

HEARING LOSS: AN EDUCATIONAL AND SCREENING PROGRAM FOR AFRICAN-AMERICAN AND LATINO ELDERLY

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This article describes a study that tested the effectiveness of culturally sensitive educational material on hearing loss and performed mass screenings to evaluate the prevalence of hearing impairment among urban African-American and Latino seniors. Bilingual information booklets on hearing loss were mailed to households and senior centers in 45 census tracts with high concentrations of minority elderly. Seniors were invited for hearing evaluations and were screened using a handheld audioscope. Subjects with hearing impairment were referred for specialized testing and later telephoned to assess subsequent care. Four hundred thirty-three persons (3.14%) responded to three mailings, typically by presenting for a hearing evaluation. Responses to a brief questionnaire indicated a high degree of learning about hearing loss. Of the 296 seniors screened, 174 demonstrated abnormal hearing, but only 26% obtained further testing. Barriers to follow-up care included problems with finances, transportation, and illness. (*J Natl Med Assoc.* 1994;86:53-59.)

Key words • hearing loss • elderly • minorities
• African Americans • Latinos

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Hearing loss is a common problem that leads to substantial disability but has been poorly addressed in health promotion and education literature for older adults (*Washington Post*, January 24, 1989).¹ With regard to elderly minority populations, the additional paucity of knowledge is even more striking. Effective educational interventions that address hearing loss, particularly hearing loss among minority populations, are needed.

The high prevalence of hearing impairment among older adults has been documented in national surveys. According to the Health Interview Survey, 294 per 100 000 report hearing loss.² Hearing loss ranks fourth among chronic conditions reported by the elderly. Its prevalence is superseded only by arthritis, hypertension, and heart disease. It is more common than cataracts (164/100 000 elderly), malignant neoplasms (145/100 000), diabetes (104/100 000), and visual impairment (97/100 000).³ In an analogous survey of older Pennsylvanians, 88% of those surveyed reported having difficulty hearing over the telephone.³

Similar data on hearing loss among minority populations are unavailable. Knowledge about the prevalence of hearing loss and its causes, as well as strategies to prevent or treat hearing loss among minority populations, represents a large gap in the knowledge base. A 10-year literature review yielded one article on hearing loss among African-American elderly and none regarding Latino elderly.⁴ Yet the number of minority elderly in Pennsylvania is expected to increase by more than 32% between 1980 and 2000 with the population over 85 increasing by 185% over the same time period.³

Despite the high prevalence of hearing loss among the elderly, there are limited educational materials available to increase the elderly's awareness of the problem. In 1988, one of the investigators requested educational

information from all appropriate organizations listed in the National Information on Deafness Directory.⁵ This inquiry yielded 10 pamphlets, only two of which specifically addressed hearing loss among the elderly. One of these was written for health professionals, and another contained so little practical information that it would be unlikely to be helpful to an elderly person trying to understand the prevalence, causes, and potential treatments for hearing loss. Of particular relevance to this study, none of the pamphlets were designed for minority populations: none were in Spanish, none showed African-American or Latino elderly in photographs or drawings, and none discussed the financial or cultural barriers to the identification of hearing loss or its treatment. This omission is of particular concern in light of findings published by health educators who have shown that interventions are most successful when they address the specific racial, cultural, economic, and age-related factors that impact on a particular disease or problem.⁶

Therefore, the purpose of this study was to: 1) design and distribute to urban, minority elderly, educational material that specifically addressed hearing loss in these populations, 2) evaluate the effectiveness of this direct mail educational intervention in increasing knowledge and awareness about hearing loss and motivating those who should undergo audiological testing, and 3) gain greater understanding about the prevalence of undetected hearing loss among African-American and Latino elderly in Philadelphia by inviting the recipients of the educational material to free audiological screening.

METHODOLOGY

The project involved three phases—development of the educational booklet, screening for hearing impairment, and follow-up of those elders with identified abnormalities. After conducting more than 35 exploratory interviews with Latino and African-American elders, an 18-page informational booklet was developed that presents causes, signs, symptoms and functional consequences of hearing loss; a list of appropriate sources of information and treatment; and an invitation for a free hearing test. The reinforcement of positive attitudes toward diagnosis and treatment and correction of misconceptions identified during in-depth interviews with African-American and Latino elders was emphasized.

