Healthy-Aging:
Lessons from Isleta Pueblo Indian Elders

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ABSTRACT

**Purpose:** Minority health is often investigated to illustrate inequity. Few studies examine positive aspects of minority health, especially older adult health. **Methods:** The Isleta Pueblo tribe commissioned a needs assessment survey to evaluate functional impairments, socioeconomic status, daily care, and health care provided and received by Isleta elders. A total of 346 elders participated in the study. **Results:** Analyses showed self-rated health was positively related to higher income levels, fewer co-morbidities, and fewer problems with functional status. **Conclusion:** These results allow Isleta Pueblo to develop more specific services to address the needs of their elders. Developing health promotion programs for Isleta Pueblo elders should be defined in a broader context of the general well-being of elders.
BACKGROUND

Healthy aging is the subjective evaluation of being healthy by older adults, different from "successful aging" (Rowe & Kahn, 1987; Rowe & Kahn, 1997) or "productive aging" (Morrow-Howell, Hinterlong, & Sherraden, 2001) as healthy aging does not impose extrinsic criteria of what it means to age positively. The subjectivity of the term healthy aging circumvents the exclusion of older adults who have a disability or limited physical capacity as is the case with other concepts of positive aging (Niles, Doss, & Moody, 2004). The concepts of "healthy", "successful", and "productive" aging, despite their differences, are part of a broader movement within gerontology to move away from a medical model that concerns itself merely with disease and disability, and instead, to look on the positive side. This movement attempts to account for older adults who may have one or more chronic illnesses but still consider themselves healthy (Bryant, Corbett, & Kutner, 2001). The emphasis of reducing the risk of negative events remains, but now included is the concept of bolstering the positive aspects of aging as well.

Healthy aging is best defined a state of being, not as a continuum. Since feeling well and having an existing condition or disease may co-exist, these two adverse concepts do not exist on one continuum. Healthy aging is a multifaceted concept determined by a number of factors. In gerontology, self-rated health has been one of the most frequently used measures of healthy aging because it is a strong predictor of mortality (Idler & Benyamini, 1997) and disability (Kaplan, Strawbridge, Camacho, & Cohen, 1993). Levy, Slade, and Kasl (2002) report positive self-perceptions of aging predict better functional health over time.

The First National Health and Nutrition Examination Survey (NHANES) (Idler and Angel, 1990) has reported the consistent association between self-rated health and mortality across racial and ethnic groups with those having poorer health also having a higher mortality rate. An analysis of the National Health Interview Survey (NHIS) (McGee, Liao, Cao & Cooper, 1999) from 1986-1994, one of the few national studies to include a sample of American Indians (n=4,779), found a twofold increase in mortality risk with fair or poor self-rated health for all US racial/ethnic groups while controlling for age, number of bed days, number of physician visits, and years of education.
Moreover, there are studies showing variance in self-rated health across rural versus urban populations (Hays, Schoenfeld, Blazer, & Gold, 1996), across European countries (Appels, Borma, Grabauskas, Gostauskas, & Sturmans, 1996), and by gender with men evaluating their health more positively than women (Anson, Paran, Neuman, & Tarnopolsky, 1993). However, there are studies that show these differences disappear when adjusting for several health related variables (Jylha, Guralnik, Ferucci, Jokela, & Heikkinen, 1998). The primary well-known difference in self-rated health is between African Americans and whites while controlling for education (Ferraro, 1987; Ferraro, 1989), level of financial strain (Krause, 1987), and household income (Dowd & Bengston, 1978). However, the extent to which extensive controls for socioeconomic status could account for black/white differences in health has not been sufficiently examined, largely because data sources typically offer only limited indicators of socioeconomic status.

**Gender**

Throughout the world, women outlive men. Using data from the 1994 European Community Household Panel, Robine and colleagues (2002) found considerable variation in gender differentials for both total and active life expectancies at age 65 years. Some countries reported experiencing a 20% lower life expectancy at age 65 years for men compared to women. Even when given a specific health state, older women tend to survive longer than older men (Arber & Ginn, 1991), implying that morbidity for older women is longer lasting than among men (Deeg, Portrait, & Lindeboom, 2002). Because of this increased longevity, older women tend to report poorer health, while men report expecting slightly poorer health in the future (Deeg & Kriegsman, 2003).

**Health and Age**

The primary determinant or antecedent of healthy aging is the lack of diseases or morbidities. It is often erroneously assumed that the relationship between morbidity and age is linear. However, a review of studies on centenarians (individuals 100 years and older) reported centenarians were healthier than their younger counterparts (Larkin, 1999) and not simply through surviving diseases and/or other ravages of life. Older age is not an independent factor but rather a proxy for the likelihood of the individual to have
experienced diseases. Age by itself is not a casual factor but rather is associated with diminished-aging.

