

Health Service Information Fact Sheets: Target Audience Evaluation

December 19, 2006

Prepared for:

U.S. Environmental Protection Agency
Office of Research and Development
National Risk Management Research Laboratory
26 West Martin Luther King Drive
Cincinnati, Ohio 45268

Prepared by:

Science Applications International Corporation
11251 Roger Bacon Drive
Reston, VA 20190

EPA Contract No. 68-C-02-067, WA 4-101

Notice

The U.S. Environmental Protection Agency (EPA or the Agency), through its Office of Research and Development (ORD), sponsored a series of workshops on Health Service Information Fact Sheets. During the workshops, the participants learned about risks associated with environmental factors and heart health. Participants were given the opportunity to review and comment on four fact sheet alternatives based on text prepared by EPA. This document was prepared by Science Applications International Corporation (SAIC) under Contract Number 68-C-02-067 based on feedback received from the workshop participants in writing and during the discussion periods at the workshops. The information presented herein does not necessarily represent the views of EPA. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Foreword

The U.S. Environmental Protection Agency (EPA) is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory (NRMRL) is the Agency's center for investigation of technological and management approaches for preventing and reducing risks from pollution that threaten human health and the environment. The focus of the Laboratory's research program is on methods and their cost-effectiveness for prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites, sediments and ground water; prevention and control of indoor air pollution; and restoration of ecosystems. NRMRL collaborates with both public and private sector partners to foster technologies that reduce the cost of compliance and to anticipate emerging problems. NRMRL's research provides solutions to environmental problems by: developing and promoting technologies that protect and improve the environment; advancing scientific and engineering information to support regulatory and policy decisions; and providing the technical support and information transfer to ensure implementation of environmental regulations and strategies at the national, state, and community levels. This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

Sally C. Gutierrez, Director

National Risk Management Research Laboratory

Abstract

Elderly Americans are at risk for a large number of potential pathogens and toxicants in the environment. This risk is amplified by social factors including poor health risk communication, lack of trust, and a host of other exposure-related factors. A series of health-consumer fact sheets has been prepared as outreach tools for the elderly and their caregivers to reduce these risks. This study evaluated the usefulness of these materials before final release to ensure their utility.

The fact sheets were prepared in several alternative formats varying in white space, color choice, reading-level, and graphics use. The fact sheet variants were based upon the existing Office of Aging fact sheet on heart health. Three additional variants, in addition to the existing fact sheet, were created. The thematic variants included the following: increased white space, high-graphics, and a message map.

Preferences among the alternatives were field tested at two sites in Pennsylvania. Small workshops were conducted to allow all of the various opinions of the participants to be registered.

Table of Contents

Notice	2
Foreword.....	3
Abstract.....	4
Table of Contents	5
List of Tables.....	6
List of Figures	6
Acknowledgements.....	7
Executive Summary.....	8
Section 1: Introduction	9
1.1 Background and Purpose	9
Section 2: Methodology	10
2.1 Workshop Design	10
2.2 Locations, Facilities, and Participants	10
2.3 Alternative Design.....	13
2.4 Workshop Packet and Knowledge Assessments	15
Section 3: Analysis of Results	17
3.1 Which alternative was most preferred by participants?.....	17
3.2 What were the differences between the results for the urban and rural sites?	22
3.3 What was the relationship between reported health problems and preferences? ..	24
3.4 Taken as a whole, were the alternatives an effective way to communicate with older Americans?	25
3.5 Did the pre- and post-tests indicate that the participants learned new information about environmental health?	25
3.6 What recommendations for revisions did participants make?	26
Section 5: Conclusions	28
References.....	29
Appendix A: Source Data	30
Appendix B: Workshop Packet	35
Appendix C: Alternatives	46

List of Tables

Table 1: Summary Demographic Characteristics.....	12
Table 2: Urban vs. Rural Educational Levels	13
Table 3: Preference by Alternative, Totals and Percent.....	19
Table 4: Selected Comments and Responses Supporting a Preference for More Graphical Forms.....	21
Table 5: Selected Comments and Responses Supporting a Preference for Conventional Forms	22
Table 6: Participants' Experience with Environmental Health Problem	22
Table 7: Preferred Alternatives, Urban, Rural, and Combined.....	24

List of Figures

Figure 1: Location of Centre Hall, PA and Folsom, PA Sites.	11
Figure 2: Educational Level Across Both Sites	12
Figure 3: The Four Versions: A) Existing, B) Increased White Space, C) High-graphics, and D) Message Map.	14
Figure 4: Results for Most-preferred Alternatives for Both Sites.....	17
Figure 5: Results for Least-preferred Alternatives for Both Sites.....	18
Figure 6: Preferences by Alternative	19
Figure 7: Graphical vs. Conventional, Total Rankings	20
Figure 8: Test Scores, Urban and Rural Compared.....	23
Figure 9: Preferred Alternatives for the Urban Workshops	24
Figure 10: Format Preferences by Type for Both Sites.....	25
Figure 11: Pre- and Post-test Scores Aggregated Across Both Sites.....	26

Acknowledgements

This report was prepared under the direction of Dr. Dan Petersen, U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Cincinnati, OH. The report was written by Robert Goldberg (who also facilitated the workshops) of Science Applications International Corporation (SAIC) under EPA Contract No. 68-C-02-067, WA # 4-101. Jeremy Alcorn of SAIC provided technical review. Lisa Kulujian was the SAIC Work Assignment Manager.

Executive Summary

A study was conducted to assess the effectiveness of health information fact sheets for older Americans. Pennsylvania, with its large population and high percentage of elderly, was selected as a suitable state for the sites. To compare urban and rural attitudes, senior centers were used as sites in representative communities. Three workshops (each no larger than nine participants) occurred at the urban site in Folsom, Delaware County, an older, inner-ring suburb of Philadelphia. Two workshops occurred at the rural site in Centre Hall, Centre County, a farming community near State College.

A quasi-quantitative approach was used and no measures of statistical significance were sought. Sampling was not random, although an illustrative sample was selected by knowledgeable aging professionals at each site.

Participants completed a written pre- and post-test, and engaged in a facilitated discussion of four alternatives: the existing fact sheet; one with increased white space and simplified text; a version with more graphics and a visually-based organizational scheme; and a "message map" as described by risk communication researcher Vincent Covello.

An analysis of the results indicates that older Americans may be receptive to alternate forms of printed health information fact sheets. U.S. EPA may want to consider creating fact sheets for the elderly that incorporate some of the features of the more graphical forms evaluated in these workshops. However, a sizeable minority of participants preferred the traditional forms. If one fact sheet model is desired, then U.S. EPA could combine elements of the conventional and graphical forms.

Participants also came out strongly in favor of illustrations and color as ways to highlight information, explain concepts, and provide entry points into blocks of text. Almost three-quarters of participants preferred or highly rated a graphically-rich version of the existing fact sheet. Also, a strong preference at one site emerged for the message map's way of logically sequencing information. Elements of the message map could be integrated into the proposed combined-form fact sheet, melding the best characteristics of the text-heavy and graphics-intensive forms of fact sheet.

Finally, three-quarters of participants have never used the World Wide Web to gather health information, and more than one-third still prefer print communication for health information. Thus, fact sheets are a good way to reach this target audience, although changes to the existing version of the Office of Aging fact sheet could improve its reception within some sub-groups.

Taking all of the variants as a whole, the participants appeared to learn new information from them; their pre- to post-test scores increased across the board, and many participants indicated that they had learned something new in the workshop. The text in the existing version thus would serve as an excellent starting point for any future versions desired.

Section I: Introduction

1.1 Background and Purpose

Elderly Americans are at risk for a large number of potential pathogens and toxicants in the environment. This risk is amplified by social factors including poor health risk communication, lack of trust, and a host of other exposure-related factors. A series of health-consumer fact sheets has been prepared as outreach tools for the elderly and their caregivers to reduce these risks. This study evaluated the usefulness of these materials before final release to ensure their utility.

A literature review revealed age-related changes in vision and information processing, which informed the design of the alternatives. The fact sheets were prepared in several alternative formats varying in white space, color choice, reading-level, and graphics use. Preferences among the alternatives were field tested at two sites in Pennsylvania, one urban and rural in order to reveal differences between these two subgroups within the main target audience of older Americans. Small workshops were conducted to allow the full range of participants' opinions to be registered.

