Issues in Evaluating Health Department Web-based Data Query Systems: Working Papers

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Chapter 1

Why We Need to Evaluate State Health Department Web-based Data Query Systems

Daniel J. Friedman[1] and R. Gibson Parrish[2]

BACKGROUND

Since the publication in 1988 of the Institute of Medicine's seminal report on The Future of *Public Health*, US public health agencies at national, state, and local levels have placed increasing emphasis on improving their assessment activities (Institute of Medicine 1988). During the 1990s and 2000s, the general focus on assessment evolved into increasing emphases on community health assessment in state and local health departments. In 2005, over half of local health departments reported completing a community health assessment within the past three years and almost two-thirds planned to complete community health assessments in the next three years (National Association of County and City Health Officials 2006). The growing health department focus on community health assessment during the 1990s and 2000s was accompanied by growing emphasis on evidence-based public health (CDC 2007; Brownson et al. 2002). The two emphases of community health assessment and evidence-based public health have combined to underline the importance of and expand state health department roles in providing data.

The increasing role of state health departments in providing data for community health assessment, evidence-based decision-making, and other purposes has been facilitated by the simultaneous growth of Internet and World Wide Web technologies and uses. Before the 1990s, state health departments relied on paper publications, often in annual report series with the same tables updated year after year, and individual special topic paper reports for disseminating data on

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community health. During the mid-1990s, health departments started to make some aggregated data, often birth or death data, available on the Web; a 2006 survey of state health departments indicated that approximately 91% of responding states currently make birth or death data available on the Web (Friedman 2007). By the late 1990s, health department interactive Web-based data query systems (WDQS) were being developed and deployed, starting with Massachusetts, Missouri, Utah, and Seattle/King County (Asarao et al. 2001; Cohen et al. 2006; Friedman et al. 2001; Haggard and Burnett 2006; Solet et al. 1999, 2006); at latest count, 27 states currently make data available on the Web through WDQS, with the overwhelming majority of those states publicly launching their WDQS in 2000 or later (Parrish and Friedman 2008).

WDQS provide user access on the Web through dynamic interfaces to data pertaining to population health held on WDQS Web servers (Friedman and Parrish 2005, 2006). WDQS enable users to formulate queries (in other words, a dynamic interface) within the bounds of the functionalities available on the specific WDQS. Accessibility to the WDQS is on the Web and is generally through a standard Web browser. WDQS produce numeric tabulations to user queries and also generate various statistics. Some WDQS enable users to choose output in the form of graphs and maps.

The potential utility of WDQS has been enhanced by the development by health departments of other related Web-based data tools, including already formatted data-based reports and tables as portable document format files (PDFs) for viewing and downloading, and evidence-based public health priority and intervention selection tools. In many states, already formatted reports include community health profiles that provide a wide range of pre-selected population health data for individual sub-state areas, and community health topic reports that provide a range of population health data, and are drawn from several data sets, are specific to a particular health problem, and are available for individual sub-state areas. In Missouri, health department staff collaborated with others in developing Intervention MICA and Priority MICA, which enable users interactively to identify potential local public health priorities and potential interventions for those priorities using evidence-based algorithms (Brennan Ramirez et al. 2006; Claus et al. 2008; Simoes et al. 2006).

RESEARCH ON WDQS

Despite the growing number of health departments making data available through WDQS and the seeming centrality of WDQS for community health assessment and evidence-based public health, only limited published literature and research focus on WDQS. The literature on WDQS is of five types. First, several articles have been published describing individual health department WDQS,

including Florida's CHARTS, Massachusetts' MassCHIP, Missouri's MICA, Seattle-King County's VistaPH, and Utah's IBIS-PH (Asarao et al. 2001; Cohen et al. 2006; Grigg et al. 2006; Haggard and Burnett 2006; Solet et al. 1999, 2006). Second, with funding from the Centers for Disease Control, an article and a report were published providing overviews of all then current WDQS and also summarizing the results of a consensus process identifying basic, enhanced, and innovative WDQS functionalities (Friedman and Parrish 2005, 2006). Third, articles and reports focusing on specific issues common to all WDQS have been published, such as approaches to small numbers and health department organizational approaches to WDQS implementation (Gjelsvik and Buechner 2006; Rudolph 2006; Stoto 2002). Fourth, two articles have focused on future directions for WDQS (Friedman et al. 2001; Friedman 2006). Fifth and finally, one article and two reports have been published dealing with various WDQS evaluation issues. One article focused on the development of a logic model intended to generate evaluation questions (Haggard and Burnett 2006). With funding from CDC, two reports were developed that included heuristic evaluation of selected WDQS, identification of WDQS best practices, and a guide for health departments based upon the heuristic evaluation and identified best practices ORC Macro 2001, no date).

Taken together, the published and widely available grey literature provides an array of descriptions of current WDQS and some specific issues common to all WDQS; speculation on desirable paths for future development and support for WDQS development; and a now almost ten-year-old heuristic evaluation of then-current WDQS.

PURPOSE AND OVERVIEW OF WORKING PAPERS REPORT

This report is a product of a Robert Wood Johnson Foundation-funded (RWJF) project on "Evaluation of health department Web-based data query systems," which had a twofold purpose. The first purpose of the project was to assess WDQS evaluation activities among states with currently operational WDQS. The second purpose was to formulate a consensus-based set of topics and sub-topics for evaluating WDQS and specific indicators within each topic.

In this working papers report, WDQS evaluation is broadly conceived to include business cases, needs analysis, testing, and impact evaluations. Impact evaluation, in turn, here is conceived of as encompassing WDQS impacts on users, communities, and health departments themselves. Impact evaluation data can be derived from user surveys, laboratory testing, and ongoing monitoring, as well as more qualitative data derived from focus groups and expert reviews.

The working papers contained in this report summarize the project's work and fulfill its purposes. In addition to this introductory working paper on "Why we need to evaluate health

department Web-based data query systems" (Section One), the other working papers are divided into four sections. Section Two focuses on conceptual issues in the evaluation of health department WDQS. In "Taxonomy of issues relating to evaluating health department Web-based data query systems," Parrish, Friedman, and the RWJF Advisory Group delineate describe, and categorize needs assessment, testing, and impact evaluation topics and sub-topics for WDQS (Parrish et al. 2008). Other chapters in Section Two include Stoto's "A logic model for evaluating WDQS" and Friedman and Parrish's "Perspectives on WDQS: key informant interviews" (Parrish and Friedman 2008; Stoto 2008a) Section Three deals with methodological issues in evaluating WDQS, including Plaisant's chapter on "Exploring the range of metrics for evaluating WDQS," Ross's "User-centered design for WDQS," and Stoto's "Statistical issues in evaluating WDQS" (Plaisant 2008; Stoto 2008b; Ross 2008). Section four consists of a paper by Parrish and Friedman reporting on a survey of WDQS evaluation activities in the 27 health departments with currently operational WDQS (Parrish and Friedman 2008). Section Five provides examples of health department evaluations of WDQS, including Scott and Christman's chapter on California, Claus and colleagues' chapter on Missouri, and Gjelsvik and colleagues' chapter on Rhode Island (Claus et al. 2008; Gjelsvik et al. 2008; Scott and Christman 2008).

UNANSWERED QUESTIONS ABOUT HEALTH DEPARTMENT WEB-BASED DATA QUERY SYSTEMS

The growing published literature largely fails to provide answers to two essential questions about WDQS: Why and how should health departments invest in WDQS?; and How should health departments evaluate WDQS? Without empirical answers to these questions, health departments cannot make evidence-based decisions about funding, developing, adopting and adapting, and revising WDQS.

Why Should Health Departments Invest in WDQS?

The existing literature on WDQS fails to empirically address and answer basic questions about "why should health departments invest in WDQS?" As indicated in Parrish and Friedman's chapter on "Current status of WDQS evaluations," few health departments can currently provide empirical answers to such questions such as: What are appropriate goals for a health department WDQS?; What uses are WDQS best suited for and how are WDQS now used?; and What users are WDQS best suited for and who are WDQS users now?; How can WDQS be designed to best meet health

department goals, intended WDQS uses, and intended WDQS users? Inherent in these three questions is an underlying and crosscutting question: Can a single WDQS design meet the needs of all WDQS users (Parrish and Friedman 2008)?

In order to invest sensibly in WDQS development and refinement, health departments must clarify WDQS purposes, intended and actual primary and secondary users, and intended and actual uses. Some health departments have developed formal business cases or needs analyses to enable empirical assessment of WDQS purposes and users, which would help address initial questions about whether and how much to invest in WDQS development. Examples of states that have produced business cases or needs analyses include California, Pennsylvania, Utah, and Washington; Scott and Christman's chapter on "Information technology planning and approval for WDQS" documents California's feasibility study report process (Scott and Christman 2008). With few exceptions, such business cases and needs analyses are available in reports and presentations available to the staff of the sponsoring health department and not widely disseminated to other health departments.

Rather than viewing the WDQS as an individual, isolated, "stand-alone" Web product, the business case and needs assessment should place the WDQS within the context of an overall health department information strategy and along side of such other Web information products as pre-formatted and pre-tabulated community health overviews and community health topic reports, downloadable ongoing surveillance reports, and even public use data files. If detailed and carefully developed, logic models can perform a fundamental role in clarifying WDQS purposes, intended primary and secondary users, and intended uses; see, for example, Stoto's chapter on "A logic model for evaluating WDQS" (Solet 2008a).

Impact evaluation of an individual WDQS or comparative impact evaluations of multiple WDQS can provide health departments with the basic data needed for documenting whether and how much to invest in a WDQS. Yet formal, empirical impact evaluations of WDQS—including evaluation of user, community, and health department organizational impact—are the exception rather than the rule for health departments with currently operational WDQS. At the most basic level, the extent of ongoing, empirical monitoring of WDQS users varies among health departments: only Massachusetts maintains and regularly reviews ongoing quantitative counts of WDQS users, based upon required user log-in for each WDQS session; some other health departments—though not all—monitor the Internet Protocol (IP) addresses in their WDQS server log files to gain an idea of the amount and type use of their WDQS. Similarly, the extent of ongoing, empirical monitoring of WDQS uses also varies among health departments: some health departments structure both their WDQS and their Web monitoring to enable ongoing counting of the number of uses (in other words, "hits") for individual data sets, statistics, or types of outputs such as tables, graphs, and maps; other health

departments monitor only the overall number of WDQS uses, essentially counting the number of "hits" on the WDQS home page. Regardless of the nature and the extent of health department monitoring of WDQS users and uses, analyses of these data are also typically available in reports and presentations available to the staff of the sponsoring health department and not widely disseminated to other health departments. At more methodologically sophisticated levels than monitoring of WDQS users and uses, laboratory- or survey-based evaluations of user needs and satisfaction have apparently been even more limited, such as Illinois, Kansas, Missouri, New Hampshire, Ohio, Tennessee, Utah, and Washington State. Evaluations of the impact of WDQS on the community and the sponsoring health department seem to be unavailable.

How Should Health Departments Evaluate WDQS?

A full agenda for health departments' evaluations of WDQS is specified in Parrish et al.'s chapter on "A taxonomy for the evaluation of health department Web-based data query systems" (Parrish et al. 2008) Most basically, WDQS evaluation should occur in all stages of WDQS development. Prior to development, evaluation should include needs analysis and development of a formal business case; Scott and Christman's chapter in this report on "IT planning and approval for WDQS" describes California's process. During development, evaluation requires testing (Scott and Christman 2008). Testing could include usability, interface, and statistics and data to ensure that queries return correct answers. Following development and public release, impact evaluation should occur. Impact evaluation is the focus of conceptual chapters in this working papers report by Plaisant 2008 ("Exploring the range of metrics for evaluating WDQS") and Ross 2008 ("User-centered design for WDQS"), and chapters reporting on a range of user impact evaluations by Gjelsvik et al. 2008 ("Needs assessment for and evaluation of Rhode Island's public health Web data dissemination system") and Claus 2008 ("Evaluation of an evidence-based intervention planning Website for public health practitioners"). Finally, during development of new functionalities and modules but following initial public release, evaluation may include needs analysis, testing, or impact evaluation.

This working papers report lays out the need for WDQS evaluations based upon explicit frameworks, and especially logic models. A variety of empirical evaluation methods are specified, including surveys; focus groups; laboratory-based user testing; and review of use logs and e-mails and telephone calls from users. In addition to these evaluation methods, expert review of WDQS by external evaluators can yield innovative insights beyond more structured methods. The chapter by Friedman and Parrish on "Perspectives on health department Web-based data query systems: key informant interviews" illustrates some positive benefits from such expert reviews.

Given limited health department resources for implementing information strategies generally and WDQS specifically, three mechanisms for reducing the resources needed for evaluation are needed. A first mechanism is the development of replicable WDQS needs analysis, business case, testing, and impact evaluation tools, instruments, and models. A second mechanism is documentation of validity and reliability testing for WDQS testing protocols and impact evaluation instruments, so that other health departments can evaluate their strengths and weaknesses prior to adoption. A third mechanism is enabling and encouraging knowledge transfer among health departments through making the components of the first and second mechanisms freely and easily available to all interested health departments, such as through a Web-based resource center. In combination, these three mechanisms could minimize the substantial start-up costs inherent in evaluation and instrument design and provide health departments with the tools needed to implement WDQS evaluation agendas.

Georgia and Utah described their use of a less expensive alternative to formal evaluation, which they characterized as continuous quality improvement. Employing a variety of mechanisms, these states sought ongoing feedback from their users, regularly reviewed and discussed the feedback, and attempted to implement feasible and useful suggestions. Utah described a preference for this approach over more formal evaluation methods. Ross also describes this approach in her chapter in this report (Ross 2008).

WHY WE NEED TO EVALUATE HEALTH DEPARTMENT WEB-BASED DATA QUERY SYSTEMS

Twenty-seven state health departments now have operational WDQS (Parrish and Friedman 2008). Each of those health departments holds explicit or implicit goals for their WDQS. Fulfilling those goals justifies or fails to justify their investments in the start-up and ongoing costs of developing, refining, and maintaining the WDQS. Anecdotal information collected during the interviews with the managers of the twenty-seven currently operational health department WDQS, as described in Parrish and Friedman's chapter on "A national survey of state health departments on evaluations of their Web-based data query systems" (Parrish and Friedman 2008), indicates just how limited are funds for evaluating WDQS. Only three states reported a budget allocation for WDQS evaluation. Other states described their ongoing choices between developing and refining a WDQS, on the one hand, and evaluating a WDQS, on the other hand.

WDQS do not justify themselves. Without empirical evidence from evaluations, health departments have no basis for determining whether their explicit and implicit goals for WDQS are

being accomplished, and whether those goals could be accomplished more efficiently and at lower costs through other means. Without business cases and needs analyses, health departments cannot justify their initial expenditures on WDQS development. Without testing, health departments do not know if WDQS are providing accurate data and accurate statistics. Without impact evaluations, health departments do not know if the WDQS is being used by the intended users; if WDQS users are satisfied and their needs are being met; if the WDQS is affecting community priorities, policies, and resource allocation; and if the WDQS has affected health department management and staff, costs, and data. Shared among health departments and especially comparing WDQS across health departments, evaluations provide a basis for designing new WDQS and refining existing WDQS.

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Chapter 2

Taxonomy for Evaluating Health Department Web-based Data Query Systems

R. Gibson Parrish,[1] Daniel J. Friedman,[2] and the Advisory Workgroup

INTRODUCTION

The purpose of this taxonomy is to provide a framework for health departments to conceptualize and plan the evaluation of current and planned Web-based data query systems (WDQS). The chapter begins with the definition of terms related to the evaluation of WDQS, followed by schemes for classifying the stages of WDQS development, principal targets of WDQS, types of potential impacts by WDQS on these targets, and methods for evaluating WDQS.

DEFINITIONS

A *Web-based data query system* (WDQS) provides user access on the World Wide Web through a dynamic interface to data held on a WDQS Web server pertaining to population health and the determinants of population health. The characteristics of a WDQS include:

- User formulation of queries (we refer to this characteristic as making the interface dynamic) within a prescribed set of functionalities available in the WDQS;
- User access through a standard World Wide Web browser;
- Production of numeric tabulations in response to a user's query; and
- Generation of statistical computations (such as adjusted rates, confidence limits) in response to a user's query.

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Evaluation refers to any aspect of the needs analysis, testing, or assessment of a WDQS. Evaluation includes any needs analysis or business case conducted prior to the development of the WDQS, and any testing or impact evaluation of the WDQS during its development, deployment, or ongoing operation:

- *Needs analysis* identifies the needs of the organization sponsoring the WDQS and the intended users of the WDQS. It occurs prior to the development or revision of the WDQS.
- *Business case* provides the justification for undertaking development of the WDQS. It typically includes background information about the context and need for the WDQS, expected benefits of the WDQS, expected costs of developing and maintaining the WDQS, other options for meeting user needs, and potential risks of the WDQS.
- *Testing* is the process of exercising a WDQS to identify differences between expected and actual behavior [FOLDOC.org]. Testing ensures that the WDQS works appropriately and "makes sense" to anticipated users. It may occur during development and prior to public release of any version, new modules, new data sets, refreshed data, or new functionalities of the WDQS. Alpha testing refers to simulated or actual testing by potential users or an independent test team at the developers' site. Beta testing refers to testing by potential users outside of the developers themselves, whether within the state public health department or outside of the department. During beta testing, the WDQS is accessed by users to identify faults or bugs.
- *Impact evaluation* determines whether the WDQS is meeting the needs of its users and producing its intended impact on the community it serves, its users, and its sponsoring organization. It occurs following completion of the development of the WDQS.

Functionality is the sum or any aspect of what a WDQS can do for a user; in other words, its features and capabilities.

An *interface* (or *user interface)* is the portion of a WDQS that users see on the computer screen, consisting of the set of commands, graphical display formats, and other features; the interface enables the user to interact with the WDQS. A *dynamic interface* enables the user to customize data queries through choosing data sets, variables, measures, statistics, and data presentation, such as a table, graph, or map. A *static interface* allows no choice of parameters for a query. WDQS interfaces exist along a continuum from relatively static to dynamic, reflecting the extent to which the WDQS enables users to choose geographies, statistics, variables, data sets, data output, and other functionalities. It is important to recognize that WDQS interfaces can be dynamic, enabling user choice, while the application and database servers—or "back-end"—of the WDQS may generate de

novo tabulations and statistical calculations in response to individual user queries ("dynamic") or may simply provide previously calculated tables and statistics ("static").

A *user* is anybody who directly uses a WDQS. Primary users are those for whom the WDQS was designed and developed, while secondary users are other incidental users. For example, the primary user of a WDQS may be local health department staff, while secondary users may include students and community groups. It is also important to distinguish primary and secondary users who interact directly with the WDQS from consumers (i.e., indirect users) of the information generated by the WDQS. For example, a state health department analyst may interact directly with the WDQS to obtain data for a member of the state legislature, who is a consumer of the information generated by the WDQS.

DIMENSIONS OF EVALUATION

WDQS needs analysis, testing, and evaluation can be described along three dimensions:

- *Stage of WDQS development* refers to where the WDQS is in its cycle of development, deployment, and ongoing operation. As described below, the type of evaluation employed varies with the WDQS stage.
- *Target of the impact evaluation* refers to the focus of the impact evaluation. The evaluation may focus on primary or secondary direct users of the WDQS, communities that are consumers of WDQS data, or the organization responsible for the WDQS.
- *Methods for needs analysis, testing, and impact evaluation* of WDQS refers to various methods that can be employed to conduct needs analysis, testing, or impact evaluation of a WDQS.

Each of these three dimensions is described below in greater detail.

Stage of WDQS Development

WDQS development can be conceptualized as consisting of four stages:

1. *Prior to development.* This stage typically includes needs analysis and the development of a business case for the WDQS, followed by the development of use cases and specification of system requirements.
2. *During development.* This stage typically includes testing the WDQS prior to its deployment to ensure that it works properly and generates accurate responses to queries.

3. *Following development and public release.* This stage typically includes the evaluation of the deployed and operational WDQS.
4. *Following development and public release, but during development of new functionalities, modules, and so forth.* This stage may include needs analysis, testing, or impact evaluation, depending on the nature of the modification of the WDQS. A minor change might be refreshing a data set; a major change might be the addition of a new data set.

Target of Impact Evaluation

The target of the impact evaluation refers to the entities that should be the focus of the evaluation of the WDQS's impact: users, communities, and the health department or other organization that sponsors and manages the WDQS.

1. User impact

   The evaluation of user impact determines who are the intended and actual users of the WDQS, how they use the WDQS, and whether the WDQS meets their needs.

   a. Purpose

      i. Who were the primary (intended) users for the WDQS?

      ii. How was the WDQS intended to affect users?

   b. WDQS use

      i. Who are the users of the WDQS?