**Marital Status**

Although women typically report lower marital satisfaction than do men (Umberson, Chen, House, Hopkins, & Slaten, 1996), being married has been shown to be positively correlated with higher self-reported health in contrast to being divorced or widowed (Lee, Seccombe, & Shehan, 1991; Rogers, 1995; Ross, 1995). Marriage helps provide stability across myriad domains (economic, living arrangement, relationship, and nutrition) and contributes to the well-being of the individual (Brown, 2000). Cohabitors, on average, are more depressed than their married counterparts (Brown, 2000; Lee Demaris, Bavin, & Sullivan, 2001; Lamb, 2003). In general, widowers are more likely to be women, and widowers are more likely to be depressed in comparison to their married and single counterparts. These differences are larger among men than women (Cooney & Dunne, 2001; Lee, Willetts, & Secombe, 1998; Umberson, Wortman, & Kessler, 1992). In contrast, those who were never married, reported fewer depressive symptoms than their divorced and widowed counterparts, but reported more depression than those who were married. In the majority of those who were never-married, most were unlikely to have children, and family support tends to be weak in this group but is offset by extensive friendship networks (Cooney & Dunne, 2001).

**Income**

More than half of the black-white mortality difference in the United States can been explained by race, education, and income (Smith, & Raynard, 1997; House, & Williams, 2001), with race becoming more pronounced at older age mortality (Sorlie, Backlund, & Keller, 1992). The incontrovertible fact is that race and income, as well as their interaction, have consistently and overwhelming been shown to be the primary determinants in predicting ill-health and treatment (Smedley, Stith, & Nelson, 2003). This relationship has been documented for nearly two centuries (Krieger, 2001). Three decades ago, in the United States, the work of Kitagawa and Hauser exposed this relationship using American data (Kitagawa, & Hauser, 1973). Similarly, the recent Institute of Medicine’s “Unequal Treatment” report (Smedley, Stith, & Nelson, 2003)
provides further evidence that race and income disparities exist in the treatment of minorities.

Given this overwhelming scientific evidence, it is surprising to find that the majority of national data could not be analyzed by race and ethnicity in the Healthy People 2010 initiative, despite the fact that racial and ethnic specific data are important variables that must be considered in order to ultimately reduce or eliminate disparities.

**Physical Functioning**

Healthy aging is determined not just by good health, but the capacity to function without severe limitations. Guralnik & Kaplan, (1989), found positive relationships between higher levels of physical ability and healthy aging. With the burgeoning use of activities of daily living (ADLs) and instrumental activities of daily living (IADLs) as standards to measure the ability to perform tasks associated with self-care, healthy aging has been defined as having the capacity to perform daily routines and chores (Gama, Damian, Del Molino, Lopez, Ferez, & Inglesias, 2000). Functional limitations significantly predict the number of hospital and physician visits (Johnson, & Wolinsky, 1994), nursing home admissions (Branch & Lu, 1989), and mortality (Sauvaget, Tsuhi, Aonuma, & Hisamichi, 1999).

Healthy aging is a complex, multifactorial concept that has both antecedents and consequences (Hansen-Kyle, 2005). According to Walker and Avant (1995) antecedents are events which must exist for the condition to be expressed, while consequences are events which result from the condition of healthy aging. Hansen-Kyle (2005) identify (1) physical ability, nutrition, and lifestyle; (2) cognitive and mental factors; and (3) social support as necessary antecedents to healthy-aging. Consequences are defined as (1) successful aging, (2) independence, and (3) autonomy. It is therefore imperative to understand healthy aging as a stage in the process of actualization, which ultimately helps determine decreased morbidity, increased life-expectancy and continued well-being.

**American Indians**

Studies examining how American Indians and Alaska Native (AI/AN) tribal groups define healthy aging are few. Similar to Dowd and Bengstrom’s (1978) results, Seccombe (1989) showed self-reported health differences between elderly Alaska
Natives and whites disappeared when income and education were controlled. Similarly, the National Resource Center on Native American Aging (NRCNAA) (2004a), gathered needs assessment data from 133 tribes from 89 different sites in 22 states (n=9,403 American Indian elder participants) and showed socioeconomic factors significantly contributed to AI/AN health status. Further, these national data identified: a) AI/AN elders had a higher prevalence of arthritis, congestive heart failure, stroke, asthma, prostate cancer, high blood pressure and diabetes than the general population ages 55 and older, b) female AI/AN elders had a significantly higher prevalence of diabetes, higher blood pressures, other cancers (not including breast, colon/rectal and lung cancer), cataracts, asthma, arthritis and moderately severe to severe functional limitations, c) the prevalence of arthritis, congestive heart failure, stroke, cataracts, colon/rectal cancer, prostate cancer and functional limitation increased significantly with age; whereas the prevalence of asthma and diabetes decreased with age, d) low income was associated with an increased prevalence of a functional limitation, arthritis, diabetes and stroke, and e) the number of chronic diseases reported by AI/AN elders was positively related to the number of functional limitations.