The fact sheet variants were based upon the existing Office of Aging fact sheet on heart health. Three additional variants, in addition to the existing fact sheet, were designed. The thematic variants included the following: increased white space, high-graphics, and a message map (see Section 2.3 for a detailed design rationale).

Section 2: Methodology

2.1 Workshop Design

The workshops consisted of facilitated discussions in which the facilitator explained each question in the workshop packet. Participants wrote their comments on a printed workshop packet and the facilitator recorded oral comments on a flip chart. Groups were limited to a maximum of nine people to allow the facilitator to help the elderly participants complete the packet; allow for a nuanced interpretation of comments; and comply with Paperwork Reduction Act requirements. A quasi-quantitative approach was used and no measures of statistical significance were sought. The sample was selected as described in Section 2.2 below.

Each participant reviewed four full-color copies of four versions of the fact sheet, which were labeled A, B, C, or D. The facilitator used a poster display of the first page of each alternative mounted on foam core (18 inches by 24 inches) to focus the group's attention on key features of each version.

Participants were not told which alternative was the existing fact sheet, or any of the theory behind the design of the alternatives as described below. Workshops were completed in about 90 minutes. Those participants who provided a social security number and address were eligible for a \$40 honorarium payment. The workshop was described as sponsored by U.S. EPA's Office of Research and Development and Office of Aging.

2.2 Locations, Facilities, and Participants

As stated before, Pennsylvania is a state with a large elderly population and a large percentage of elderly. In 2004, persons 65 years old and over made up 15.3% of the state's population, well over the national average of 12.4% and second in rank only to Florida when compared to other states with the greatest percentage of elderly (U.S. Census Bureau, 2006).

It was decided to use two Pennsylvania sites, one urban and one rural. SAIC contacted the directors of senior centers belonging to the Senior Center Director's Association of Pennsylvania via email, with follow-up via telephone calls to selected sites. Of those who responded, SAIC selected two sites that met the following criteria:

- met location criteria of being sufficiently urban or rural,
- hosted a large population of English-speaking daycare members, and
- were willing to assist in the selection of the participants.

The urban site was the Schoolhouse Senior Center in Folsom, Pennsylvania, an inner-ring suburb of Philadelphia, four miles from the city border and close to the industrial corridor along the Delaware River. The rural site was the Centre Hall Fire Hall, located in a farming community in the center of the state, 14 miles east of State College, Pennsylvania. Centre Hall hosts the state’s annual Grange Fair Encampment. Both centers are part of their respective county’s aging services system and offer a variety of services, including daytime activities, to members. This daycare function allowed for large membership groups from which representative sample groups could be selected.



Figure 1: Location of Centre Hall, PA and Folsom, PA Sites.

Due to the unique population of the target audience (a large percentage of people suffering from senile dementia in both centers’ populations), the center directors selected the participants. Directors were instructed to select typical members who were 60 years or older, were literate, could read 12-point type in English, and had no other disabilities such as dementia that would interfere with filling out a written handout.

Thus, no attempt was made to select a random sample. However, the center directors did select participants from a variety of backgrounds in both genders, thus using so-called “typical case sampling” in which the sample is said to be “illustrative not definitive” (Patton, 1990, p. 173). In addition, this study used a quasi-quantitative approach, and no measures of statistical significance were sought.

Across both sites, the median age was 76, most participants had a high-school education, and females outnumbered males two to one. Tables 1 and 2 below summarize some of the participants’ demographic characteristics; Figure 2 below shows the breakdown of educational level for all participants. These results are presented here to orient the reader to the sample, and are discussed in detail in Section 3: Analysis of Results.

Total Number of Participants:	40 total at two sites (three groups at first site and two groups at second site)
Locations:	<ul style="list-style-type: none"> • 22 participants (n=9, n=9, n=4) at Folsom on 10/25/2006 • 18 participants (n=9, n=9) at Centre Hall on 11/16/2006
Median Age:	76
Average Age:	75
Number Male:	14 (35 percent)
Number Female:	26 (65 percent)
Number College Graduates: (see Figure 2 for additional educational detail)	2 (5 percent)
Race/Language:	38 Caucasian, 2 American Indian, all with English as primary language

Table 1: Summary Demographic Characteristics

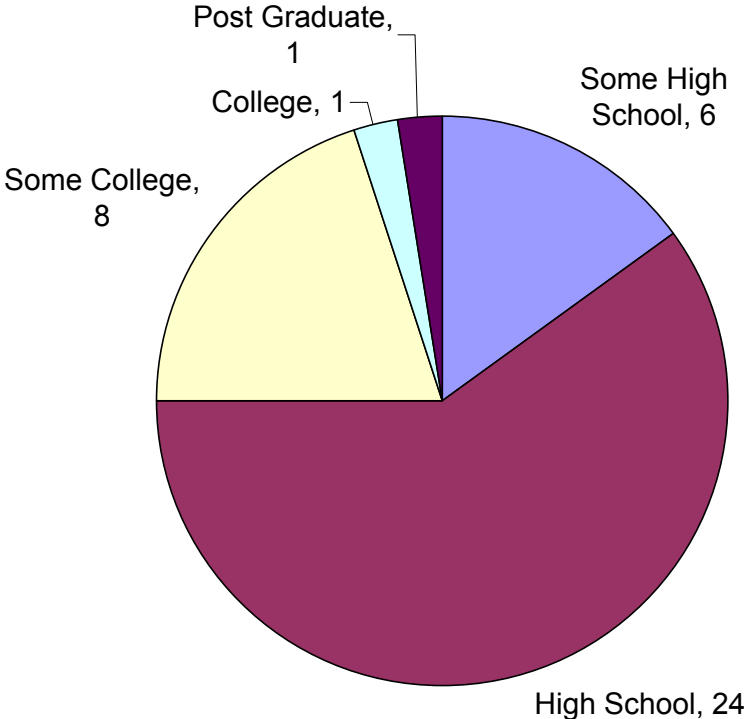


Figure 2: Educational Level Across Both Sites

	Urban	Rural	Combined
Some High School	4	2	6
High School	11	13	14
Some College	5	3	8
College	1	0	1
Post Graduate	1	0	1

Table 2: Urban vs. Rural Educational Levels

2.3 Alternative Design

Alternatives were meant to represent a progression from the existing fact sheet to progressively more schematic and visual approaches, culminating in the message map, which represented the most visual form as compared to a typical fact sheet. All were printed in color and reproduced on a commercial color copier. The alternatives are reproduced in Appendix C and Figure 3 below shows the first page of each alternative.

Existing Fact Sheet: The existing fact sheet was the low-literacy version of the fact sheet “Environmental Hazards Weigh Heavy on the Heart: Information for Older Americans and their Caregivers” prepared by U.S. EPA’s Office of Aging. This existing fact sheet was modified in a page layout program to create the three alternate versions described below.

Increased White Space: In this version, the line spacing was increased, the font was increased from 11 points to 13 points, and a similar sans-serif font with a more open character spacing was chosen. At the same time, the text was lightly edited so that it would receive a ninth-grade reading level in the standard Microsoft Word Flesch-Kincaid grade-level readability check. Otherwise, the existing layout was preserved as much as possible to be able to isolate the effects of the increased white space and reduced sentence complexity.

The next two versions, high-graphics and message map, were a response to the literature search that described the following:

- “large age-related deficits for prose recall” (Park, Morrell, & Shifren, 1999, pp. 63-64),
- the importance of primacy and recency effects, i.e., the order of information and how recently it was received greatly increases recall in older people, (Ibid, p. 65), and
- age-related declines in visual acuity, contrast sensitivity, and color discrimination and a concomitant importance of color cues for older people (Rousseau, Lamson, & Rogers, 1998, p. 646).

High-Graphics: In this version, the simplified text created for the above version was used as the basis for a reorganized, more graphically rich fact sheet. The organizational

scheme diverged from the narrative format of the existing and increased white space versions, which employ an introduction followed by a body section.

