Indicator-Based Information system for Public Health (IBIS-PH)

Data, Information and Knowledge Management Category

Executive Summary

The Utah Department of Health currently has a web-based data dissemination system, called the Indicator-Based Information System for Public Health (IBIS-PH). IBIS may be accessed at the following URL: http://ibis.health.utah.gov. The system is meant to provide broad dissemination of information deemed necessary or useful for public education and public health program and policy decision-making.

a. Static Web Pages and Published Reports. IBIS-PH provides access to static pages, such as published reports (.pdf files), and information on public health, such as the role of government in public health practice and the local public health system. Reports published on IBIS-PH are keyword searchable through the University of Utah Eccles Health Sciences Library.

b. IBIS-Q Data Query System. IBIS-Q provides a user-friendly Web interface allowing custom queries of public health data sets, such as death, birth, hospital, emergency department, BRFSS, and population data. Data results are returned in tables and with graphs or maps.

c. IBIS-PH Indicator Reports. The IBIS Indicator Reports provide web reports of standardized views (including graphs and public health context) for public health indicators, such as Healthy People 2010 national health objectives, communicable diseases, risk factors, and chronic diseases.

Indicator Profile Web reports are generated dynamically from data stored in a central database. Performance and search engine indexing are enhanced by maintaining HTML artifacts of dynamic reports. Ease of Web content maintenance and timely reporting of new data and updates is accomplished through the IBIS-Admin system (described below).

Sets of indicator pages may be combined to create reports, as in the Utah Department of Health’s annual report to the state legislature, the Public Health Outcome Measures Report (http://ibis.health.utah.gov/phom/introduction.html).

d. IBIS-Admin Content Management System. The IBIS-PH Web content is maintained by a network of over 50 public health professionals, each with expertise in his or her own subject area. Those subject matter experts use the secure IBIS-Admin interface to create, update, and modify their Web content. IBIS-Admin employs a user-friendly GUI that allows subject-matter experts to create and modify indicator report data stored in the IBIS-Admin database. It also allows for system administration functions, such as granting user privileges and standardizing report elements, such as the way data sources are presented, etc.

Summary.

Without accurate and timely public health assessment information, public health dollars are wasted, opportunities for prevention are missed, and individual lives are endangered. IBIS-PH provides modern looking, interactive pages, while using standard technologies that are readily available. It is user-friendly, broadly accessible, and platform independent. Applying current, non-bleeding-edge technologies, using good software development methodologies, and obtaining the involvement and buy-in of the user community has helped us to create a system that is modern, maintainable, and functional.
A. Business problem and solution, length of time in operation.

1. Business Problem

The problem of making evidence-based public health policy, management, clinical, and personal decisions affects public health practitioners, whether they are in traditional public health environments (i.e., public sector health departments), health plans, private providers, educators, and members of the general public. Without accurate and timely public health assessment information, public health dollars are wasted, opportunities for prevention are missed, and individual lives are endangered.

- Public health policy makers need accurate and timely information on the health of the population to make informed decisions on resource allocation, legal and regulatory interventions, public information campaigns and more.
- Public health managers need public health assessment information to plan, target, and implement, effective programs that control and prevent adverse health events, evaluate progress toward health objectives, and manage their budgets and strategic plans.
- Health educators need information to provide useful and credible information, including specific local examples, to the students and the public.
- Teachers need accurate and timely information and information resources to pass along to their students.
- Health plans need information to improve the health of their customer populations, plan effectively for change, and promote disease prevention activities among their members.
- Private providers need information to direct useful, timely and appropriate healthy lifestyle and disease prevention messages to their patients.
- Public administrators (including local boards of health, healthy community leaders and others) need accurate and timely public health information to make informed decisions on resource allocation, legal and regulatory interventions.
- Members of the general public need information to make healthy lifestyle and disease prevention decisions.