         1. Who are the primary users?
         2. Who are the secondary (incidental) users?
         3. Who consumes WDQS information?

      ii. How is the WDQS used by primary users, secondary users, and consumers?

         1. How often is each available data set queried?
         2. What types of queries do users pose?
         3. Which indicators do users access?
         4. How often do users access pre-tabulated reports, such as community health overviews?
         5. What types of statistics do users request?
         6. How often do users request different types of outputs, such as tables, graphs, and maps?
         7. Do users access WDQS help?
         8. Do users access on-line training?

9. Do users access WDQS documentation and meta-data?

c. User needs and satisfaction

i. Does the WDQS meet the needs of its users?

1. Needs as defined during a formal needs analysis conducted prior to WDQS development
2. Needs identified during post-release via user feedback, user survey, or other method

ii. Is the WDQS "look and feel" inviting to users?

iii. Does the WDQS provide adequate functionality to meet its users' needs?

iv. Is it easy for users to find the WDQS on the health department's Website?

v. Is the WDQS easy to use? (e.g., ease of navigation within WDQS; clear explanation of how to use the WDQS)

vi. Do the data sets available through the WDQS meet user needs?

vii. Do available formats for WDQS output—such as tables, graphs, and maps—meet user needs?

viii. Does the WDQS provide adequate help, training, documentation, and meta-data to meet user needs?

ix. Does the WDQS provide safeguards, either through system design or training, against the misinterpretation or other misuse of data obtained from the system?

2. Community Impact

The evaluation of community impact determines whether communities are using the WDQS, how they are using it, and whether it meets their needs for community-related data. (Community groups may be primary or secondary users of the WDQS, consumers of WDQS data obtained by other direct users, or both.)

a. Impact on health assessment and priority setting

i. If the intended user of the WDQS is the community, is the WDQS regarded as a tool for facilitating public discussion and setting community priorities?

ii. Does the WDQS facilitate evidence-assisted decision-making?

iii. Do community-based organizations, health care providers, or other groups (such as United Way) use WDQS data in community health assessments and reports?

iv. Has data from the WDQS been used to set community priorities?

v. Has use of the WDQS to obtain community data resulted in cost-savings for conducting health assessment and priority setting?

b. Impact on resource development
   i. Has the WDQS helped build partnerships between the community and public health agencies? Partnerships may start with data-related needs and then continue with resource-related issues and needs.
   ii. Has providing data via the WDQS increased the community's trust of the health department?
   iii. Has the WDQS helped community groups to prepare grant proposals?

c. Impact on policy development and health advocacy
   i. Does the WDQS support community advocacy?
   ii. Is the WDQS mentioned in, or used by, the local media?
   iii. Has the WDQS facilitated changes in community policies?
   iv. Has the WDQS facilitated changes the community's long-term planning?

d. Impact on health
   i. Can any changes in community health be attributed to use of the WDQS?

3. Organizational impact[1]
   a. Mission
      i. What is the relationship of WDQS to overall health department mission and does the WDQS support the mission?
      ii. What is the relationship of WDQS to specific policies, programs, or activities within health department, and does the WDQS support these policies and programs?
      iii. What is the relationship of WDQS to overall information strategy of health department?
         1. How does the WDQS relate to other elements of the health department's information strategy, such as Web-page text, tables, and figures (HTML); published reports (usually .pdf); downloadable datasets (usually .xls); public use datasets; searchable, pre-compiled tables, graphs, and maps; and Web-based data systems providing customized queries of data sets (WDQS)

[1] Impact on the health department or other organization that sponsors and manages the WDQS.

2. Does the WDQS support the overall information strategy for the health department?

iv. Has the WDQS facilitated or improved the following:

1. Sharing data within health department?
2. Use of data standards by the department?
3. Data linkages and the ability of department staff to analyze linked data sets?
4. Relationships with non-government agencies?
5. Relationships with local health departments?

b. Management and Staff

i. What is the health department leadership's perception of the WDQS and its impact?

ii. What is the WDQS management's perception of the WDQS and its impact?

1. Is the WDQS being marketed adequately?

iii. Has the WDQS resulted in the following:

1. Actual or perceived staff time-savings (i.e., reduction in time spent by staff responding to data requests from various users)?
2. Actual or perceived increased staff productivity?

c. Costs

i. What was the cost of building the WDQS?

ii. What was the cost of deploying the WDQS?

iii. What is the annual cost of maintaining the WDQS?

iv. What is the cost of updating and revising the WDQS?

v. What are the cost-savings and return-on-investments resulting from the WDQS?

Methods for Evaluating WDQS

This section outlines various methods that can be employed to conduct needs analysis, testing, or impact evaluation of a WDQS. The methods include both subjective measures of user experience and satisfaction (e.g., surveys and focus groups) and objective measures of WDQS use, content, and performance. This section also recognizes the potential usefulness of a logic model or other framework for organizing and guiding the evaluation, and that the evaluation may be conducted by

internal health department staff or by external independent evaluators, depending on organizational needs and available resources for conducting the evaluation.

1. Testing, needs analysis, or evaluation framework
    a. Logic model
    b. Other
2. Evaluation method
    a. Surveys
        i. Population-based surveys
        ii. Surveys with purposive samples
            1. Based upon roles of individuals
            2. Users
    b. Focus groups
        i. Current primary and secondary users
        ii. Potential users
        iii. Consumers
    c. Expert review
    d. Laboratory-based user testing
        i. With observation
        ii. Employing usability heuristics, such as Nielsen's heuristics
            1. Visibility of system status
            2. Match between WDQS navigation and real world
            3. User control and freedom
            4. Consistency and standards
            5. Error prevention
            6. Recognition rather than recall
            7. Flexibility and efficiency of use
            8. Design
            9. Help users recognize, diagnose, and recover from errors
            10. Help and documentation
    e. Use logs
        i. User registration
        ii. User log-in
        iii. Survey
        iv. Web page hits

f. Informal and unstructured (e.g., review of emails and telephone calls from users concerning their experience with the WDQS).
g. WDQS content and performance
    i. Data
        1. Quality
        2. Availability
        3. Timeliness
        4. Security
    ii. Testing for data and computation accuracy
    iii. System availability and maintainability
    iv. WDQS requirements for user's computer (e.g., Windows OS, specific browser, specific plug-ins to display graphics or maps)

3. Evaluators
    a. Internal to health department
    b. External to health department

CONCLUSION

This taxonomy is intended to provide a framework for health departments as they consider the focus, content, and methods of evaluating various aspects of a WDQS. While not all elements of the taxonomy need to be included in an evaluation, health departments should consider each element as they conceptualize and plan their evaluation to ensure that important issues are not overlooked.

Chapter 3

Logic Models for Evaluating Web-based Data Query Systems

Michael A. Stoto[1]

Common in public health and related fields, logic models describe the sequence of events needed to accomplish a goal by synthesizing the main elements of an intervention into a picture of how the intervention supposedly works. Logic models help guide evaluations by clarifying assumptions about how the components of an intervention work together to impact the ultimate goal, as well as how various functions, processes, and resources contribute to meet the goal (Centers for Disease Control and Prevention 1999; Stoto 2007). Most Web-based data query systems (WDQS) are intended, ultimately, to improve the community's health, a goal that takes many years to achieve. Moreover, many public and private entities within the community impact the community's health, in addition to extraneous factors (Institute of Medicine 2003).

Haggard and Burnett developed a useful logic model focused on inputs, activities, outputs, and outcomes, as common in the evaluation literature (Haggard and Burnett 2006). I propose to tailor this model to focus more directly on the logic of Web-based data query systems. As displayed in the Figure, the model has five components. The two basic inputs are health data and a WDQS interface that enable users to access the data. With these inputs, the use of WDQS leads to intermediate outputs such as analyses and reports that inform health decision-makers. In the end, these outputs should contribute to the ultimate outcome, namely a marked improvement in the community's health.

The logic model in figure 3-1 represents the key aspects of the process by which a WDQS can lead to improved community health. This model provides a starting point for developing the

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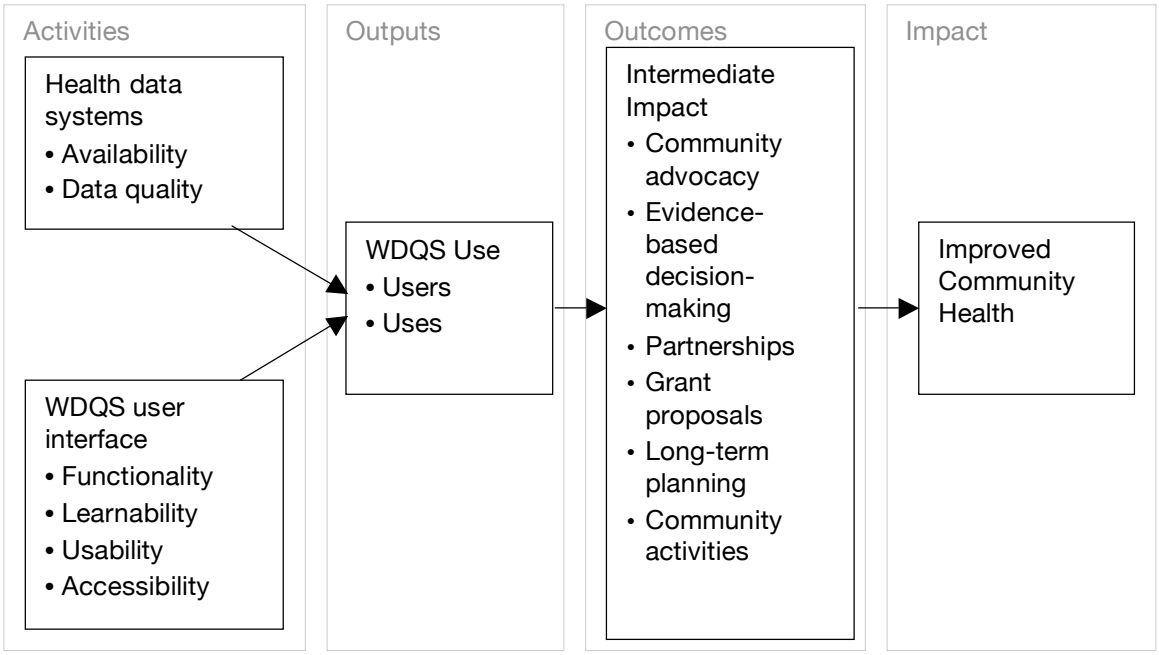
dimensions or domains of a set of WDQS evaluation measures, but must be adapted to any community's particular approach to disseminating health data. Consider the following options, organized according to the components of the generic logic model.

Figure 3-1. Logic model for evaluating Web-based data query systems (WDQS)



The availability and quality of *health data systems* accessible through the WDQS is the first input that must be evaluated. *Availability* includes consideration of data systems included, dimensions of health status, health determinants, and consequences described; the geographic area and number of years covered, and the unit of analysis at which the data are available. De-identified individual level data are available for researchers through some WDQS, but, more typically, the unit of analysis is the population group defined by geographic (e.g. state, county, zip code, locally-defined "neighborhood"), demographic (sex, age, race and ethnicity), or socio-economic characteristics (education, income, and so on). Many WDQS disseminate data owned by agencies other than the health department that developed the WQDS itself, and the availability of such data depends on arrangements that the WDQS developers make with the data owners. The need to protect the privacy and confidentiality of the data subjects often limits the availability of data, especially for small population groups; see Stoto's chapter on "Statistical Issues in Evaluating Web-based Data Query Systems" (Stoto 2008).

Data quality includes interrelated concepts of completeness, representativeness, timeliness, reliability, and, ultimately, validity (the degree to which the data represents the actual status of the community's health defines validity). Completeness is the degree to which all of the relevant individuals or health-related events are included in the database. It is important to know, for instance, whether the number of reported cases of tuberculosis represent all or only some of the cases in the community. Less than complete data can be valid, however, if it fairly represents the community. It is not important to measure every resident's body mass index (BMI), for instance, if BMI is available from a scientifically-designed sample survey. Timeliness depends on the amount of time it takes to gather data and make it available through the WDQS. The extent to which data in the WDQS can differ from actual population values due to chance alone defines reliability. Low reliability can arise in measures based on samples, or simply because the health event is rare within the population group. See Stoto's chapter on "Statistical Issues in Evaluating Web-based Data Query Systems" (Stoto 2008).

Evaluation of the *WDQS user interface*, the second input, must address both its functionality and its usability. *Functionality* depends, of course, on data availability as previously discussed, but also on the types of queries that a user is allowed to make, and what breakdowns and presentation formats can be requested. Options range from pre-tabulated reports to standard profiles that can be customized by place and time to tables, graphs, and maps whose parameters are completely determined by the user.

System *usability*, on the other hand, depends on such factors as system design and navigation approaches, help functions and documentation, user control and freedom, consistency and standards, error prevention, flexibility and efficiency of use, reliance on recognition rather than recall, and the ability to recognize, diagnose, and recover from errors (Plaisant 2008). Usability also includes learnability and accessibility (Plaisant 2008). System usability can be enhanced through training (which may be required) and through a quality improvement process that takes user satisfaction into account.

The third component of the logic model, *WDQS use*, includes considerations of the number and type of users, as well as what uses they make of the data. Use can be thought of as the output of the WDQS. The number and type of *users* can be tracked by the WDQS itself, especially if registration is required and/or user characteristics must be entered. Actual *use* of WDQS systems can also be assessed quantitatively through the system itself, simply by tracking the number and types of reports requested, data sets accessed, and population and geographic areas covered. One can also survey WDQS users can about the intended use of the data (such as planning, monitoring, grant proposals, media). See Ross's chapter on "A Scientific Approach to the Design and Ongoing Improvement of

Health Department Web-based Data Query Systems" (Ross 2008). More qualitatively, case studies describing specific uses can be prepared. Such case studies might address, for instance, the intended audience for the analysis or report derived from the WDQS and how it was intended to affect users.

The *intermediate impact* can be judged in terms of how the information from the WDQS has been used to facilitate and inform public discussions about choosing community priorities, setting public health policies, and providing health services. In logic model terms, these are outcomes of the WDQS. Questions to consider include:

- Does the WDQS support community advocacy?
- Does the WDQS facilitate evidence-based decision-making?
- Has the WDQS helped build partnerships between the community and public health agencies?
- Has the WDQS helped community groups to prepare grant proposals?
- Has the WDQS facilitated changes in community policies?
- Has the WDQS facilitated changes the community's long-term planning?
- Has the availability of data affected community activities?

Ultimately, the goal and long-term outcome of developing a WDQS is to *improve community health*. Even in the best circumstances, however, such improvements take many years to become apparent and depend on many factors, making it nearly impossible to measure the direct effect of a WDQS on community health. Moreover, simply making data available, or even ensuring its use, is not sufficient to achieve community health improvement goals. In this context, logic models provide a structure for specifying an intervention's expected inputs, outputs and intermediate outcomes. These should be the dimensions assessed in an evaluation study to ensure that the intervention is on track in the short and intermediate term to meeting its ultimate goal.

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Chapter 4

Perspectives on Health Department Web-Based Data Query Systems: Key Informant Interviews

Daniel J. Friedman[1] and R. Gibson Parrish[2]

BACKGROUND

Health department budgetary, staffing, and technological capacity has constrained the development and diffusion of Web-based data query systems. The limitations imposed by these resource constraints have been evident in the extent of needs assessment prior to WDQS development, testing during development, and evaluation following release. Relatively few of the 27 states with currently operational WDQS have completed formal cycles of assessment, testing, and evaluation. Especially lacking have been attempts to expand WDQS design conceptualization through involving a wide range of potential users as well as public health information experts with minimal familiarity with WDQS. The purpose of this chapter is to summarize key themes and perspectives that emerged during a series of key informant interviews on how health department Web-based data query systems of the future could better meet user needs.

METHODS

The key informant interviews were intended as a limited, qualitative attempt to elicit new perspectives on WDQS evaluation and design that could be further explored in the future. Interviews were conducted with twelve key informants, including seven international experts in population health information systems, two former state health officers, and three local frequent WDQS users.

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The selected key informants constitute a purely purposive sample, selected through the authors' knowledge (international experts and former state health officers) and recommendations from health department WDQS managers (local users).

Interviews were solicited via e-mail. For the international experts and former state health officers, their acceptance of the invitation for an interview was followed by an e-mail response from the authors that scheduled the interview and requested that they review two specified example WDQS (Florida's CHARTS and Utah's IBIS) and consider two questions (Florida Department of Health [Internet]; Utah Department of Health [hp]. The first question was "If a WDQS similar to the two reviewed WDQS were available for your state/province/local area, would it meet the needs of the following groups: health department professional staff; community groups; students and researchers?" The second question was "In what specific ways could the two reviewed WDQS be enhanced to better meet the needs of these groups?" For the local users, their acceptance of the invitation for an interview was followed by an e-mail response from the authors that scheduled the interview and requested that they consider two questions. The first question was "Does your state's WDQS meet your needs and those of other WDQS users?" The second question was "In what specific ways could your state's WDQS be enhanced to better meet your needs and those of other users?"

All interviews were conducted on the telephone jointly by the two authors, lasted from 15 to 60 minutes, and occurred from October through December 2007. Both authors took notes during all interviews, which were later reviewed by the authors and common themes were identified. The identification of themes was a purely qualitative analysis. All opinions expressed in this chapter are those of the interviewed key informants.

FINDINGS

Data

Two themes related to data included in health department WDQS emerged during the key informant interviews. The first theme is the need for WDQS to include a broad range of data. A former state health officer pointed out that the next challenge for WDQS is to include data related to education, environment, Medicaid, Medicare, notifiable diseases, and public health programs. The same former state health officer also emphasized that "public health defines itself too narrowly as only what health departments do" and that current WDQS reflect that narrow definition.

A second theme relating to data is the need to include contextual data and information in WDQS. One key informant said that state and local data are useless unless they are placed within a comparative context. Examples of comparative contexts for data provided by key informants included national data, peer groupings of local areas, over-time data, and Healthy People objectives.

Also stressed was the need for better contextual information for expert users, such as information on the construction of indicators and fuller explanations of numerators and denominators. Key informants also discussed the need for more easily understandable contextual information for non-expert users, such as basic descriptive information about statistics and methods that could be easily accessed in the WDQS.

A final category of contextual information mentioned by key informants related to data limitations and warnings. Key informants pointed out that through their WDQS, health departments should attempt to minimize the potential for "over-interpretation" of small differences in numbers and rates over-time or between local areas. A former state health officer discussed how WDQS data can be unintentionally abused, especially when data are presented on individual counties, cities, and towns with small populations or numbers of events. An international population health expert pointed to the need for WDQS to communicate uncertainty of data. Data limitations need to be prominently displayed and highly visible. Confidence intervals should be included for all rates and survey-based estimates, with easy-to-understand explanations for users unfamiliar with confidence intervals and standard errors.

Users

Based on their review of the two example health department WDQS, interviewed international population health information experts said that they assumed the intended users of WDQS were experts already familiar with health data and common statistics. For example, interviewed international population health information experts pointed to professionals engaged in regional strategic health planning and analytic staff in large local public health departments as the likely target users of WDQS. An interviewed international population health information expert also maintained that WDQS would have "limited knowledge translation" for other audiences not experienced in using and interpreting public health data and statistics.

Another international population health information expert acknowledged the potential for a varied array of WDQS user groups. According to this key informant, WDQS should target individual user groups by recognizing and responding to their specific business, strategic, and policy needs. In

order to be effective, WDQS will need to provide data differently for different user groups (see Interfaces below).

The need for training of WDQS users was stressed by several key informants. A former state health officer pointed out that on the one hand, local health departments are often accustomed to functioning with little data, and, consequently, local health department staff often has minimal data skills; on the other hand, state health departments are typically lacking in resources to train WDQS users. Similarly, another international population health information expert stressed that small regional public health organizations are typically overloaded with providing services; as a result, WDQS probably cannot be appropriately utilized unless staff capacity to analyze and interpret data is augmented through training. To meet this need, an international population health expert suggested the inclusion of a Web-based tutorial package on the tabular, map, and graphic displays for health data that perhaps could be shared or a common site for several WDQS.

Key informants suggested the need for multiple mechanisms in WDQS for providing help to users, including: context-sensitive help that varies with and reflects particular data sets, data items, and calculations; explanations on screen that pop-up when the cursor hovers over a cell or a table heading, which could also provide context-sensitive help; e-mail and telephone help desks; and on-going in-person and Web-based training in the use of a specific WDQS.

