

# APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

## Applying the Interactive Systems Framework to the Dissemination and Adoption of National and State Recommendations for Hypertension

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## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

The findings and conclusions in this submission are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

### **Introduction**

Hypertension affects approximately one in three American adults and is the leading risk factor for heart disease and stroke, which are the first and fourth leading causes of death in the United States (Centers for Disease Control and Prevention [CDC] 2008; Miniño et al. 2010). In recent years, rates of hypertension have increased by as much as 20%, and deaths from hypertension have increased by 56.4% (Lloyd-Jones et al. 2010). Hypertension accounts for one out of every six deaths in the United States and for almost half of all cardiovascular deaths (Danaei et al. 2009). The estimated direct and indirect cost of hypertension was approximately \$73 billion in 2009 (Lloyd-Jones et al. 2010).

Hypertension is one of the most costly health problems facing the United States today, yet it's also among the most preventable. Scientific evidence confirms that many lives can be saved through prevention, early detection, and control of hypertension. Public health strategies and policies that promote healthy living, encourage healthy environments, and promote evidence-based clinical and community practices to prevent hypertension are critical to improving the public's health and saving lives. Evidence suggests that hypertension is highly preventable and manageable through population-based strategies (Institute of Medicine [IOM] 2010); however, population-based approaches have yet to be fully operationalized in public health practice. In this paper, we report on a project to bridge the research-practice gap in hypertension prevention and control using the Interactive Systems Framework as an evaluation framework.

The Division for Heart Disease and Stroke Prevention (DHDSP) at CDC provides public health leadership to reduce the burden of cardiovascular disease and its risk factors, such as hypertension and high cholesterol. Cardiovascular health promotion and disease prevention

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

requires a collaborative effort among numerous state heart disease and stroke prevention (HDSP) programs, CDC and other federal agencies, and private organizations across the country. In 1998, Congress provided CDC funding to establish a National Heart Disease and Stroke Prevention (NHDSPP) program. This program currently funds 41 states and the District of Columbia. DHDSPP conducts surveillance and research and provides guidance and technical assistance to state Heart Disease and Stroke Prevention (HDSP) programs to increase their capacity to plan, implement, and evaluate population-based interventions. NHDSPP's focus on policy and systems change allows state health departments to use evidence- and practice-based research to inform public health practice and policy.

To assist DHDSPP and state health departments in their prevention efforts for hypertension, DHDSPP engaged the IOM to synthesize evidence for controlling and preventing hypertension. The IOM convened an expert committee, which reviewed science- and practice-based evidence to provide recommendations on strategies to prevent and control hypertension in the U.S. population. Released in February 2010, the committee's report, entitled *A Population-Based Policy and Systems Change Approach to Prevent and Control Hypertension*, prioritizes action areas and specifies the relationships and responsibilities of DHDSPP, state health departments, and other public health partner organizations in addressing these areas.

The IOM report's 23 recommendations fall into six areas: (1) enhance population-based efforts and strengthen efforts among CDC and partners, (2) strengthen leadership in reducing sodium intake and increasing potassium intake, (3) improve the surveillance and reporting of hypertension and its risk factors, (4) improve the quality of care provided to individuals with hypertension, (5) remove economic barriers to effective antihypertensive medications, and (6) provide community support for individuals with hypertension. Most of the recommendations

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

include activities for both DHDSP and its funded partners. DHDSP reviewed the recommendations and developed formal and informal research and programmatic activities to assist practitioners in the use of the recommendations. For example, DHDSP held several conference calls, provided training and supported practice groups focused on the IOM recommendations. These supports and resources were meant to provide state health department staff with practical guidance for implementing specific types of policies or interventions at the state level. These materials, in conjunction with ongoing technical assistance from DHDSP, aimed to strengthen each state's capacity for implementing effective public health programs in hypertension prevention and control.