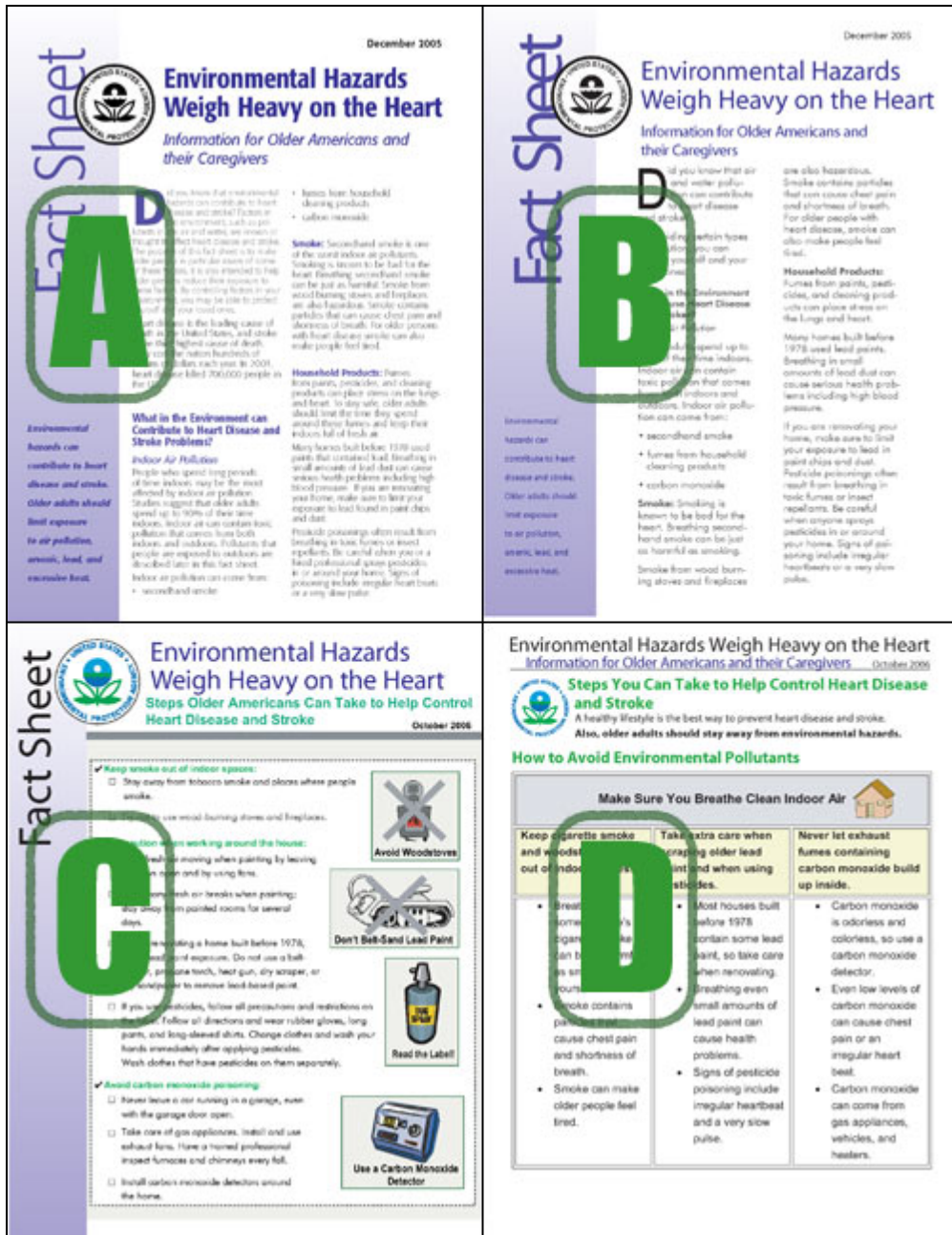


Figure 3: The Four Versions: A) Existing, B) Increased White Space, C) High-graphics, and D) Message Map.

Instead, the high-graphics version begins with a graphical checklist of important ways to avoid environmentally-induced heart problems, which in the two conventional formats resides on page three of the four-page sheet. In the high-graphics version, no introduction is used and the topic of the fact sheet is introduced through a large header at the top of the page. Also, due to the increased use of graphics, the text on the final

page of the existing version was omitted (whose topic was “Encourage Your Local Government to Take Action”).

Illustrations in the high-graphics version provided entry points into topics displayed in a list format. For example, an image of a belt sander with an “X” through it, was not meant to stand on its own as an icon but rather was intended to augment the text and visually indicate what that section was about, allowing a reader to jump to that topic in a non-linear fashion.

Responding to the research supporting the importance of color cues and an age-related difficulty discriminate between colors close in hue, the hue of subheadings was changed from a purple very close to black to a dark green that contrasted sharply with the black text.

Message Map: The message map format was intended to use the rules of message mapping as outlined by risk communication researcher Vincent Covello (Covello, 2002). It organized the messages into groups of three, and restated the main principles in three ideas of nine words each (27 words). Follow-up concepts with additional points to the top-level three appeared beneath the main points. These were laid out in a tabular format for easy visibility.

2.4 Workshop Packet and Knowledge Assessments

Participants supplied demographic information on the workshop packet (see Appendix B); this information included age, gender, educational level, opinions about environmental contamination, previous experience with environmental contamination, and current health problems.

The knowledge assessments (pre and post-test) consisted of six multiple-choice questions designed to gauge participants’ knowledge of environmental health issues covered by the fact sheets. The questions covered specific content described by the fact sheets, such as the frequency of the publishing of the Air Quality Index, as well more general environmental issues such as the ability of airborne contaminants to travel from state to state.

Including a mix of harder and straightforward questions allowed all participants to feel that they were succeeding at the evaluation, thus avoiding alienating the participants at the opening of the workshop. However, several questions required knowledge likely to be gained only from the fact sheet, including the following:

- the safest ways to remove lead paint,
- the frequency of publishing of the Air Quality Index, and
- end-of-pipe water quality issues present in home water supply piping not owned by public water suppliers.

Indeed, scores increased from pre- to post-test across all groups; see Section 3: Analysis of Results for further discussion of the pre- and post-test results.

In the evaluation portion of the workshop, participants first engaged in a group discussion, with the facilitator using the poster displays to draw the group's impressions of the differences between the four versions.

Then, participants entered their responses to open-ended questions such as "Were the fact sheets easy to understand?" and "What would you add, delete, or change?" Next, they were asked to rank the four versions with regard to clarity, level of detail, tone, and overall preference. Finally, they were given an opportunity to add reasons for the ranking and any additional comments.

It is important to note that it was challenging to accurately quantify the amount of knowledge that was gained from each of the individual alternatives. Successive reviews of alternatives added to the participants' knowledge, and thus disentangling the effect of a specific alternative was not possible. Thus, pre-and test-scores are discussed as a reflection of knowledge gained from all of the alternative fact sheets.

Section 3: Analysis of Results

3.1 Which alternative was most preferred by participants?

Across all groups and sites, the high-graphics version was the most preferred (55 percent of all participants), followed by the message map (20 percent), existing (17.5 percent), and increased white space (7.5 percent), as shown in Figure 4 below.

