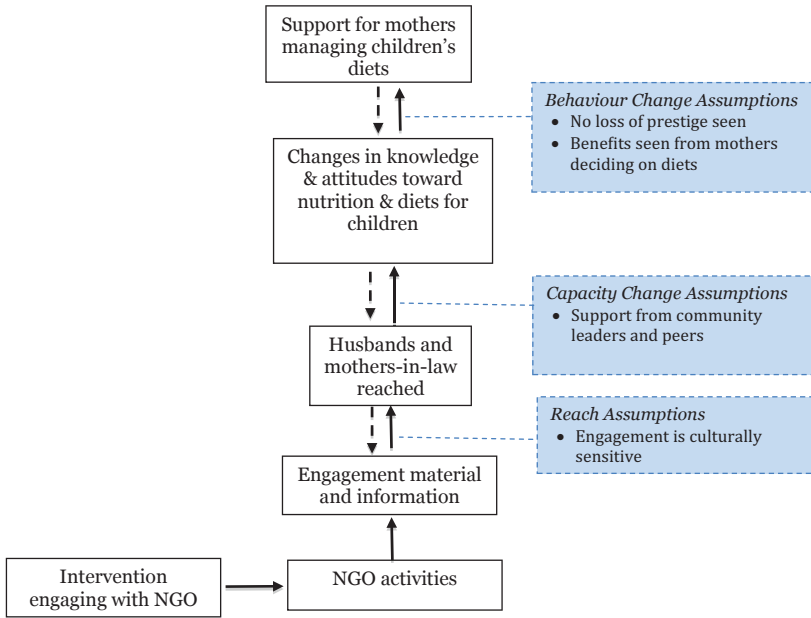


Figure 5. Nested NGO Theory of Change

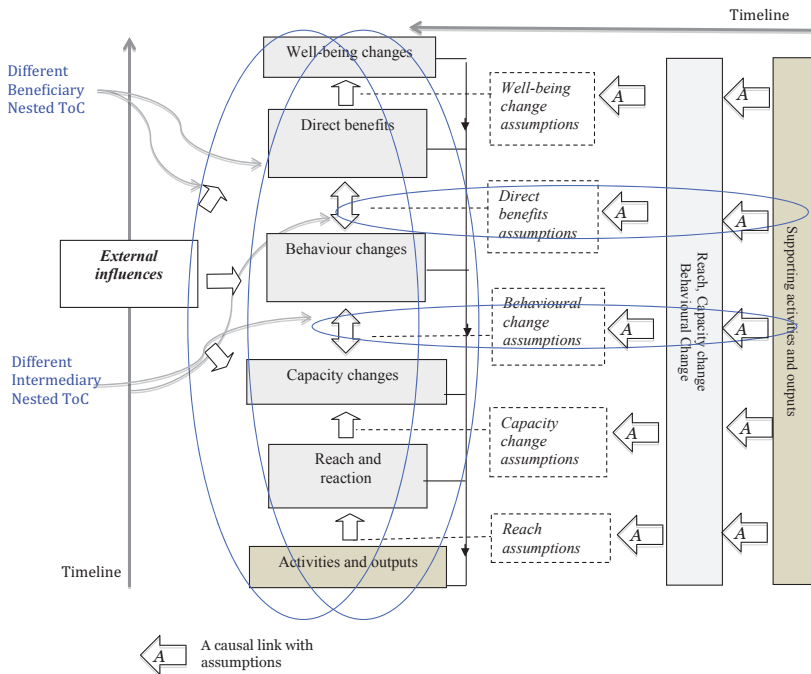


Figure 6. Nested Theories of Change

Causal Link Analysis

Another way to handle a messy theory of change is to discuss the different major causal links in the theory of change separately, such as discussing the link “getting from capacity changes to behavioural changes.” In addition, discussion of, for example, the different causal link assumptions can be done in an accompanying narrative that could also provide suitable references to prior research and evaluation that support the underlying assumptions, as done in [Table 1](#). [Mayne and Johnson \(2015\)](#) illustrate this approach.