A recent review on the use of theory of implementation research indicates that greater use of explicit theory to understand the processes to successfully move from research to practice is needed (Davies et al. 2010). Theories of dissemination and uptake processes have largely been informed by the literature on diffusion of innovations (Rogers 2003), information processing (McGuire 1989), and other social science theories (Bandura 1989; McAlister et al. 2008). To guide the development of its evaluation plan, we researched available theoretical frameworks and systems models. One such model is the Interactive Systems Framework (ISF) for Dissemination and Implementation (Wandersman et al. 2008). The greater detail afforded by this systems approach informs an improved evaluation planning process by specifying interconnections and interdependencies among identified systems.

In this evaluation, the ISF provides a framework to gain insight about how systems of synthesis and translation, support, and delivery activities aid in reducing the research to practice gap. We used the ISF to inform the creation of evaluation questions and indicators by overlaying a logic model (activities, outputs, and outcomes) on the ISF's three distinct systems (Prevention

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

Synthesis and Translation System, Prevention Support System, and Prevention Delivery System) supporting the dissemination-to-implementation process (Figure 1). We used an information processing model to explain the processes through which outcomes of the Prevention Synthesis and Translation System and Prevention Support System lead to changes in the Prevention Delivery System. We posit this as a sequence of steps in the process of dissemination that drives adoption of practice change. In this logic model, the activities and work in the Prevention Synthesis and Translation System and Prevention Support System create the exposure and familiarity that lead potential adopters to consider and implement policy and organizational changes consistent with the recommendations contained in the IOM Report on Hypertension. DHDSP activities directly support the Prevention Synthesis and Translation System and the Prevention Support System. The Prevention Delivery System's activities are primarily the work of public health practitioners in the field as they implement practice changes that drive improved health outcomes.

The overall evaluation strategy includes data collection from multiple partners involved in hypertension prevention and control (e.g., CDC, state health departments, national partners, and state HDSP programs). However, in this paper, we focus on data collection involving state program managers of DHDSP's funded state programs. DHDSP's ongoing, reciprocal relationship with state health departments is a natural place to begin an examination of the adoption, use, and implementation of the IOM recommendations. We use our ISF-based logic model as a guiding framework to assess variables concerning awareness, familiarity, relevancy, credibility, and intent to implement the IOM recommendations. In this article, first we describe our methodology for three evaluation activities at the state level. Next, we present the results

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

from these data collection activities according to the ISF systems. Finally, we interpret these results within the context of the ISF.

### **Method**

A mixed-method design was employed to assess the dissemination and implementation of IOM's hypertension recommendations for state health departments. Because no single data collection method adequately addressed the overarching evaluation questions, a mixed-method approach to triangulate the data was chosen (Brewer and Hunter 1989). This approach also allowed the evaluation team to assess various elements of each ISF system. Data collection included: (1) key informant interviews and (2) a web-based survey that were used to assess variables in the Prevention Synthesis and Translation, Prevention Support and Prevention Delivery Systems, and (3) a content analysis using an alignment scoring analysis to assess in more detail the prevention delivery system. By using multiple methods over the course of the project, the evaluation team gained a richer understanding of the types of ongoing activities at the state level, challenges in implementing the IOM recommendations, and potential application of the IOM recommendations by state public health departments.

### **Key Informant Interviews**

Key informant interviews were conducted with nine state program managers in summer 2010, approximately 4 months after the release of the IOM report. The purpose of the interviews was to explore awareness, perceptions, and attitudes about the IOM report. We also sought to understand expectations of how the report's recommendations will be implemented within the states; expectations for policy and systems changes at the state level due to the recommendations; and technical assistance needs for implementing the recommendations.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