Interfaces

Several key informants stressed that WDQS interfaces should reflect user needs rather than those of health department analysts, epidemiologists, and Web developers responsible for designing the WDQS. An international population health information expert compared the interfaces and outputs of current WDQS to a situation in which a physician provides a patient with his or her entire medical record, including laboratory, test and imaging results. For most patients, the amount and array of information in an entire medical record is enormous and overwhelming; providing access to the entire record represents openness, but is neither useful nor usable for the typical patient. Similarly, according to this key informant, the two reviewed WDQS were successful in providing access to a wide range of population health data, but the data as presented were neither useful nor usable for the typical community user. This key informant argued that developers designing WDQS need to bear in mind several questions: what brings a user to trying to use a particular WDQS?; what goes through the user's mind when he or she tries to use the particular WDQS?; and how could the experience of an in-person, face-to-face conversation between the user and a health department analyst be transferred to a WDQS interface.

The desirability of a question-based WDQS interface was mentioned by an international population health expert and a former state health officer. As described by these key informants, a question-based interface would pose and answer typical questions about typical community health problems and issues. As illustrated by the key informants, the WDQS interface for each community health problem or issue could revolve around four basic types of questions. The first question is "What is the current situation in a particular geographic area or for a particular population group for a particular health problem?" According to a former state health officer, this first question includes related sub-questions, such as: "Why are these data important?"; "Should we be worried about these data?"; and "Do these data warrant further investigation"? The second question is "What is now being done to address this particular health problem for the particular geographic area or population group?" The third question is "What can we do better to address the particular health problem than we are now doing?" The fourth and final question is "What can we do right now to address the particular health problem for the particular geographic area or population group? An international population health information expert described such a question-based interface as moving from a quantification of "What is?" in current WDQS to an approximation of "What if?" in future WDQS.

Key informants also discussed the desirability of different interfaces for different user groups. Different interfaces were discussed for both different levels of user data and statistical sophistication, and also for users with different professions. Several key informants mentioned the desirability of a "tiered" interface to better address the needs and capabilities of users with different levels of data and statistical sophistication. Immediate access to the WDQS could occur through a simple and intuitively obvious first tier interface to the desired data, with a second tier interface for users with greater familiarity with public health data and statistics. The second tier interface could either be related to but separate from the first tier, or essentially embedded in the first tier through drill-downs, buttons, and so forth.

Different interfaces could also be designed for users in different professions. An international population health information expert pointed out that different user groups will come to WDQS with different lines of inquiry: for example, that regional health planners, health department staff, and legislative staff would all seek answers through a WDQS to different questions. Rather than forcing such different groups to utilize a single interface that fails to specifically meet the needs of any single group, more specialized interfaces could be designed to meet the business, strategic, and policy needs of particular groups. Such profession-specific interfaces were also paired in the key informant's discussion with the desirability of question-based interfaces.

SUMMARY AND CONCLUSIONS

Although limited in number and qualitative in nature, the key informant interviews conducted for this small study revealed some fresh perspectives for evaluating and designing health department WDQS. Three especially interesting and potentially important themes emerged from the interviews. First, several international population health information experts—none of whom were previously familiar with US health department WDQS—volunteered their assumptions that the developers of the two reviewed WDQS intended the primary users to be planning and policy professionals with data and statistical knowledge and skills. These key informants did not envision the reviewed WDQS as appropriate for typical community users.

Second, and directly related to the first theme, key informants discussed ways in which WDQS could be designed to more directly meet the needs of different user groups. One way could be through developing interfaces tiered for users with differing levels of data and statistical expertise. Another way would be through question-based interfaces that would pose and answer typical questions about typical community health problems and issues.

Third, key informants also stressed the need for richer contextual information and data, and multiple means of accessing the contextual information and data within WDQS.

Based on the results of this small study, it appears that qualitative interviews with a wide range of key informants constitute a promising means of obtaining new perspectives on designing and evaluating WDQS, and are worthy of further expansion.

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Chapter 5

A Range of Indicators for the Evaluation of State Health Department Web-based Data Query Systems

Catherine Plaisant[1]

This chapter explores the wide range of possible indicators (also called metrics) that can be used to evaluate state health department Web-based data query systems (WDQS). While the list of indicators we propose is not exhaustive, it strives to cast a wide net on the range of issues that should be considered when evaluating WDQS, from the richness of functionalities provided by the WDQS, to the usability of the WDQS, the level of human resources required to develop and maintain the WDQS, and the frequency and intensity of WDQS use.

DEFINING THE GOALS OF THE EVALUATION ACTIVITY

Evaluation can take many forms; it is critical to start by defining the goal of the evaluation. Is the evaluation goal to identify problems that users encounter in order to improve the WDQS (i.e., a formative evaluation, which is part of an iterative development cycle)? Or, is the goal to conduct a summative evaluation that compares the functionalities or use of an operational WDQS with those of a previous version of the same system? Or, is the evaluation goal the comparison of systems from different states (e.g., Ceaparu 2003; Ceaparu and Shneiderman 2004)?

Another issue is to identify state priorities that should influence the focus of the evaluation. For example, if reducing teenage pregnancies is a state priority, then evaluating the availably of related data and the attractiveness of the WDQS to teenagers should be a component of the evaluation

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effort. Similarly, in terms of WDQS audience, some states may choose to cast a wide net in an attempt to reach as many users as possible, while others may choose to focus their resources on addressing the needs of fewer users who visit the WDQS regularly for specific purposes (e.g., research). This choice influences the selection of primary indicators of success: giving more importance to the number of individual users, or to the number of advanced queries performed, or to the number of citations of the WDQS in research publications. In general, the comparison of heterogeneous data services benefits from using a combination of metrics (e.g., Komlodi and Plaisant 2000).

Defining Users and Their Needs

Evaluation starts by identifying users and their needs. Generating an exhaustive list of types of users and examples of typical tasks that they may want to accomplish while using the WDQS should guide the evaluation effort. A useful contribution would be to make scenarios of different types of WDQS users and uses available, in order to help states set priorities in terms of users and tasks, and to evaluate their own WDQS services. Examples of such scenarios can be found in Hert, 2002.

A Range of Metrics

We can contrast the *usefulness* of the WDQS (i.e., its ability to answer users' questions based on the functionalities and data available) with the *usability* of the WDQS (i.e., the ease with which diverse users learn and use the WDQS interfaces to find the answers they need.) This leads to a variety of indicators or metrics for evaluation, which we now describe.

Usefulness

Richness of functionalities. Rich functionalities allow more varied types of questions to be answered. Evaluators will need to determine whether the WDQS:

- Allows query and display of sub-county level data (e.g., zip code, census tract, metropolitan area, and congressional district)
- Allows custom grouping of data by age or geographic area (e.g., county)
- Provides the ability to graph time-based data (e.g., graph of rate of low birth weight over the past ten years)

- Provides the ability to map geographically-based tabular data (e.g., map of disease-specific mortality rates by county)
- Provides context-sensitive explanations of variables or datasets, or context-sensitive help in constructing queries or interpreting results

A list of approximately 145 basic, enhanced, and innovative functionalities for WDQS can be found in Friedman and Parrish, 2006. Using this list consistently across evaluation efforts by individual states would facilitate comparisons across states and systems.

Richness of data available. Indicators may reflect how many types of datasets are available, their temporal and geographical coverage, and their currency. For example, how many datasets are available in each of the following categories:

- Population (decennial census)
- Health determinants (behavioral risk factors, alcohol and drug use, environmental hazards or exposures)
- Disease or condition specific (injury incidence, cancer incidence, infectious disease incidence, birth defects)
- Vital statistics (natality, mortality)
- Use of health services (hospital discharge, Medicaid use, Women, Infants, and Children program use)

A list of types of datasets found in WDQS can be found in Friedman and Parrish, 2006.

Coverage indicators might reflect the time range available, the granularity of data (e.g., yearly, weekly, or daily; state, county, or block level) and the completeness of the data (e.g., are some years or months missing?). Currency indicators might assess the availability of the recent data for each data set.

Overall Usability

Even if a WDQS offers up-to-date information and all needed functionalities, it can still fail to deliver a useful service if users have difficulty accessing the WDQS or finding what they need, or become frustrated with hard-to-learn or error prone interfaces. Many resources are available to guide designers toward the creation of empowering user interfaces, including Shneiderman and Plaisant, 2005; and Sharp et al., 2007. Usability testing can then verify that user needs and usability goals have been met and that users are able to use the system on their own with a sense of control and

satisfaction (Dumas and Redish 1999). Specific guidelines are available for Web usability (Nielsen and Loranger 2006) or specific components, such as map design (Pickle 2003); and many advanced designs are becoming available (Dykes et al. 2005). A variety of indicators can be devised to measure the usability of a Web site.

Learnability. How easy is it to learn to use the WDQS? Is Web-based help available, such as training manuals, video demonstrations, or sample tasks and how to accomplish them? How easy is the WDQS to use for new users, for returning intermittent users, or for experts? A combination of measures can be compiled, either objective (e.g., presence or absence of training materials; and average time spent by a first-time user to compose a given query) or subjective (e.g., responses to user surveys).

Effectiveness and user satisfaction. Many factors can affect usability. Measurable criteria can be established for the time for users to accomplish representative tasks, their error rate, their retention of knowledge about how to use the WDQS over time, and their subjective satisfaction. Ease of navigation, screen layout, consistency, appropriateness of terminology, informative feedback, use of color and highlighting, error prevention, data entry, readability, customization, and other indicators can be assessed using a variety of techniques (Dumas and Redish 1999). User interface experts can conduct expert reviews rapidly. Surveys can provide detailed feedback on multiple aspects of the Web site (e.g., the QUIS tool [http://lap.umd.edu/QUIS]). Finally formal usability tests can be conducted in a laboratory setting to observe 10-20 users conducting representative tasks.

Accessibility. Is the Web site accessible to users with disabilities, for example, users who are colorblind or have other visual or auditory impairments? Is the speed of response acceptable even with a slow Internet connection? Are all displays readable even in low resolution? Are all versions and type of Web browsers supported? Are special Web browser plug-ins required? Is the WDQS accessible from behind a firewall? Some of those issues are discussed in Plaisant, 2005, and Plaisant et al., 2003, along with discussions of how to help users get started.

Actual Use

Even a well-designed WDQS may remain unused when it is new or not well advertised. On the other hand, some Web sites may see large numbers of users using a single popular feature but never visiting other parts of the Web site. Recording and analyzing data on usage is important for evaluating the site's overall impact (e.g., number of unique users or unique Internet Protocol

addresses, number of simple queries, number of advanced queries, type of queries, most used datasets, and downloads), assessing which parts of the Web site are used more often, and identifying potential problems with the interface (e.g., by logging error messages or measuring which sections of the user manual are accessed more often).

Human resources

Indicators can also be used to assess the amount of resources required to provide adequate WDQS services, such as the size of the WDQS budget, the number of staff members needed to keep the Web site running, the number of person-hours required to add a new temporal increment to a dataset (e.g., adding data for the latest month), or the number of phone calls or emails answered to assist users. Of course, assessing the type of questions answered is also important (e.g., questions about interpreting query results versus complaints about hard to use interfaces or missing data).

Visibility

Evaluating the visibility of a Web site may reveal ways to increase its usage by the community of intended users. For example, can the Web site be easily found using Internet search engines (e.g., does it appear on the first page of results when searching the Internet for "health statistics [state name]")? Are other state Web sites appropriately linking to the WDQS (e.g., is Family Services or Vital Statistics connected to the WDQS)? Are reference professionals aware of the existence of the Web site (e.g., staff of public libraries, universities, research institutions, and journalists)? Is the WDQS advertised?

Impact

Measuring actual impact of the WDQS in terms of lives saved or quality of life improved is extremely difficult—if not impossible—and out of the scope of the evaluation efforts discussed here. Nevertheless, it is possible to design indicators that reflect the possibility that the WDQS might affect community health. Indicators of usage discussed above are an example, as are the number of research reports, news stories, or even blog entries referring to the WDQS or to data obtained through the WDQS. Well-crafted individual case studies or short success stories about how the WDQS was used in productive ways can provide convincing evidence of impact, and should be documented and published.

Collaboration

Effective sharing of resources among states and agencies has many benefits and should also be documented when evaluating a WDQS. For example, sharing software not only saves development and maintenance resources, but also helps provide consistent interfaces, allowing users to navigate more easily within different Web sites (e.g., helping a reporter find health statistics and employment statistics by providing the same query interface for both types of statistics). Collaboration with neighboring states also has natural benefits for users who often want to compare data across state boundaries (e.g., District of Columbia collaboration with Virginia and Maryland).

In conclusion, we believe that taking a multidimensional approach to the evaluation of WDQS by using a variety of indicators taken from the many dimensions listed above will lead to a richer representation of the strengths and weaknesses of WDQS sites.

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Chapter 6

A Scientific Approach to the Design and Ongoing Improvement of Health Department Web-based Data Query Systems

Denice Warren Ross[1]

User-centered design is a formal, scientific approach to creating interfaces between humans and machines that are intuitive and easy to use. This approach is most likely to be adopted when outcomes are obvious—for example, in weapons design where poor design leads to casualties, and commercial Web sites where poor design results in money lost. The public and nonprofit sectors, sometimes with less-tangible outcomes, have been late in adopting this methodology, shifting the burden of "figuring out the system" to the users. This chapter will outline steps to ensuring a user-centered approach to designing Web-based data query systems (WDQS) for public health departments, and building in feedback loops for ongoing quality improvement.

DESIGN FROM THE OUTSET USING PROVEN METHODS

User-centered design requires well-defined characteristics and needs of users. One challenge in applying user-centered design to health department Web sites and especially to WDQS is that, being government entities, the audience is "all citizens"—ranging from researchers to laypeople, working at neighborhood, regional, state and national levels.

The typical approach to creating data systems for such a wide audience is to (1) inventory all the data sets the health department wants to publish, (2) specify functionality for the query system (often

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based on ideas gathered in focus groups or staff meetings), (3) build the system, and (4) design the interface and solicit feedback from users on what they think of the system. Sometimes, two interfaces are designed ("easy" and "expert"), and subsequent user challenges in using the system are addressed with training workshops and "read me first" instructions. This approach is technology-centered.

User-centered design, in contrast, has developers (1) begin with a thorough analysis of *segments* of the audience (e.g., researchers, nonprofit grant writers, and local government health departments) and what tasks they need to accomplish on the system, (2) choose data sets and methods for displaying the data to support the tasks users need to accomplish, (3) build low-fidelity prototypes (paper mockups of the proposed interface design that intentionally look like a work in progress) and test them with prospective users, and (4) build the system, incorporating feedback from iterative testing. The result of a user-centered approach is a data system that allows users to focus on the information within it, rather than struggling with how to use the system itself.

OBJECTIVE METHODS FOR ITERATIVE TESTING OF DESIGNS

Heuristic Analysis Using Proven Design Standards

A heuristic analysis is a process where a small group of evaluators rates an interface against a checklist of standards to find usability problems. The checklist is typically based on research in the field of human-computer interaction (USDHHS 2008, Pierotti 2008) and in the case of data publishing, research in Web credibility (Stanford 2008). Examples of standards include: Are similar links grouped in proximity? Is the "date last modified" clearly attached to each piece of information that requires it? Do users receive visible feedback after performing queries (even when the results are null)? Heuristic analyses give critical guidance to an iterative design process and are also handy when a system has been "live" for some time and is starting to look a little "ragged" due to piecemeal additions of content and functionality. One caveat regarding heuristic analyses: heuristics are generalizations based on the characteristics of all users, not your target audience. As such, they can fail to address the specific needs of your users (Microsoft Corporation 2000). In short, heuristic analyses are a good start, but they cannot replace usability testing.

Low Fidelity Prototype Testing Before Programming

Techniques, such as card-sorting (Nielsen 2004, Maurer and Warfel 2004)—to inform information architecture—and paper-prototyping (Snyder 2003)—for feedback on draft interface designs and

proposed functionality—use "typical" naïve testers to provide feedback on the design of systems *before* costly programming begins. In card-sorting, indicator names, or names of entire data sets, are written on separate index cards. Users are asked to think aloud while sorting these cards into natural categories, giving developers a glimpse into how members of the audience conceptualize the data that will be in the system. Paper-prototyping assigns users tasks to accomplish on the system, using paper printouts (often taped together and with hand-drawn elements) instead of the live system on the computer. The beauty of low-fidelity prototype testing is that the user feedback is usually more honest and practical than it would be if the system looked too slick and finished. Return on investment for testing done early in design is substantial; renowned systems engineer Tom Gilb writes, "Once a system is in development, correcting a problem costs 10 times as much as fixing the same problem in design. If the system has been released, it costs 100 times as much relative to fixing in design." (Gilb 1988)

Formal Field Usability Testing

Usability testing is a formal method of watching users interact with a system to complete a task (Warren and Bonaguro 2008). "Field" usability testing means that rather than conducting these tests in-house, the tests are conducted on the user's office computer. Field tests provide a crucial glimpse into the conditions in which the Web site will actually be used. In such testing, a naïve "typical" user is given realistic tasks to complete on the Web site. The user might be a grant writer for a mental health counseling agency, and a sample task might be to identify "What was the suicide rate in Orleans Parish before and after Hurricane Katrina?" The test administrator collects data about the user's interaction with the site. Qualitative data (comments like "Oh, I wasn't expecting *that* when I clicked on this link!") and quantitative data (such as number of times the user hits the "back" button on their browser) are gathered while the user navigates to complete the task. Analysis of the data from such testing then informs the iterative design of these Web systems to better meet the needs of the audience. (Side note: Usability testing observes users in action and cannot be replaced with focus groups where people talk about what their actions would be [Nielsen 1997].)

FEEDBACK SYSTEMS FOR ONGOING EVALUATION AND QUALITY IMPROVEMENT

As systems are tweaked, new data are added, and user needs change, ongoing monitoring of user experiences with the site is essential. Such monitoring is most meaningful when data are collected across time, starting with the launch of the WDQS. In order to maximize the usefulness of various

evaluation methods, non-technical staff should have real-time access to the results and use the results in gauging the effectiveness of outreach campaigns and interest in specific data sets. (Evaluation data are unlikely to be used for continuous quality improvement if there are even small barriers to accessing them.)

Web Server Statistics

Web server statistics include how many times different Web pages have been accessed, and what search queries users are conducting. Such statistics are challenging to interpret and even more challenging to benchmark, because each method of tracking Web server activity has a wide range of variables and thresholds that are differently defined by different vendors and programmers. As a result, to get the most value out of server statistics, one must pick a good system (or set of systems) for tracking server activity and stick with it over time. Most WDQS will require more than one system for measuring Web server activity.

The most common Web statistic is "monthly unique visitors," as it is the most interpretable and stable indicator of traffic. A count of monthly unique visitor measures how many different computers accessed the WDQS during a calendar month. For instance, if a user came back to the site ten times during the day from their work computer, that would only count as one unique visitor; however, if another user accessed the site once from home and once from their work computer, then that would count as two visits. Most systems also have a metric for identifying "most popular" content or pages. However, these data are not necessarily a reflection of what data your target audience needs, but rather what pages they thought might contain the data they need. Another useful Web statistic is "top referring pages" which shows which other sites are linking to your site and driving traffic to it. (Tip: Developers may want to build in ability to filter out their own activity from the server statistics, especially when "real" traffic volume is low.)

WDQS also should have reporting features that aggregate the topics that visitors seek and use. Searching WDQS contents with a key word (rather than open text field) from a structured list of key words helps in the reporting of WDQS uses. For example, in a key word search, users would choose "births to teen mothers" from a list; however, in an open text field, users might type in a variety of text such as "teenage pregnancy statistics" or "teen mothers." A key word (with simple explanations for what a given term means) will make users more successful in searching the WDQS for variables or data sets and will make real-time interpretation of search term frequencies more straightforward.

Quick Surveys

Satisfied and unsatisfied users often leave the same "footprints" as they navigate the Web site. One way to tease those footprints apart and better interpret Web server statistics is to include a "quick survey" on every page with a simple question "Did you find the data you were looking for? Yes or No." For example, on gnocdc.org, "employment" data from the Census was consistently one of our most popular pages according to Web server statistics. We might believe that this was high-interest data that should receive more prominent placement and supporting materials on our Web site. Our quick survey results, however, revealed that most respondents viewing that page did not find the information they sought: we had many visitors looking for "New Orleans jobs," but they were looking for work, not data about employment.

Online surveys

Surveys can give useful insights into what users are doing with the data found in the WDQS. In selecting a survey method, consider two factors: (1) what method will get the most users to fill out the survey, and (2) answers to what questions will be most useful.