Uncertainty and Emerging Results

Interventions vary in their “messiness”—from more complicated, such as the multifaceted sufficient interventions discussed earlier, to truly complex interventions exhibiting uncertainty and emergent properties. In evaluating truly complex interventions, using evaluation for incremental learning and adapting over time is usually suggested ([Ling, 2012](#); [Mayne, 2011](#), pp. 82–84; [Rogers, 2011](#); [Sander-son, 2000](#)). Consistent with that thinking would be developing initial theories of change such as the ones discussed here, which are then revised and adapted as new knowledge is acquired. [Rogers \(2008\)](#) and [Ling \(2012\)](#) discuss using program theories/theories of change in complex settings.

DIFFERENT VERSIONS OF A THEORY OF CHANGE FOR DIFFERENT PURPOSES

There are clearly limits to how much detail can be usefully depicted in a theory of change model, especially of a large and multifaceted intervention. Something more manageable is needed, both to work with and for communication purposes. It can be useful to have at least three versions of each theory of change.

The first is a text version, describing in a sentence or two how the specific intervention being planned or implemented is intended to work, a *theory of change narrative*. This version explains in a straightforward manner how the intervention is supposed to work and can identify the underlying rationale assumptions behind the intervention. This is the basic description or “story line” given by managers (or politicians) when asked to describe why they think the intervention will work, or set out in a policy-type documentation, usually entailing a few sentences. An example might be the simple theory for an anti-smoking TV ad intervention: by describing on TV the dangers of smoking, smokers will stop smoking. In the child nutrition example, the theory of change narrative would be something like: “By educating and informing mothers about the importance of a nutritious diet for their children, mothers will change their past behaviour and seek to improve the diets of their children.” The rationale assumption here is that better information will change behaviour.

The theory of change narrative plays an important role, because it sets out how the intervention will be publicly described and defended. It is in essence the public theory of change.

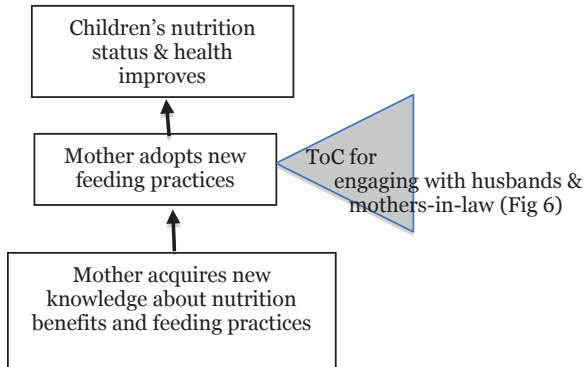


Figure 7. Overview of Nutrition Intervention

The second theory of change version is a simplified *overview theory of change* to show the big picture for a multifaceted intervention. This is especially useful for multifaceted sufficient interventions. The overview theory of change can just be a simplified impact pathway showing as relevant any nested theories of change, along with the rationale assumptions. [Figure 7](#) illustrates the nutrition example with the theory of change for engaging with husbands and mother-in-law noted in the triangle.

The third and more detailed version of a *causal theory of change* is usually a diagram model such as those shown in [Figures 1](#) through [5](#), showing the impact pathways and the causal link assumptions details of the theory of change. Each of these versions of a theory of change has its uses, and often all three are helpful to have at hand.

A further way to simplify a theory of change model by dropping “boxes” and including their essence in the causal link assumptions—essentially rearranging the causal package for the link. For many interventions, displaying all the elements of their impact pathway or theory of change in a single diagram can be cumbersome, resulting in a too-complex diagram of arrows and boxes. [Figure 8](#) shows a “simplified” version of [Figure 1](#) in which the Reach and Capacity Change boxes have been dropped. This is often tempting to do since it is the behavioural changes that are thought to be the key outcomes along the impact pathway.

[Figure 8](#) still shows the essence of the impact pathway, but in developing it as a theory of change, it needs to be remembered that the reach and capacity change aspects are not explicitly shown. In this case, the assumptions behind the arrows leading from activities and outputs to Behavioural Changes need to include assumptions about reach and capacity change. That is, *the causal packages associated with each link remain intact*, just positioned differently. Ignoring the reach and capacity change issues will significantly weaken the theory of change.