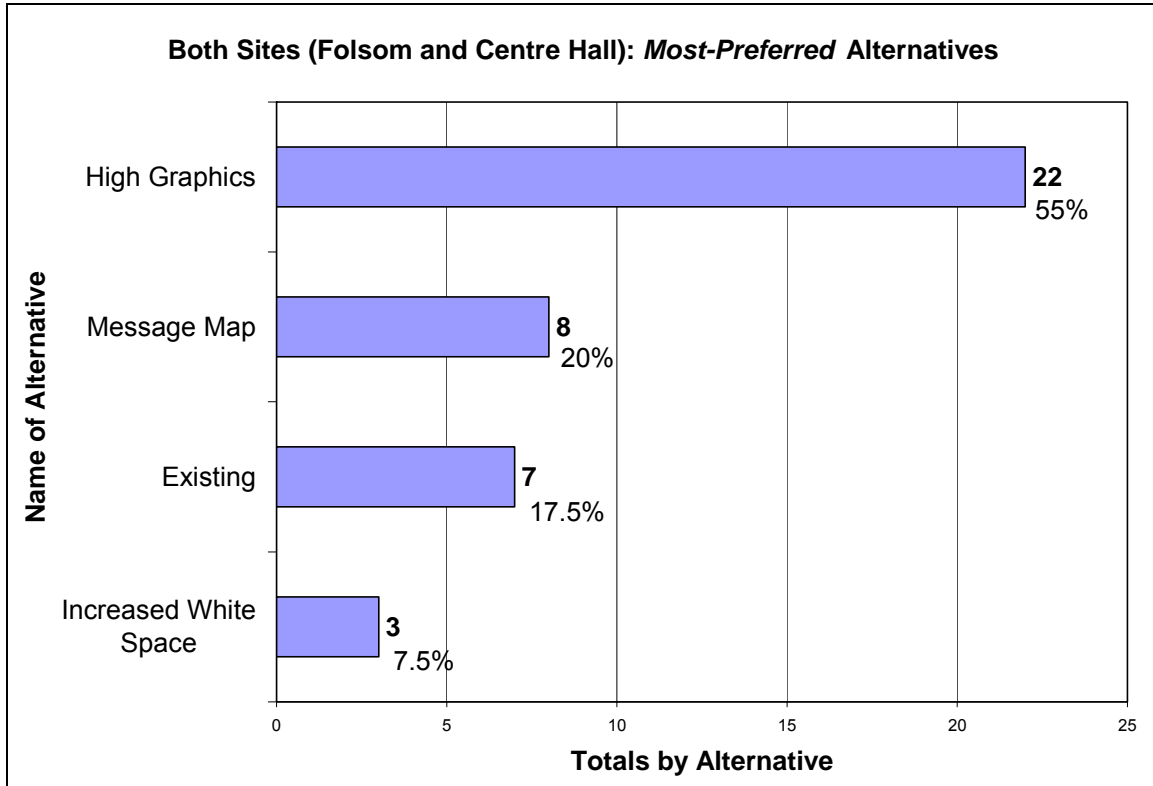


Figure 4: Results for Most-preferred Alternatives for Both Sites.¹

¹ Of those who selected the high-graphics version as their most-preferred alternative (represented by the top bar in Figure 4 above), more than one-half (12 participants) selected the existing fact sheet as their least-preferred alternative.

Looking at the opposite end of the ranking scale, Figure 5 below compares the *least-preferred* alternatives at all sites, and shows that the existing fact sheet garnered the greatest number of least-preferred rankings by a wide margin, at 52 percent of those completing the least-preferred ranking step of the packet.

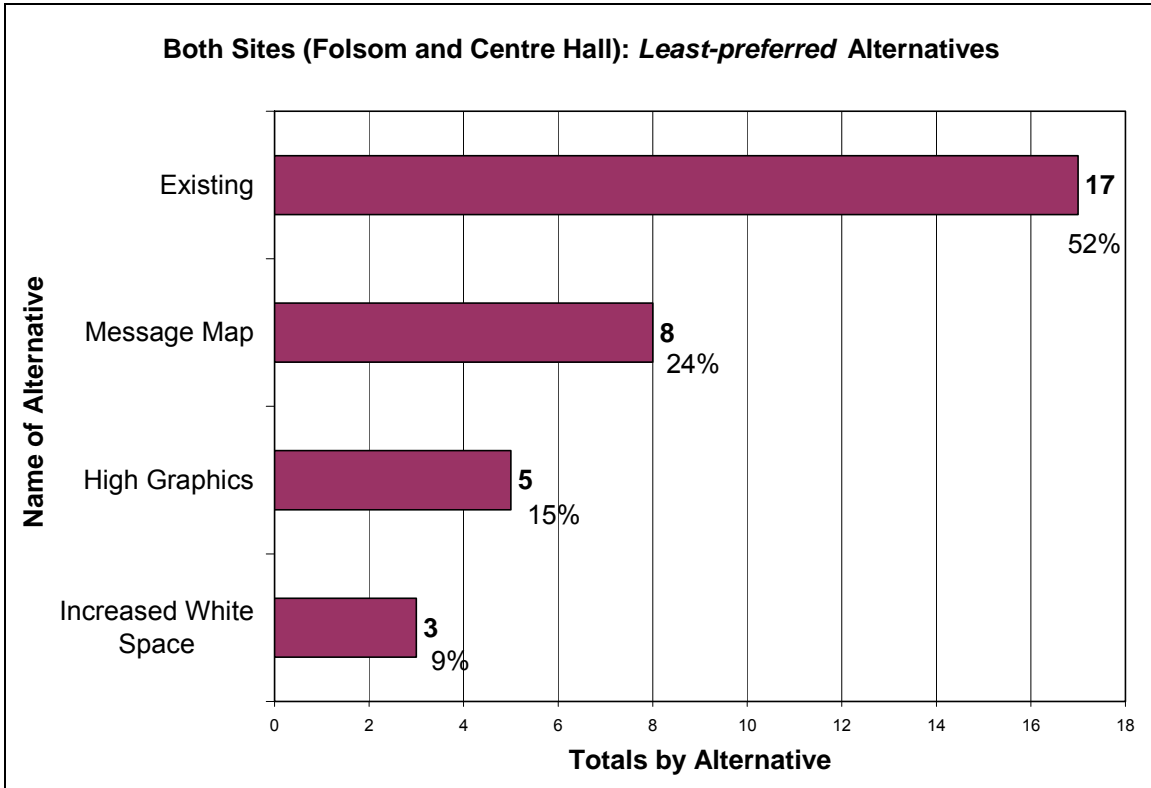


Figure 5: Results for Least-preferred Alternatives for Both Sites.²

Figure 6 and Table 3 on the next page show the total rankings for each alternative. This table and figure provide the full ranking of alternatives on a four-point scale, ranging from Best to Second-Best to Third-Best to Worst, thus providing a simultaneous view of the most- and least-preferred rankings, as well as the two middle choices.

² Of those who selected the existing fact sheet as their least favorite (represented by the top bar in Figure 5 above), a large majority (12 participants) selected the high-graphics version as their most-preferred alternative.

If one combines the results for first and second choice, 29 participants (72.5 percent of participants) rated the high-graphics version as their best or second-best choice. Similarly, if one aggregates the results for third-best and worst-choice alternatives, 24 participants (60 percent of participants) ranked the existing fact sheet as the third-best or worst.

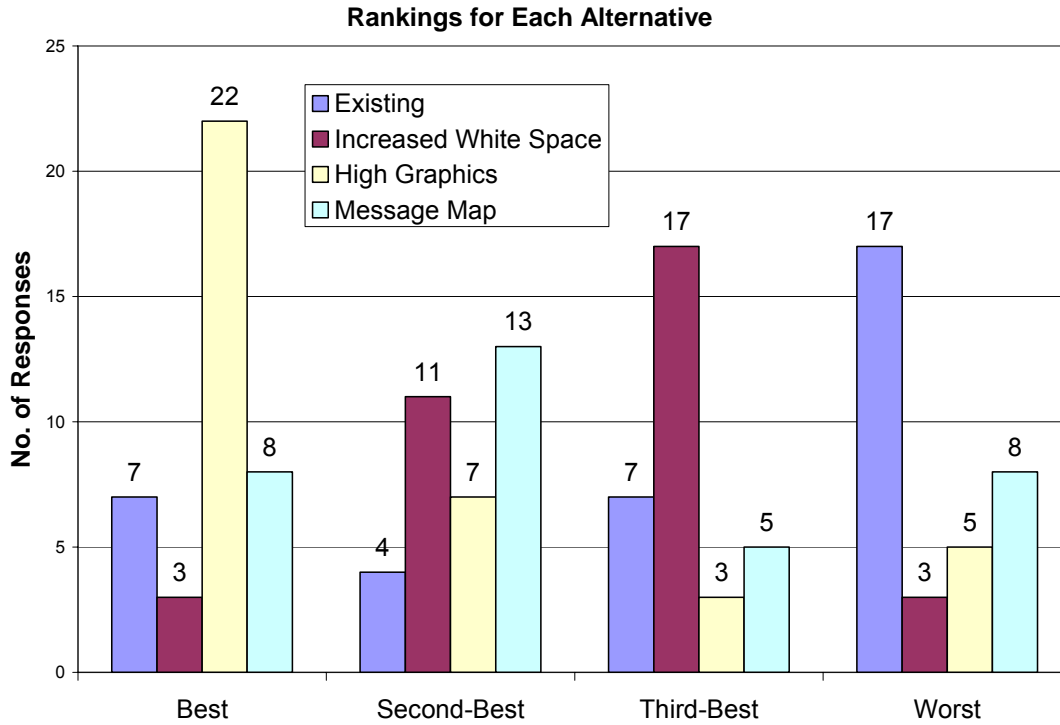


Figure 6: Preferences by Alternative

	Best (total=40)		Second Best (total=35)		Third Best (total=32)		Worst (total=34)	
	Number and % of Best Votes		Number and % of Second Votes		Number and % of Third Votes		Number and % of "Worst" Votes	
Existing	7	17.5%	4	11%	7	22%	17	50%
Increased White Space	3	7.5%	11	31%	17	53%	3	9%
High Graphics	22	55%	7	20%	3	9%	5	15%
Message Map	8	20%	13	37%	5	16%	8	24%