Methods

Table 6-1. Pros and cons of electronic survey methods for WDQS

Survey method	*Pros*	*Cons*
Mandatory survey on Web site (i.e., survey pops up when user visits site, or is required when user tries to search for data)	• Catches all users	• Response quality is low because users are often in a hurry and annoyed
Optional survey on home page (with incentive)	• Less intrusive than mandatory survey • Potentially catches a cross-section of users (from first-time casual visitors to serious return visitors)	• A low response rate is likely, even with the incentive (GNOCDC's[1] recent survey had a response rate of less than 1% of visitors to the home page) • Audience is limited to those who visit the site during the time period the survey is active • If an incentive is offered, answers may be deceitful (e.g., users signing up under multiple email addresses)
E-mail survey link to e-newsletter recipients (with incentive)	• Taps into existing communication network with users • Has a high response rate (a recent one conducted by GNOCDC was 28%) • Results in highest specificity in answers (e.g., "The data allowed us to make projections about the number of clients that could benefit from our services and the kinds of services that residents would need.")	• Requires three follow-up e-mails of increasing urgency • Only catches committed users who have signed up for e-newsletter

[1] GNOCDC (Greater New Orleans Community Data Center)

Question Types

Questions asking people about specific sections or functions of the Web site generally result in muddled answers—and those issues are better explored with formal usability testing. We have found that questions designed to elicit the following information are most useful for understanding our audience, improving the site, and justifying the resources going into the site:

- In your use of [Website], whom do you represent? (multiple choice options that segment your audience into informative categories)
- For what purposes have you conducted searches on this Website? (multiple choice options that segment your audience into informative categories)
- Provide an example of how your use of [Website] has enabled you or your organization to have a positive impact.

(A note about forced registration: Data collected from users who are forced to register on a site to access information is often of low-quality (for example, registered users named "Donald Duck"), and site registration (especially if it requires a password) decreases usability and increases the need for Web site technical support.)

Reverse URL Lookups, and Media Mentions

Though server statistics will yield information on the pages from which your WDQS receives the most referrals, a reverse URL lookup is another way of digging deeper to see who is linking to the Web site and in what context. This is a good way to understand your actual (not just intended) audience. In Google, to perform a reverse URL lookup, search for: link:yourURL (e.g., link:www.gnocdc.org).

An easy way to monitor how the media are using your data is to register with a news tracking service (Google Alerts and Search Google Archives are free). You will need to structure several queries and adjust them as results roll in, so that you are catching all the relevant articles but not too many irrelevant ones. Since most media mentions will include the source and geographic area of the data, you can start with a query such as [New Orleans "Community Data Center"] where the first term defines the geography, and the second being the shortest string of words that the media would use to describe the data source (in quotations marks to ensure a match with the string, which is especially important if your organization's name is a combination of common words). To test out the best queries, search the archives linked from http://news.google.com with different combinations of terms until you find one that catches articles mentioning your data, without a lot of extraneous

search results. Use Google's "News Alerts" with your query for regular updates. Seeing how your data play in the news can help identify misconceptions about the data you publish, and allow you to pre-empt future misconceptions by providing better explanations or help concerning the content in your system.

E-newsletter Metrics

Having an e-newsletter that notifies users of updated and new data sets on the WDQS can be useful on many levels, as you (1) encourage the use of the most recent data among your users, (2) build a list of users that you can occasionally tap for surveys or usability tests of new features, (3) gauge interest in the data and Web site based on patterns of e-newsletter sign-ups, and (4) build rapport with your audience. If you use an e-marketing service for sending your newsletters, you can also learn more about your audience at each mailing by tracking *open rates* and *click-throughs*. An *open rate* is the number of people who opened your e-newsletter in a way that could be tracked (that is, their email browser viewed the images, or they clicked through on a link). A 30% open rate is considered "good" for a list generated from users signing up on your Web site. A *click-through* is when a recipient follows a link in the e-newsletter to go off to a Web site (typically, that would be your site, or a specific page in your site). Developing an effective voice for communicating to your audience helps drive traffic to the site and deliver your message. You can use open rates and click-throughs to understand what types of subject lines tend to entice your audience, and what style (friendly, technical, short, long, w/graphs or photos, etc.) of e-newsletter messages generate the most interest. The field of e-mail marketing keeps on top of the technology and culture of e-mail, so to make the most of an e-newsletter, it's worth learning about the field, through Web sites such as marketingprofs.com, or a Google search for "e-newsletter tips."

Data Request Tracking

Having a feature on the Web site that allows visitors to ask questions is not only a critical element for building credibility, but also the most effective way to become aware of the needs of users who are not finding what they need on the site. The "ask" feature requires a formal protocol to ensure that trust is built, not lost, when users attempt to make contact. That protocol should include timeliness of first response (e.g., all queries receive an e-mail within one business day), triaging and assigning ownership of questions to appropriate staff (e.g., tech support questions go to IT, but content questions go to researchers), and clear expectations for what the level of service will be provided

(e.g., staff may explain how to get data from the site, but not provide the data directly). With a functional data request system in place, the data requests become a window into your audience's needs and whether the site is fulfilling them. For example, if you are receiving telephone or written requests for data that are in the WDQS, then that is a sign the data may not be labeled using a term that the audience understands, be sufficiently visible in the design, or be organized in an expected category. Users submitting their questions may provide insight into the site's usability breakdown, or allow you to frame formal tasks in usability testing.

CONCLUSION

In sum, although the techniques of user-centered design are mainstream in commercial Web applications and have been codified for federal applications through the Usability.gov(US DHHS 2008b) Web site, they have not taken hold in many corners of state and local government and the nonprofit sector. As Web-based data query systems for state health departments become more widespread and sophisticated, there is an opportunity to apply the best knowledge (IBM 2008) from the fields of usability and user-centered design.

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Chapter 7

Statistical Issues in Web-based Data Query Systems

Michael A. Stoto [1]

With their goal of providing data to inform community health decisions at the local level, web-based data query systems (WDQS) typically disseminate health data for populations defined by combinations of geographic (such as state, county, Zip Code, locally-defined "neighborhood"), demographic (sex, age, race and ethnicity), or socio-economic characteristics (education, income, and employment). However, as WDQS increasingly seek to provide information regarding these more closely defined populations, "small numbers problems" inevitably arise. For example, the number African American females, under the age of 50 living in a certain Zip Code who have been diagnosed with lung cancer may be quite small. Or a sample of 4,000 individuals living in a given state may provide from only 10 or 100 located in a certain target county who are male, Hispanic and college educated.

Two interrelated concerns often surface in these circumstances, specifically the lack of statistical reliability and the potential that the WDQS have for releasing confidential information about participants. Both of these concerns derive from the small number of individuals with the same characteristics. Each of these problems has potential solutions, and, fortunately, some solutions address both concerns. Some standard approaches are summarized in table 7-1 at the end of this chapter. The degree to which WDQS address problems of statistical reliability and protect confidentiality—with the minimum loss of information and usability—is an important aspect that should be addressed in the evaluation of these systems.

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This chapter is based on Stoto 2003.

DATA RELIABILITY

For many categories of public health data, small numbers problems lead to statistical estimates with large variances relative to their expected value—poor reliability—due to stochastic variability. For instance, the infant mortality rate, a widely used public health measure, is often subject to relatively large statistical fluctuations from year to year due to the small number of infant deaths in most communities. While well understood in sample surveys, however, stochastic variability is often not considered with respect to rates and proportions based on actual counts.

A typical solution involves the suppression of results, such as counts, rates, or averages, based on small numbers. Specifically, the WSQS software denies the user access to data based on fewer than x observations. This approach is sometimes referred to as the "rule of 5" or the "rule of 3" depending on the value of x. Rules of this sort often stem from confidentiality concerns (see the following section), so x varies across and within data systems and typically depends on the subject of the data rather than statistical reliability concerns.

Statistical concerns about limitations of population-based data for "small areas" are not unique to public health, and indeed other fields have developed useful approaches to address such problems. Since stochastic variability is reasonably well understood, one solution is to recognize and communicate this variability to WDQS users with confidence intervals. These could be prepared by the WDQS either on request or automatically. When the variability is large relative to the estimate presented, it may be desirable to alert users through a different typeface or color. Alternatively, the WDQS could have the capability to conduct statistical hypothesis tests on possible trends or differences across geographic units or population groups to avoid false inferences.

Averaging the data over time through the use of time series methods or weighted moving averages, for instance, provides a different approach to addressing the issue of variability. One could consider averaging the data over space as well, using spatial analogs of these methods. These solutions, however, lead to problems in timeliness of the results and perhaps their understandability, as an increase over the last three years cannot be detected if five years data were averaged to create a stable rate, for example.

Alternatively, proxy measures might be developed. In some circumstances, for example, the proportion of children born with low birth weight might be a more stable summary measure of infant health than the infant mortality rate (Stoto 1992, 2003). Empirical Bayes and mixed effects models can be very useful in this context (Pickle 2000; Shen and Louis 2000). One such model was used in the preparation of the Atlas of United States Mortality (Pickle et al. 1999).

Indicators based on survey data are also problematic. Most health surveys are designed to make estimates at the national or state level, thus incorporating a sample size of thousands of respondents.

The number of observations for sub-state areas, however, is substantially less, and often too small to provide reliable estimates. This problem might be approached through hierarchical Bayesian statistical models or through reweighting (Borgoni and Billari 2003; Rao 2003). Alternatively, synthetic estimates or regression models might be developed to incorporate reliable local data possibly based on either vital statistics or administrative records (Malec and Sedransk 1993).

Spatial models rely on the assumption that geographically proximate areas have similar health outcomes, and, on this basis, "borrow strength" in order to overcome the limitations of small numbers. Alternatively, one could assume that non-geographic factors such as socioeconomic status are more appropriate, and, therefore, construct regression models to estimate local area rates. These and other statistical techniques for model-based "small area estimation" are well developed, but have only rarely been used in public health (see, for example, National Research Council 1997, 1999). It must be acknowledged, however, that statistical models of this sort are better for some purposes than for others. Depending on both the degree of variability in the data for the target area and the desired degree of smoothing, more or less weight is put on a community's own area data. Due to the underlying assumptions, these models are not appropriate for finding outliers or differences between adjacent or similar communities, as differences of this sort will be minimized in relation to both the degree of smoothing and the statistical model. These techniques can be very useful, though, in order to reveal the "big picture" in geographical and other patterns.

PRIVACY AND CONFIDENTIALITY

Beyond purely statistical considerations, small numbers in public health data also present concerns about the confidentiality of personal and group information. Confidentiality protection is important, first of all, because of ethical obligations of health officials to the public. It is also important in maintaining the willingness of the public and health care providers to participate in data-gathering activities that are in the public interest. Although confidentiality concerns are similar to statistical reliability in the sense that the problems are greatest when the number of individuals or cases is small, the solutions can be somewhat different.

The confidentiality issue most common in health care settings is the protection of individual medical and administrative records, especially those kept in electronic form. State and federal laws, including the HIPAA Privacy Rule, protect the confidentiality of the personal health information in these records, and such records are generally not directly available through WDQS (CDC 2003).

Confidentiality protection for such data is mostly focused on maintaining the security of information in databases and during transmission.

In a WDQS, two different confidentiality issues are of greatest concern. First, knowing someone is found within the database, depending on the nature of the database, can be harmful in itself. Being in a state's HIV registry, for instance, could lead to stigma and discrimination. For other conditions, this categorization also holds true, albeit to a lesser extent. Second, recognizing someone in a public database may permit one to determine that person's characteristics. For example, suppose mortality data are tabulated by cause of death and income in small areas, and there is only one case of lung cancer. If the identity of the person with lung cancer in the community is known through other sources, then his income will also be known. Similarly, if only one death has occurred among men aged 50 to 60 in a small town, one might infer the cause of death from tabulated data. Thus, the likelihood of disclosure of such private information increases as the number of individuals with knowable demographic characteristics, such as sex, age, and race, decreases.

The primary means for protecting confidentiality in WDQS is the suppression of "small" cells, plus complementary cells, in tables. Unfortunately, this approach often results in a substantial loss of information and utility. Hence, as discussed above, the "rule of 5" and similar procedures, were in fact instituted in order to maintain confidentiality. Complementary categories must also be suppressed to avoid discovery of the number of cases by subtraction. For example, assume there were deaths traceable to AIDS among ten men in a small community. Reporting that nine of the decedents were White allows one to infer that one was Black. With complementary suppression, data quickly becomes unusable. Cell suppression rules can also be based on either the denominator or both the numerator and denominator (Rudolph et al. 2006).

Statisticians in a number of state health data centers have recently reconsidered data suppression guidelines currently in use and have developed creative and thoughtful new approaches (Rudolph et al. 2006). Their analyses, however, have not been guided by theory or statistical and ethical principles. Furthermore, such analyses have not taken account of extensive research on these issues and development of new methods that has taken place in the last two decades (Lambert 1993; Doyle et al. 2001). Fienberg and colleagues, for instance, demonstrate how the disclosure problem can be formulated as a statistical decision problem that explicitly balances the loss that is associated with the possibility of disclosure and the loss associated with non-publication of data (Feinberg et al. 1998). In practical terms, a variety of methods are available to modify data tables before their release in a way that limits disclosure risk while maximizing information available to the user. Gonzalez and Cox described software developed for the National Center for Health Statistics to implement five of these

"statistical disclosure control" or SDC methods, such as controlled rounding (Gonzalez and Cox 2005).

A less common, but, possibly, important, alternative is the use of smoothing algorithms and other statistical modeling techniques. Although developed to deal with statistical reliability, as addressed in the previous section, these algorithms in effect replace the original data with a less variable estimate that does not represent any individual's personal data. As a result, publishing smoothed values has the unintentional, but desirable, side effect of protecting confidentiality.

Table 7-1. Strengths and weaknesses of approaches to dealing with small numbers and protecting confidentiality in WDQS.

Method	*Examples*	*Strengths*	*Weaknesses*
Cell suppression	Do not publish cells based on < 5 individuals	Protects confidentiality	Loss of information in suppressed and adjacent cells
Aggregation	Combine data for 3–5 years, adjacent geographical areas, or demographic groups	Protects confidentiality	Unable to identify differences or changes within aggregated groups
Statistical disclosure control (SDC)	Controlled rounding	Protects confidentiality while minimizing loss of information	Requires specialized software
Statistical analysis	Confidence intervals, tests for trends	Protects against over-interpretation of statistical fluctuations	Requires specialized software
Statistical smoothing	Empirical Bayes hierarchical models, geographic smoothing	Identifies geographical and other patterns while protecting confidentiality	Requires specialized software

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Chapter 8

National Survey of State Health Departments on Evaluations of their Web-based Data Query Systems

R. Gibson Parrish[1] and Daniel J. Friedman[2]

BACKGROUND

Web-based data query systems sponsored by health departments have been available for public use for almost ten years. They now constitute the major means for the public to access population health data at the state and local level. Uncounted dollars—undoubtedly amounting to many millions—have been spent on their development, implementation, revision, and maintenance. However, informal inquiries among states with well-established Web-based Data Query System (WDQS) reveal that not a single state has conducted a comprehensive evaluation of its WDQS and that even systematic and thorough logging of WDQS use by functionality and data set is spotty. Not a single article in a peer-reviewed journal documents evaluation of a state WDQS.

The reasons for this overwhelming absence of WDQS evaluation remain unclear: Are states consciously choosing to devote their scarce budgetary and staff resources to WDQS development rather than to WDQS evaluation? Do states lack the knowledge needed for evaluating WDQS? Do states simply assume that their WDQS provides a valuable, cost-effective resource to their staff and the public?

Against this background, we conducted a survey of 27 state health departments during August and September 2007 to determine (1) which states have a currently functional WDQS; (2) the

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purpose and intended users of each state's WDQS; (3) each state's efforts to gauge the use of, and user satisfaction with, its WDQS; and (4) what assessment, testing, or evaluation each state has conducted of its WDQS. In this chapter, we describe the methods that we used to conduct the survey, our findings, and our conclusions about the current status of state health department WDQS.

METHODS

Definitions

For our survey, we defined a *WDQS* as a system that provides user access through a dynamic interface to data pertaining to population health and the determinants of population health on the World Wide Web. We defined a *State Health Department WDQS* as a WDQS that is maintained by a state health department (SHD) or by another entity through a contract with a SHD, *and* that is accessible via the SHD's Web site.

Sampling Frame

To identify which states have a currently functional WDQS, we first visited and reviewed the Web sites identified in a previous review of WDQS that we conducted in 2005 (Friedman 2006). For states not identified in the previous review as having a WDQS, or states whose previously reviewed WDQS was no longer functional, we located via a Web-search engine and then visually searched all SHD Web sites for a functional WDQS. We found 27 states with a currently functional SHD WDQS (table 8-1).

We initially contacted via email or telephone either the director or health statistics; the contact provided on the WDQS Web page; or, if known to one of us, the manager of a state's WDQS to identify the person within the SHD with overall responsibility for managing each of these 27 states' WDQS. We confirmed this person's role during the interview.

Table 8-1. States found to have a currently functional WDQS, which were included in the 2007 survey

Alabama	Minnesota	Pennsylvania
California	Missouri	Rhode Island
Colorado	Montana*	South Carolina
Florida	Nevada	Tennessee
Georgia	New Hampshire	Texas
Illinois	New Jersey	Utah
Iowa*	North Carolina	Vermont
Kansas	Ohio	Washington
Massachusetts	Oklahoma	Wisconsin

*States not found to have a WDQS in 2005 review (Friedman 2006). Two states (Kentucky and Arkansas) included in the 2005 review do not currently have a functional WDQS.

Survey Topics and Questionnaire

We conducted a single interview with one or more staff members of each surveyed state. Interviews were conducted by telephone by one of us with the exception of the first two interviews (with Massachusetts and New Jersey), which were conducted by both of us. The interviews used a structured questionnaire with open and close-ended questions that covered the topics listed in table 8-2. (The complete survey is available in Appendix 8-A.) Several questions attempted to determine the basis for respondents' answers to questions on these topics. For example, respondents were asked whether their WDQS was meeting its purpose; this question was followed by a question asking respondents *how they knew* whether the WDQS was meeting its purpose.

We developed the questionnaire during June and July 2007 with input and review by members of the Workgroup convened to assist us with the overall project. For many questions, more than one response was allowed; as a result, the number of responses for a question may exceed the number of respondents.

Table 8-2. Topics included in the survey of 27 state health departments

Purpose and intended users of WDQS
Types of queries submitted by users
Efforts to gauge user satisfaction
Impact of WDQS on various groups
Efforts to monitor number of users and types of use of WDQS
Efforts to obtain user feedback
Previous or proposed needs assessment, testing, or evaluation of WDQS
Modification of WDQS based on testing or evaluation
Budget for evaluation

Note: Although a question about a SHD's plans to replace its current WDQS was not included in the questionnaire, several states mentioned such plans, and this information has been included in the findings.

FINDINGS

We interviewed WDQS staff for all 27 states with a currently functional WDQS.

Purpose of WDQS

Most states reported that the purpose of their WDQS was to provide data to a particular audience: general public (eight states), SHD staff (six states), or local health department staff (six states). Seven states reported the purpose of their WDQS was for community assessment or local planning. Other commonly reported purposes were to allow users to perform own queries and to provide as many statistics as possible. A number of other purposes were less frequently reported.

Using their own criteria and information gained in various ways, respondents from twenty states (74%) reported that the purpose of their state's WDQS had been achieved. Information for making this assessment came from informal feedback[1] from users (15 states), the volume of use of the WDQS (seven states), and comments received via the WDQS Web site (two states). Again, respondents reported a number of other sources of information for making this assessment.

[1] For example, discussions with users at meetings, training sessions, or via telephone; or emails sent by users to WDQS staff.

Intended Users and Uses of the WDQS

States reported a variety of intended users (i.e., audiences) of their systems. We sought to determine both the *primary* intended users and *other* intended users. Local and state health department staff were most commonly reported as the primary intended users of WDQS, followed by the general public, students, and researchers (table 8-3). Although the questions focused on *intended* users, we had the sense that many respondents listed users *in general* regardless of whether the WDQS intentionally targeted them.

Table 8-3. Number of survey respondents reporting various types of users as either intended primary users of their state's WDQS or other users of their state health department's WDQS, 27 states, 2007.

Intended Users	*1°*	*2°*	*Total**
LHD staff	21	2	23
SHD staff	14	6	18
General public	8	8	16
Researchers	4	6	10
Students	5	4	9
Hospitals & health care providers	2	5	6
Other state agencies	2	4	6
Legislature	1	4	5
Media	3	1	4
Policy makers	1	2	3
Community assessment and planning	1	2	3

*The total is the number of states reporting a given type of intended user as either a primary or secondary (i.e., other) user. Because a state may report a given type of user as both primary and secondary, the total may be less than the sum of the numbers listed under primary and secondary.

The most commonly reported question asked by users of WDQS concerned the health status of their own community (15 states). Other common uses of data were for conducting community assessment and planning (11 states) and applying for grants (five states).

Respondent Perceptions of WDQS and Its Impact

Most respondents perceived the WDQS as meeting the needs of its users. Twenty (74%) respondents felt that the purpose of the WDQS had been achieved and that user questions were being answered. Seventeen (63%) responded that the WDQS was reaching its intended users and that they were satisfied with it. The respondents reported a variety of impacts of the WDQS for different users, including improved access to data, reduced burden on health department staff in filling requests for data, more flexibility for users, and ability to obtain data more quickly (table 8-4).