The purpose of the present study was to investigate how age, gender, co-morbidities, marital status, income, instrumental/activities of daily living, and receiving economic assistance were associated with subjective levels of healthy aging among a reservation-based American Indian population in New Mexico.

METHODS

Sample size

In the present study, the U.S. Census provided the initial estimates to identify all older adults at Isleta Pueblo. However, the final sample was selected from Tribal roles. All individuals who were aged 60 and older by November, 2003, were selected as part of the census for the study. The Isleta Pueblo Census from tribal records identified 476 elders, 60 years and older in the fall of 2004 (compared to 460 in the U.S. Census for 2000). Attempts were made to contact all of the 476 elders. The final sample size was 346 elders who were 60 years and older, a response rate of 72.7%. Although no log was maintained on non-respondents, a post-study evaluation identified that out of the 130 who were not captured by the survey, more than half were not at home when the
interviewers called at their residence despite repeated attempts, while less than 25% refused to participate, and approximately 25% were either too ill to participate, were deceased, or were unable to participate for various undisclosed reasons.

The study protocol was reviewed by the Isleta Tribal Council and permission was granted by two tribal resolutions to conduct the study and submit the manuscript for publication. Additionally, the study protocol was reviewed and approved by the human subjects protection committees of San Diego State University and the University of California, San Diego.

**Survey**

In 2003, the needs assessment survey was drafted, piloted tested with three elders employed by the Isleta Pueblo, and finalized by Isleta staff. The survey was one page and could be completed in 5-10 minutes. Included were questions about standard demographics, self-rated health, a list of 13 possible disease/conditions (has a doctor ever told you had…) including osteoporosis and depression, problems with activities of daily living (ADL) which were a possible total of six items coded as yes or no (bathing, dressing, eating, getting in and out of bed, walking, and getting to and using the toilet) and problems with instrumental activities of daily living (IADL) which were a possible total of seven items coded as yes or no (preparing own meals, shopping managing own money, using the telephone, doing heaving housework, doing light housework, and getting out of the house). Questions about income, benefits, other assistance and providing or receiving care were included, and income categories were related to eligibility levels established for the Medicaid waiver program in New Mexico.

A training session was conducted by the project coordinator and the director of the Department of Elderly Services at Isleta Pueblo. The training session addressed the reasons for the questions and the type of information each question was designed to elicit. The training session also focused on nuances of question delivery and how to address inconclusive or ambiguous answers, or answers that did not have an appropriate response box in the scan sheets. The director of the Department of Elderly Services at Isleta Pueblo and the project coordinator provided individual hands-on training to the interviewers. Ten elderly center employees were trained and carried out the interviews. All interviewers either lived or worked at Isleta Pueblo for numerous
years and were sensitive to the cultural context. Language of the interview was chosen by the participant and interviews were conducted predominantly in English (over 90%), with less than 10% in Tiwa (Isleta native language).

Fifty-two records had missing ages; and a post study investigation, using local service databases, identified the ages for eighteen records which were later appended to the database.

**Statistical Analyses**

Differences in proportions for unadjusted variables were estimated using a chi-square test, and by a Mantel Hanszæl chi-square test when adjusted. Significant differences for continuous variable were estimated by general linear regression models while controlling for age. Continuous variables were normally distributed and did not require transformation. Odds ratios were modeled on diminished aging and were estimated using the logistic regression procedure, a 95% confidence interval to determine significance at an alpha level of 0.05, and an adjusted R-squared to report the overall amount of variance explained in the nominal dependent variable, healthy aging versus diminished aging. (An adjusted R-squared of 1.0 would signify the model explains all of the variance in the data.) Logistic models were incremental with each variable entered sequentially. All data analyses tests were performed using SAS Software Version 9.1.