Table 3: Preferences by Alternative, Totals and Percent³

³ Totals not 100 percent due to rounding. Total number ranked not 40 when participants were unwilling to complete all four rankings.

The pattern that emerges from these results is a clustering of high rankings for the high-graphics version and a similar clustering of lower rankings for the existing version. These results support a conclusion that the high-graphics version was the most preferred and the existing fact sheet the least preferred.

Yet another way to examine the results is to divide the four alternatives into two groups: 1). *conventional* (existing and increased white space) and 2). *graphical* (high-graphics and message map). One can compare results for these two types as shown in Figure 7 below, which combines and plots the same data for most- and least-preferred alternatives seen earlier. For the purposes of Figure 7, a negative number denotes a negative ranking, i.e., a ranking of worst. Looking at the results this way, one can see a relatively strong preference for the graphical alternatives (30 positive rankings and only 13 negative rankings) compared to the conventional alternatives (only 10 positive rankings and 20 negative rankings).

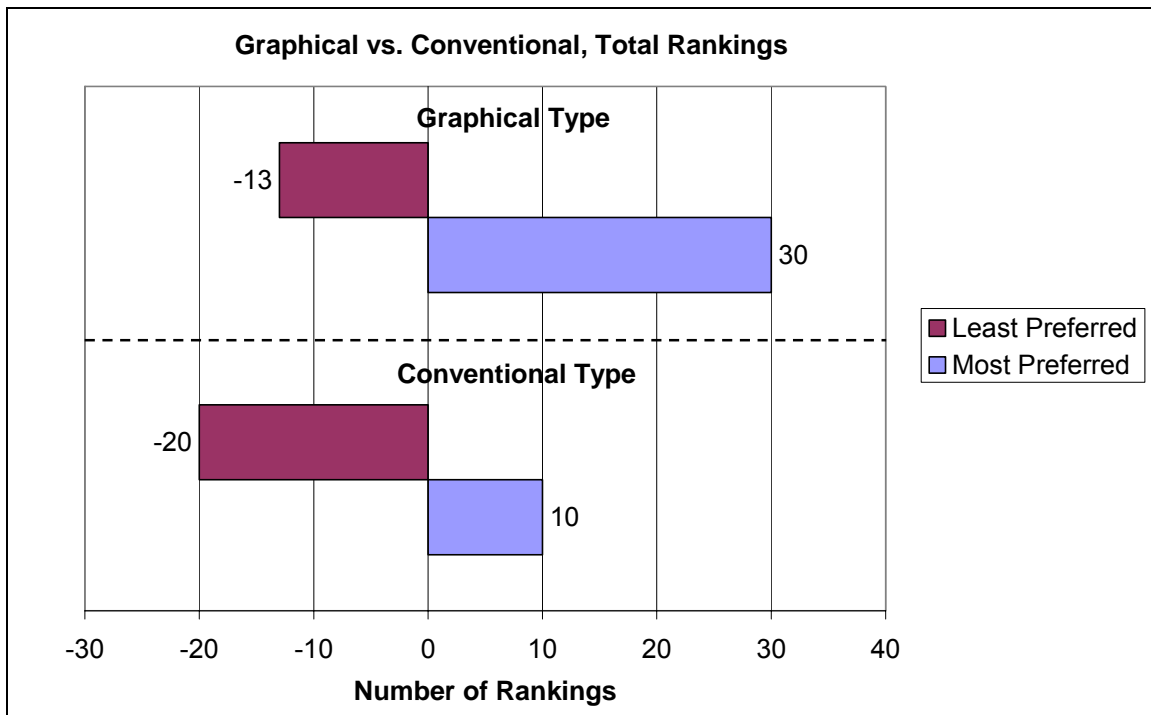


Figure 7: Graphical vs. Conventional, Total Rankings (negative numbers indicate worst choice)

This numerically-expressed preference for the more graphical forms is buttressed by the following selection of discussion comments and open-ended responses. In the chart below, comments about the conventional types appear in the two left-most columns and comments about the graphical types appear in the gray-shaded, right-most columns.

Selected Comments Indicating Preference for Graphical Type			
Existing	Increased White Space	High Graphics	Message Map
Too much information. Boring.	The spacing (line and paragraph) very good.	Liked the picture to home in on an area you'd be interested in reading.	My preference for fact reading
Too long to read. Too much.	I like large print.	I would read C [high graphics] first in a package presented to me.	Charts are better to read and understand.
Dislike single spacing. Too much information.	The information is great.	I like images for explanation. I like that U.S.A. Today. They get right to the point.	I like the simplicity of charts and lists.
Too wordy.	Less wordy.	Pictures are good – self-explanatory. Easier reading and understanding.	I like it short and to the point.
Easy to read but must read a couple of times to really understand. Keep it simple or it won't be read.		More direct and easy to refer to.	Easier to read and easier to access information.
I wish it had larger letters.	I'm a numbers person, I don't like to read, so A [existing] and B [white space] are no good.	You can read it quick and go to other things.	It works, but you have to figure out the chart first.
Too much like a book.	Good for reading.	Very easy to go to source of concern.	Gives information in a logical sequence by subject.

Table 4: Selected Comments and Responses Supporting a Preference for More Graphical Forms

However, the above table does not include some comments from a small but vocal minority at both sites who responded positively to the authoritative, comprehensive quality of the existing fact sheet and negatively to the summary aspects of the graphical versions. A few such responses follow:

Selected Comments Indicating Preference for Conventional Type			
Existing	Increased White Space	High Graphics	Message Map
I like the statistics – I like to know the numbers.	I like B [increased white space] best because I had no trouble reading it.	Colored backgrounds don't work.	I found the directives offensive. I don't want them telling me what to do.
The list of Web sites lends authority.	Narrative is nice in B [increased white space]. Use a chart such as D [message map] as a summary.	Having a lot of images would be okay for kids, but we're adults.	Almost too simple.

Table 5: Selected Comments and Responses Supporting a Preference for Conventional Forms

3.2 What were the differences between the results for the urban and rural sites?

Test Scores: Average and median scores for both the pre- and post-test were generally higher in the urban site compared to the rural site, although the differences are not great, as shown below. This result could be due to the greater familiarity the urban residents had with issues of environmental contamination, as Folsom is a working-class community near an industrial corridor while Centre Hall lies in farmland in Pennsylvania's central Ridge and Valley area.

Thus, it would stand to reason that the urban participants would answer yes to the question, "Have you ever experienced a health problem that you would identify as an environmental health problem?" Indeed, more urban participants than rural participants indicated that they had experienced an environmental problem, but the spread at 27 percent urban versus 22 percent rural was small (see Table 6 below). Further study such as individual interviews could allow researchers to tease out the exact nature of prior experience with environmental health issues. For example, during the discussions, just what constituted an environmental health problem was open to interpretation and was clouded by issues that are regulated by multiple agencies such as workplace exposure and medical waste.

Experienced Environmental Health Problem			
	Urban	Rural	Combined
Yes	6 (27%)	4 (22%)	10(25%)
No	12 (55%)	14 (78%)	26(65%)
Don't Know	4(18%)	0	4(10%)

Table 6: Participants' Experience with Environmental Health Problem

Figure 8 below compares urban and rural test scores, and shows slightly higher urban pre- and post-test averages.