The 8½×11-in. booklet used large print and a double-facing page format that allowed suitable graphics to be placed centrally with related text on either side. The graphics drew from scenes of Philadelphia and persons of color and served to reinforce the concepts presented in the text. The removable last page could be

(without compromising the educational text) mailed back to the project office if the reader wished additional copies of the brochure or more information.

English and Spanish text were placed on the left and right sides of each page, and both were written at a fifth grade reading level. The Spanish translation was reviewed by several Spanish-speaking people of different ethnic origins to assure its suitability for elderly of different ethnic groups. Common phrases identified during in-depth interviews with African-American and Latino elders were incorporated into the narrative. For example, the phrases, “I’ve heard that” and “I have not heard that” were used often by the respondents when asked about causes and symptoms of hearing loss. So, in the booklet, when presenting accurate information about hearing loss, the phrase “Have you heard?” was used as a lead into the text.

The booklet was mailed directly to 19 000 households in 45 census tracts that were characterized by high concentrations of African-American (>75%) or Latino (>25%) households. Mailing lists were purchased from a commercial mailing service for households with these traits. According to 1980 census data,⁷ these 45 census tracts contained a total of 81 395 households of which 17 534 were elderly households and 13 150 were African-American or Latino elderly households. Additionally, four census tracts encompassing 8220 African-American or Latino households were selected for a direct mail campaign to every household. In this way we hoped a friend, relative, or informal caregiver of an elderly person would distribute the booklets to a senior who might benefit from the information.

Adjusting for incorrect addresses and the 80% accuracy rate guaranteed by the commercial mailing service, we estimated the mailings reached 13 800 households with elderly African-American or Latino members. Mailings were repeated twice at 10-day intervals to reinforce the information to recipients. At the time of the first mailing, 100 booklets were delivered to each of the 14 senior centers located within the 45 tracts and to block captains, church leaders, and the elders interviewed during the development phase. These centers and individuals were asked to distribute the booklets.

To evaluate the impact of the direct mail campaign and the effectiveness of the booklet in prompting response from older African Americans and Latinos, three measures of response were assessed by the team—the number of persons reporting to the screening sites for the free testing described in the booklet, the number of telephone calls received, and the number of persons returning the removable section of the booklet.

TABLE 1. CHARACTERISTICS OF THOSE WHO SOUGHT SCREENING*

Gender	No. (%)
Age (mean \pm SD)	72.8 \pm 8.8
Male	89 (39.4)
Female	157 (60.4)
Source of information on the screening	
Mail	133 (51.1)
Senior center	92 (35.4)
Church	11 (4.2)
Friend	7 (2.7)
Letter	3 (1.2)
Newspaper	2 (0.8)
Block captain	0 (0)
Store	1 (0.4)
Missing	1 (4.2)

*N = 260.

The screening was conducted on nine different dates during a 1-month period. The first screening session was timed to occur roughly 3 days after the addressees were expected to have received their first booklet. Sites for testing included senior centers, churches, and an ambulatory geriatric clinic. All sites were convenient to public transportation within the targeted census tracts.

At the time of screening, all participants were asked to complete a short questionnaire about their knowledge, attitudes, and practices regarding hearing loss. A log that recorded names, project identification numbers, and the source of information about the screening was maintained at each screening site. A Welch-Allyn audioscope was used to perform the screening tests. This instrument is a portable, battery-operated device that allows the clinician to examine the ear and then test the subject's ability to hear a 25 dB tone emitted at four different frequencies (500, 1000, 2000, and 4000 Hz). The sensitivity and specificity of the audioscope for detecting hearing impairment has been demonstrated to be excellent.⁸⁻¹¹

Finally, hearing test results for each ear were recorded on a separate sheet by the clinician performing the screening test. Each person tested received a written statement of the results. For those with identified problems, a resource list of local specialists and clinics was provided. Each of these sources had been contacted ahead of time and had agreed to be included on the list. This information was provided in English and Spanish. Persons with an abnormal result were telephoned several weeks later to determine if they had sought or received the additional testing or treatment recommended.