A purposive sample was selected based on three criteria: (1) degree of alignment with the IOM recommendations, (2) program type proportionally representing those funded by DHDSP, and (3) geographic region based on U.S. Census region. Degree of alignment was assessed in the alignment scoring analysis (described below); states were categorized as either high ( $\geq 40\%$ ), medium (15-40%), or low ( $< 15\%$ ) to yield approximately equal numbers in each category. We developed an initial list of 12 states, with the intention of selecting 3 states from each alignment category. We narrowed our sample to nine states based on input from DHDSP staff familiar with the activities of each state program. A single interviewer called the state program manager to explain the purpose of the interview, confirm awareness of and exposure to the IOM report, and extend an invitation to participate; this team member also conducted the interviews. One state program manager declined to participate; we replaced that state with a similar state based on the selection criteria. Prior to the interview, an email confirmation with a summary of the state-level IOM recommendations was sent to each participant for reference during the interviews, which lasted approximately 1 hour each.

The interview guide was organized into five general topics, with a set of questions for each topic. The five topics included: 1) perceptions and attitudes about the IOM Report; 2) diffusion of the IOM Report; 3) adoption and implementation of the IOM Report; 4) impact of the IOM Report; and 5) support and technical assistance needs. The interviewer took notes during the interviews to document responses. Following the interviews, the interviewer sent an e-mail thanking each participant. The interviewer also analyzed the data and prepared the summary of results. Analysis consisted of reviewing interview notes and identifying themes or specific topics related to the purpose and objectives.



## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

### **Web-Based Survey**

An online survey of state program managers was administered in fall 2010 using SurveyMonkey, a Web-based data collection tool. Office of Management and Budget (OMB Control No: 0920-0864) and human subjects approval were obtained prior to data collection. The purpose of the survey was to explore awareness, perceptions, and attitudes about the IOM report. Similar to the key informant interviews, we sought to assess expectations of how the report's recommendations would be implemented within the states; expectations for policy or systems changes at the state level due to the recommendations; perceived barriers to implementation and potential partnerships; and technical assistance needs for implementing the recommendations. The survey included 19 closed-ended questions (see Table 1) on a five-point Likert scale and 6 open-ended questions about specific IOM recommendations and technical assistance needs. The survey allowed only one submission per IP address to ensure only one response per person.

The survey remained open for 10 days and took approximately 20 minutes to complete. State program managers were invited to participate via email four times, using a Dillman technique shown to increase response rates through multiple invitations and reminders to participate (Dillman et al. 2009). The first email was sent 4 days prior to the data collection period. A second email was sent to all managers 2 days prior to data collection. A reminder to participate was given during a monthly teleconference call with state program managers, and a third email was sent 2 days prior to closing the survey. Descriptive statistics were generated using SurveyMonkey's online interface. All 42 state HDSP program managers were invited to participate in the Web-based survey; 24 completed the survey for a response rate of 57%.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

### **Alignment Scoring Analysis**

A content analysis using an alignment scoring methodology (Chorn 1991; Venkatraman 1989) was conducted in spring 2010 using the funded states' mid-year activity workplans ( $N = 42$ ) for the third year of a 5-year funding cycle. The mid-year activity report was chosen because it includes the states' activities in the period closest to the release of the IOM report. The mid-year workplan describes the states' activities conducted in the previous 6 months (September 2009 through February 2010). The purpose of the alignment scoring analysis was to establish a baseline degree of alignment between the IOM recommendations and the states' activities. The term "alignment" indicates shared objectives, goals, priorities, indicators, authority, programs, people, and financial resources.

Each state's workplan was scored to assess the degree of alignment between the workplan and the IOM recommendations. Every activity in each workplan was entered into a database for this project by copying the information verbatim from PDF files exported from a management information system. This process allowed the evaluation team to facilitate searches, ensured consistency with source materials, and will simplify future comparisons. Each activity was scored for alignment to the seven state-level IOM recommendations (see Table 2) based on the narrative descriptions of the activities, their associated objectives, and relevant prefatory material (e.g., executive summaries, introductions) in the workplan. Coding was performed by a single reviewer familiar with the IOM report and alignment scoring techniques. Rules for coding were documented in the State Plan Review Protocol and the Abstraction Guide (available by request from the corresponding author). For each activity:

- If the activity addressed a subject area of the IOM recommendation in a manner outlined by the recommendation, it was scored as "aligned."