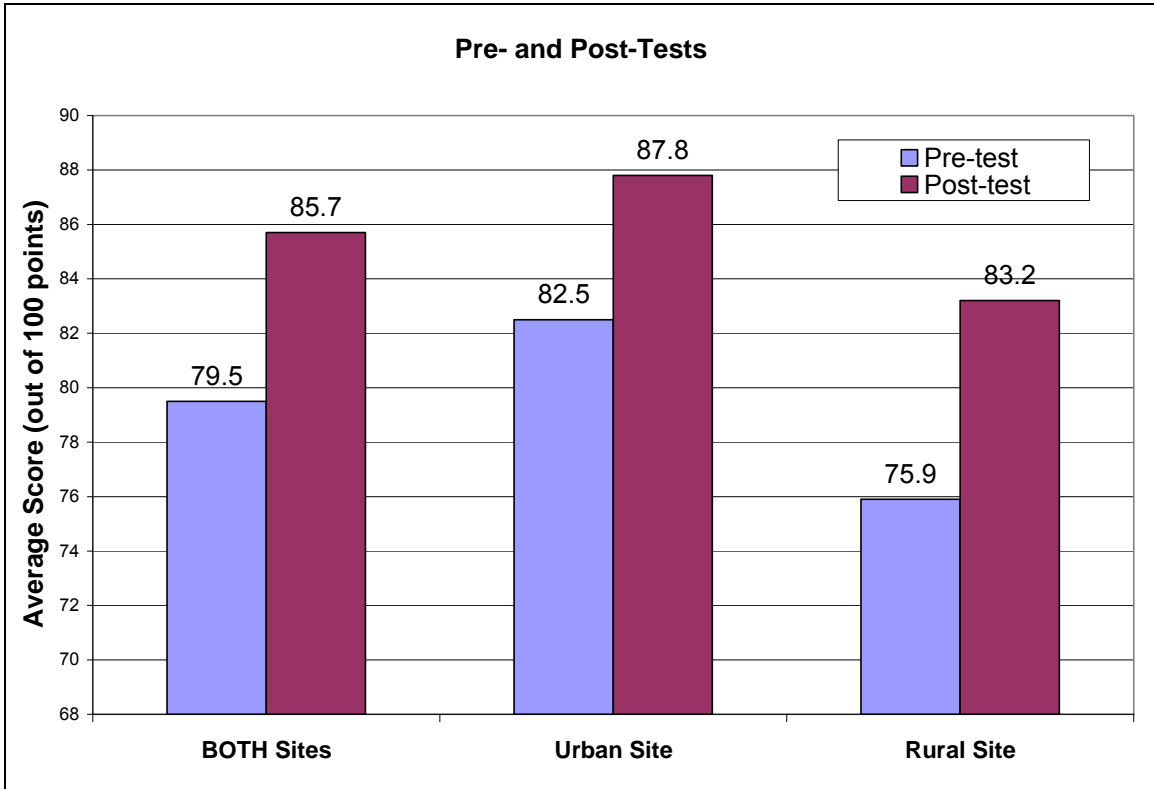


Figure 8: Test Scores, Urban and Rural Compared.

With regard to the above higher urban test scores, educational level appears not to be a factor because the educational breakdown is very similar across both sites, with the great majority of participants having a high school education in both places (see Table 2 in Section 2.2 above. (However, if one aggregates the college graduate and “some college” responses, the urban site at 27 percent is much larger than the rural site’s 17 percent.)

Preferences: With regard to differences in preferences between the two sites, Figure 9 and Table 7 show a similar preference for the high-graphics version across both sites. However, the urban site differs from the rural site in that the urban participants granted a much higher ranking to the message map (35 percent) than the rural participants did (5 percent).

	Urban	Rural	Combined
Existing	1 (5%)	3 (17%)	4 (7.5%)
Increased White Space	4 (18%)	2 (11%)	6 (17.5%)
High-graphics	10 (45%)	12 (67%)	22 (75%)
Message Map	7 (32%)	1 (5%)	8 (20%)

Table 7: Preferred Alternatives, Urban, Rural, and Combined

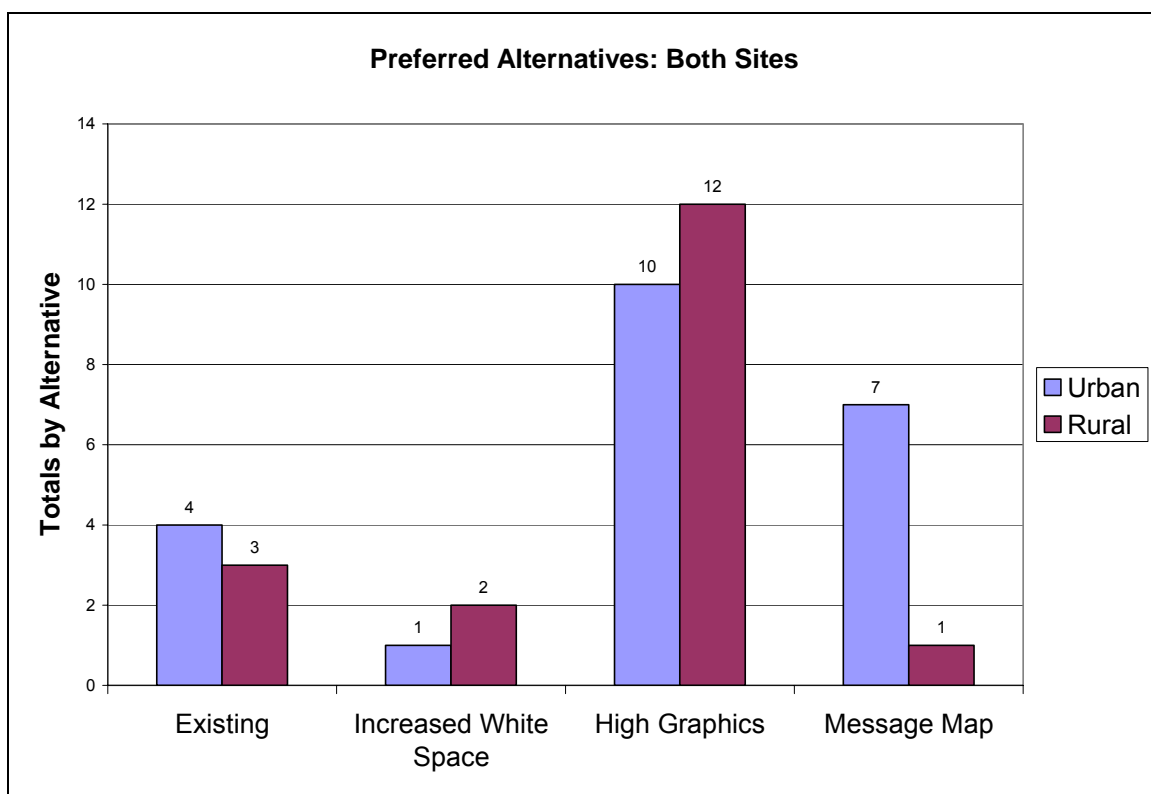


Figure 9: Preferred Alternatives for the Urban Workshops

3.3 What was the relationship between reported health problems and preferences?

Across both sites, 25 percent of all participants listed vision problems as a health problem; of this group, 80 percent chose either the high-graphics version or the message map as their preferred alternative (the remaining 20 percent split evenly between the existing version and the increased white space version). Comments indicated that the graphics and message map versions were easier to read than the other two alternatives.

3.4 Taken as a whole, were the alternatives an effective way to communicate with older Americans?

Figure 10 below shows that 47 percent of all participants preferred oral health information (e.g., talking with a medical professional), followed by 36 percent for print, 12 percent for video, and 5 percent for World Wide Web. Thus, more than a third of participants like to receive information in the form of fact sheets.

It was interesting to note that, while both centers provided Internet-connected computers for members to use, lack of computer knowledge prevented participants from using them as an information source. Just under three-quarters (72.5 percent) of participants had never used the Internet to gather health information.