**RESULTS**

**Overall sample**

The needs assessment survey was completed by a total of 346 elders who were 60 years or older. Twenty-five elders in the sample were aged 90 years or older. Almost two-thirds 60% were female (60%, n=213). Half of the respondents were currently married (47%), while the second largest group were widowers (28%) More than seven percent had never married (data not shown). Isleta elders reported good (37%), very good (19%), or excellent (6%) health, totaling 62.7% (n=217) and this group was identified as the healthy aging group. More than a quarter (29%) reported fair health while only seven percent reported poor health, and this combined group was identified as the diminished aging group (37.3%, n=129).
The primary co-morbid health conditions Isleta elders identified by self-report were arthritis (39%), high blood pressure (38%), and diabetes/dialysis (33%). Cataracts were reported by 17%, followed by heart disease (13%), osteoporosis (11%), stroke (8%), depression (6%), asthma (4%), lung disease (3%), breast cancer (2%), prostate cancer (1%), and other cancers (2%) (data not shown).

Less than one-third (29%) of the sample reported a problem with performing heavy housework, and this, combined with problems walking (27%), constituted the primary physical problems reported by Isleta elders. Other problems in order of severity were: shopping for personal items (16%), getting out of the house (13%), bathing/showering (13%), preparing own meals (12%), doing light housework (11%), getting in and out of bed (10%), managing money (9%), dressing (9%), using telephone (7%), getting to and using toilet (6%), and eating (4%). Just over 14% reported problems with only one I/ADL, while only seven percent reported two I/ADLs.

Twenty seven percent of Isleta elders provided care predominantly to their spouse (7%) or parent (6.8%), followed by grandchildren (5%), son or daughter (3%), a non-relative (2.2%) and other relatives (1.1%). Fewer than 3% provided care to multiple recipients. Interestingly, and possibly an AI/AN specific situation, approximately the same percentage of Isleta elders who provided care also received care. Twenty nine percent received care provided by their sons or daughters in 14% of cases, followed by care provided by their spouse. In six percent of the cases of care receiving, there were two or more care providers.

Seventy percent of the sample reported receiving Social Security. In addition, around one in four of the sampled Isleta elders received Medicaid (23%), and some other type of economic assistance (25%). Just over a third (36%) of Isleta elders reported a personal annual income of between $4,000 and $6,700.

**Stratification by healthy vs. diminished aging**

Gender distributions for those in the healthy aging group versus the diminished aging group were similar, with women comprising the majority of the sample (Table 1). Age distribution by five-year intervals was significantly different (p < 0.001) between the groups with the healthy aging group having more elders in the lower age categories and the diminished age group having more elders in the older age categories. Overall, the
healthy aging group was significantly younger at 71 years versus 76 years in the diminished aging group \((p < 0.001)\) (Table 2).

The healthy aging group had a significantly higher proportion of elders distributed across the higher income categories \((50\% \text{ with over } \$8,000 \text{ per year})\) compared with the diminished aging group \((75\% \text{ with less than } \$8,000 \text{ per year})\) \((p < 0.001)\) (Table 1). The healthy aging group was more likely to be married than the diminished aging group but this difference was not significant. The healthy aging group was also significantly less likely than the diminished aging group to receive care \((p < 0.001)\), social security \((p < 0.001)\), Medicaid \((p < 0.01)\), or other assistance \((p < 0.01)\), and were more likely to provide care but this difference was not significant.

When compared with the diminished aging group, the healthy aging group had a significantly lower mean number of co-morbid conditions \((1.2 \text{ vs. } 2.7, p < 0.001)\), problems with ADLs \((0.2 \text{ vs. } 1.3, p < 0.001)\), problems with IADLs \((0.5 \text{ vs. } 1.7, p < 0.001)\), and total combined ADLs and IADLs \((0.7 \text{ vs. } 3.1, p < 0.001)\) (Table 2).

The odds ratio analyses results estimated age, number of co-morbid conditions, income, ADLs, IADLs, or combined ADLs with IADLS were all significantly related to diminished aging, whereas gender, marital status, and other assistance were not significantly associated with diminished aging (Table 3). All the odds ratios for these variables indicated a positively related risk for diminished aging, except for income where a significant odds ratio of 0.5 \((0.4, 0.7, 95\% \text{ confidence interval})\) indicated higher income was a protective factor for diminished aging. The final model (includes all the variables listed in the table) explained 51\% of the variance in diminished-health, with each variable entered into the model incrementally and progressively explaining more of the variance. The number of chronic diseases/conditions reported was the major predictor of diminished aging (explaining 28\%).

**Chronic disease rates**

AI/AN tribal groups have consistently been shown to have higher morbidity and mortality rates than the general U.S. population (IHS, 2004). However, Isleta Pueblo elders reported fewer chronic conditions when compared with other national AI/AN tribal groups. The prevalence of 11 chronic diseases were slightly less (except congestive
heart failure which was similar) than those reported from the national study on Al/ANs undertaken by NRCNAA (2004a)(Table 4).