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

- If the activity focused on the same subject area but in a manner different from that outlined in the IOM recommendation, it was scored as “neutral.”
- If the activity focused on the same subject area but in a manner counter to the intention of the IOM recommendation, it was scored as “misaligned.”
- If the activity did not focus on the subject area of an IOM recommendation, the activity was not scored.

Data were exported from the database into Microsoft Excel, and alignment frequencies were calculated and recorded for each activity. In addition, each workplan received a composite score if it contained activities in alignment with any one IOM recommendation. We reported this calculation as the proportion of state workplans that align to each IOM recommendation. Next, the results are reported by the three ISF systems.

### **Results**

#### **Prevention Synthesis and Translation System**

The Prevention Synthesis and Translation System encompasses activities to distill research and evidence in meaningful ways and to disseminate the synthesis to practitioners in the field (Wandersman et al 2008). The IOM process involved reviewing the scientific literature and surveillance data to identify evidence-based best practices for hypertension prevention and control. DHDSP promoted the resulting IOM Report to its state partners. In addition, DHDSP worked with its state partners to develop supplemental materials that translate the IOM Report’s recommendations into guidance for how states might address the recommendations in their hypertension prevention and control efforts. We used the data collection activities to assess the effectiveness of using an IOM Report as a synthesis tool, the IOM Report’s usefulness for the

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

Prevention Delivery System, and DHDSP's efforts to promote, disseminate, and translate the IOM Report's recommendations for program implementation.

### **Key Informant Interviews**

All nine of the managers interviewed were aware of the IOM report, and most had read enough of the report to be familiar with the recommendations for state health departments. Based on the IOM's reputation for independence and scientific integrity, managers viewed the report as highly credible. Given this credibility, the report was seen as a call to action and legitimized an increased focus on hypertension as a neglected yet important public health problem.

The managers interviewed believed that key partners and stakeholders were generally aware of the IOM report, although most were not very familiar with its contents. Most managers reported efforts to raise awareness about the IOM report among their state partners, such as making announcements through their normal channels of communication. Managers noted that broader dissemination of the report among state partners may be hindered because the purchase price of the report was perceived as high. The IOM report also was seen as highly relevant for program managers because it calls for a focus on policy and systems change strategies, which were viewed as necessary for making a substantial, long-term reduction in hypertension rates. Our evaluation findings support the premise of the Prevention Synthesis and Translation System, which implies that the IOM report contained understandable information and was adequate in summarizing a body of scientific evidence for public health hypertension strategies. However, additional translation of the IOM report is needed to make the IOM recommendations actionable for state HDSP programs.

### **Web based survey**

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

All of the respondents were aware of the IOM report. 27% had read the report carefully, 89% had read or skimmed the report, and 11% had not read the report but planned to read it. Respondents received timely notification of the IOM report. Among respondents who read the report, it was perceived as credible, clearly written, and containing understandable recommendations for state HDSP programs. Respondents were most likely to report that public health officials at the state and federal levels, public health partners, and policymakers were the target audiences for the IOM report.

Respondents were asked their opinions about the IOM report in a series of 19 Likert-scale questions. In 15 of the 19 attitudinal questions, more than 70% of respondents reported that they either strongly agreed or agreed with the statements (see Table 2). Respondents indicated that the report was relevant to their work.

In terms of benefits of using an IOM panel to make recommendations, 14 of 18 respondents gave a positive assessment. They said the IOM was a credible independent body whose recommendations would provide a unified approach across states and would augment states' ability to justify the approaches taken. Two respondents, however, noted that the report was broad and general and did not include actionable recommendations. Sixty-two percent of respondents said the report improved their understanding of public health strategies to control and prevent hypertension. These findings imply that there was not a need for additional synthesis and translation needed to better understand the IOM report. Given the respondents agreement to the high level of clarity and credibility of the IOM report, CDC's Prevention Synthesis and Translation System activities focused on providing additional translational research and guidance on each specific hypertension strategies that were referenced in the report.