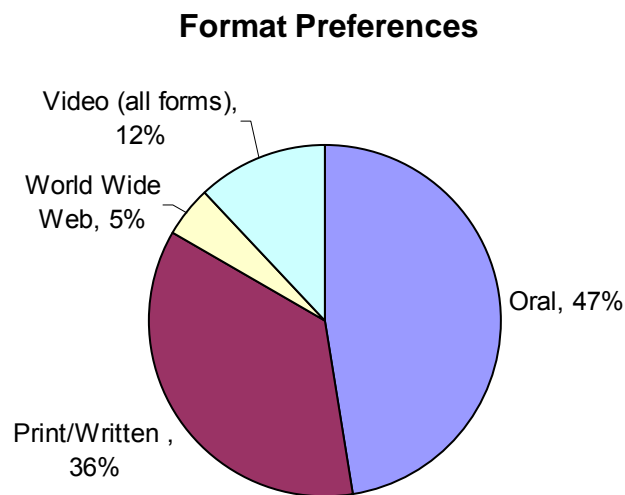


Figure 10: Format Preferences by Type for Both Sites

3.5 Did the pre- and post-tests indicate that the participants learned new information about environmental health?

One important qualification for this aspect of the evaluation is that the questions were deliberately simplified so as not to affect the participants' mood during the rest of the workshop, especially the very useful discussion sessions. Many participants at both locations had little experience interacting with governmental agencies, and appeared to be intimidated by any aspect of the workshop that reminded them that its sponsor was a federal agency. For example, of the 40 participants, only 2 had earned a college degree. Accordingly, the questions were simplified and the facilitator minimized the importance of the test results in order to be able to gather important qualitative information. Nevertheless, across both sites test scores increased from an average of 79.5 pre-test to 85.7 post-test (see Figure 11 below). (However, it should be noted that the *median* score was 83 for both the pre- and post-tests, indicating that the calculated average may be influenced by a small number of low scores, thus overstating the difference between pre and post-tests.)

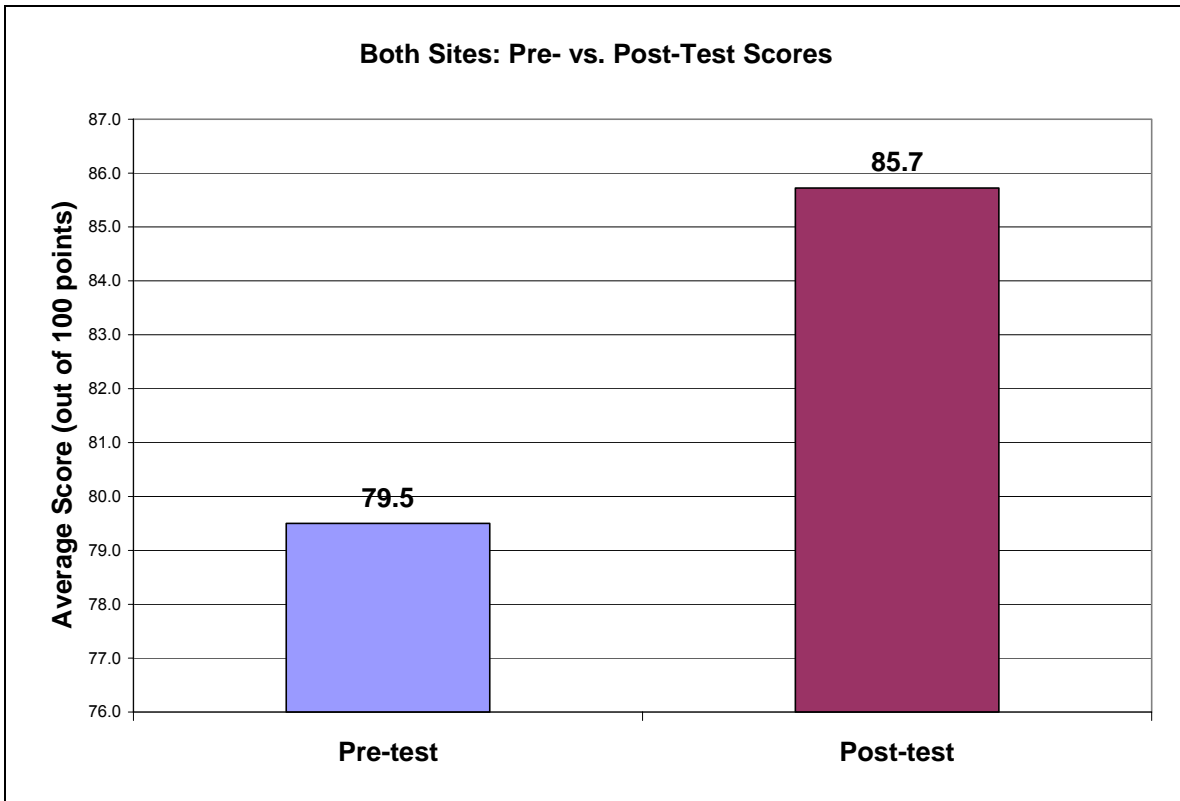


Figure 11: Pre- and Post-test Scores Aggregated Across Both Sites

Further, in response to the open-ended question “Was any of the information new to you?” participants indicated that they had learned new information about the following topics:

- running drinking water to clear standing water in plumbing before drinking,
- arsenic as a drinking water contaminant,
- wood-stove risks for people with compromised lung function,
- the existence of U.S. EPA’s Air Quality Index,
- gas stoves as a source of carbon monoxide,
- 1978 as year before which lead paint was used, and
- time spent in traffic is associated with increased heart-attack risk.

3.6 What recommendations for revisions did participants make?

Layout: Layout changes, suggested both on the packets and in the discussion period, included the following:

- Combine the conventional and graphical types to include the advantages of each.

- Add the message map as a chart within the high-graphics version.
- Add the message map as a chart within the increased white space version.
- Add the list of Web resources to the end of the increased white space version.

These comments reflect the majority of participants who preferred the high-graphics version, but also liked the way the message map presented a logical sequence of information.

Format: Format suggestions included the following:

- Print them in color. (The workshop samples were printed in color; this comment refers to copying of the fact sheets once a final version is created.)
- Whatever version used, use large type “double-spaced,” although what they were referring to as double space was actually 1.5 line spacing, e.g., “liked the double-spacing in B.”
- Don’t put text on any background color but white.

Content: Content suggestions included the following:

- Several participants assumed the discussion of heat stress was referring to global warming as the cause. Thus, they expected to see a discussion of global warming and thought it had been accidentally omitted.
- A few participants at the urban site felt that diesel particulate emissions from commercial vehicles like buses should be explained. They demanded to know why this visible source of pollution is permitted by U.S. EPA, while they must submit their vehicles for state emissions inspection.
- A few participants at the rural site suggested more information on crop pesticide/herbicide spray issues, especially health effects on people nearby during spraying.

Section 5: Conclusions

Older Americans may be receptive to alternate forms of printed health information fact sheets. U.S. EPA may want to consider creating fact sheets for the elderly that incorporate some of the features of the more graphical forms evaluated in these workshops. One caution, however, is that a sizeable minority of participants liked the traditional forms, and felt that they were familiar and authoritative. If one fact sheet model is desired, then U.S. EPA could combine elements of the conventional and graphical forms.

Participants also came out strongly in favor of illustrations and color as ways to highlight information, explain concepts, and provide entry points into blocks of text. This preference presents a challenge for the Agency as many fact sheets are downloaded from the Web and printed in black and white instead of color. One option could be to create separate gray-scale versions that would retain strong contrast between type and its background when printed in black and white. These separate versions could be posted alongside the color versions on the U.S. EPA Web site.

Also, a strong preference at one site emerged for the message map way of logically sequencing information. Elements of the message map could be integrated into the proposed combined-form fact sheet, melding the best characteristics of the text-heavy and graphics-intensive forms of fact sheet.

Although Americans increasingly have come to rely on the World Wide Web for governmental information, older Americans lag behind. Almost three-quarters of participants had never used the Web for such a purpose, and more than one-third still prefer print communication for health information. Thus, fact sheets are a good way to reach this target audience, although changes to the existing version could improve its reception by some sub-groups.