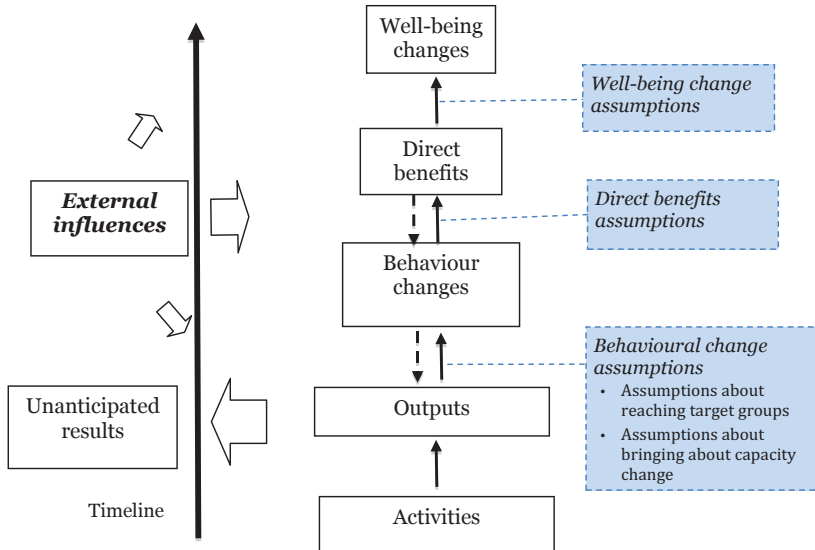


Figure 8. A Simplified Generic Theory of Change

BUILDING IMPACT PATHWAYS AND THEORIES OF CHANGE¹⁰

The concept and application of theories of change can appear complicated, but only because “theory of change” is not one thing per se. This is similar to the concept of “evaluation” that can be many things, depending on a variety of situations. Theories of change

- are time dependent—can vary over time
- have different purposes
- need to recognize uncertainties and nonlinearities
- can be ex ante and ex post.

There are now numerous sources available for guidance on developing theories of change. Vogel (2012a) and Barnett and Gregorowski (2013) discusses theories of change in relation to research interventions. There is an extensive website on theories of change at www.theoryofchange.org with references to many other guides and relevant literature.

In getting to a robust prior theory of change, initial versions should be tested against the logic and assumptions set out, as well as against any available evidence from previous research or evaluations that might (or might not) support the way the theory of change is being depicted. This challenging of a theory of change is what Brousselle and Champagne (2011) and Kautto and Silila (2005) discuss, arguing the value of this type of theory of change analysis even before testing it in the field against the actual results of the specific intervention in question. The

analysis undertaken to develop the theory of change may uncover weaknesses in initial ideas and assumptions about how the intervention is supposed to work. As noted at the outset, a theory of change can also be used as a framework for designing the intervention, developing a monitoring regime, and developing an evaluation plan.

In developing impact pathways and theories of change, several points should be kept in mind:

- They are probably best developed in a participatory manner, but this is not always possible.
- In a participatory process, one can start with a blank page and build from soliciting views or, perhaps more efficiently, with a straw impact pathway/theory of change that is developed by a few people and then used as the basis for comment, challenge, and revision.
- In discussion with stakeholders, more than one version of an intervention's theory of change may emerge (Hansen & Vedung, 2010; Weiss, 1997). It may then be useful to test both versions against reality.
- It is important to explicitly or implicitly include all the theory of change elements.
- Developing impact pathways and theories of change should be seen as a process, evolving over time as more insight is gained.
- Aim for a “good enough” impact pathway/theory of change, rather than the perfect one.
- The capacity and behavioural changes are often key.
- To the extent possible, impact pathways and theories of change should be based on prior research in addition to stakeholder views.
- Nested impact pathways and theories of change/theories of reach can be quite useful, developed around the types of intervention strategies being used and/or target groups.
- Theories of change can be displayed in a variety of ways and can be set out at different levels of detail.
- Generic impact pathways and theories of change can be quite useful as building blocks when similar interventions occur at different locations.