The results were analyzed using descriptive statistics, chi-square test, and Student's *t* test. Percentages, frequencies, parametric, and nonparametric summary

TABLE 2. PERCEPTIONS ABOUT THE CAUSES AND SYMPTOMS OF HEARING LOSS*

	% Correct	P Value
Causes of Hearing Loss		
Drugs or fumes	68.7	.001
Diet	65.5	.001
Excessive wax	91.0	.001
Ear infection	91.3	.001
Difficulty walking	66.4	.001
Punctured ear drum	90.8	.001
Nerve loss due to aging	90.4	.001
Exposure to noise	89.6	.001
Sudden loud noise	79.1	.001
Fever	25.4	.001
Birth defects	90.8	.001
Family history	28.9	.001
Signs and Symptoms of Hearing Loss		
High pitched sounds are difficult to hear	80.0	NS†
Difficult to hear in noisy places	88.3	<.001
Many repetitions	93.1	<.001
High volume on TV or radio	85.5	<.001
Tension/irritability	56.6	NS
Street noise more noticeable	54.9	NS
Lip reading	81.8	<.001
Concern expressed by family and friends	86.6	<.001

*The answers provided by the elders are compared with the "correct" answer as determined by the investigators. Chi-square was used to determine those significantly higher than the % correct expected by chance alone.

†Not significant.

statistics with 95% confidence intervals were conducted on all questionnaire items. To assess the impact of the brochure on knowledge, a quasi-experimental design was used to compare two groups of persons who had come to one of the sites for screening: those who had not been mailed the booklet and those who had. The investigator determined the "correct" answer for each of 20 questions on the signs and symptoms of hearing impairment. Item *P* values (percent correct) were compared using chi-square, and the averages were compared using unmatched *t* test to describe mailing and advertisement impact. Percents and 95% confidence intervals were used.

RESULTS

Response to the Mailing

Of the estimated 13 800 elderly households receiving the mailings, 297 responded, yielding an overall response rate of 2.15%. Most of the responses were in

TABLE 3. UNDERSTANDING OF CAUSES AMONG THE TWO COHORTS

Cause	% Correct of Those Who Did Not Get Brochure	% Correct of Those Who Got the Brochure	P
Drugs	0.47	0.68	<0.01
Diet	0.47	0.66	<0.01
Excessive wax	0.77	0.91	<0.01
Ear infection	0.87	0.91	NS
Difficulty walking	0.41	0.61	<0.001
Punctured ear drum	0.80	0.91	<0.05
Nerve loss due to aging	0.73	0.90	<0.005
Noise exposure	0.75	0.79	<0.01
Sudden loud noise	0.75	0.79	NS
Fever	0.17	0.25	NS
Birth defects	0.71	0.91	<0.005
Family history	0.28	0.28	NS
High-pitched sounds difficult to hear	0.49	0.50	NS
Difficult to hear in noisy places	0.74	0.88	<0.01
Many repetitions	0.83	0.93	<0.05
High volume on TV or radio	0.77	0.86	NS
Tension/irritability	0.47	0.57	NS
Background noise more noticeable	0.64	0.54	NS
Lip reading	0.67	0.82	<0.01
Concern expressed by family and friends	0.70	0.87	<0.005

Abbreviations: NS = not significant.

the form of individuals actually presenting to a screening site for testing (n = 133), followed by mail responses (n = 101), and phone responses (n = 63). Of those presenting for screening (Table 1), 51.1% indicated that they came because of the mailing, and approximately 9% came because they were advised to by someone else who had gotten a mailing. Thirty-five percent heard about the screening at the senior center.