Finally, the participants appeared to learn new information from the fact sheets; their post-test scores increased across the board, and many participants indicated that they had learned something new in the workshop. The text in the existing version, clearly, had been researched and written with care, and thus provides an excellent basis for any future versions desired.

References

- Agency for Toxic Substances and Disease Registry. Evaluation primer on health risk communication programs. Retrieved September 19, 2006, from <http://www.atsdr.cdc.gov/risk/evalprimer/index.html>
- Covello, V.T. (2002). Communication in risk situations: responding to the communication challenges posed by bioterrorism and emerging infectious diseases. Retrieved September 19, 2006, from <http://astho.org/pubs/ASTHO%20Risk%20Communication%20e-Workbook.htm>
- Hancock, H.E., Rogers, W.A., & Firsik, A.D. (2001). An evaluation of warning habits and beliefs across the adult life span. *Human Factors*, 43(3), 343-354.
- Himes, C. (2002). Elderly Americans. *Population Bulletin: a Publication of the Population Reference Bureau*, 56(4), 1-40.
- Park, D.C., Morrell, R.W., & Shifren, K. (Eds.). (1999). Processing of medical information in aging patients: cognitive and human factors perspectives. Mahwah, NJ: Lawrence Erlbaum.
- Rousseau, G.K., Lamson, N., & Rogers, W.A. (1998). Designing warnings to compensate for age-related changes in perceptual and cognitive abilities. *Psychology & Marketing*, 15(7), 643-662.
- U.S. Bureau of the Census (2006). County population estimates by demographic characteristics - age, sex, race, and hispanic origin. Retrieved September 19, 2006, from <http://factfinder.census.gov>
- Weitzman, P.L., Chee, K.Y., & Levkoff, S.E. (2001). Issues in rural aging. In Levkoff, S. E., Chee, K.Y., & Noguschi, S. (Eds.), *Aging in good health*. (pp. 133-143). New York: Springer Publishing Company.
- Wogalter, M.S., Dejoy, D.M., & Laugherty, K.R. (Eds.). (1999). Warnings and risk communication. London: Taylor & Francis.

Appendix A: Source Data

Source Data: Part 1

KEY: C= Caucasian, Y=Yes, N=No, DK=Don't know, S=Single, M= married, VP=Vision problem, HBP=high blood pressure, OHP=Other heart problem, BP=breathing problem, D=Diabetes I=Important, SI=Somewhat important

Race	Eng. Primary	Marital Status	Education	Env. Health Experience	Health Problems	Living Status	Web Access	Env. Health Concern Level
C	Y	S	HS	Y	VP, HBP	Alone	No	I
C	Y	S	HS	Y	OHP	Alone	No	SI
C	Y	M	SC	N	HBP	Not Alone	Yes	I
C	Y	S	HS	DK	HBP,D	Not Alone	No	VI
C	Y	S	SHS	Y	E,D	Alone	Yes	VI
C	Y	S	SC	N	HBP, D	Alone	Yes	SI
C	Y	M	SC	N	HBP,OHP	Not Alone	No	SI
C	Y	S	C	N	VP	Alone	No	VI
C	Y	M	SHS	N	BP	Not Alone	Yes	I
C	Y	M	HS	N	HBP	Not Alone	No	I
C	Y	M	HS	Y	HBP	Not Alone	No	VI
C	Y	M	HS	N	VP, HBP	Not Alone	No	I
C	Y	M	HS	N	HBP	Not Alone	Yes	VI

Race	Eng. Primary	Marital Status	Education	Env. Health Experience	Health Problems	Living Status	Web Access	Env. Health Concern Level
C	Y	M	HS	Y	HBP	Not Alone	Yes	VI
C	Y	M	PG	N	None	Not Alone	Yes	VI
C	Y	M	SC	N	None	Not Alone	Yes	VI
C	Y	S	HS	N	VP	Alone	No	VI
C	Y	M	HS	Y	VP,HBP,OHP,BP	Not Alone	Yes	I
C	Y	S	SHS	DK	VP,S,OHP,BP	Not Alone	No	I
C	Y	S	SC	DK	OHP	Not Alone	No	I
C	Y	M	HS	N	VP,BP	Not Alone	No	SI
AI	Y	M	SHS	DK	BP	Not Alone	Yes	VI
C	Y	M	HS	N	OHP	Not Alone	No	VI
C	Y	M	HS	N	HBP,OHP,D	Alone	Y	VI
C	Y	M	SHS	Y	HBP	Not Alone	No	VI
C	Y	M	SC	N	OHP,BP	Not Alone	Yes	I
C	Y	M	SC	N	none	Not Alone	N	VI
C	Y	S	HS	N	VP.HBP.BP,D	Alone	N	VI
C	Y	S	HS	N	HBP	Not Alone	N	VI
C	Y	S	HS	N	HBP,D	Not Alone	N	I

Race	Eng. Primary	Marital Status	Education	Env. Health Experience	Health Problems	Living Status	Web Access	Env. Health Concern Level
C	Y	S	HS	N	none	Not Alone	No	I
C	Y	M	HS	N	none	Not Alone	N	I
C	Y	M	HS	N	HBP	Not Alone	Y	I
C	Y	M	SHS	Y	VP	Alone	No	VI
C	Y	M	HS	N	none	Not Alone	Y	I
C	Y	M	HS	N	none	Alone	N	SI
AI	Y	S	HS	N	S,HBP	Alone	N	VI
C	Y	S	HS	Y	VP,HBP,BP	Alone	N	VI
C	Y	S	HS	Y	VP,OHP,D	Not Alone	N	VI
C	Y	M	SC	N	HBP	Not Alone	Y	VI

Source Data Part, 2

KEY: Ranking in last four columns uses the following key: A=Existing fact sheet, B=Increased white space, C=High graphics, D=Message map.

Verbal/Radio Ranking	Printed	WWW	Video	Pre-Score	Post-Score	Ranking Most Preferred	R2	R3	R4 Least Preferred
2	1	4	3	67	100	C	B	D	A
2	1	4	3	83	100	C	D	B	A
1	4	N	1	83	83	D	C	B	A
N	1	N	N	50	50	D	C	B	A
4	2	3	1	83	100	C	D	B	A
1	3	4	2	83	100	C	D	B	A
3	1	4	2	83	83	C	D	B	A
2	1	4	3	83	83	D	C	B	A
3	2	4	1	100	100	C	B	D	A
3	1	4	2	100	100	A	B	C	D
1	1	4	4	83	100	A	D	B	C
1	2	4	3	83	83	C	D	B	A
4	1	2	3	100	100	C	D	A	B
4	1	2	3	83	83	D	A	B	C
1	2	3	4	83	83	B	A	D	C
2	3	4	1	100	100	A	B	C	D
1	2	4	3	67	83	C	D	A	B
2	1	3	4	83	83	C	B	A	D
1	3	4	2	100	100	D	C	B	A
1	3	4	2	67	67	D	C	B	A
1	2	4	3	100	100	D	A	B	C
4	3	2	1	50	50	A	B	D	C
1	2	4	3	100	83	C	D	A	B
2	4	1	3	83	83	C	B	A	D
1	2	4	3	83	83	C	N	N	N

Verbal/Radio Ranking	Printed	WWW	Video	Pre-Score	Post-Score	Ranking Most Preferred	R2	R3	R4 Least Preferred
3	1	4	2	83	100	C	A	B	D
1	2	3	4	100	100	A	B	C	D
1	2	4	3	50	83	B	C	A	D
2	1	4	3	67	67	D	C	N	N
1	2	4	3	50	67	C	B	N	A,D
1	2	4	3	50	83	C	B	A	D
1	2	4	3	100	100	A	N	ND	N
3	4	1	2	83	100	C	D	B	A
1	2	4	3	50	33	C	B	D	A
2	1	3	4	83	100	C	N	N	A
2	1	4	3	83	83	C	D	N	N
1	2	4	3	67	83	B	N	N	N
1	2	3	4	67	83	A	N	N	N
1	2	4	3	67	67	C	D	B	A
4	1	2	3	100	100	C	D	B	A

Appendix B: Workshop Packet

Appendix C: Alternatives