CLOSING REMARKS

Credible theories of change are essential for undertaking theory-based evaluations. The models discussed here are meant to be flexible enough to apply to a wide range of interventions. The article argues that the model of a theory of change illustrated generically in Figures 1 and 3 are “useful.” They are useful for several reasons:

- The models are often a “good enough” representation of a theory of change and not overly complex. They lay the basis for a logical performance story (Mayne, 2004).

- The models deliberately avoid explicit labelling of results along the impact pathway as different levels of outputs and especially outcomes, such as immediate, intermediate, and final outcomes. These output and outcome labels have no inherent meaning and are not helpful in developing a theory of change—indeed they often lead to wasted debate. Rather, it is the sequence that is important. The goods and services, reach, capacity change, behavioural change, and other labels in [Figures 1 and 3](#) have intuitive meaning and provide a good analytical structure for developing a theory of change.
- Causal link assumptions can be well defined, describing what is necessary for the link to work, and they are front and centre in a theory of change.
- The use of the causal link assumption boxes allows for a more straightforward looking representation. Otherwise, many more boxes and arrows would be needed.
- The theory of change model can be often simplified somewhat by dropping a “result box” and including it as an assumption instead.
- More complicated theories of change can be simplified by using the idea of nested theories of change and reach to focus on key nested impact pathways.
- The model with assumptions as support factors links directly with the concepts of causal packages and contributory causes, providing a rigorous basis for making causal claims.

NOTES

- 1 The term “logic model” is sometimes used synonymously with program theory or theory of change ([Funnell and Rogers, 2011](#)), but often is identified with only the causal pathway. Thus, for example, the Canadian federal government defines logic model as “a depiction of the causal or logical relationships between activities inputs, outputs and the outcomes of a given policy, program or initiative, e.g., Results Chain” ([Treasury Board Secretariat, 2012](#)).
- 2 The main revisions were to simplify the representation of the model by dropping explicit references to “risks,” “other explanatory factors,” and “incentives” and making explicit reference to unanticipated results.
- 3 Knowledge pertains to learned information or accepted advice; attitudes focus on beliefs, opinions, feelings, or perspectives; skills refer to mental and physical abilities to use new or alternative practices; aspirations refer to ambitions, hopes, objectives, or desires. Adapted from [Bennett and Rockwell \(1995, p. 6\)](#).
- 4 Well-being is the broad term used here for the end result aimed for. Livelihood is another term that could be used.
- 5 In previous articles, I had often explicitly included “risks” in the assumption boxes, noting that some assumptions are more easily understood and written as risks. This can be useful, but does clutter the boxes somewhat.
- 6 The nested theories of reach in [Figure 2](#) are discussed later.
- 7 INUS stands for an Insufficient but Necessary part of a condition that is itself Unnecessary but Sufficient for the occurrence of the effect ([Mackie, 1974](#)).

- 8 Figure 3 illustrates one type of complicated and complex intervention, with core and supporting activities. Another (not shown) would be a *multicomponent sufficient intervention* made up of a number of quite separate and distinct component activities, which together are expected to lead to improved well-being. Here the components would be nested theories of change within a larger overview theory of change.
- 9 Theories of reach are discussed in Mayne (2014).
- 10 The points in this section are further elaborated on in Mayne and Johnson (2015).