### **Prevention Support System**

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

The provision of information from the IOM Report or the companion materials alone is insufficient to lead to outcomes. To impact hypertension prevention and control as indicated by the IOM Committee, the 42 funded HDSP also need support to increase their capacity to undertake policy, systems, and environmental public health approaches and to undertake specific hypertension prevention and control strategies recommended in the IOM Report. The Prevention Support System functions to provide both general capacity building and innovation-specific capacity building (Wandersman et al 2008). Our findings imply that the Prevention Support System is critical to the implementation of hypertension recommendations. Thus, we posit that greater attention is needed within the ISF to highlight the critical functions of capacity building. We used our data collection activities to reveal the types of technical assistance and support that HDSP programs, state program managers, and their staff would need to be able to implement the IOM Report's recommendations. Additionally, the data collection efforts help determine if the IOM Report's recommendations are feasible to implement and to identify potential barriers to implementation. DHDSP utilized this information to develop additional trainings and support materials.

### **Key Informant Interviews**

Although generality may be necessary for broad public health recommendations, interviewees believed that implementing those recommendations would be difficult without further guidance. They expected to use the report as a reference while they reviewed and updated their program plans in collaboration with their partners and as an educational tool for various constituencies and decision-makers about the importance of hypertension prevention and control. To increase their state's capacity in implementing the recommendations and achieve these public health goals, managers noted several areas in which technical assistance would be

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

helpful. First, given the general nature of the IOM recommendations, managers requested guidance from CDC on specific strategies and approaches that could be used. Similarly, they requested guidance on how they should prioritize the recommendations and direct their limited resources. Third, additional training and education on population-level approaches, systems and policy change, and policy support were viewed as needed.

### **Web-Based Survey**

Most respondents reported needing additional technical assistance to increase their capacity to implement the IOM recommendations. These findings are aligned with the need for great attention to incorporating time and resources to building innovation specific capacity building as noted in the Prevention Support System. Specific areas that respondents requested related to the IOM recommendations include: guidance and strategies for sodium reduction policies, successful practices for increasing physician adherence to guidelines, reducing costs for antihypertensive medications, and additional funding. The majority of respondents (86%) were aware of the supporting materials being developed to assist state HDSP programs in implementing the report's recommendations, and 71% said CDC is providing leadership to reduce the prevalence of hypertension through population-level approaches.

### **Prevention Delivery System**

The Prevention Delivery System for hypertension prevention and control consists of DHDSP, its 42 funded state programs, and their local and national partners (Wandersman et al 2008). As Wandersman and his colleagues point out, the individuals, organizations, and communities in the Prevention Delivery System have varying capacities to implement prevention programs and, in our case, hypertension prevention and control policies and systems change. We used our data collection activities to assess the baseline level of capacity to implement the IOM

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

Report's recommendations for the funded state programs. Over time and with additional efforts in the Prevention Synthesis and Translation and Prevention Support Systems, we anticipate increased capacities in the Prevention Delivery System. In this section, we present baseline data for the Prevention Delivery System.

### **Key Informant Interviews**

Program Managers said that they planned to use the IOM report as a general guide for broad planning and priority setting, with an emphasis on population-level approaches and systems/policy change. At the same time, the recommendations for state health departments were viewed as being framed at a general level, without specific guidance as to how they could be implemented. Program Managers plan to use the IOM report as a general framework to guide activities in Prevention Delivery System, however due to the perceived vagueness of the IOM report, we do not expect immediate implementation to occur without specific intervention level guidance that's needed from the Prevention Synthesis and Translation System and support as noted from the Prevention Support System.