Educational Impact of the Booklet

The impact of the booklet as an educational tool can be seen in Table 2. Those who received the booklet in the mail, and subsequently came to one of the sites for screening, answered questions on the causes of hearing loss more accurately than would have been expected by chance alone. Similarly, they answered most of the questions on the signs and symptoms of hearing loss more accurately than would be predicted by chance. When the responses given by elders who had not read the booklet were compared with those who had the opportunity to read the booklet, the latter group were more likely to answer questions correctly (Figures 1 and 2 and Table 3).

Results of the Screening

The results of the screening indicated a high prevalence of hearing impairment. Approximately three quarters of those tested failed to hear at least one of the tones. When

a standard definition of hearing loss is used (failure to hear more than one frequency in a given ear), 57% had abnormal hearing. The results of the screening are shown in Table 4. As would be expected in this age group, there were more persons who failed to hear the highest frequency tone (4000 Hz) than the lower frequencies (500, 1000, and 2000 Hz). There was no significant difference between the number or type of abnormalities detected in the right compared with the left ear.

Follow-Up

Telephone numbers were available for 170 of 174 elderly with an abnormality on the screening test, and 82% were reached. The results are shown on Table 5. Twenty-six percent of these persons received follow-up as recommended, and 55% did not. The majority of those who had not sought follow-up were planning to do so. Fifteen percent listed financial reasons as the barrier to follow-up care, 8% indicated lack of transportation was the reason, and 13% listed illness. Only one person (0.6%) reported not following up because of negative attitudes about hearing aids. Thirteen percent were not planning to get follow-up because they did not think the problem was serious enough. Most (58%) of those receiving follow-up evaluations had a problem confirmed by a hearing specialist. Seventeen percent were found to have normal hearing, and 22% were either awaiting the results or did not know the results.

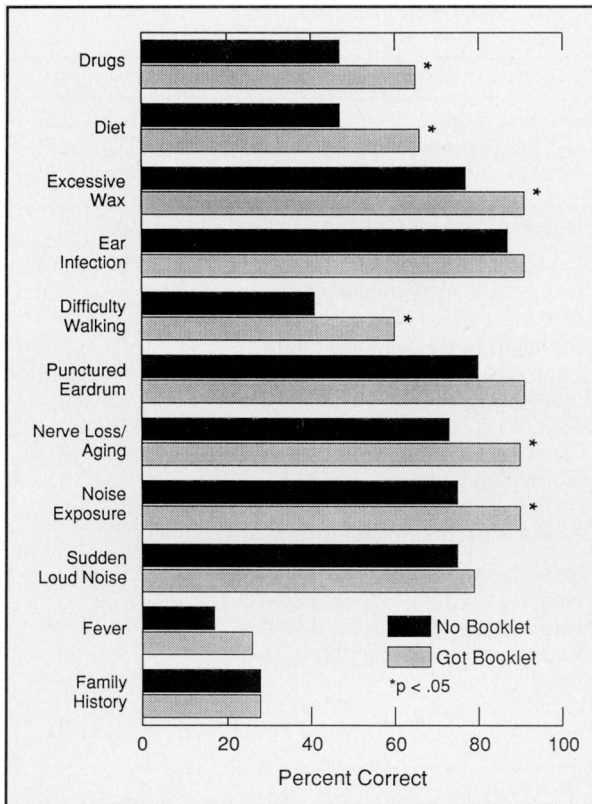


Figure 1. Graph depicting the number of elderly who received the booklet and understood hearing loss etiologies.

DISCUSSION

We conclude that inner-city African-American and Latino elders in Philadelphia respond positively to a direct mail educational campaign and that these same elders have significant amounts of hearing impairment.

The overall response rate was extremely good for a direct mail campaign. In general, mailings with a greater than 1% response rate are considered successful.^{12,13} By these criteria, our response was more than twice the expected response rate. These data support our original hypothesis that direct mail would be more effective in elderly minority populations if it addressed a topic of interest to the community and did so in a sensitive way.

Several practical points can be made about designing and producing a booklet that is bilingual, culturally sensitive, responsive to the needs of the community, and suitable for direct mailing. First, care must be taken to produce a translation that is consistent with the lexicon of everyday speech. To this end, we asked that the translation be reviewed by several people from various ethnic groups.