2. Solution

To provide timely and credible information for public health assessment in Utah, the Utah Department of Health has developed the Indicator-Based Information System for Public Health (IBIS-PH, http://ibis.health.utah.gov). IBIS-PH is a web-based data query and public health information dissemination system that provides useful information on a large number of public health topics in an understandable format. Unlike data query systems alone, the IBIS-PH system also provides the public health context that is necessary for adequate understanding of a public health issue.

a. Static Web Pages and Published Reports. IBIS-PH provides access to static pages, such as published reports (.pdf files), and information on public health, such as the role of government in public health practice and the local public health system. Reports published on IBIS-PH are keyword searchable through the University of Utah Eccles Health Sciences Library.

b. IBIS-Q Data Query System. IBIS-Q provides a user-friendly Web interface allowing custom queries of public health data sets, such as death, birth, hospital, emergency department, BRFSS, and population data. Data results are returned in tables and with graphs or maps.

c. IBIS-PH Indicator Reports. The IBIS Indicator Reports provide web reports of standardized views (including graphs and public health context) for public health
indicators, such as Healthy People 2010 national health objectives, communicable diseases, risk factors, and chronic diseases (see Figure 1, below).

**Figure 1. IBIS-PH Indicator Profile Report Page**

Indicator Profile Web reports are generated dynamically from data stored in a central database. Performance and search engine indexing are enhanced by maintaining HTML artifacts of dynamic reports. Ease of Web content maintenance and timely reporting of new data and updates is accomplished through the IBIS-Admin system (described below).

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functions, such as granting user privileges and standardizing report elements, such as the way data sources are presented, etc.

IBIS-PH provides modern looking, interactive pages, while using standard technologies that are readily available. It is user-friendly, broadly accessible, and platform independent. Applying current, non-bleeding-edge technologies, using good software development methodologies, and obtaining the involvement and buy-in of the user community can create systems that are modern, maintainable, and functional.

**Broad public access.** IBIS-PH emphasizes broad user access. It runs on the vast majority of current Web browsers. The thin client provides minimal intrusion into the user’s computing environment and requires little or no IT expertise. IBIS-PH depends on the user having only an up-to-date version of his or her browser and an Internet connection. The SVG plug-in provides a more interactive user experience but is not necessary for viewing graphs and maps.

**Rich, interactive, and easy to use.** The query system is highly interactive with thousands of available configurations for displaying query results to meet the needs of its users. The query interface was designed to be easy to use by following Web design heuristics for usability and taking advantage of over a decade of staff experience in working closely with end users. Query results are enriched by graphical presentations of health data.

**Portability.** Almost all the software technologies used by IBIS-PH are open source and adaptable to different computing environments. The second tier of the IBIS system can run on any platform that supports standard Java Servlets, which includes virtually all hardware and operating systems in use today. The IBIS query software currently runs on HP-Unix servers, Intel Linux servers, and Intel-based servers running Apache or Microsoft’s IIS. The data processing and analysis system can be ported to run on any hardware platform and operating system that has a C compiler and a Web server that supports CGI, and that can run SAS.

**Accessibility.** The IBIS Query-Builder pages use some JavaScript to expand and collapse sections, but the pages are presented as standard HTML to the user, so they are Section 508 compliant.

**Supportability.** The IBIS-PH application is supportable for many of the same reasons that it is portable. It runs on software that is common in the industry, and is also common to most state, and many large local health departments. Because the software and hardware needs are few and typically already present in the organization, the IT department support needs are simplified.

**Security.** The IBIS-PH three-tier architecture and firewall technology provide a secure data environment to meet HIPAA requirements.

3. **Time in Operation**

The IBIS-Q query system predates other functionality, but the IBIS-PH Indicator reports and IBIS-Admin content management system were added to the Web-based data query system in 2000. The IBIS-PH system has been refined since that date, but it was in 2000 that the current system functionality was implemented.