During the interviews, managers were asked to refer to the list of seven recommendations for state health departments. The managers believed some recommendations would be more feasible to implement than others, depending on the level of resources available in the state. Other recommendations, they believed, were best addressed at a national level. Regarding specific IOM recommendations, managers agreed that population-level approaches (6.1) should be pursued, although they expressed concern about the feasibility of effecting systems and policy changes that would require political support. Managers viewed recommendation 6.2 regarding integration with other relevant programs (e.g., nutrition, physical activity, health care financing) as critical in achieving a broad impact on hypertension, however implementation of this



## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

recommendations is perceived as difficult because of the current method of categorical disease funding in public health. For those managers who had already begun an integration process, the IOM report provided additional justification for pursuing this approach. Most managers believed that sodium reduction strategies (6.3) were best handled at the national level because they would have limited ability at the local level to influence sodium levels in the food supply. They did, however, believe that states could help increase public awareness of sodium and its connection to hypertension. Increasing local HANES capacity (6.4) was not seen as feasible without additional funding to begin and sustain the effort. Managers believed that convening to improve medical treatment (6.5) was the most feasible recommendation because they could draw on existing partnerships to achieve this goal. In contrast, managers had mixed perceptions of feasibility for partnerships within the business community (6.6); most did not have partnerships in place that would facilitate achieving this goal. Lastly, managers viewed the use of Community Health Workers (CHW) (6.7) to facilitate hypertension prevention and control as feasible and beneficial, although there was variability in how CHW was defined.

### **Web Based Survey**

Respondents were asked which of the IOM recommendations they viewed as most feasible and which were the most difficult to implement in the next 2 years. Less than one-third said the IOM recommendations were feasible to implement. Follow-up questions assessed how difficult it would be to implement the recommendations perceived as most feasible to implement. Across respondents, most believed that convening to improve medical treatment was feasible to accomplish in the next 2 years. Whereas about half said that sodium reduction was feasible, approximately one-third did not see this as possible in the next 2 years. Of the 14 respondents who answered the question, 11 thought that it would be difficult to implement the recommendation they

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

had mentioned as being feasible in the next 2 years. These responses provide a glimpse into what changes in policies, organizational or environmental change we might expect in the Prevention Delivery System, such that IOM recommendations that are viewed as difficult to implement will need additional support (as provided in the Prevention Support System) to facilitate implementation.

Respondents were asked which partnerships they might use to advocate for the IOM recommendations. Nine respondents said they would work with new and existing partners. Two respondents noted that they would work with existing partners, and one would establish a new partnership. Although respondents viewed the benefits of the IOM report to be aligned with the state HDSP program's objectives, fewer than half reported that their program was currently implementing the recommendations. Whereas 76% said they would realign their program priorities and partnerships based on the report's recommendations, only 55% said they would realign their resources based on the recommendations. Almost all (95%) respondents said they would use the IOM report for program planning; however, fewer (67%) said they would use the report to direct their evaluation activities.

### **Alignment Scoring Analysis**

The findings have significant implications on the Prevention Delivery System, wherein state health department who have existing activities that align with the IOM recommendations will be more likely to be early adopters and implementers of the recommendations. We expect that state programs that currently have activities aligned with the recommendations will be more likely to have environmental and policy changes related to the recommendations. The findings below are categorized according to the IOM recommendations most and least frequently aligned with state program activities.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

**Most frequently aligned recommendations.** The most frequently aligned recommendation was 6.5, which focuses on collaboration with other stakeholders to improve the medical treatment of hypertension (see table 2). Forty of 42 workplans and more than 20% of all activities were aligned with this recommendation. This finding is not surprising because state programs frequently engage in activities that involve outreach, collaboration, and resource-sharing with stakeholder groups in the development of materials (e.g., reports and information products) and training intended to improve medical treatment of hypertension.