Table 8-4. Number of survey respondents reporting various perceived impacts of WDQS on state health department, local health department, and other users, 27 states, 2007.

Perceived impact	*SHD*	*LHD*	*Other*	*Total*
Improved or easier data access	10	7	5	14
Reduced burden on staff filling data requests	9	1	1	9
Community assessment or planning	1	3	8	9
Grant applications	4	2	6	9
More flexibility for users	3	6	3	7
Faster response times	4	5	2	7
Reduced number of requests	4	0	0	4
Changed nature of requests	1	0	0	1
Other	20	17	15	23

The perceived impact on SHD users was easier access to data for doing their work and a reduction in the time that they had to spend responding to requests for data. Respondents felt that local health departments appreciated easier and more rapid access to data and more flexibility in how it could be queried and displayed. The impact on other users was perceived as making it easier for them to conduct community assessment or planning and obtain data needed to complete grant applications.

Monitoring Users and Uses of WDQS

Sixteen (59%) state health departments monitor the number of users of their WDQS. Reviewing and tabulating Internet Protocol (IP) addresses of users was the most commonly reported method (10 states), followed by the use of a log-in (five states) or registration (three states) to use the WDQS and

user surveys (two states). Several states described limitations of using IP addresses to identify users, such as all users of certain Internet Service Providers appearing as the same IP address.

Fifteen (56%) respondents reported that they monitored the use of one or more components of their WDQS. All 15 states counted the use of particular data sets (for example, natality and population datasets), followed by counting the use of pre-tabulated reports (seven states), and health indicators (four states). Six states reported monitoring the use of specific statistics for data analysis (for example, age-adjusted rates), or the use of specific methods for displaying data, such as graphs, tables, and maps. The methods used to monitor these uses included counting the number of times that either specific Web pages (seven states) or entry Web pages (five states) were accessed; surveying users (three states), and requiring either log-in (two states) or registration (one states) to access data. A few other methods were used.

Efforts to Obtain User Feedback

All states have a specific person responsible for answering questions about their WDQS. Ten (37%) states keep either a formal or informal "log" of WDQS-related complaints or suggestions. The use of information from these logs to improve the WDQS ranged from none to extensive, periodic review of logs and concerted efforts to address user concerns and suggestions.

Principal "Technical" Problems Experienced by Users

In response to a question about the principal technical problem that users experienced with the WDQS, most respondents answered that users reported no technical problems. Among respondents whose WDQS users reported problems, constructing a query was the most commonly reported problem (nine states), followed by understanding query results (eight states), difficulty learning how to use the WDQS (three states), and difficult in getting the WDQS to run within a particular browser (three states). Respondents said that this information about problems usually came from either health department staff or informal feedback from other users.

Assessment, Testing, and Evaluation

We next asked a series of questions to determine whether states had conducted user needs assessments prior to developing their WDQS, had tested the WDQS during development, or had evaluated the WDQS since making it available to its intended users. Nineteen (70%) states responded

that they either *formally or informally* assessed user or agency needs prior to the development of their WDQS. Methods to conduct these needs assessments included the use of formal advisory committees, focus groups, or lab-based testing, and informal methods (table 8-5).

Table 8-5. Methods used to determine user needs prior to development of WDQS, test WDQS during development, or evaluate WDQS after release, 27 states, 2007.

Method used	*Needs assessment prior to development*	*Testing during development*	*Evaluation after release*
Advisory committee	7	-	5
Focus group	4	-	3
Lab-based testing	2	3	-
Comparing results of WDQS queries to other data sources	-	8	-
Running test queries or scripts	-	5	-
Expert review	-	4	-
User-based survey	-	-	7
Reviewing use logs	-	-	4
Informal method	6	4	7

Twenty-four (89%) states *formally or informally* tested their WDQS during or following development. The most common testing method was to compare the results of WDQS queries to other sources of the same data (for example, comparing the results of WDQS queries of a mortality dataset with data from mortality statistical reports). Five states reported that they ran a series of formal test queries. One of these states, for example, periodically runs a set of 1800 test queries against its WDQS to ensure that it is functioning properly and providing accurate data. Four states used experts outside of the group developing the WDQS to test the WDQS. These experts used a variety of methods that typically employed a formal testing plan or process. For example, one state's system was tested and certified by MIT's Total Data Quality Management Program, which involved a review of the system's "life history" from production of data sets to results of system queries.

Thirteen (48%) states reported *formally or informally* evaluating their WDQS since its release to determine whether it is meeting user needs. Most of these states used more than one method to do so. The most commonly reported method of formal evaluation was user-based surveys. Typically, these were surveys that were presented to users when they accessed the WDQS and were available on-line for about a month. The extent to which states used the results of these surveys varied from

little use to extensive review and use of the results to improve the WDQS. Advisory committees were also used to evaluate WDQS. In contrast to user surveys, evaluations by advisory committees tended to be ongoing, and some included long-term planning for the WDQS. One state used students to compare its WDQS with other states' WDQS. Informal evaluation methods included the use of displays at public health meetings at which users could try the WDQS and provide feedback, ad hoc meetings and telephone discussions with state and local health department users, and email feedback. Several states commented that providing informal mechanisms for obtaining user feedback about their WDQS and continually reviewing and acting upon that feedback worked well as a method for improving the quality of their WDQS and increasing user satisfaction.

Only two of four states that planned an evaluation during WDQS development had conducted one. Although only three (11%) states reported having a budget for evaluating their WDQS, nine (33%) states reported plans to evaluate their WDQS within the next year.

Twenty-three (85%) states found assessment, testing, or evaluation useful. Although twenty (74%) states reported modifying their WDQS based on the results of assessment, testing, or evaluation, the extent to which results were used varied considerably. Some states reported lacking adequate resources to implement improvements identified through their evaluations.

Plans to Replace Current WDQS

Although not a part of the survey, nine (33%) states mentioned definite plans to replace their current WDQS, and two other states said they were considering it. Of these 11 states, only three reported having conducted an evaluation of their WDQS using one of the formal methods listed in Table 5 (i.e., advisory group, focus group, user-based survey, or use log review).

SUMMARY & CONCLUSIONS

In summary, we found that the purpose of most WDQS is to provide data to specific users. The principal intended users of WDQS are the staffs of state and local health departments and the general public. Most user queries concern the health status of the user's "community", or the need for data for community assessment and planning. Despite these specific findings, however, it might be fairer to say that most WDQS are used by a variety of types of users for a variety of purposes.

Although most WDQS managers state that their WDQS purpose is being achieved, its intended users are being reached, its users' questions are being answered, and its users are satisfied, the data

from which these impressions were drawn are generally limited and informally gathered. The perceived impact of the WDQS varies by user:

- For state health departments, it is improved access to data and reduced burden on their staff;
- For local health departments, it is improved access to data and more flexibility for their users; and
- For other users, it is improved data for conducting community assessment and applying for grants.

About 60% of WDQS managers are able to monitor the users and uses of their WDQS, and a third of managers keep a "log" of WDQS-related complaints or suggestions. The ability to construct queries and understand their results is a greater problem for most users than issues related to browsers or the "system." Despite having these monitoring data or logs, not all WDQS managers review or use them to improve their WDQS.

Many states conduct some type of formal or informal needs assessment prior to developing their WDQS. Far more states test their WDQS for data errors during development than evaluate whether it is meeting its users' needs once it is released. Very few states have a budget for conducting such evaluations. Although few states formally and regularly evaluate their WDQS, several states periodically modify their WDQS based on informal, but regular user feedback.

Against this background, it is interesting that a third of current WDQS managers reported plans to replace their current WDQS. We are led to conclude that this decision is being made principally on the basis of these managers' or their health departments' informal assessment of their WDQS without the benefit of any formal evaluation, or even an informal evaluation of the WDQS by others. Given the limited funds available to these WDQS managers for evaluating their systems, this is not unexpected.

Chapter 9

California—Information Technology Planning and Approval for Web-based Data Query Systems

Linette Scott[1] and Scott Christman

INTRODUCTION

Assessment and evaluation are essential aspects of public health policy, programs, and interventions. State health department Web-based data query systems (WDQS) frequently provide data and information needed for such assessment and evaluation, yet the WDQS rarely receives this same assessment and evaluation. WDQS are implemented in information technology (IT) environments yet have not historically been treated as IT projects. From industry, we know that more than 50% of IT projects fail. To counteract this, California's state government has implemented a planning and approval process for IT projects that is captured in a document called a Feasibility Study Report (FSR).

California's Office of Statewide Health Planning and Development (OHSPD) prepared and submitted an FSR that was approved for a large geographic information system (GIS) technology implementation. A primary objective of the project was realized through the development of a WDQS, the California Healthcare Atlas, which continues in production and operation today.

This chapter will provide a discussion of the FSR process and highlight some unique challenges with calculating return on investment for health IT systems generally and WDQS specifically. This will be done by describing the approach and processes followed by OHSPD to address state IT planning requirements and successfully implement a WDQS for health assessment, in the state IT environment.

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FEASIBILITY STUDY REPORT DEVELOPMENT PROCESS

Contents of the FSR

An FSR is a highly structured process for evaluating, documenting, and justifying proposed IT projects in California's state government. The FSR provides a basis for reaching shared understanding and agreement among project management, program management, and executive management, as well as state-level control agencies (State of California 2008). FSRs typically require an IT procurement plan and are frequently coupled with a budget change proposal requesting additional funds to support the proposed project. The FSR process is therefore linked to the state budget cycle and requires substantial lead times prior to the actual initiation of a project, if approved.

IT Timeframe

Each component of the IT project proposal must be submitted during specific time frames, spanning two fiscal years. FSRs and IT procurement plans are submitted in the spring of the state fiscal year, which ends in June. An associated budget change proposal is due by late summer of the following fiscal year so that it may be approved for inclusion in the Governor's proposed budget, which is released in January. With approval of both the FSR and budget change proposal, funds are made available and the project may begin on July 1 of the next fiscal year.

Review Process

The Department of Finance is responsible for state government IT project review and approval in California. An FSR is the vehicle for this decision-making process undertaken by the Department of Finance and must include the following: a summary, business case, current IT methods and environment, proposed solution with alternatives considered, project management plans including scope, a thorough risk management plan, and economic analysis. The Department of Finance will ultimately base a project approval decisions on cost, benefits, risks, and the many competing state interests and needs presented by other state agencies.

CHALLENGES IN DEVELOPING THE FEASIBILITY STUDY REPORT

OSHPD engaged in a feasibility study for an organization-wide implementation of GIS technology. The Enterprise GIS (EGIS) project included the development of a GIS-based, database-driven, WDQS as a critical component of the enterprise technology implementation project. The FSR process presented some unique challenges to the health agency. Establishing return on investment (ROI), a traditional measure of successful IT projects, can prove difficult when project deliverables include assessment tools intended to generally improve health policy making, access to care, and health outcomes. ROI arguments often include increased organizational productivity or decreased production costs. Such elements rarely apply in the case of WDQS projects, which can result in tension between IT organizations and the health agencies responsible for WDQS supported by IT organizations.

Unique challenges for the EGIS project were immediately presented by the traditional structures found in the California FSR requirements. The California Department of Finance was accustomed to reviewing IT project FSRs that proposed the replacement of existing, antiquated systems. Such business cases commonly outline the cost savings associated with system replacement, due to decreased maintenance costs associated with outmoded technologies, and productivity gains realized by staff usage of more efficient, contemporary tools. Necessary ROI measures are fairly straight-forward under these circumstances. "We will save this much time and this much money if we replace an old mainframe system with a new client-server system," reads a typical justification. In the case of the EGIS project, however, OSHPD was not proposing to replace any existing systems:

> *The overall objective of the project is to use GIS technology to improve OSHPD's enterprise capabilities for providing consistent, timely, accurate information to support assessment, allocation of resources, measurement of outcomes, and improve communication to achieve equitable accessibility to healthcare for all Californians.* (VESTRA Resources, Inc.).

The above EGIS objective represents purely new investment. No obvious cost savings were outlined in the FSR business case for the EGIS Project. Instead, the EGIS FSR tied technology deliverables to the mission, strategic business plan, and IT architecture goals of OHSPD. The target was to improve *effectiveness* of the OSHPD programs in supporting equitable healthcare accessibility across California.

OHSPD argued that the ROI would be realized through the GIS technology support of business functions across the organization and improved decision-making by programs, government, and other consumers of healthcare information managed and disseminated through value-added tools like WDQS. While positive aspects such as these are not directly measurable prior to a WDQS

implementation, OSHPD took steps to reinforce their assertion that decision support benefits would be realized if the FSR were approved. Specifically, a pilot project was implemented and documented while the EGIS Project FSR was under review by state control agencies. The pilot was manifest specifically in the form of a WDQS rapid application development effort and proved critical in supporting the value proposition being presented in the EGIS Project FSR. Additionally, an addendum to the FSR was prepared answering specific questions posed by the control agencies regarding the EGIS project, technology selection, and funding issues. The WDQS pilot project offered the EGIS team applied experience that was instrumental to answering many questions in the addendum with a degree of authority based on first-hand knowledge, which was otherwise unavailable.

SUCCESS OF THE FEASIBILITY STUDY REPORT

The difficulties in presenting an ROI-based business case were overcome, and the EGIS Project FSR was approved. Other factors might well have prevailed in the decision to approve, including the relatively low risk presented and secure funding source identified for the project. Regardless, the EGIS implementation project has been a tremendous success and recognized as such by many stakeholders across California's state government, public health, and the healthcare industry. Interestingly, there are several significant ROI measures that emerged as the EGIS technology implementation was rolled out. These include an increase in federal funding for California community health centers following a GIS-empowered redistricting of medically under served areas across the state, and the reconsideration of a blanket seismic safety policy estimated to cost the California hospital industry more than $50 billion in retrofit construction costs following the application of GIS-enabled geologic science to the actual ground and seismic conditions present at each hospital site. However, calculation and determination of ROI specific to WDQS projects remain elusive. How does one measure the value of more effective decision-making in the health industry or better health policy in government, based on the availability of health information and analytical tools in a Web-based application?

CONCLUSIONS

Governments are struggling to do more than simply publish information to the Internet. Traditional conventions dictating technology projects do not help. The next step is movement towards the Web 2.0 paradigm, where services, not just information, are available from government Web sites.

Agencies will then have to consider replacing business processes, not just an old IT system. ROI calculation will present even greater challenges, though greater opportunities to serve are at stake. For health agencies, WDQS represent a feasible transition from simple public information to value-added services on the Web. Delivering tools for more accurate and effective assessments of population health, healthcare quality, and access to care undoubtedly serves to improve health policy and decision-making in both government and industry. If the popular response to the OSHPD WDQS is any indication of similar project success in the future, value propositions for effective decision support may eventually outweigh traditional ROI arguments, measurable or not.

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Chapter 10

Missouri—Evaluation of an Evidence-based Intervention Planning Web Site for Public Health Practitioners

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BACKGROUND

Public health professionals have developed a wide variety of evidence-based interventions that have the potential to impact both morbidity and mortality. In order to impact population health, these interventions must be translated and disseminated to public health practitioners and community groups to enhance public health decision-making and effective resource utilization. The dissemination of evidence-based public health processes and interventions through a Web-based format can ensure accessibility of information to a wide range of audiences and bridge the gap between research and practice.

In Missouri, a series of inter-related Web-based tools have been developed to assist in community assessment, intervention, and evaluation at the local level. This system, Missouri Information for Community Assessment (MICA), translates evidence from existing data sources, tracked by the Missouri Department of Health and Senior Services (DHSS), into resources for communities to improve health. Three surveillance components are included in the MICA interactive Web-based system: (1) Community Profiles, which provides data in a graphic format for presentation (Missouri Department of Health and Senior Services [Internet] Community Data Profiles); (2) MICA, a Web-based data query system which allows users to access databases and create tables for a variety

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of health indicators (Missouri Department of Health and Senior Services [Internet] Missouri Information for Community Assessment); and (3) Priorities MICA, which prioritizes diseases and risk factors (Missouri Department of Health and Senior Services [Internet] Priorities MICA). A fourth MICA tool, Intervention MICA, includes intervention planning, implementation, and evaluation information that assists users in selecting appropriate intervention strategies for their community (Missouri Department of Health and Senior Services [Internet] Intervention MICA).

Intervention MICA was developed based on interviews with experts in the field (e.g., health practitioners, health care administrators, and academics), review of the scientific literature, and other resources, such as Internet sources, and government reports (Agency for Healthcare Quality and Research; Baker et al. 2005; Bender et al. 2005; Brennan Ramirez et al. 2005; Brownson et al. 1999; Brownson et al. 2003; Centers for Disease Control and Prevention [Internet]; Cochrane Collaboration [Internet]; Glasgow et al. 1999; Health Canada [Internet]; Institute of Medicine 2003; International Union for Health Promotion and Education [Internet]; Substance Abuse and Mental Health Services Administration [Internet]; Truman et al. 2000; University of Kansas [Internet]; University of New Hampshire [Internet]). This development has been reported elsewhere (Baker et al 2008).

Intervention MICA is designed around a 7-step evidence-based intervention planning process (i.e., partnerships, assessment, readiness, capacity, intervention, evaluation, momentum). The Web site includes descriptions of intervention strategies that are effective, tools and resources to implement and evaluate interventions, and links to other Web sites that provide evidence for, or assistance with, the intervention planning process.

In order to determine whether Intervention MICA is useful for its intended audience (e.g., community-based organizations, local public health agencies, researchers, funders), applying appropriate Web site evaluation strategies was essential. Web site evaluations have gained increasing popularity lately as more information becomes available on the internet. Research has shown that evaluating a Web site prior to its implementation can reduce usability errors and improve the overall interface design (Choi and Bakken 2006). Furthermore, usability testing should be done early and repeated often (ORC Macro no date). A three-tiered approach has been recommended by experts in Web site evaluation: (1) scenarios—testing a specific section or path of the Web site; (2) simplified thinking out loud—users think out loud while performing a series of tasks; and (3) heuristic evaluation—three to five independent reviewers evaluate the user interface based on industry best practices and current thinking in designing for ease of use (ORC Macro no date; Nielsen [Internet] Heuristic Evaluation). Experts also recommend having participants perform the type of tasks

intended by the system as well as training them to use the Web site and document the applicability of the site (Nielsen [Internet] How to conduct; ORC Macro no date).

Over the last three years, Intervention MICA has been rigorously evaluated by practitioners and researchers in state and local settings through support from the Centers for Disease Control and Prevention and the National Library of Medicine. This process, along with findings from the evaluation, will be discussed below. Preliminary evaluation findings have been previously reported (Brennan Ramirez et al. 2006).

METHODS AND FINDINGS

Before evaluation of Intervention MICA began, extensive research was conducted on Web site evaluation and existing Web site evaluation tools (Nielsen [Internet] Heuristic Evaluation; Kyrnin [Internet]; Pozadzides [Internet]; R & R Technologies, Inc. [Internet]; Schrock [Internet]; University of California at Berkeley [Internet]; University of Maryland [Internet]; World Wide Web Consortium [Internet]). Researchers attended a Web survey design teleconference to further their understanding of the methods and measures recommended for Web site evaluations. From this, several Web site evaluation tools were developed, based on heuristic evaluation principles, usability testing, and Web evaluation (Grassion [Internet]; Nielsen [Internet] How to Conduct).

In-depth quantitative and qualitative feedback was obtained from public health practitioners, students and faculty in public health, and community groups about their experience using Intervention MICA through four consecutive phases of evaluation: Pilot Test–Phase I, Pre-test, Pilot Test–Phase II, and Community Training. See Table 1 for an overview of the evaluation process.

Pilot Test–Phase I

Purpose. The purpose of Pilot test–Phase I was to obtain general impressions of Intervention MICA from participants, and specifically to understand how the participants responded to the content, design, and layout of the information presented and the extent to which they considered it a useful tool, how they might use it in their work, and specific changes they recommended.

Participants. Fourteen participants were recruited among public health practitioners who completed an evidence-based public health course in St. Louis, Missouri during March and May 2005. In the course, participants had an opportunity to familiarize themselves with the MICA system. Given this exposure, they had greater understanding of the steps involved in evidence-based decision-making

and therefore the potential to have greater ability to navigate through the MICA systems than other groups.