REFERENCES

- Barnett, C., & Gregorowski, R. (2013). *Learning about theories of change for the monitoring and evaluation of research uptake* (IDS Practice Paper in Brief, ILT Brief 14: Institute of Development Studies). Retrieved from <http://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/2995/PP%20InBrief%2014%20FINAL.pdf;jsessionid=4E0FEAAE919534B1B2A65F654E121023?sequence=1>
- Bennett, C., & Rockwell, K. (1995). *Targeting outcomes for programs: A hierarchy for targeting outcomes and evaluating their achievement* (University of Nebraska). Retrieved from ftp://bseerv214.bse.vt.edu/grisso/Program_Logic/Targeting_Outcome_Programming.pdf
- Bickman, L. (Ed.). (1987). *Using program theory in evaluation* (New Directions for Evaluation, no. 35). San Francisco, CA: Jossey-Bass.
- Brousselle, A., & Champagne, F. (2011). Program theory evaluation: Logic analysis. *Evaluation and Program Planning*, 34, 69–78.
- Cartwright, N., & Hardie, J. (2012). *Evidence-based policy: Doing it better. A practical guide to predicting if a policy will work for you*. Oxford, UK: Oxford University Press. <http://dx.doi.org/10.1093/acprof:osobl/9780199841608.001.0001>
- Chen, H. T. (2015). *Practical program evaluation: Theory-driven evaluation and the integrated evaluation perspective* (2nd ed.). Thousand Oaks, CA: Sage.
- Darnton, A. (2008). *Practical guide: An overview of behaviour change models and their uses*. Retrieved from http://www.civilservice.gov.uk/wp-content/uploads/2011/09/Behaviour-change_practical_guide_tcm6-9696.pdf
- Funnell, S., & Rogers, P. (2011). *Purposeful program theory: Effective use of theories of change and logic models*. San Francisco, CA: Jossey-Bass.
- Gatersleben, B., & Vlek, C. (1998). Household consumption, quality of life and environmental impacts. In K. Noorman and A. Schoot-Uiterkamp, Eds., *Green households? Domestic consumers, environment and sustainability* (pp. 141–183). London, UK: Earthscan.
- Hansen, M. B., & Vedung, E. (2010). Theory-based stakeholder evaluation. *American Journal of Evaluation*, 31(3), 295–313. <http://dx.doi.org/10.1177/1098214010366174>
- James, C. (2011). *Theory of change review* (Report commissioned by Comic Relief). Retrieved from <http://mande.co.uk/blog/wp-content/uploads/2012/03/2012-Comic-Relief-Theory-of-Change-Review-FINAL.pdf>
- Johnson, N., Guedenet, H., & Saltzman, A. (2014). *What will it take for biofortification to have impact on the ground? Theories of change for three crop-country combinations*

- (IFPRI discussion paper). Washington, DC: International Food Policy Research Institute. Retrieved from <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/129089/rec/1>
- Johnson, N., Mayne, J., Grace, D., & Wyatt, A. (2015). *How will training traders contribute to improved food safety in informal markets for meat and milk? A theory of change analysis* (IFPRI discussion paper 1451). Washington, DC: International Food Policy Research Institute. Retrieved from <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/129293>
- Kautto, P., & Silila, J. (2005). Recently introduced policy instruments and intervention theories. *Evaluation*, 11(1), 55–68.
- Ling, T. (2012). Evaluating complex and unfolding interventions in real time. *Evaluation*, 18(1), 79–91. <http://dx.doi.org/10.1177/1356389011429629>
- Mackie, J. L. (1974). *The cement of the universe: A study of causation*. Oxford, UK: Oxford University Press.
- Mahoney, J. (2008). Toward a unified theory of causality. *Comparative Political Studies*, 41(4-5), 412–436. <http://dx.doi.org/10.1177/0010414007313115>
- Mayne, J. (2004). Reporting on outcomes: Setting performance expectations and telling performance stories. *Canadian Journal of Program Evaluation*, 19(1), 31–60.
- Mayne, J. (2008). *Contribution analysis: An approach to exploring cause and effect*, (ILAC Brief No. 16). The Institutional Learning and Change Initiative. Retrieved from http://www.cgiar-ilac.org/files/publications/briefs/ILAC_Brief16_Contribution_Analysis.pdf
- Mayne, J. (2011). Contribution analysis: Addressing cause and effect. In R. Schwartz, K. Forss, & M. Marra (Eds.), *Evaluating the complex* (pp. 53–96). New Brunswick, NJ: Transaction.
- Mayne, J. (2012). Contribution analysis: Coming of age? *Evaluation*, 18(3), 270–280. <http://dx.doi.org/10.1177/1356389012451663>
- Mayne, J. (2014). Using theories of reach to enhance equity considerations in evaluation. In K. Forss & M. Marra (Eds.), *Speaking justice to power: Ethical and methodological challenges for evaluators* (pp. 133–152). New Brunswick, NJ: Transaction.
- Mayne, J., & Johnson, N. (2015). *Using theories of change in the Agriculture for Nutrition and Health CGIAR research program*. *Evaluation*, 21(4), 407–428.
- Montague, S., & Porteous, N. (2013). The case for including reach as a key element of program theory. *Evaluation and Program Planning*, 36(1), 177–183. <http://dx.doi.org/10.1016/j.evalprogplan.2012.03.005>
- Morra Imas, L. G., & Rist, R. C. (2009). *The road to results: Designing and conducting effective development evaluations*. Washington, DC: World Bank.
- Patton, M. Q. (2008). *Utilization-focused evaluation* (4th ed.). Thousand Oaks, CA: Sage.
- Rogers, P. (2008). Using programme theory to evaluate complicated and complex aspects of interventions. *Evaluation*, 14(1), 29–48. <http://dx.doi.org/10.1177/1356389007084674>
- Rogers, P. (2011). Implications of complicated and complex characteristics for key tasks in evaluation. In K. Forss, M. Marra, & R. Schwartz (Eds.), *Evaluating the complex: Attribution, contribution and beyond* (pp. 33–52). New Brunswick, NJ: Transaction.

- Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2004). *Evaluation: A systematic approach* (7th ed.). Thousand Oaks, CA: Sage.
- Sanderson, I. (2000). Evaluation in complex policy systems. *Evaluation*, 6(4), 433–454. <http://dx.doi.org/10.1177/13563890022209415>
- Stein, D., & Valters, C. (2012). *Understanding 'theory of change' in international development: A review of existing knowledge*. Asian Institute and the Justice and Security Research Programme. Retrieved from http://www.theoryofchange.org/wp-content/uploads/toco_library/pdf/UNDERSTANDINGTHEORYOFChangeSteinValtersPN.pdf
- Suchman, E. D. (1967). *Evaluative research: Principles and practice in public service & social action programs*. New York, NY: Russell Sage Foundation.
- Treasury Board Secretariat. (2012). *Results-based management lexicon*. Ottawa: Author. Retrieved from <http://www.tbs-sct.gc.ca/cee/pubs/lex-eng.asp>
- United Nations Development Group. (2011). *Results-based management handbook: Harmonizing RBM concepts and approaches for improved development results at country level*. Retrieved from <https://undg.org/wp-content/uploads/2015/01/UNDG-RBM-Handbook-2012.pdf>
- Vogel, I. (2012a). *ESPA guide to working with theory of change for research projects*. Ecosystem Services for Alleviation of Poverty. Retrieved from <http://www.espa.ac.uk/files/espa/ESPA-Theory-of-Change-Manual-FINAL.pdf>
- Vogel, I. (2012b). *Review of the use of 'theory of change' in international development*. Department for International Development. Retrieved from http://www.oxfamblogs.org/fp2p/wp-content/uploads/DFID-ToC-Review_VogelV4.pdf
- Weiss, C. H. (1997). How can theory-based evaluation make greater headway? *Evaluation Review*, 21(4), 501–524. <http://dx.doi.org/10.1177/0193841X9702100405>
- White, H. (2009). *Theory-based impact evaluation: Principles and practice* (Working Paper 3). International Initiative for Impact Evaluation (3ie). Retrieved from http://www.3ieimpact.org/admin/pdfs_papers/48.pdf. <http://dx.doi.org/10.1080/19439340903114628>

AUTHOR INFORMATION

John Mayne is an independent advisor on public sector performance. Over the last 11 years he has focused largely on international development evaluation and results-based management work. He has been working with a number of government, NGOs, and international organizations. He has authored numerous articles and reports, including several on contribution analysis, and co-edited eight books on program evaluation and performance monitoring. In 1989 and in 1995, he was awarded the Canadian Evaluation Society *Award for Contribution to Evaluation in Canada*. In 2006, he was made a Canadian Evaluation Society Fellow. Dr. Mayne's current research interests are on approaches for strengthening impact evaluation, useful theories of change, and dealing with attribution.