Thirty-seven of 42 workplans and more than 16% of all activities were aligned with recommendation 6.7, focused on the involvement of community health workers (CHWs) to “ensure that prevention and control of hypertension is included in the array of services they provide and are appropriately linked to primary care services” (IOM 2010, p. 12).

Eight percent of all activities and 29 of 42 workplans were aligned with recommendation 6.2, which focuses on the integration of hypertension activities in disease control programming and the assessment of alignment of existing and new programs to priority populations.

**Least frequently aligned recommendations.** The least frequently aligned recommendation was 6.6, which focuses on developing coalitions with business to reduce the costs of using antihypertensive medications. We found a degree of alignment with this recommendation in only 0.1% of all activities and only two workplans. The addition of hypertension program elements to non-hypertension programs (recommendation 6.1) was similarly rare, appearing in less than 1% of all activities and 11 of 42 workplans. Slightly less than 2% of all activities and 19 of 42 workplans exhibited alignment with recommendation 6.3 regarding dietary sodium programs. Similarly, less than 2% of all activities and 20 of 42

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

workplans exhibited alignment with recommendation 6.4 regarding local health and nutrition examination survey (HANES) or other surveillance efforts.

### **Discussion**

The ISF serves as a foundation for our evaluative thinking in assessing the synthesis, dissemination, and implementation of public health hypertension recommendations. Our inclusion of information processing measures expands the ISF to explain how the three ISF systems are interconnected and when they work together will lead toward better health outcomes. The use of the ISF as an evaluation framework focused our baseline measures and informed areas where we should aim our evaluation efforts. For example, while our interest in dissemination guided us to develop measures for awareness, the ISF guided our thinking to focus more on how information from the IOM report should be synthesized and translated for our target audience (e.g., state health departments). The results presented in this paper demonstrate that the IOM process and resulting report were viewed by state program managers as a credible, relevant way to synthesize and the science and practice of hypertension prevention and control. Yet, many state program managers said that the IOM recommendations were too general and that additional guidance and technical assistance were needed to help them implement the recommendations in their states. DHDSP utilizes these findings in their prevention support efforts by developing additional guidance documents and focusing trainings on areas that need specificity. This finding suggests that the activities in the Prevention Synthesis and Translation System and Prevention Support System cannot just be a one-time event, but rather continuous activities to synthesize and translate the materials for practitioners implementing public health recommendations in the Prevention Delivery System.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

Our findings suggest that states are more frequently aligned with some IOM recommendations than others, and only one-third of the state program managers surveyed reported that their state was working on all or most of the recommendations. This result indicates a potential opportunity to provide guidance to state HDSP programs in focusing prevention delivery efforts in future years. States expressed mixed concerns about the feasibility of implementing the IOM recommendations, which consequently might affect adoption or successful implementation in the Prevention Delivery System. Identifying this as a concern of comprehensive implementation in the Prevention Delivery System provides DHDSP the opportunity to identify specific opportunities to support practitioners in the field through the Prevention Support System function. One element needed to successfully implement activities aligned with the IOM recommendations is additional guidance and technical assistance (e.g., activities within the support system in Figure 1). DHDSP staff working with their partners, as part of the Prevention Synthesis and Translation System function, can continue to develop resources, guidance, training and technical assistance to be delivered as part of the Prevention Support System.

The lessons learned from this evaluation indicate that the ISF is useful as a guide for developing meaningful program logic model and evaluation questions. Through data collection and analysis we have been able to isolate where in the ISF system additional resources and work would be needed to address the gaps our evaluation identified. The framework informs specific evaluation activities within each of the systems and explicitly recognizes the sequence of steps in the process of dissemination that drives adoption of practice change. Understanding these concepts informs the timing of data collection components. The ISF provides structure for which to assess variables regarding dissemination, intention to adopt recommendations, and

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

individual and organizational program needs. Our findings support the necessity of the two ISF systems integral to this stage of our evaluation, Prevention Synthesis and Translation and Prevention Support Systems. For example, state program managers expressed a need for translation (“how to”) materials in implementing public health recommendations and for technical assistance and training in specific content areas. We anticipate that the ISF also will be useful in assessing the use and implementation of the IOM recommendations as we move forward in evaluating elements related to the Prevention Delivery System.