**I/ADL rates**

Once again, Isleta Pueblo elders reported fewer problems with both ADLs and IADLs in comparison with other national Al/AN elders (NRCNAA, 2004b), and with US elders in general (Table 5). Under one-third (29%) reported a problem with performing heavy housework or walking (28%), the two primary physical problems of Isleta and similar to other Al/AN elders, but not elders from the National Long-Term Care Survey, (1994). Other problems for Isleta elders in order of severity were: shopping for personal items, getting out of the house, bathing/showering, preparing own meal, doing light housework, getting in and out of bed, managing own money, dressing, using telephone, getting to and using toilet, and eating. Overall, more than two-thirds of Isleta elders reported no problems with ADLs (68%) or IADLs (64%). Just 17% had problems with one I/ADL, approximately five percent reported two I/ADLs, and less than 15% reported three or more I/ADLs.

**DISCUSSION**

A needs assessment survey to evaluate functional impairments, socioeconomic status, and daily health and health care provided and received by 353 Isleta Pueblo elders was conducted in 2003-2004 in New Mexico. The results indicated Isleta elders were primarily healthy and both provided and received care. Healthy aging (self-rated health = excellent, very good, or good) was associated with higher income levels, less problems with I/ADLs, fewer co-morbidities, and a younger age. In comparison with national data concerning Al/AN elder groups, Isleta Pueblo elders reported lower chronic disease prevalence rates and fewer problems with I/ADLs. These results indicate Isleta Pueblo elders are aging well compared with other Indian tribal groups with regard to both their number of diseases/conditions as well as their own self-reported health. We speculate this is probably due in part to the activities, events, and social support provided by the Isleta Pueblo Department of Elderly Services.

As stated earlier, the only national study of self-reported health status located which included Al/AN tribal groups was McGee et al. (1999) using the NHIS data who reported a prevalence rate for diminished health (fair or poor self-rated health) as
approximately 38% for AI/AN men and 37% for AI/AN women all aged 55-74 years. For AI/ANs aged 75+ the rates were considerably higher at 47% for men, and 46% for women. Although not directly comparable because Isleta Pueblo participants were all over the age of 60 years, overall rates were slightly lower than the NHIS data with 35.3% of Isleta Pueblo men and 33.5% of Isleta Pueblo women reporting diminished health. When stratified by ages 60-74, and 75+, 26.0% and 46.0% of Isleta men (respectively) and 30.7% and 56.9% of Isleta women (respectively) reported diminished self-reported health. These diminished aging rates for the oldest Isleta male elders were similar to NHIS AI/AN men, but rates were considerably higher for the oldest Isleta female elders compared with NHIS AI/AN women. Diminished health among Isleta women aged 75 years and older might reflect the presence of much older women in the Isleta sample compared with the NHIS sample. There were 70 women aged 75 and older constituting more than 36% of the sample.

The primary health condition reported by Isleta elders over aged 60 years was arthritis (39%), a slightly higher prevalence than among all US adults who have reported arthritis as the leading cause of disability. In 2001, the estimated prevalence of arthritis among U.S. adults was 33.0%, representing approximately 69.9 million adults, including 10.6% (22.4 million) of the adult population. For those adults aged 45 years and older, more than 52% reported suffering from arthritis (Bolen, Helmick, Sacks & Langmaid, 2001).

Isleta elders reported hypertension (38%) as the second highest most prevalent condition, a rate higher than that for the total US population at 25.8% and more than twice as high than the rate for AI/AN groups in New Mexico at 17% (CDC, 2004).

Diabetes was reported by one-third of the Isleta Pueblo elder sample, a rate double that of the US total population for those aged between 64-74 years of age (16.8%)(NHIS, 2001). Although this rate is considerably higher than the US population, it is lower than the 38% reported by the AI/AN national elder study (NRCNAA, 2004a).

Cataracts reported by 17% of the Isleta elders. Nationally, cataracts affects nearly 20.5 million Americans age 40 and older (16%), while at age 80, more than half of all Americans have cataracts which are slightly more common in women than in men (Friedman, Congdon, Kempen, & Tielsch, 2002).
Heart disease reported by Isleta elders (13%) was much lower than for the national population aged 65 years and older which stands at 31% (National Center for Health Statistics, 2004), but were similar to other AI/AN elders (NRCNAA, 2004a).