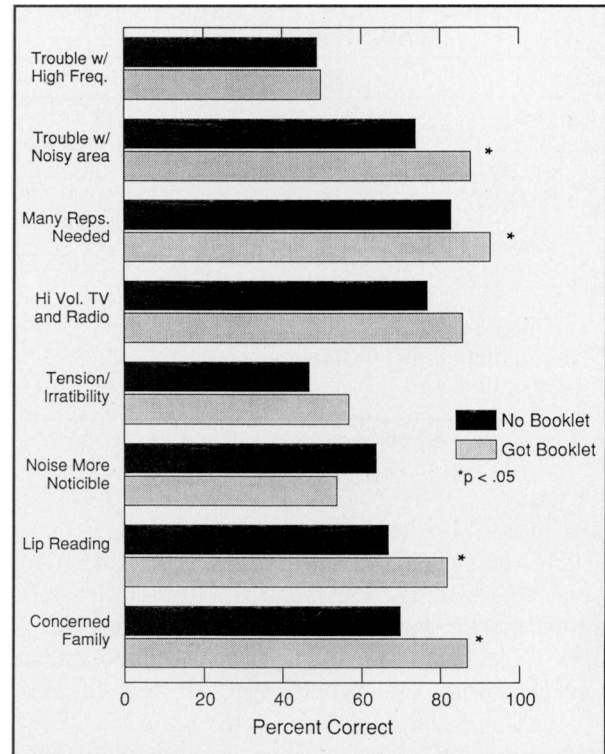


Figure 2. Graph depicting the number of elderly who received the booklet and understood hearing loss symptoms.

Second, review by potential users provided us with valuable comments that resulted in the clarification of several points. The draft booklet was critiqued and reviewed by both Latino and African-American elders, and extensive conversations with these individuals provided detailed feedback. Two of these people were former teachers, and their comments were particularly helpful.

Third, it is essential to ask an expert on literacy to review the document. Most writers are unfamiliar with recording capabilities of a specific grade level and the knowledge of which grade levels are understood by various populations. Because some older Latinos may be partially literate in English and Spanish, using a parallel format maximizes understanding.

Finally, we would emphasize the value of incorporating local scenes and people of color in the graphics used. Several people commented on how this made the booklet more personal.

There is no scientific information related to serial direct mailings. Unreferenced comments in the health promotion literature emphasize the need to send information more than once, and marketing experts suggest that frequent mailings are more successful.^{12,13} One respon-

TABLE 4. RESULTS OF SCREENING FOR HEARING IMPAIRMENT*

	Right Ear (%)	Left Ear (%)
Cerumen plug present	60 (27)	60 (27)
Unable to hear a 25 dB tone at:		
500 Hz	98 (42.1)	89 (38.2)
1000 Hz	101 (43.3)	97 (41.6)
2000 Hz	102 (43.8)	115 (49.4)
4000 Hz	134 (57.5)	150 (64.4)
	N (%)	
Any hearing abnormality	174 (74.7%)	
Missed more than two frequencies in one or both ears	148 (56.9%)	

*Test conducted using a Welch-Allyn Audioscope.

dent to a mailing said he had decided to respond after getting five notices, which adds anecdotal support for serial direct mailings. Thus, we arbitrarily decided to send the material three times and to space each mailing 7 to 10 days apart. When we asked those who came for the screening what color booklet they had received, most answered one color only, usually the last color to have been mailed. Only a few of the many screened indicated that they had received several mailings. We interpret this as suggesting that not every mailing made an impact and that multiple mailings were essential. Also, a response rate three times greater than expected from a direct mail campaign suggests that this strategy was effective.

We were disappointed in the low response resulting from secondary distribution. Our data suggest that this happened in very few instances, a finding consistent with the marketing literature. It argues for choosing the persons to send the mailing to very carefully because if the information is not relevant to them, it will be discarded.