Process. Participants were given a case example (see Appendix 10-A) requesting them to imagine themselves as a project manager in a local public health agency. Participants signed on to Intervention MICA and using the case example, progressed through the evidence-based decision-making process, while identifying information needed to plan a physical activity intervention. Participants were monitored by trained research staff using direct observations methods. Only small sample sizes (as few as five) are needed to sufficiently capture the range of potential responses regarding the usability of the Web site (Nielsen [Internet] How to Conduct). Participants navigated through Intervention MICA while observers noted where they made "mistakes," got stuck, were unsuccessful in reaching their desired destination, or successfully made it to where they wanted to be. The observers did not assist the participants in any way. Participants were asked to "think out loud" regarding their process and reasons for decisions they made moving through the Web site (Forsyth and Lessler 1991; Jabine et al. 1984; Sudman et al. 1996). This methodology is a standard, high-quality procedure used when developing new systems and is recommended by the U.S. Department of Health and Human Services (US Department of Health [Internet]).

When participants finished the case study, observers completed a brief assessment of their performance. Observers tracked Web pages visited within Intervention MICA and navigational problems encountered, using a 25-item tool (see Appendix 10-B). Observers also completed a 13-item tool that described ease with moving about the Web site and emotions expressed by participants (e.g., frustration, satisfaction). Participants answered a 25-item quantitative survey regarding design, content and technical elements of Intervention MICA (e.g., it is easy to find what you need, the content is interesting and stimulating, it is easy to move from page to page). See Appendix 10-C for the Participant Feedback Survey. All participants were provided a thank you note and a monetary incentive.

Analysis. Each session was tape-recorded and transcribed verbatim with permission from the participants. The transcripts were coded using focused coding procedures to ensure findings point to specific suggestions for improvements to the Web site (Charmaz 1983; Chelser 1987). Quantitative data from the surveys were used to calculate agreement rates for each statement by collapsing the four answer categories (i.e., strongly agree, agree, strongly disagree, disagree) into two categories (i.e., agree and disagree). See Table 2 for highlights of the percent agreement scores and qualitative feedback from participants.

Findings and revisions. Findings from direct observations and surveys were very favorable for the utility of the Web site and its applicability in community settings. Participants recommended enhancements to the Web site, including the need to improve navigation (e.g., movement from one section to the next and movement within sections) diversify the format and presentation of information, define or clarify terms, modify specific content and add graphics. Participants expressed differential experience with using Web sites, differential exposure to public health terminology and intervention planning processes, and variations in comfort level with being observed by others. Upon completion of Pilot test–Phase I, a matrix of findings from the quantitative survey and direct observations was created. This matrix was used to identify problems with Intervention MICA and recommendations for changes to the Web site. Findings from Pilot test–Phase I were prioritized and all critical changes (i.e., problems happening frequently or those that could not be easily overcome) were revised prior to the Pre-test phase.

Pre-test

Purpose. The purpose of the Pre-test phase was to capture the overall utility of the Web site, ease or difficulty in navigation, appropriateness of the type and amount of content, aesthetic appeal of the design and layout, applicability and functionality of the integrated MICA system (i.e., Community Profiles, MICA, Priorities MICA, Intervention MICA).

Participants. Fourteen participants were included in the Pre-test phase in July and August 2005, including representatives of the evidence-based public health course, community-based organizations, local public health agencies, federally-qualified health centers and public health schools. These individuals were chosen to provide insight into the range of experience of the potential end users of Intervention MICA.

Process. Pre-test participants performed an independent review of the Intervention MICA Web site at a time and place convenient to them. The pre-test evaluation tool included three primary activities: (1) explore Intervention MICA to obtain a general idea of what is included; (2) design and plan a physical activity intervention using information provided in Intervention MICA; and (3) evaluate their experience using the Web site (see Appendix 10-D). Participants made notes as they progressed through the Web site, including general feedback, pages visited, and suggestions for improvement. Finally, participants completed an evaluation of the Web site comprised of the same survey items used in Pilot test–Phase I. Nine additional open-ended questions were added (e.g., Does Intervention

MICA apply to the work you do? Who would benefit from using Intervention MICA? Which components are most useful?). Participants were provided a thank you note and a monetary incentive.

Analysis. Quantitative data from the pre-test evaluation tool were downloaded into an SPSS database and analyzed descriptively. Qualitative data were analyzed using focused coding procedures mentioned previously.

Findings and revisions. Due to the increased time participants spent on Intervention MICA during the pre-test phase, in addition to the opportunity to apply the information to design a hypothetical intervention, feedback provided by participants was more in-depth and insightful than that provided during the Pilot test–Phase I.

Recommended changes to the Web site included: improving navigation within Intervention MICA (e.g., a sequence or logical order for people to track progression through the Web site), providing a direct link to intervention information; increasing the font size; creating balance among graphics and words; minimizing public health jargon and extraneous information; adding supportive tools; and providing training opportunities and technical assistance, particularly for those who are not computer users.

Priority changes identified by participants were used to make recommendations to Missouri DHSS staff. In response, the Web site was modified with a static navigation toolbar to help users access information desired and track where they were in the Web site. Each Web page was given a "clickable" table of contents at the top of the page and internal links to return to this menu of items. The left-hand menu bar was simplified and included a link directly to intervention topics. The format was modified to include pictures, bullets and indented text to enhance user-friendliness and appearance of the Web pages. Printable worksheets were developed to supplement the content on the Web site and allow users to complete information with their partners.

Pilot Test–Phase II

Purpose. The purpose of the Pilot test–Phase II was to evaluate whether changes made to Intervention MICA based on recommendations from the Pilot test–Phase I and Pre-test improved usability, design, and navigation as well as to identify further improvements.

Participants. An additional seven participants were recruited among participants in the evidence-based public health course in August 2006.

Process. The Pilot test–Phase II was similar in purpose and structure to Pilot test–Phase I, utilizing the same methodology and measures. An additional 7-item qualitative feedback survey was developed for the Pilot test–Phase II to obtain in-depth comments regarding prioritization of features needing improvement, visual and navigational elements that were helpful and elements that were still needed on the Web site.

Analysis. Quantitative data from the pre-test evaluation tool were downloaded into an SPSS database and analyzed descriptively. Qualitative data were analyzed using focused coding procedures mentioned previously.

Findings and revisions. Overall, revisions made to Intervention MICA greatly improved navigation, design and layout, such that these issues did not re-emerge in the feedback received. Rather, recommendations were similar to those previously received and of which are still undergoing revision (e.g., lowering reading level, adding graphics, providing definitions, developing more comprehensive instructions to use the Web site). Feedback from Pilot test–Phase II validated that revisions made as a result of the previous two evaluation phases were necessary and appropriate.

Community Training

Purpose. The purpose of the community training was to work with existing community-based organizations to educate them on how to utilize Intervention MICA within their partnerships to plan local intervention activities and to provide feedback about their use of the Web site for each step of the intervention planning process. Feedback from the training was used to understand what elements of Intervention MICA are useful, which items need to be modified and how best to train the end user to fully utilize the Web site for intervention planning. This evaluation phase informed the development of a training manual and protocol that will be used by Missouri DHSS staff for future training purposes.

Participants. Three Missouri communities were identified through recommendations from Missouri DHSS staff based on their work with the DHSS on the Steps to a Healthier US grant proposal and participated in the training. These three communities represented different regions across Missouri:

northwest region (8 participants), southeast region (4 participants), and southwest region (6 participants). Training groups were encouraged to invite at least two different partner organizations and at least four individuals to participate in each day of the training.

Process. Three training workshops were conducted over a two-day period (8 hours total) in February, March and May 2007. The training workshop was broken into nine modules, corresponding to the structure of Intervention MICA: (1) Welcome and Introduction, (2) Navigation, (3) Partnership, (4) Assessment, (5) Readiness, (6) Capacity, (7) Intervention, (8) Evaluation, and (9) Momentum.

In the training workshop, participants received background information on Intervention MICA, skills to utilize the Web site and opportunities to apply information to their community context. At the end of the training workshop, partnerships were allowed time to work together to discuss Intervention MICA and how they could use the information, tools and resources to design a real intervention in their community.

Training satisfaction surveys were conducted for each day of the training to collect in-depth feedback from participants (e.g., module-by-module satisfaction, overall training workshop experience, reactions to trainer presentations). See Appendix 10-E for the training satisfaction survey. Furthermore, to capture trainer presentations and trainee questions throughout the workshops, trainers transcribed each module. Additional data were collected from participants at the end of the training workshop using a training workshop feedback survey. The survey asked similar questions from previous evaluation phases regarding design and navigation, content, and technical elements of the Web site and ranked features according to those needing most improvement to those needing least improvement.

To determine how participants were able to apply Intervention MICA to their intervention planning efforts, training groups completed an intervention planning tool (see Appendix 10-F). This tool guided participants through the seven-step intervention planning process to apply information to current or future work of their partnership. Training groups identified which sections were most useful and which were least useful and any information they were unable to find on the Web site. Once the intervention planning tool was completed and returned, training groups were rewarded a stipend to apply toward their intervention activities.

Analysis. Quantitative data from the satisfaction survey and Web site feedback survey were downloaded into an SPSS database and analyzed descriptively. Qualitative data were analyzed using

focused coding procedures mentioned previously. Transcripts from the training groups were analyzed and used to make modifications to the training manual.

Findings and revisions. Participants validated the importance of having tools available for the range of processes needed in evidence-based public health (e.g., partnership development and building budgets). The worksheets provided on Intervention MICA were useful to thinking through the relevant information provided on the Web site, both as a refresher for more experienced participants, and as to provoke thought in less experienced users. The research-based evidence tables helped participants think through appropriate intervention strategies for their community. Participants indicated the Web site was logically designed and the step-wise process allowed them to develop a consistent outline. Information they were interested in was able to be located within Intervention MICA.

Recommended changes to the Web site included altering the navigation bar to know what is included in each section and to make it more accessible and user-friendly; providing methods for the user to personally adjust font size; minimizing public health jargon; clarifying how to use information from Intervention MICA; developing a keyword search function for the Web site; enhancing formatting and including a site map. These recommendations have been presented to the Missouri DHSS and are currently under the process of revision.

DISCUSSION

Summary of Findings

Navigation and format are critical elements to Web site functionality as evidenced by the evaluation findings. Different users have different levels of comfort and experience in using Web-based programs, and, as such, the Web sites that are developed must be responsive to this variability. Language should reflect appropriate literacy levels and terminology should be easily understood by local audiences, yet still engage those who are more experienced in the field. Content must be comprehensive, as well as include some level of specificity, to ensure that all users' needs are being met. As the effectiveness of the intervention is dependent on a wide variety of factors (e.g., resources, staff, population and setting considerations, environmental and political considerations), Web-based intervention planning systems need to provide a menu of options for different approaches within the constraints of ensuring implementation fidelity. Intervention planning systems should maximize user interaction and customization in response to the user (e.g., allowing users to be

directed towards specific interventions that are effective for populations and settings in which they are involved, allowing users to input evaluation information they are gathering). Sharing intervention information across users (e.g., success stories, message boards) may help to further increase capacity for intervention planning through opportunities to learn from others' successes and failures. Lastly, training on these types of Web-based systems may be necessary for users to fully utilize their features and information. As a result of the training workshops conducted in this evaluation, we found a heightened capacity for applying the information provided in Intervention MICA to daily work.

Limitations

There are several limitations to the evaluation of the Intervention MICA Web site. First of all, the evaluation is based on a small sample size. Furthermore, there were inconsistencies in sample size between each phase (e.g., Pilot test–Phase I and the Pre-test phase had twice as many participants as the Pilot test–Phase II). Intervention MICA has been designed to meet the needs of multiple users, who may have different preferences regarding the content and design of the Web site. This may result in contradictory opinions about key issues and necessary changes to the Web site. Finally, computer skills and Web navigation abilities varied greatly among evaluation participants. Some participants lacked basic computer and Web skills, which may have hindered their ability to effectively evaluate the Web site. Despite these limitations, we believe that the multiple evaluation methods and measures adequately captured the key issues and led to subsequent recommendations that have greatly improved the utility and functionality of Intervention MICA.

From what has been learned through the evaluation of Intervention MICA, Web-based technology is a vital mechanism for propelling the wealth of information compiled in public health research to the frontlines of public health practice. Further evaluation of the application of the Intervention MICA Web site or other intervention planning systems in local public health practice settings can help to increase understanding of the impact and relevance of these systems.

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Chapter 11

Rhode Island—Needs Assessment for and Evaluation of Rhode Island's Public Health Web-based Data Query System

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BACKGROUND

When the Rhode Island Department of Health (HEALTH) undertook the development of its Web Data Query System (WDQS) under the Assessment Initiative Cooperative Agreement with the Centers for Disease Control and Prevention (CDC) in 2003, the first step was a needs assessment to determine (1) what databases and types of analyses the WDQS should encompass and (2) what would be the target audience(s). The first element of the needs assessment was accomplished by evaluating ad-hoc data requests that were received by the then Office of Health Statistics (OHS), and the second element, setting a target audience, was approached through the use of focus groups of persons within and outside of the Department of Health.

Prior to 2007 the principal systems analyst in OHS collected ad-hoc data requests on paper only for those data requests fulfilled by that analyst. Complete data for these requests were available from 1994 through 1999. They did not include requests received or fulfilled by other individuals within OHS or by other Divisions within HEALTH. They did, however, include requests for data from all databases handled by OHS. Although these data requests provided an underestimate of overall requests, they were, nonetheless, substantial. During that period of time, the analyst received requests from 1089 organizations and individuals. Using an estimate of 2 ½ hours of staff time spent on each data request, a very conservative estimate is that 65 person-days a year, or 13 weeks of person-time,

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were spent responding to data requests from the public. The time spent on customer service by OHS staff was estimated to be at least twice this—nearly a half year of one person's time. Of these requests, 24% were submitted by HEALTH, 24% by the general public, 19% by community-based organizations, 10% from state and federal government, 9% from health care agencies, 6% from academic institutions, and 9% from other organizations. A substantial proportion (25%) of these requests were for statewide hospital discharge data, and 12% were for Behavioral Risk Factor Surveillance Survey data.

Early in the process of developing the HEALTH WDQS, it became apparent that no single WDQS could meet the needs of all potential users. A system that would be easy enough for public health professionals in the community to use (who might only access data three or four times a year) would probably not meet the needs of university researchers performing advanced analyses. The volume of ad-hoc data requests received led us to consider three categories of potential users: general public, public health practitioners, and the research community (ORC Macro 2003). Because public health workers at HEALTH and community-based organizations submitted a third of requests, we identified our target audience as public health workers with the understanding that this target audience included users both within and outside of HEALTH.

Based on this information, we held five focus groups with a total of twenty representatives of the designated target audience to assess the needs of this audience for features and functions of a WDQS. Participants in the focus groups were data managers, data analysts, program managers, epidemiologists, information technology technicians and managers, communications personnel, and legislative liaisons from both within and outside of HEALTH. Two different types of focus groups were held. In the first type of focus group (four groups, ten participants), we gathered participants in a computer laboratory with each person at his or her own computer. We asked participants to review existing WDQS—MICA (State of Missouri 2008), IBIS (Utah Department of Health 2008), WISQARS (USDHHS 2008), Maryland BRFSS (Maryland Department of Health and Mental Hygiene 2008) (registration required)—by working through sample queries that had been developed by Assessment Initiative staff. (Sample queries used for MICA and IBIS in October 2003 are included in Appendix 11-A.). These systems were evaluated in their 2003 configurations and have undergone modification since then. We asked participants to provide feedback on process, "look and feel," ability to obtain information desired, and ease of interpreting information received. The second type of focus group (one group held, ten participants) was held in a conference room setting with only one computer and an LCD projector. The leader worked through the sample queries to which participants provided feedback.

Results from the focus groups were extremely helpful in determining key decisions about the HEALTH WDQS. We aggregated responses by focus group and produced a summary. There was consensus across all groups on the desired form and functionality of the HEATH WDQS, with the participants endorsing a system that combined features from each of the examined systems. By obtaining this information early in the process of developing a WDQS, we were able to create a scope of work that met the needs of identified end-users.

EVALUATION

Many HEALTH staff members meet the definition of our target audience. Without county or city health departments, RI has a centralized public health system, and many functions occur at the state level. Each year since the launch of the first WDQS module, which became operational in September 2004 on the HEALTH Intranet and in September 2005 on the Internet, we have conducted a Web-based survey of all HEALTH staff asking about use of the WDQS. This affords us the benefit of asking questions of a defined population that is made up of persons who use, and who do not use, the system. Users provide information on how they use it and improvements they would like to see. We ask non-users why they do not use the system; possible responses include the following: job does not require accessing data; respondent hadn't heard about it; system is too difficult; and system does not have needed data. These surveys were conducted in the fall of 2005, 2006, and 2007. (See Appendix 11-B for an example of a survey.)

To encourage participation in the surveys, we send an e-mail to all active HEALTH employees, including contract staff, with a link to the Web-based survey. The survey remains active for approximately one month. The e-mail asks all persons to complete the survey, even if they have never used the WDQS. While this survey method is efficient and allows us to survey a defined group, limitations include not reaching members of the target audience who are external to HEALTH and including persons who are not a part of the target audience (for example, administrative assistants and human resources personnel).

The survey asks about use of the system (including which databases have been used, topics that have been queried, and how often the system is used), performance of the system, and training. In addition, several open-ended questions are included, such as what questions were researched using the system, and what databases would respondents like added to the system. In 2005, 2006, and 2007, a total of 64, 71, and 97 HEALTH employees answered the survey, representing response rates of 13%, 14%, and 19%, respectively. We find that the majority of persons who do not use the system do not need it for their job, and very few report not using it because it is too difficult to obtain a

result. For example, in 2007, 66% of respondents reported never using the WDQS, of whom 65% reported not using the WDQS because they do not need it for their job, but only 2% reported that it is to difficult to use. Although few respondents report difficulty using the system once accessed, less than 2% of respondents across survey years have found it on their own, which identifies the need for better marketing and positioning on the HEALTH website. In response, we have created bookmarks and postcards to market the system and added more links on the HEALTH website to the WDQS. In 2006, 10% of those who did not use the system reported that it was because the system had no data of interest for them. This, combined with a list of databases that respondents report they would like added to the system, has helped staff prioritize work. In future years we plan to ask respondents to describe their job duties so that we can analyze responses by job function for those not needing to use the system for their job. Across the three years the percent of respondents who do not use the system has decreased slightly (from 73% in 2005 to 66% in 2007).

WEB ACCESS TO RI PUBLIC HEALTH DATA COURSES

From August 2006 to August 2007 HEALTH's Center for Health Data and Analysis (CHDA) offered thirteen workshops on use of the HEALTH WDQS at no cost to participants. Prior to the RI Assessment Initiative, there was little coordinated training in RI about the use, interpretation, and presentation of RI public health data. To address this need, RI Assessment Initiative staff in collaboration with the RI Public Health Training Program developed and implemented the Web Access to Rhode Island Public Health Data workshops.

To ensure that the workshops addressed the specific public health training interests of the intended audience, we developed them based on information gleaned from key informant interviews of 46 executives and administrators in the government, business, and non-profit sectors in RI. Contact information for key informants came from the Rhode Island Public Health Directory—an electronic working list consisting of licensed health care practitioners and facilities, public health policy-makers, health-related community agencies, and others. The key informant interviews asked about the responding executive's own interest in public health training ("self assessment"); the respondent's assessment of whether or not the organization's policies and practices would support participation by employees in public health training ("organizational assessment"), and the respondent's assessment of the perceived interest of professional employees within the organization ("employees assessment"). The key informant interviews also asked about the organization and its workforce. We mailed advance letters to selected respondents and followed up with a telephone call (Tolentino and Marshall 2006). Forty-three executives and administrators were interviewed,

representing a response rate of 93%. Each interview lasted about fifteen minutes. Most key informants stated that access to public health training would be of interest to their professional employees and the organization for which they worked.

Based on these findings, we targeted the workshops at public health professionals working at HEALTH or in community-based health agencies and use case studies to give participants an opportunity to apply what they learn on how to interpret and present data effectively. Each case study dramatizes a public health problem that could be addressed using data, and participants are asked to work through questions that a hypothetical public health worker would need to answer. Because we partnered with the Rhode Island Asthma Control Program to develop the workshop, the case studies primarily involve asthma questions. (Examples include the following: What is the percent of lifetime and current asthma among RI adults? Are there differences in the percentage of current asthma based on gender? Are there differences in the percentage of asthma based on race/ethnicity? What percent of RI adults who have current asthma report excellent health?) These questions are used to illustrate how to obtain results, interpret tables, use confidence intervals, and present results. HEALTH has posted the case studies on line as stand-alone structured exercises for review by persons who did not enroll in the workshops or were unable to attend a workshop (Gjelsvik 2008).

We evaluate the workshops using two methods. Immediately after each workshop, an evaluation assesses participants' understanding of concepts introduced in the workshop, level of satisfaction with case studies and workshop materials, and intent to use the WDQS. A three-month follow-up Web-based survey, which is sent to all participants, assesses whether participants are using the HEALTH WDQS, how they are using it, and whether they have encountered barriers in accessing Web-based data. This evaluation has been updated for the two most recent workshops to include a pre (collected during workshop registration) and post workshop self-assessment of each participant's of ability to find, interpret, and present health data.