**B. Significance to the improvement of the operation of government.**

Currently, there are over 3,000 unique individuals (IP addresses) who are visiting the website each month, making 4,700 visits, and requesting over 20,000 Web pages. IBIS-PH provides accurate, timely, relevant public health assessment information at the state and local community level to the following groups.
• State and local executive management of public health agencies, and state and local public administrators who have authority to make policy decisions that influence access to health care and health outcomes for individuals
• State and local public health practitioners who manage programs aimed at improving health outcomes for individuals through education, public awareness, financial assistance, and direct provision of services
• State legislators, county commissioners, and other elected officials who set public policy and law
• Public servants such as members of local boards of health, mayors, city managers, and others involved in the administrations of public services

C. Benefits realized by service recipients, taxpayers, agency or state.

Table 1., below, provides examples of benefits realized by Utahns. These examples were selected from those submitted by department program staff.

Table 1. Public Benefits of IBIS-PH

<table>
<thead>
<tr>
<th>IBIS Feature</th>
<th>Initial Outcome</th>
<th>Intermediate Outcomes</th>
<th>Ultimate Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to prenatal care measure on IBIS query and indicators systems</td>
<td>Reproductive health program desires to study prenatal care (Utah rate is low)</td>
<td>Factors identified associated with late entry to prenatal care and low frequency of visits</td>
<td>Development of new Baby Your Baby campaign</td>
</tr>
<tr>
<td>Health plan media department access to data on tobacco use trends</td>
<td>Data presented to medical and MPH students at University of Utah</td>
<td>Increased referrals to Utah tobacco Quit Line</td>
<td>More smokers trying to quit</td>
</tr>
<tr>
<td>Local MD requests information from infectious disease program and is referred to IBIS website</td>
<td>Improved MD understanding of both infectious and chronic diseases, and trends over time</td>
<td>More informed, thoughtful education of patients in MD’s practice</td>
<td>Improved patient understanding of disease process, and treatment instructions</td>
</tr>
<tr>
<td>Ability to query data on specific causes of injury deaths</td>
<td>Credible information for children age 0-4 for “struck by/against” cause of injury death</td>
<td>News story, including data on small children being injured by falling objects such as TV sets on dressers</td>
<td>Injury prevention message published: “Anchor down heavy objects in the home to prevent child injury.”</td>
</tr>
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<td>Heart Disease and Stroke Prevention Program access to stroke mortality and hospitalization data</td>
<td>Questions raised about pre-hospital data quality, availability</td>
<td>New data reporting requirement implemented, including training for providers on early stroke treatment</td>
<td>Public awareness campaign on stroke symptoms, use of 911</td>
</tr>
<tr>
<td>Diabetes Program access to diabetes mortality data</td>
<td>Awareness of geographic variation (urban/rural) in diabetes mortality</td>
<td>Increased training effort for providers in rural communities</td>
<td>Better patient education on self-management and treatment</td>
</tr>
</tbody>
</table>

**D. Realized return on investment, short-term/long-term payback (include summary calculations).**

It is difficult to estimate financial return on investment for the IBIS-PH system for a number of reasons. While there are certain measurable financial returns, such as reducing printing costs for paper reports and reducing the burden on staff to respond to data requests from the public, most of the benefit is in producing increased awareness and improving the health status of Utahns. Although most of our “power users” work in state government, IBIS is a Web-based product, and we are not always aware of whom our users are. For instance, teachers use IBIS in classroom instruction. But it is not known how many teachers use IBIS in the classroom. Furthermore, how should one measure the financial return on that investment?

In another example, the capacity of Utah Department of Health program staff who publish indicator profile reports for their own health objectives has increased substantially in some cases. They are expected to maintain their own health data views, and also to be able to explain data issues and interpret those data for members of the general public. The increased awareness and capacity of health program staff surely has a positive effect on their program activities (i.e., they are more likely to make evidence-based program decisions). But the financial ROI of that improved capacity is difficult to measure.