On the other hand, the senior centers provided a very effective way of distributing the materials and ensuring convenient sites for screening. The fact that 35% of the persons we screened said they learned about the screening from their senior centers suggests the important role senior centers play in the dissemination of information. The elders in these communities looked to the senior center staff for validation that the project was credible and turned to them for answers to questions. Senior centers are an important way to reach elders in the minority communities, but they should not be the sole way.

This project demonstrates that direct mailing of educational information can be successful in another way. At the screenings, the group of elders who had received the educational material and presumably had read it

TABLE 5. TELEPHONE FOLLOW-UP SURVEY RESULTS*

	No. (%)
Got follow-up	45 (26.5)
Did not get follow-up	93 (54.7)
Couldn't reach after three calls	32 (18.8)
Reason for Not Getting Further Evaluation	
Illness (self or family member)	12 (13.0)
Didn't feel problem was serious enough	12 (13.0)
Don't like appearance of hearing aid	7 (6.0)
Planning to do so in the future	49 (52.0)
Financial reasons	14 (15.0)
Lack of transportation	8 (8.0)
Lost list	4 (4.0)
Cleaned ears—now okay	1 (1.0)
No reason given	3 (3.0)
Results of Additional Information	
Need a hearing aid	10 (22)
Hearing normal	8 (17)
Hearing abnormal but not severe	4 (8)
Excessive cerumen only	8 (17)
Infection	5 (11)
Awaiting results	1 (2)
Don't know	5 (11)

*N=170.

answered more of the questions about the causes of hearing loss correctly than did those who had not received the material. This finding suggests a positive educational impact of the mailings. We could be more confident of the educational impact if we had evaluated it using test-retest design. Hopefully, educational researchers will pick up where this project ended and explore this question further with a more rigorous research design.

The results of the screening and the follow-up interviews demonstrated a significant amount of hearing impairment in these two groups of elderly. Our results do not reflect true prevalence because this was a self-selected sample. We suspect that the prevalence of hearing loss was higher among elders who chose to be screened than in those who did not.

The disabilities associated with hearing impairment make these results clinically significant. In addition to the obvious disabilities, hearing loss is associated with significant cognitive impairment, social isolation, depression, and paranoia.¹⁴⁻²¹ Gilhome-Herbst and Humphrey reported on a sample of community-dwelling elderly in which 60% had evidence of significant hearing loss; of those with hearing loss, 53% had depressive symptoms and 20% had evidence of cognitive impairment.⁹

Similarly, among institutionalized elderly, where 36% have both hearing loss and psychiatric disorders, several investigators have found decreased performance on cognitive tests among those with hearing impairment.⁷ Patients with Alzheimer's disease and hearing loss seem to have a more rapid decline in cognitive function than those Alzheimer's patients without hearing loss.²⁰

Because hearing loss is often accompanied by a decreased ability to discern speech, particularly in noisy environments, it has been postulated that hearing loss may be associated with decreased social interactions and eventual social isolation.^{18,21} While such consequences have been described frequently, there are few studies carefully addressing the issue. One study that examined the association between presbycusis and social roles and participation did not find a correlation between the degree of hearing loss and measures of social isolation.¹⁸ Yet another British study has shown a twofold greater incidence of depression among elderly persons with hearing loss.¹⁶ Certainly, depression can lead to social isolation.

In light of these potentially preventable disabilities, the number of persons who received further testing or treatment was disappointing. We tried to facilitate the follow-up process as much as possible by preparing a resource list, contacting the providers on the list to ascertain their availability and willingness to serve our referrals, and choosing local providers to minimize problems with travel. The fact that most people with positive screens were planning to get follow-up, but had not gotten around to it, raises the question of whether subsequent follow-up might be useful.

SUMMARY

Hearing impairment appears to be a common and often untreated source of disability in inner-city older minority populations just as it is nationwide. To know whether it is truly more common, as these data suggest, and to begin understanding not only the reasons but the functional impact and potential remedies, a study using a random sample of elderly inner-city minority populations is required. Because of the tendency to underreport hearing impairment, auditory screening is preferable to self-report. However, large-scale auditory screening is impractical. Thus, screening using a hearing handicap scale may be the most reasonable next step.

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