Findings indicate that the delivery and organization of the workshops have been well received and that the workshops have increased participants' self-assessed ability to find, interpret, and present health data. The response rate for the three-month follow up survey for all workshops combined has been 40%. Of the participants responding to the survey, only 50% had used the HEALTH WDQS since taking the course. A more intensive method of three-month evaluation may be necessary to obtain a better response rate and will be considered for future courses.

AD HOC DATA REQUEST TRACKING SYSTEM (AHDRTS)

The Ad Hoc Data Request Tracking System (AHDRTS), which is similar to the one used to establish need for the WDQS initially, was moved in May 2007 from a paper-based system to a server-based system to allow for multiple users. The system can be used to track the number of people making data requests who were referred to the WDQS modules and to estimate CHDA staff time spent responding to ad hoc data requests pre- and post- module deployment. In addition, AHDRTS data will provide contact persons for focus groups and interviews to gain more in-depth information about WDQS use for program and policy development. No reports about the WDQS are available yet from this system.

NEEDS ASSESSMENT FOR EXPANSION OF FUNCTIONALITY

In 2007, we conducted two focus groups (each composed of six participants) with university health and medical faculty, curriculum developers, and librarians from four RI universities and colleges with the goal to explore ways to increase the use of Rhode Island public health data and the HEALTH WDQS in educational settings. The specific objectives of the two focus groups were to determine (1) level of knowledge of the existence of the HEALTH WDQS; (2) level of use of the HEALTH WDQS; (3) what improvements should be made to increase use, strengthen content, and improve format, accessibility and usefulness; and (4) ways to promote the system.

Based upon what we learned from the participants, graduate level students and faculty researchers are not an appropriate target audience for the HEALTH WDQS, as their requirements are more sophisticated, including in particular the need to manipulate raw data. Participants felt that the appropriate audiences for the HEALTH WDQS are community-based organizations, undergraduate students, and community public health workers. This assessment by outside informants validated our initial development and marketing, as we had identified community public health workers and members of community-based organizations as the initial target audience. Adding undergraduate students as a target audience will require additional marketing and the development of training workshops geared specifically towards them. Other suggested improvements and recommendations included (1) promoting the HEALTH WDQS on state libraries' homepages and via professional organizations for social workers, public health professionals, and others; (2) targeting deans of universities and colleges several times a year; (3) adding additional databases to the system (i.e., vital statistics, cancer incidence, hospital discharges); (4) creating the ability to compare state with national level data; and (5) adding a Web-based tutorial in order to address the barrier created by

the lag time between attending training and using the system. Based on the additional suggestions, we have already added a web-based tutorial to the system.

DISCUSSION

Gaps in the evaluation of the HEALTH WDQS include not having many specific success stories from public health programs within or external to HEALTH. A few success stories have been gathered, but the time invested in locating and describing these stories has been excessive in relation to the gain. With additional information from the AHDRTS, perhaps success stories will be easier to locate. In addition, it has been difficult to connect greater access to data directly to an impact on the health of the population. Nevertheless, assessing the WDQS using all our evaluation methods combined has given a more complete picture than any one method alone. We have been able to demonstrate increasing use of the system and to use the results of the evaluations to prioritize expansion of HEALTH's WDQS databases and functionalities.

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Appendix 8-A

Questionnaire used in state survey of WDQS evaluation practices

RWJF WDQS Evaluation Survey

Hello, my name is [Gib Parrish] [Dan Friedman]. [DF] [GP] and I are conducting a survey of states with Web-based data query systems as part of a project funded by the Robert Wood Johnson Foundation. The purpose of the survey is to identify and describe evaluations of WDQS that states have done.

Your state maintains a WDQS named [NAME OF WDQS]. I would like to ask you a few questions about it, which should take about five ten minutes.

1. Respondent

   Name_____ Telephone_____

   Position_____

2. Are you the person in your state with overall responsibility for managing [NAME OF WDQS]?
   Yes ___[IF YES, GO TO #3]
   No ___[IF NO, GO TO #2a}

   a. What is the name and telephone number of the person with oversight or management responsibility for [NAME OF WDQS]?

   Name_____ Telephone_____

   Position_____

3. Purpose
   a. What is the purpose of [NAME OF WDQS]?
   b. Is this purpose being achieved?
      Yes ___ No ___ Maybe ___ Don't know ___
   c. How do you know?

4. Users
   a. Who are the intended primary users of [NAME OF WDQS]?
   b. Who are the other intended users of [NAME OF WDQS]?
   c. Is [NAME OF WDQS] reaching its intended users?
      Yes ___ No ___ Maybe ___ Don't know ___
   d. How do you know?

5. Uses
   a. What questions are users trying to answer with [NAME OF WDQS]?
   b. Are these questions being answered?
      Yes ___ No ___ Maybe ___ Don't know ___
   c. How do you know?

6. User satisfaction
    a. Are users satisfied with [NAME OF WDQS]?
        Yes ___ No ___ Maybe ___ Don't know ___
    b. How do you know?

7. Impact
    a. What is impact of [NAME OF WDQS]?
        i. On users inside your health department?
        ii. On users in local health departments?
        iii. On users in other settings, such as community-based organizations, health care providers, and so forth?
    b. How do you know?

8. Use volume
    a. Users
        i. Are individual users or types of users of [NAME OF WDQS] counted?
        Yes ___ [GO TO #8a.ii]
        No ___ Maybe ___ Don't know ___ [GO TO 8b]
        ii. Do you use any of the follow methods to count users?
            1. registration Yes ___ No ___ Maybe ___ Don't know ___
            2. log-in Yes ___ No ___ Maybe ___ Don't know ___
            3. survey Yes ___ No ___ Maybe ___ Don't know ___
            4. other Yes ___ No ___ Maybe ___ Don't know ___
            (Specify _____)
    b. Uses
        i. Are any of the following uses of [NAME OF WDQS] routinely counted?
            1. data sets Yes ___ No ___ Maybe ___ Don't know ___
            2. indicators Yes ___ No ___ Maybe ___ Don't know ___
            3. pre-tabulated reports, such as community health overviews
            Yes ___ No ___ Maybe ___ Don't know ___
            4. statistics Yes ___ No ___ Maybe ___ Don't know ___
            5. outputs, such as tables, graphs, and maps
            Yes ___ No ___ Maybe ___ Don't know ___
        [IF YES TO ANY IN #8b.i, GO TO #8b.ii]
        [IF NO TO ALL, GO TO #9]
        ii. Do you use any of the follow methods to count uses?
            1. registration Yes ___ No ___ Maybe ___ Don't know ___
            2. log-in Yes ___ No ___ Maybe ___ Don't know ___
            3. survey Yes ___ No ___ Maybe ___ Don't know ___
            4. other Yes ___ No ___ Maybe ___ Don't know ___
            (Specify _____)

9. Is there a person in your agency whose responsibility it is to answer questions or about the [NAME OF WDQS]?
    Yes ___ No ___ Maybe ___ Don't know ___

10. Does your agency keep a log of complaints about or requests for improving [NAME OF WDQS]?
    Yes ___ No ___ Maybe ___ Don't know ___

11. What is the main technical problem users of [NAME OF WDQS] seem to have?
    a. How do you know?

12. Has your state conducted any of the following?
    a. Assessment of user or agency needs prior to development of [NAME OF WDQS] (for example, to formulate initial development ideas or to identify system requirements and use cases)
       Yes ___ No ___ Maybe ___ Don't know ___
    If yes, please describe.

    b. Testing of [NAME OF WDQS] by users, agency staff, or others during development (for example, alpha or beta testing)
       Yes ___ No ___ Maybe ___ Don't know ___
    If yes, please describe.

    c. Evaluation of [NAME OF WDQS] to determine whether it is meeting user needs.
       Yes ___ No ___ Maybe ___ Don't know ___
       If yes, please describe.

    [IF YES TO ANY IN #12a-c, GO TO #13. IF NOT TO ALL, GO TO #17]

13. Was the evaluation of [NAME OF WDQS] planned during its development?
    Yes_____[GO TO #13a]
    No_____[GO TO #14]

    a. Was a logic model used in planning the evaluation?
    Yes____
    No_____

14. Were any of the following method(s) used in the needs assessment, testing, or evaluation? [RECORD ANSWERS AND PROBE FOR METHODS]

Method	**needs assessment**	**testing**	**evaluation**
Survey			
Population-based survey			
Surveys with purposive samples based upon roles of individuals			
User-based surveys			
Focus groups			
Current users			
Potential users			
Laboratory-based testing			
Use logs			
Expert reviews			
Advisory committees			
Other evaluation methods			

15. Was the needs assessment, testing, or evaluation useful?

    Yes ___ No ___ Maybe ___ Don't know ___

16. Were any modifications made to [NAME OF WDQS] because of the evaluation?

    Yes ___ No ___ Maybe ___ Don't know ___
    If yes, please describe.

17. Does your agency have a budget for evaluation of [NAME OF WDQS]?

    Yes ___ No ___ Maybe ___ Don't know ___
    If yes, please describe.

18. Does your agency plan to evaluate [NAME OF WDQS] within the next year?

    Yes ___ No ___ Maybe ___ Don't know ___
    If yes, please describe.

THANK YOU FOR YOUR TIME AND HELP WITH OUR SURVEY.

Appendix 10-A

Intervention MICA Evaluation—Case Example

You are a project manager at a local public health agency in downtown St. Louis. Your agency has just received a grant for $50,000 to increase physical activity. You are responsible for deciding how those funds can best be used.

Let's assume that you have already used the Community Profiles and MICA tools to learn more about the leading causes of death and rates of **physical activity** in St. Louis City. From this information, you have learned that **African Americans** in St. Louis have a high risk of developing several diseases related to **physical inactivity** (e.g., cardiovascular disease, cancer and arthritis).

Can you find:

1. The 7 **steps in the evidence-based process**?
2. **What is an intervention?**
3. Information about **creating your partnership**?
4. Steps for **identifying your community of interest**?
5. Information about **assessing your readiness?**
6. Information on **community capacity**?
7. Key elements for **budget preparation**?
8. Selected diseases/conditions that are associated with the different **intervention topics**?Assume you want to conduct an **intervention** to enhance access to opportunities for physical activity in your community. Select **Physical Activity** as your intervention topic.
    a. Your population is primarily **African Americans**. Can you find information regarding **African Americans**?
    b. Information on **Physical Activity in Different Settings** you could choose to implement your intervention?
9. Select **environment and policy initiatives** as your intervention strategy. Can you find information on **environment and policy initiatives for physical activity**?
    a. Information on **evidence on environment and policy initiatives**?
    b. Information on **action steps to create and implement environment and policy initiative**?
    c. Challenges with **evaluation of environment and policy initiatives?**
10. Move on to **Step 6: Evaluation**. Can you find information regarding **sharing your work with others?**
11. Can you find information on **sustaining your partnership's initiative** and momentum over time?

Appendix 10-B

Intervention MICA Evaluation—Observational Tool

BEHAVIORS	Clicked and read/skimmed	Clicked, not read	Didn't click/visit	Revisited	Don't know/NA
SPECIFIC WEB PAGES					
1. Intervention MICA Home Page	☐	☐	☐	☐	☐
a. What is an Intervention?	☐	☐	☐	☐	☐
b. How to use Intervention MICA?	☐	☐	☐	☐	☐
c. What is an intervention?	☐	☐	☐	☐	☐
d. What is evidence?	☐	☐	☐	☐	☐
2. Background and Development	☐	☐	☐	☐	☐
a. How was Intervention MICA created	☐	☐	☐	☐	☐
b. Research- and Practice-based evidence	☐	☐	☐	☐	☐
3. Partnerships	☐	☐	☐	☐	☐
a. Creating your partnership	☐	☐	☐	☐	☐
b. Identifying the vision and mission for the partnership	☐	☐	☐	☐	☐
c. Building partnership capacity	☐	☐	☐	☐	☐
d. Printable partnership worksheet	☐	☐	☐	☐	☐
4. Assessment	☐	☐	☐	☐	☐
a. Identifying your community of interest	☐	☐	☐	☐	☐
b. Printable community of interest worksheet	☐	☐	☐	☐	☐
c. Conducting a needs assessment	☐	☐	☐	☐	☐
d. Prioritizing the needs of your community	☐	☐	☐	☐	☐
5. Readiness	☐	☐	☐	☐	☐
a. Assessing your readiness	☐	☐	☐	☐	☐
b. Preparing for your intervention	☐	☐	☐	☐	☐
c. Addressing the special needs of your community of interest	☐	☐	☐	☐	☐
6. Capacity	☐	☐	☐	☐	☐
a. Community capacity	☐	☐	☐	☐	☐
b. Social determinants of health	☐	☐	☐	☐	☐
c. Cultural competence	☐	☐	☐	☐	☐
e. Budget preparation	☐	☐	☐	☐	☐
f. Funding resources	☐	☐	☐	☐	☐

BEHAVIORS	Clicked and read/skimmed	Clicked, not read	Didn't click/visit	Revisited	Don't know/NA
7. Intervention topics	☐	☐	☐	☐	☐
Risk factor/disease (e.g. Physical activity)					
a. Background on physical activity	☐	☐	☐	☐	☐
b. Physical activity in different populations	☐	☐	☐	☐	☐
c. Physical activity in different settings	☐	☐	☐	☐	☐
d. Physical activity intervention strategies	☐	☐	☐	☐	☐
8. Intervention strategies (e.g., environment and policy initiatives)	☐	☐	☐	☐	☐
a. Background on environment and policy initiatives	☐	☐	☐	☐	☐
b. Evidence on environment and policy initiatives	☐	☐	☐	☐	☐
c. Example environment and policy initiatives	☐	☐	☐	☐	☐
d. Action steps to create and implement environment and policy initiatives	☐	☐	☐	☐	☐
e. Tools and resources for environment and policy initiatives	☐	☐	☐	☐	☐
f. Evaluation of environment and policy initiatives	☐	☐	☐	☐	☐
9. Evaluation	☐	☐	☐	☐	☐
a. What does it mean to evaluate?	☐	☐	☐	☐	☐
b. Why evaluate?	☐	☐	☐	☐	☐
c. Evaluating your partnership	☐	☐	☐	☐	☐
d. General intervention evaluation overview	☐	☐	☐	☐	☐
e. Needs assessment	☐	☐	☐	☐	☐
f. Intervention evaluation	☐	☐	☐	☐	☐
g. Outcome evaluation	☐	☐	☐	☐	☐
h. Sharing your work	☐	☐	☐	☐	☐
10. Momentum	☐	☐	☐	☐	☐
a. Adapting to change	☐	☐	☐	☐	☐
b. Preserving energy and enthusiasm	☐	☐	☐	☐	☐
c. Maintaining partnerships	☐	☐	☐	☐	☐
d. Sustaining your partnership's initiative	☐	☐	☐	☐	☐
e. Honoring your partnership	☐	☐	☐	☐	☐
f. Institutionalizing your efforts	☐	☐	☐	☐	☐

BEHAVIORS	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/NA
MOVEMENT THROUGH THE SYSTEM					
1. The participant was able to move forward within the system easily.	☐	☐	☐	☐	☐
2. The participant was able to move backward within the system easily.	☐	☐	☐	☐	☐
3. There were many movements the participant wanted to make but could not. (4+ movements)	☐	☐	☐	☐	☐
4. There were many items for which the participant indicated that they wanted more information. (4+ items)	☐	☐	☐	☐	☐
5. The participant was able to find help when needed.	☐	☐	☐	☐	☐
6. The participant spent a lot of time "retracing" his/her steps to get back to where he/she started.	☐	☐	☐	☐	☐

BEHAVIORS	Always	Frequently	Occasion-ally	Never	Don't know/NA
USE OF WEB SITE FEATURES					
1. The participant used the 7-Step navigation bar to move through the 7 steps.	☐	☐	☐	☐	☐
2. The participant used the left menu bar.	☐	☐	☐	☐	☐
3. The participant used the drop down menus.	☐	☐	☐	☐	☐
4. The participant used the "continue to" and "back to" links at the bottom of the pages.	☐	☐	☐	☐	☐
5. The participant used the "select a section" to jump to sections.	☐	☐	☐	☐	☐
6. The participant used the "select a topic" drown down menu to select physical activity.	☐	☐	☐	☐	☐
7. The participant used the "select a strategy" to select environments and policy initiatives.	☐	☐	☐	☐	☐

EMOTIONS	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/NA
1. The participant spent a lot of time frustrated or confused.	☐	☐	☐	☐	☐
2. The participant seemed unsure of how to proceed with questions on the case study.	☐	☐	☐	☐	☐
3. The participant appeared satisfied with the function.	☐	☐	☐	☐	☐
4. The participant appeared satisfied with the design and aesthetic quality.	☐	☐	☐	☐	☐
5. The participant appeared dissatisfied with the information provided.	☐	☐	☐	☐	☐

Appendix 10-C

Intervention MICA Evaluation—Participant Feedback Survey

DESIGN AND NAVIGATION	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
1. The font size is appropriate.	☐	☐	☐	☐	☐
2. The graphics add to the understanding of the material.	☐	☐	☐	☐	☐
3. The web pages are visually appealing.	☐	☐	☐	☐	☐
4. I would be able to print off the information easily if needed.	☐	☐	☐	☐	☐
5. I can easily get back to the home page.	☐	☐	☐	☐	☐
6. The instructions for using the Intervention MICA website are clear.	☐	☐	☐	☐	☐
7. It is easy to get to the intervention topics directly.	☐	☐	☐	☐	☐
8. It is useful to have the intervention information organized by intervention topic and intervention strategy.	☐	☐	☐	☐	☐
9. The drop down menus made it easy to jump to different sections.	☐	☐	☐	☐	☐
10. I can easily move forward and backwards from section to section.	☐	☐	☐	☐	☐
11. I could go to specific intervention topics using the left menu bar.	☐	☐	☐	☐	☐
12. It was easy to select an intervention topic (e.g., physical activity) and a strategy (e.g., environments and policies).	☐	☐	☐	☐	☐
13. I could find information about different subpopulations (e.g., children, minorities) easily.	☐	☐	☐	☐	☐
14. The navigation bar in the blue banner with the Steps 1-7 was helpful in moving from step to step in the evidence-based process.	☐	☐	☐	☐	☐
15. I could determine where I was in the seven step process at all times.	☐	☐	☐	☐	☐
16. The subheading made it easier to know which section I was in for each of the seven steps (e.g., What is an Intervention?)	☐	☐	☐	☐	☐
17. "Intervention MICA" in the blue banner clearly identified the website at all times.	☐	☐	☐	☐	☐
18. There was too much scrolling up and down on each page.	☐	☐	☐	☐	☐

CONTENT	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
1. The purpose of the website is clear.	☐	☐	☐	☐	☐
2. The reading level of the material is appropriate for practitioners and community groups.	☐	☐	☐	☐	☐
3. There is an assumption that the user already knows a lot about program planning.	☐	☐	☐	☐	☐
4. There are too many big words or words that not everyone will know.	☐	☐	☐	☐	☐
5. The information presented is understandable.	☐	☐	☐	☐	☐
6. The content is appropriate for the audience.	☐	☐	☐	☐	☐
7. There is enough here so I could use the website and recommend it to others.	☐	☐	☐	☐	☐
8. The information is too redundant.	☐	☐	☐	☐	☐
9. There are an appropriate number of links to other websites.	☐	☐	☐	☐	☐
10. The content is interesting and stimulating.	☐	☐	☐	☐	☐
11. The information is credible.	☐	☐	☐	☐	☐
12. The information is sufficient for my needs.	☐	☐	☐	☐	☐
13. The seven step names were in a logical stepwise order.	☐	☐	☐	☐	☐
14. The seven step names were clear and I was able to get to the information that I wanted.	☐	☐	☐	☐	☐

TECHNICAL ELEMENTS	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
1. All pages within Intervention MICA worked well, with no errors.	☐	☐	☐	☐	☐
2. All the links to other websites work well.	☐	☐	☐	☐	☐
3. The site is usable by my browser.	☐	☐	☐	☐	☐
4. The text is well written with no grammatical or spelling errors.	☐	☐	☐	☐	☐

Additional Questions:

Please prioritize these ten features of the Intervention MICA website that you think needs improvement. (1=area needing most improvement, 10=area that needs little or no improvement)

- ☐ **Font size** Explain:
- ☐ **Color** Explain:
- ☐ **7-step navigation bar** Explain:
- ☐ **Drop down menus** Explain:
- ☐ **Graphics (pictures, designs, logos, etc.)** Explain:
- ☐ **Headings and subheadings for web pages** Explain:
- ☐ **Direct links to intervention topics** Explain:
- ☐ **Left menu bar** Explain:
- ☐ **Navigation throughout the system** Explain:
- ☐ **Visual distinction of each of the seven steps** Explain:

Were there other areas that you felt needed improvement besides the ones mentioned? If so, explain.