Eleven percent of Isleta elders in the sample reported having osteoporosis, a rate much lower than 55% of the national population aged 55 years and older. Osteoporosis is a major public health threat for an estimated 44 million Americans. In the U.S. today, 10 million individuals are estimated to already have the disease and almost 34 million more are estimated to have low bone mass, placing them at increased risk for osteoporosis and fracture. Of the 10 million Americans estimated to have osteoporosis, eight million are women and 2 million are men. One in two women and one in four men over age 50 will have an osteoporosis-related fracture in her/his remaining lifetime (NIH, 2004).

Eight percent of Isleta elders reported having had a stroke. Strokes are the third leading cause of death in the United States. Each year, about 700,000 people experience roughly 500,000 first attacks and 200,000 recurrent strokes. Stroke accounted for more than one of every 15 deaths (6.6%) in the country in 2001 (National Heart Association, 2004).

While only six percent of Isleta elders reported problems with depression, approximately 18.8 million US adults, or about 9.5 percent of the U.S. population age 18 and older in a given year, have a depressive disorder. Nearly twice as many women (12.0 percent) as men (6.6 percent) are affected by a depressive disorder each year (National Institute of Mental Health, 2001).

Only four percent of Isleta elders reported having asthma, while rates for the US total population aged 55 years and older is 7.38% (Behavioral Risk Factor Surveillance System, 2002). Lung disease was reported by 3% of Isleta elders. In the U.S. during 2004, there will be about 173,770 new cases of lung cancer (93,110 among men and 80,660 among women). Lung cancer will account for about 13% of all new cancers. The average age of people diagnosed with lung cancer is 60; it does not usually occur in people under the age of 40 (cancer.org, n.d.). Only a small percentage of our sample reported other cancers (2%), breast cancer (2%), and prostate cancer (1%), rates too small to compare with national averages.
The national AI/AN elder representative study, NRCNAA (2004), showed socioeconomic factors significantly contributed to AI/ANs health status. Elders with the lowest incomes and educational levels were more likely to suffer from high blood pressure, a precursor to many other health problems. In addition, the NRCNAA study (2004a) reported that due to lower levels of functional limitation, AI/AN elders would benefit from wellness and chronic disease management programs to improve quality of life. These two points are supported in the present study.

Recently the CDC (Lang, Moore, Harris, & Anderson, 2005) laid out its vision for engaging the aging network in public health initiatives. The three main themes from this vision were to increasing healthy behaviors; reducing the prevalence of hazards and risk behaviors; increasing the delivery of clinical preventive services and increasing the use of effective self-management for chronic diseases. Given the results of the present study and results from the NRCNAA, it is surprising that federal agencies do not invest in addressing the underlying needs of older adults among AI/AN communities. The results from the present study indicate there is a missing component in the CDC vision, namely economic status. Economic status is an essential antecedent to healthy aging, and a factor that is missing in most theoretical models of health (Walker & Avant, 1995), despite a history of its significance in health research (Krieger, 2001). Within the Isleta Pueblo context, our finding is important as it allows for tribal governments to monitor the economic status of older adults and provide coordination of services that maintain and promote economic security.

The emphasis is both to reduce the risk of negative events that occur as a result of the broader aging process, but also to bolster the positive aspects of aging well. Isleta Pueblo elders are fortunate to have an active and visionary Department of Elderly Services that can identify needs and promote conditions that contribute to the well-being of individual members. Health promotion is a vital focus of this department. A number of Isleta Pueblo activities promoting senior health include traditional arts and crafts, daily chair exercise, walking with the intergenerational “Wisdom Steps” program, Senior Olympics, senior companions, volunteer opportunities, field trips to historical sites, other senior centers and health and fitness fairs, nutrition screening and education, intergenerational collaboration with Head Start and the elementary school, and
transportation to the senior center, medical appointments, and shopping trips. Health promotion is an important activity that needs to be sponsored in tandem with economic security.

**Limitations**

Primarily, the lack of cognitive and emotional indicators in the present study restricted the examination of the association of depression and loneliness with healthy aging. Cognitive studies on centenarians from Sweden, Japan, and the United States show greater variation in cognitive functioning with increasing age (Hagberg, Alfredson, Poon, & Homma, 2001). Cognitive functioning has been found to be a crucial determinant of quality of life and successful aging (Baltes & Baltes, 1990), as well as longevity (Poon, Johnson, Davey, Dawson, Siegler, & Martin, 2000).