Overall, we found the ISF a useful tool for planning and (thus far) implementing the evaluation of adoption and use of the IOM recommendations. Moreover, by incorporating elements from an interactive perspective, we were able to delineate the steps needed to move from one system (e.g., Prevention Synthesis and Translation) to others (e.g., Prevention Support and Delivery). Future evaluation efforts will continue to follow activities in the Prevention Support and Delivery Systems as state programs further align their work with the IOM recommendations and catalyze practice change through CDC-supported programming. This process also calls attention to technical assistance needs for capacity building at the state level as part of the Prevention Support System. Materials, resources, training, and ongoing assistance from CDC staff will enhance state capacity to implement the approaches outlined in the IOM report.

### **Limitations**

Several limitations exist for this project. First, we used a purposive sample for the key informant interviews with state program managers, and responses may have been different if we had selected other individuals to participate. Given that the survey yielded similar responses, we do not believe that the purposive sample represents a significant threat to our conclusions.

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

Second, approximately one-third of survey respondents did not answer open-ended questions related to the feasibility of implementing the IOM recommendations; thus, these findings may not be representative of programs that responded to the survey. Third, without budgetary information, we were unable to assess the relative size of each activity; thus, all activities were weighted equally. This approach may give the impression that some of the IOM recommendations are further along in implementation at the state level than they actually are. Additionally, alignment scoring of state workplans presents a number of challenges because states vary in their definitions of what constitutes an activity. Some states report each component in an intervention as a separate activity, whereas others report information at a higher level, leading to fewer reported activities. We addressed this discrepancy through a comprehensive review of each state's workplan to capture activity-level and higher-level information.

Last, this study's attempt to use the ISF as an evaluation framework poses several drawbacks. First, this study is not at a stage to assess outcomes relevant to the Prevention Delivery System, thus conclusions cannot be made as to the utility of this system of the ISF in guiding our evaluation activities. Secondly, given the early stage of our programmatic activities more emphasis in our evaluation planning and data collection should have focused on the Prevention Support System to assist in the implementation of prevention delivery efforts.

### **Conclusion**

One of the most significant challenges in public health programs is eliminating the disconnect between research and practice. Government agencies and academic institutions gather evidence on interventions and the factors that catalyze or inhibit success in achieving desired outcomes. However, the adoption of research into practice lags because of breakdowns in translation and

## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

dissemination of effectiveness research. Additionally, our evaluation indicates that additional support factors [e.g., specific technical guidance and training] are needed in order for practice change to occur in the field of public health. At the same time, practitioners may have evidence for effective policies and practices that is not part of the body of knowledge available to evaluators or other researchers. DHDSP recognizes the importance of understanding the processes by which scientific evidence is translated into operationalizable practices and policies. To this end, DHDSP continues to assess the uptake, use, and implementation of the IOM recommendations.

The ISF as an evaluation framework for the dissemination and adoption of the IOM recommendations provided an enriched understanding of how synthesis, translation, and technical assistance can help close the gap between research and public health practice. The ISF moves beyond earlier frameworks of *exposure*, *selection*, and *adoption* of innovative practice changes to consider the organizational infrastructure supporting and carrying out each of these steps. The use of the ISF allowed for a more detailed evaluation from a *systems* perspective supported by activities, which permits a closer focus on how evidence of successful innovations actually drives widespread and effective change. The ISF retains sufficient generality to be employed in any context where research is translated into proposed practice change, supported through technical assistance aimed at practitioners, and implemented in the field.



## APPLYING THE INTERACTIVE SYSTEMS FRAMEWORK

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