What other navigation elements would be helpful to you in using Intervention MICA?

What other visual elements would be helpful to you in using Intervention MICA?

What do you think is missing from Intervention MICA?

What did you like about Intervention MICA?

Would you use Intervention MICA? Would you recommend it to others?

Appendix 10-D

Intervention MICA Evaluation—Pre-test Evaluation Tool

EVALUATION INSTRUCTIONS & QUESTIONS

This evaluation includes 3 primary activities: explore, design and evaluate. Your feedback will be used to improve the overall Intervention MICA system. Your participation is voluntary and your responses will remain confidential (i.e., your name or personal identification will not be linked to your answers). When you visit the Intervention MICA website, you will notice that there are many links to other tools and resources. We are only interested in your feedback on the Intervention MICA web pages, so please do not spend a lot of time exploring other websites. If you have any questions about the evaluation, please contact us.

Step 1: Explore Intervention MICA

Using your Internet browser, log on to the following website:

http://www.dhss.mo.gov/InterventionMICA/

At this time, we would like you to explore the Intervention MICA web pages to get an idea of what is included in the entire system. Please do not spend much time reading the content of the pages, but, rather, try to see the different types of information, tools and resources that are provided. Be sure to locate and explore the Physical Activity web pages as the other pages related to health and behavioral *Intervention Topics* have not yet been created. Please spend approximately 15-20 minutes just familiarizing yourself with all of the components of Intervention MICA. If you have any general comments or suggestions, please insert them below.

Comments/Suggestions:

Step 2: Design an intervention using Intervention MICA

Now that you have a general sense of what is provided in Intervention MICA, we would like you to design a physical activity intervention for your community guided by Intervention MICA information, tools and resources. In this activity, we would like you to access all of the web pages that you think may be useful to you in creating your intervention. Again, there are links to other tools and resources (e.g., Community Profiles and Priorities MICA), but you should not spend very much of your time with these resources. In fact, we are only interested in general feedback about whether or not you think these links are useful as part of the Intervention MICA system overall.

As you go through Intervention MICA, please comment or make suggestions for improving any of the sections. Document your thought process as you create the intervention, specifically what pages did you go to first and why, what pages were useful or not useful, what was missing, what was difficult or challenging about trying to get to the information, tools or resources you wanted. Please spend approximately 30-40 minutes designing your intervention using Intervention MICA.

Begin by writing down your ideas for creating your Physical Activity intervention:

Intervention Ideas:

Who will be involved? How will you get them involved?

Others involved:

Describe the community that will be the focus of your intervention:

Community description:

Describe the resources needed to help you carry out the intervention (people, facilities, budget, etc.):

Resources:

Identify the setting(s) and strategy(ies) that you plan to include in your physical activity intervention as well as the rationale for these settings/strategies with respect to your community of interest:

Settings/Strategies:

Describe some of the things you will need to think about in planning and implementing your intervention strategy(ies):

Intervention Strategies:

Describe some of the things you will need to think about in evaluating your intervention strategy(ies):

Evaluation Ideas:

Describe how you will sustain your intervention activities over time:

Maintenance:

Use your notes from the above sections to describe your intervention and identify any challenges in using the Intervention MICA to help you create the intervention.

General description of intervention:

Step 3: Evaluate Intervention MICA

Now that you have completed the design of your community-based intervention, please respond to the following questions about your use of the system and its components. Please spend approximately 15-30 minutes evaluating Intervention MICA.

DESIGN	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
1. Intervention MICA is a useful system for practitioners (public health, nursing, etc.).	☐	☐	☐	☐	☐
2. Intervention MICA is a useful system for other community organizations.	☐	☐	☐	☐	☐
Who else do you think would benefit from using this system?					
Would you or others you work with use Intervention MICA? If so, how does it apply to the work you do?					
3. The graphics add to the understanding of the material.	☐	☐	☐	☐	☐
4. It is easy to find what you need.	☐	☐	☐	☐	☐
5. The directions for using the website are clear.	☐	☐	☐	☐	☐
6. It is easy to get to the interventions directly.	☐	☐	☐	☐	☐
How would you change Intervention MICA to make it more user-friendly? What would you add/remove?					
What components are most useful? Least useful?					
7. The web pages are visually appealing.	☐	☐	☐	☐	☐
How would you change Intervention MICA to make it more visually appealing? What would you add/remove?					

CONTENT	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
8. The purpose of the website is clear.	☐	☐	☐	☐	☐
Do you have any suggestions for changes to the content of the Intervention MICA? the range of information presented? the types of information presented?					
9. The reading level of the material is appropriate for practitioners and community groups.	☐	☐	☐	☐	☐
10. There is an assumption that the user already knows a lot about intervention planning.	☐	☐	☐	☐	☐
11. There are too many big words or words that not everyone will know.	☐	☐	☐	☐	☐
Do you think you or your partners would need any other training in order to use Intervention MICA?					
12. The information presented is understandable.	☐	☐	☐	☐	☐
13. There is too much information.	☐	☐	☐	☐	☐
14. The information is appropriate for the intended users.	☐	☐	☐	☐	☐
15. The information is too redundant.	☐	☐	☐	☐	☐
16. There are an appropriate number of links to other websites.	☐	☐	☐	☐	☐
17. The information is interesting.	☐	☐	☐	☐	☐
18. The information is credible.	☐	☐	☐	☐	☐
19. The information is sufficient for my needs.	☐	☐	☐	☐	☐
20. I would recommend Intervention MICA to others.	☐	☐	☐	☐	☐
Does Intervention MICA provide you with enough information, tools and resources to create, implement and evaluate interventions? If not, what else should it provide?					
TECHNICAL ELEMENTS	Strongly disagree	Disagree	Agree	Strongly agree	Don't know / not sure
21. All the links to other websites work well.	☐	☐	☐	☐	☐
22. It is easy to move from page to page.	☐	☐	☐	☐	☐
23. I can easily get back to the home page.	☐	☐	☐	☐	☐
24. My Internet browser can be used to access Intervention MICA effectively.	☐	☐	☐	☐	☐

Do you have any additional comments or suggestions?

Appendix 10-E

Intervention MICA Evaluation—Training Satisfaction Survey

Thank you for participating in the Intervention MICA training workshop. Your thoughtful completion of this evaluation will help us in planning the training in the future.

For the rating scale, write the number that best describes your opinion.

A. TRAINING WORKSHOP EVALUATION

Use the scale below to rate the following:

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly agree

IF NOT APPLICABLE, WRITE N/A

___ 1. The training was presented in logical format.
___ 2. The training was easy to follow.
___ 3. I learned how to find information that will be useful in working with my partnership.
___ 4. I can apply what I learned about the Intervention MICA system in my partnership.

Comments about the training objectives and content:

B. INSTRUCTION METHODS

Use the scale below to rate the following:

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly agree

IF NOT APPLICABLE, WRITE N/A

___ 1. Training instruction was well coordinated among the trainers.
___ 2. The audiovisual materials were useful.
___ 3. Having trainers guide participants through Intervention MICA concurrently with the trainer was useful.
___ 4. Participants were encouraged to share their own relevant experiences.
___ 5. Participants were encouraged to participate in the learning process through activities such as discussion, asking questions, and exercises.

C. MODULE BY MODULE SATISFACTION

Use the scale below to rate the following:

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly agree

IF NOT APPLICABLE, WRITE N/A

___1. The information provided in the Introduction and Navigation sections was useful.
___2. I was able to follow the trainer through the Introduction and Navigation sections.
___3. The training presentation was helpful for understanding the Introduction and Navigation sections.
___4. I liked the look and feel of the Introduction and Navigation sections.
___5. The information provided in Module 1: Partnerships was useful.
___6. I was able to follow the trainer through Module 1: Partnerships.
___7. The training presentation was helpful for understanding Step 1: Partnerships.
___8. I liked the look and feel of Step 1: Partnerships.
___9. The information provided in Module 2: Assessment was useful.
___10. I was able to follow the trainer through Module 2: Assessment.
___11. The training presentation was helpful for understanding Step 2: Assessment.
___12. I liked the look and feel of Step 2: Assessment.
___13. The information provided in Module 3: Readiness was useful.
___14. I was able to follow the trainer through Module 3: Readiness.
___15. The training presentation was helpful for understanding Step 3: Readiness.
___16. I liked the look and feel of Step 3: Readiness.
___17. The information provided in Module 4: Capacity was useful.
___18. I was able to follow the trainer through Module 4: Capacity.
___19. The training presentation was helpful for understanding Step 4: Capacity.
___20. I liked the look and feel of Step 4: Capacity.
___21. The information provided in Module 5: Intervention was useful.
___22. I was able to follow the trainer through Module 5: Intervention.
___23. The training presentation was helpful for understanding Step 5: Intervention.
___24. I liked the look and feel of Step 5: Intervention.
___25. The information provided in Module 6: Evaluation was useful.
___26. I was able to follow the trainer through Module 6: Evaluation.
___27. The training presentation was helpful for understanding Step 6: Evaluation.
___28. I liked the look and feel of Step 6: Evaluation.
___29. The information provided in Module 7: Momentum was useful.
___30. I was able to follow the trainer through Module 7: Momentum.
___31. The training presentation was helpful for understanding Step 7: Momentum.
___32. I liked the look and feel of Step 7: Momentum.

Comments about module satisfaction:

D. OVERALL TRAINING WORKSHOP SATISFACTION

Use the scale below to rate the following:

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly agree

___1. I was satisfied with this training workshop.
___2. I would recommend this training workshop to my partners.
___3. I will share what I have learned about the Intervention MICA system with my partners.

Comments about training satisfaction:

E. REACTIONS TO TRAINER PRESENTATIONS

Use the scale below to rate the following:

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly agree

IF NOT APPLICABLE, WRITE N/A
TRAINER #1

___1. Demonstrated a thorough knowledge of the subject matter.
___2. Was well prepared.
___3. Presented material in a clear and organized manner.
___4. Used effective teaching/facilitating techniques.
___5. Discussed how the information can be applied in an actual situation.

Trainer #2

___1. Demonstrated a thorough knowledge of the subject matter.
___2. Was well prepared.
___3. Presented material in a clear and organized manner.
___4. Used effective teaching/facilitating techniques.
___5. Discussed how the information can be applied in an actual situation.

Trainer #3

___1. Demonstrated a thorough knowledge of the subject matter.
___2. Was well prepared.
___3. Presented material in a clear and organized manner.
___4. Used effective teaching/facilitating techniques.
___5. Discussed how the information can be applied in an actual situation.

Trainer #4

___1. Demonstrated a thorough knowledge of the subject matter.
___2. Was well prepared.
___3. Presented material in a clear and organized manner.
___4. Used effective teaching/facilitating techniques.
___5. Discussed how the information can be applied in an actual situation.

F. OTHER INFORMATION

1. What is your role and responsibility in relation to your partnership?

2. What type of agency do you work for?

3. How would you describe your expertise in the health field?

4. Which parts of Intervention MICA do you think you will use most often in your day-to-day work?

5. What could we do to improve this training workshop?

Appendix 10-F

Intervention MICA Evaluation—Intervention Planning Outline

INSTRUCTIONS: Please create a detailed intervention plan outline using the Intervention MICA website. Prompts are provided for each section to guide your partnership.

I. PARTNERSHIP **(See Intervention MICA, Step 1: Partnership)**
   a. Describe your partnership and related organization.
   b. Identify other potential partners you may want to include on your project.

II. COMMUNITY OF INTEREST **(See Intervention MICA, Step 2: Assessment)**
   a. Describe your community of interest (e.g., an organization, a neighborhood, a specific population).
   b. Provide background on the health topic to be addressed.

III. INTERVENTION
   Describe your intervention:
   a. Identify goals and objectives for the intervention. **(See Intervention MICA, Step 3: Readiness)**
   b. Identify the type of intervention strategy. **(See Intervention MICA, Step 5: Intervention)**
   c. What indicators in the evidence table made you choose this strategy for your intervention? **(See Intervention MICA, Step 5: Intervention)**
   d. Outline the action steps you will take to implement the intervention in your community. **(See Intervention MICA, Step 5: Intervention)**

IV. EVALUATION **(See Intervention MICA, Step 6: Evaluation)**
   a. Provide examples of activities you would do to evaluate your intervention.

V. PLAN FOR SUSTAINING THE INTERVENTION **(See Intervention MICA, Step 7: Momentum or Step 4: Capacity)**
   a. Describe funding and other strategies that will sustain your proposed intervention over time.

VI. BUDGET DESCRIPTION **(See Intervention MICA, Step 4: Capacity)**
   a. Identify key elements for your intervention budget.

Wrap-up Questions:

- Did you use the Intervention Planning Outline as an individual or as a group? If as a group, which partners were involved and how were your partners included in the intervention planning process?

- Which steps in the seven step process did you use for the Intervention Planning Outline? How were these steps useful?

- What specific sections (e.g., Building Partnership Capacity, Budget Preparation, etc.) in the seven step process did you use and why?

- Which steps in the seven step process did you **not** use for the Intervention Planning Outline? Why didn't you use these steps?

- What information were you unable to find?

Appendix 11-A

Rhode Island—Sample Query Questions for Focus Groups

In order to compare systems we selected a few sample queries that were common or recent data queries fulfilled by the Office of Health Statistics. You may not be able to get all the information from each site. These queries are so that you have experience obtaining data from the systems and can compare the usability of the systems.

1) Birth Query
    a. What is the total number of live births by county for 1998?
        i. What are the counts of live births within St Lois County (Missouri)/ Salt Lake County (Utah) by mother's education?
        ii. Can you download these data to your hard drive?
2) Death Query
    a. What is the 1998 death rate from suicide for males age 15-24 for the entire state? What is the 1998 death rate due to cardiovascular disease for all persons in the entire state compared to St Lois County (Missouri)/ Salt Lake County (Utah)?
    b. What were the 10 leading causes of death in 1998 for the entire state for women age 45-49? For a specific county?
3) BRFSS Queries
    a. What are the rates of adults who engage in physical activity by gender? By education? By race? By age?
    b. What percent of adults smoke? In which geographic location is the smoking rate the highest? (1999 for Missouri/ 1998-2001 for Utah)

Questions

1) What features do you like about the Missouri system? What features do you like about the Utah system?
    a. Prompts if necessary:
        i. Which of these pages lays out the information in the most intuitive and informative way?
        ii. Which of these pages gives you enough information (or access to information via links) to understand the results?
2) If you could pick and choose from these features to create your perfect system, what features would you choose?
3) Are there features that aren't in any of these systems that you know about that you would like to include?

Appendix 11-B

Sample Rhode Island HEALTH Web-based Data Query System Yearly Survey

Welcome to the RI HEALTH Web Query System Survey. The HEALTH Web Query System is a web-based program that makes data from the Behavior Risk Factor Surveillance System (BRFSS) and the Youth Risk Behavior Survey (YRBS) available over the Internet. Currently the Web Query System houses 8 years of data (1998-2005) from the RI BRFSS and 3 years of data (2001, 2003, 2005) from the RI YRBS. It displays data in easy to read tables and graphs directly from the RI BRFSS and RI YRBS datasets.

To help us serve you better, our goal is to evaluate the use of the HEALTH Web Query System yearly. The information gathered in this survey will be used to improve access to the HEALTH Web Query System and to help us keep the website relevant to your needs.

Thank you for your time. It will take about 10 minutes to complete the survey.

Part A: Use

A1. How did you hear about the HEALTH Web Query System?

- ☐ Email
- ☐ Presentation
- ☐ Half-day Web Access to RI Public Health Data workshop
- ☐ Heard of it from colleague
- ☐ Word of mouth
- ☐ Found it on the web on my own
- ☐ Never heard about it before this survey **(skip to B1)**
- ☐ Other (please specify) _____

A2. Have you ever used the HEALTH Web Query System?

- ☐ Yes **(skip to A4)**
- ☐ No

A3. What is your reason for not using the HEALTH Web Query System?

- ☐ I don't need the Query System for my job **(skip to C1)**
- ☐ The Query System does not contain data of interest to me (**skip to B1**)
- ☐ The HEALTH Web Query System is to difficult (**skip to B1**)
- ☐ I have other methods of obtaining and analysis data (**skip to C1**)
- ☐ Unable to access system due to technical difficulties (**skip to B1**)
- ☐ Other (please specify) _____ (**skip to B1)**

A4. Please indicate all of the HEALTH Web Query datasets have you accessed/used?

- ☐ Behavioral Risk Factor Survey Data (BRFSS)
- ☐ Youth Risk Behavior Survey Data (YRBS) **(skip to A.4.2)**
- ☐ All of the above

A.4.1. Which BRFSS topics did you query? Please check all that apply.

- ☐ Alcohol consumption
- ☐ Asthma
- ☐ Cholesterol
- ☐ Colorectal Cancer Screening
- ☐ Demographics
- ☐ Diabetes
- ☐ Disability
- ☐ Firearms
- ☐ Fruits and vegetables

- ☐ General Health
- ☐ Geography
- ☐ HIV/AIDS
- ☐ HIV/AIDS beliefs
- ☐ Healthcare Access
- ☐ Healthy People 2010
- ☐ Hypertension Awareness
- ☐ Immunization
- ☐ Oral Health
- ☐ Prostrate Cancer Screening
- ☐ Seatbelts
- ☐ Smoking
- ☐ Weight Control
- ☐ Women's Health
- ☐ Year

A.4.2. Which YRBS topics did you query? Please check all that apply.

- ☐ Alcohol and other drugs
- ☐ Asthma
- ☐ Demographics
- ☐ Depression and Suicide
- ☐ Personal Safety-vehicle
- ☐ Physical Activity
- ☐ Sexual Behavior
- ☐ Tobacco
- ☐ Violence
- ☐ Weight and Nutrition
- ☐ Year

A5. On average, how often do you use the HEALTH Web Query System?

- ☐ Once a day
- ☐ Once a week
- ☐ Once a month
- ☐ Once a quarter
- ☐ Once a year

A6. When was the last time you used the HEALTH Web Query System?

- ☐ Within the past week
- ☐ Within the past month
- ☐ Within the past six months
- ☐ Within the past year

A7. Please indicate how much you agree with the following statements. The last time you used the HEALTH Web Query System…

	Not at all	Some-what	Very much
a. The system performance was fast/good	☐	☐	☐
b. It was easy to follow the steps and submit my query	☐	☐	☐
c. The output was understandable	☐	☐	☐
d. The results looked correct	☐	☐	☐
e. The results were interpretable	☐	☐	☐

A8. If you answered "not at all" to any of the items above, please explain?

_____

_____

A9. The last time you used the Health Web Query System, how long did it take for you to get at least one usable result?

- ☐ Less then 15 minutes
- ☐ 16 to 20 minutes
- ☐ 21 to 29 minutes
- ☐ 30 + minutes

A10. The last time you used the HEALTH Web Query System, what question (s) were you researching?

_____

_____

A11. How did you use the information? Please check all that apply.

- ☐ General knowledge
- ☐ Grant application
- ☐ Presentation/report
- ☐ Identifying target population
- ☐ Policy Brief
- ☐ Background research
- ☐ Other (Please specify)

A.11.1. Did the information influence your course of action?

- ☐ Yes (Please specify) _____
- ☐ No

A12. What other datasets would you like to see added to the HEALTH Web Query System?

_____

_____

A13. What are your favorite features on the HEALTH Web Query System?

_____

_____

A14. What are your biggest frustrations with the HEALTH Web Query System?

_____

_____

Part B. Training

B1. Have you attended any training session on how to use the HEALTH Web Query System?

- ☐ Yes **(skip to C1)**
- ☐ No

B2. Would you be interested in attending a training session on how to use the HEALTH Web Query System?

- ☐ Yes, short presentation introduction to the Web Data Query System **(skip to B3)**
- ☐ Yes, Web Access to RI Public Health Data course **(skip to B3)**
- ☐ Not interested

B.2.1. Why not?

- ☐ I don't need the HEALTH Web Data Query System for my job **(skip to C1)**
- ☐ I will learn on my own **(skip to C1)**
- ☐ Other (Please specify) _____ **(skip to C1)**
- ☐

B3. Please give us your email address so we can contact you regarding available training.

_____

Part C. Demographics

C1. What division/center do you work for?

- ☐ Center for Emergency Preparedness
- ☐ Center for Epidemiology
- ☐ Center for Public Health Communication
- ☐ Division of Community Health and Equity
- ☐ Division of Environmental Health
- ☐ Division of Family Health
- ☐ Division of Health Services Regulation
- ☐ State Laboratories
- ☐ Office of the Medical Examiner
- ☐ Director's Office
- ☐ Other state employees
- ☐ Other (Please specify)

Part D. General Comments

D1. Additional comments:

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Thank you for your participation.