In addition, although this study examined the role of care-giving and care-receiving, data describing the social support network that exists for older adults in Isleta Pueblo were not identified. Social support, as identified by family members, friends, and community, has been shown to be an important aspect of healthy-aging (Beckingham & DuGas, 1993; Boyle & Counts, 1988; Clark & Dellasega, 1998; Ebersole & Hess, 1994; Elovainio & Kivimaki, 2000; Lieberman, 2001; Siegal, 2001). Social support networks mitigate or counter the effects of limitations in I/ADLs through practical support activities (e.g. friends/relatives who cook or clean for the elder). In addition, significant correlations have been found between healthy-aging, physical activity, and nutrition (Guralnik & Kaplan, 1989; Morgan, Armstrong, Huppert, Brayne, & Solomou, 2000), concepts that would have provided more pragmatic indicators of the antecedents of healthy aging.

**CONCLUSION**

This study has shown that Isleta Pueblo elders with higher incomes, fewer diseases, and higher functional status have more positive self-rated health. Even though marital status and gender were not independently related to self-rated health, they were included in the model as they affect other independent variables. Taken together, income and receiving other forms of economic assistance explained 6% of the variance in diminished-aging and were strong indicators that can serve to target vulnerable groups within the tribal community.
The results of the present study will allow Isleta Pueblo to continue to develop health promotion and social service assistance to a more targeted group of their elder population. Maintaining a strong health promotion program for Isleta Pueblo elders needs to be defined in a broader context of general well being of elders, one that includes social services to mitigate the effect of weak income among those who indicate diminished self-reported health.

Based on the present study results, it is not necessary to administer a long questionnaire to understand the needs of Isleta Pueblo elders who might be new to the Elder Services program. Instead, the Isleta Pueblo Elder Services program might simply use the single question regarding self-rated health as a screening tool for providing valuable clues to the elder services staff as to the individual specialized needs of the new participant in the areas of income, chronic diseases/conditions, and I/ADL improvement activities.

Among AI/ANs, healthy aging is an important variable to help gauge the present and future well-being of this group. Identifying conditions that promote healthy aging are important for policy decisions. Within the confines of limited resources, social and health services need to address interventions to reduce the risk of negative events while at the same time support antecedents that promote positive aspects of aging well. Since older adults are the main recipients of health and social services, it behooves tribal sovereign governments to address and promote healthy-aging not just for the well-being of individual members, but also to ensure a viable health and social service system for future tribal generations.
Table 1. Sample characteristics stratified by healthy-aging categories for the Isleta Pueblo Elderly Needs Assessment Study: New Mexico, 2003-2004.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Healthy-aging (n=217)</th>
<th>Diminished Aging (n=129)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
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<td>86</td>
<td>39.6</td>
</tr>
<tr>
<td>Age categories***</td>
<td></td>
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</tr>
<tr>
<td>60 - 64 years</td>
<td>52</td>
<td>26.7</td>
</tr>
<tr>
<td>65 – 69 years</td>
<td>46</td>
<td>23.6</td>
</tr>
<tr>
<td>70 – 74 years</td>
<td>46</td>
<td>23.6</td>
</tr>
<tr>
<td>75 – 79 years</td>
<td>23</td>
<td>11.8</td>
</tr>
<tr>
<td>80 – 84 years</td>
<td>15</td>
<td>7.7</td>
</tr>
<tr>
<td>85+ years</td>
<td>13</td>
<td>6.7</td>
</tr>
<tr>
<td>Income categories***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$4,000 - $6,700</td>
<td>63</td>
<td>32.1</td>
</tr>
<tr>
<td>$6,701 - $8,000</td>
<td>35</td>
<td>17.9</td>
</tr>
<tr>
<td>$8,001 - $15,000</td>
<td>49</td>
<td>25.0</td>
</tr>
<tr>
<td>$15,001+</td>
<td>49</td>
<td>25.0</td>
</tr>
<tr>
<td>Married</td>
<td>105</td>
<td>51.7</td>
</tr>
<tr>
<td>Not Married</td>
<td>98</td>
<td>48.3</td>
</tr>
<tr>
<td>Provide Care</td>
<td>63</td>
<td>30.1</td>
</tr>
<tr>
<td>Receive Care</td>
<td>34</td>
<td>16.7</td>
</tr>
<tr>
<td>Receive Social Security</td>
<td>135</td>
<td>62.8</td>
</tr>
<tr>
<td>Receive Medicaid</td>
<td>40</td>
<td>20.2</td>
</tr>
<tr>
<td>Receive other assistance</td>
<td>46</td>
<td>24.0</td>
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Chi-square test ** p < 0.01 *** p < 0.001

<table>
<thead>
<tr>
<th>Variable</th>
<th>Healthy-aging (n=217)</th>
<th>Diminished Aging (n=129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>70.7</td>
<td>75.9***</td>
</tr>
<tr>
<td>Number of comorbid conditions</td>
<td>1.2</td>
<td>2.7***</td>
</tr>
<tr>
<td>Activities of daily living</td>
<td>0.2</td>
<td>1.3***</td>
</tr>
<tr>
<td>Instrumental activities of daily living</td>
<td>0.5</td>
<td>1.7***</td>
</tr>
<tr>
<td>Combined ADLs and IADLs</td>
<td>0.7</td>
<td>3.1***</td>
</tr>
</tbody>
</table>

*** p < 0.001
Table 3. Odds ratios (95% confidence intervals) for healthy-aging in the Isleta Pueblo Elderly Needs Assessment Study: New Mexico, 2003-2004.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratios</th>
<th>95% CI</th>
<th>Adjusted R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.06</td>
<td>1.03, 1.09</td>
<td>0.10</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>1.3</td>
<td>0.8, 2.1</td>
<td>0.10</td>
</tr>
<tr>
<td>Number of comorbid conditions</td>
<td>2.3</td>
<td>1.9, 2.9</td>
<td>0.38</td>
</tr>
<tr>
<td>Married (not married)</td>
<td>0.9</td>
<td>0.5, 1.7</td>
<td>0.39</td>
</tr>
<tr>
<td>Income categories</td>
<td>0.5</td>
<td>0.4, 0.7</td>
<td>0.42</td>
</tr>
<tr>
<td>ADLs (IADLs not in model)</td>
<td>2.1</td>
<td>1.4, 3.3</td>
<td>0.48</td>
</tr>
<tr>
<td>IADLS (ADLs not in model)</td>
<td>1.5</td>
<td>1.2, 2.0</td>
<td>0.46</td>
</tr>
<tr>
<td>Combined ADLs and IADLs</td>
<td>1.4</td>
<td>1.2, 1.8</td>
<td>0.48</td>
</tr>
<tr>
<td>Other Assistance</td>
<td>2.0</td>
<td>1.0, 4.3</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Other variables entered into the model that were not significant: receive social security, Medicaid, provide care, or receive care.

<table>
<thead>
<tr>
<th>Chronic Disease</th>
<th>NRCNAA</th>
<th></th>
<th>Isleta Pueblo Elders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>4,432</td>
<td>47</td>
<td>39</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4,708</td>
<td>50</td>
<td>38</td>
</tr>
<tr>
<td>Diabetes</td>
<td>3,537</td>
<td>38</td>
<td>33</td>
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<tr>
<td>Cataracts</td>
<td>1,924</td>
<td>21</td>
<td>17</td>
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<tr>
<td>Congestive heart failure</td>
<td>1,104</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>--</td>
<td>--</td>
<td>11</td>
</tr>
<tr>
<td>Stroke</td>
<td>865</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Depression</td>
<td>--</td>
<td>--</td>
<td>6</td>
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<tr>
<td>Asthma</td>
<td>945</td>
<td>10</td>
<td>4</td>
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<tr>
<td>Lung cancer</td>
<td>77</td>
<td>1</td>
<td>3</td>
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<tr>
<td>Breast cancer (females)</td>
<td>219</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Other cancer</td>
<td>317</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Prostate cancer</td>
<td>263</td>
<td>7</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>NRCNAA</th>
<th>NLTCS</th>
<th>Isleta Pueblo Elders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activities of Daily Living</strong></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Walking</td>
<td>26</td>
<td>34</td>
<td>28</td>
</tr>
<tr>
<td>Bathing or showering</td>
<td>14</td>
<td>37</td>
<td>13</td>
</tr>
<tr>
<td>Getting in or out of bed</td>
<td>11</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>Dressing</td>
<td>10</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Using the toilet, including getting to the toilet</td>
<td>7</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>Eating</td>
<td>7</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td><strong>Instrumental Activities of Daily Living</strong></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Doing heavy housework</td>
<td>33</td>
<td>52</td>
<td>29</td>
</tr>
<tr>
<td>Shopping for personal items</td>
<td>13</td>
<td>35</td>
<td>16</td>
</tr>
<tr>
<td>Getting outside</td>
<td>13</td>
<td>44</td>
<td>13</td>
</tr>
<tr>
<td>Preparing your own meals</td>
<td>15</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Doing light housework</td>
<td>14</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Managing your money</td>
<td>7</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Using the telephone</td>
<td>6</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>
References


Bryant, L.L., Corbett, K.K., & Kutner, J.S. (2001). In their own words: A model of healthy-aging. *Social Science and Medicine, 53*, 927-941.


National Long-Term Care Survey (NLTCS), (1994). Duke University Center for Demographic Studies, 2117 Campus Drive, Durham, NC 27708-0408.


