ABSTRACT

Objectives. To determine if age and gender subsets of Inupiaq Elders living in urban and rural locations present different characteristics of self-reported health, physical and mental functioning, functioning of daily activities, body mass index, nutrient intake and food insecurity.

Study design. Quantitative, comparative survey of 100 Inupiaq Elders, 52 living in 2 north-western Alaska communities, and 48 living in Anchorage. All participants were community-dwelling, non-institutionalized individuals.

Methods. Surveys were one-to-one in an oral conversational format using tested instruments.

Results. For all age groups, mean fat intake was 37%. Rural groups reported higher vitality scores. The most commonly reported physical limitation was walking. Rural males of 50–59 years reported the highest level of food insecurity, calorie intake and rates of smoking but also the highest SF-12 Mental Functioning Composite Scores (MCS) and Physical Functioning Scores (PCS). Of urban males 50–59, half reported hypertension, the highest percentage of all groups, and 41% reported eating less than 2 meals per day. Urban males ≥60 years reported the highest number of Activities of Daily Living (ADLs). Females 50–59 reported the highest self-reported health status and the lowest depression scores. Older rural women ≥60 years reported higher SF-12 MCS and SF-12 PCS than their urban cohorts, but reported the most Instrumental Activities of Daily Living (IADLs). Older urban women ≥60 years had the lowest mean calorie intake.

Conclusions. Rural Inupiaq villages provide positive environments for aging well. Reinforcing and enhancing services to assist Native Elders in rural locations might enhance their quality of aging more so than moving them to urban communities.

Keywords. Quality of aging, nutrition, food insecurity, Inupiaq, Alaska
INTRODUCTION

Longer life spans have rapidly increased the number of Alaska Native Elders (1). Life expectancy has increased from 64.4 years in 1980 to 69.5 years in 1997, making this age group the fastest growing segment of Alaska’s population (2,3). As the number of Native Elders increases, it is important to evaluate the status of aging among the younger old and older old individuals.

This paper examines aging from a health and nutrition perspective. The data presented focus on the question: Do age and gender subsets of Inupiaq individuals living in urban and rural locations present different tendencies towards health, physical and mental abilities, Body Mass Index (BMI), nutrient intake and levels of food insecurity?

This paper revisits the data from the Alaskan Inupiaq Elders Study (4) that examined trends simply by location, and investigates differences by age and gender of Inupiaq individuals living in rural and urban Alaskan locations. Comparison of urban and rural groups of Alaskan Inupiaq Elders (aka “Elders”) showed few differences attributable to location (4). Both groups reported few chronic diseases, few limitations in Activities of Daily Living and their body weights were within recommended levels for aging populations.

MATERIAL AND METHODS

The Alaskan Inupiaq Elders Study was a quantitative, comparative survey that used multiple tested instruments (Table I) to survey 101 Inupiaq individuals, 52 living in 2 rural communities in north-western Alaska, and 48 Inupiaq individuals living in Anchorage. Ninety-four percent (n=52) of all eligible Elders living in the partnering Villages of Buckland and Deering participated in the survey. In the previous analyses (4), Cohen’s statistical techniques (5) were used to estimate that comparisons between approximately 50 individuals in each group could achieve 84% power to detect a medium effect size of 0.6 using a significance level of 0.05 in a 2sample-t test; thus the desired urban sample number was set at 50. Individuals for the urban sample were recruited through contacts in the rural villages and members of the Alaska Native Brotherhood and Sisterhood, Anchorage chapter. All respondents had celebrated a 50th birthday in or prior to 2005, and were community-dwelling, non-institutionalized individuals. Age 50 was chosen to be consistent with the Alaska Indian Health Service’s (IHS) classification of older adults used to determine benefits eligibility.

The study was approved by the 2 participating communities, the Institutional Review Board (IRB) at the University of Alaska Anchorage and the Florida International University, and the Alaska Region IRB of the IHS undertook a courtesy review. The survey process was consistent with guidelines in Ethical Principles for Conduct of Research in the North by the National Science Foundation (6) and the Policy of Research Ethics published by the Alaska Federation of Natives (7). Elders were told that they could answer all, some or none of the survey questions without penalty. The Tribal Councils assisted the researchers in obtaining funds so that the Elders could be given small monetary gifts to show of respect. Funds were distributed by the Tribal Council. Elders who participated in the urban sample were given the same honorarium.
Tribal leaders and Elders’ Councils of 4 Inupiaq villages invited researchers to present the project to their communities during the for six weeks during the summer of 2004. Inupiaq communities extended the invitation in response to a sign posted at a statewide meeting that read Villages Needed for Elder Nutrition Study. Throughout this process, Elders worked with researchers to develop research protocols, and they reviewed, pilot tested and revised questions to improve readability and community acceptance. For example, Elders asked that all questions related to the use of alcohol be omitted since alcohol use was prohibited in the participating villages. Tribal leaders frequently proposed that we host a party for the Elders as a part of the team’s introduction into the communities, often suggesting that we bring frozen fruit to make agutuk. At parties and during individual visits with community members, the project was discussed and Elders shared stories about life in the village and the challenges they faced as they aged.

During the fall of 2004, formal approval of the study was given by the Elders’ Councils from the Villages of Buckland and Deering, and plans were initiated to return in the summer of 2005. Between the 2 visits, village leaders and members of the community maintained communication with Janell Smith when they came to Anchorage for meetings and health visits.

During the 5 weeks of data collection in 2005, we spent time catching up on the status of old friends we had met the year before in the 2 villages. Coffee cake was baked daily, which we delivered to Elders when we visited, often talking with them for hours. Completion of the questionnaires was done when the Elders felt they were ready. Interviews were on a one-to-one basis often lasting 1 to 3 hours and were held in homes and in community meeting rooms. Each question was read to the participant. While the interviewing atmosphere was very relaxed, the Elders’ responses were taken very seriously by both the interviewers and respondents. Student researchers were taught not to rush respondents and to listen to all of the Elders’ comments offered during the interview. Any notes taken were reviewed with the Elders once the interview was completed to ensure full disclosure. Recorded comments considered by the team leaders to be too sensitive or confidential were removed from the interviewers’ notes. In the community centres, visiting family members contributed to the warm social atmosphere; grandchildren often delivered an Elder on a 4-wheeler and stayed to play basketball while the Elder completed the survey.

Tribal leaders supervised the research team of Smith, Easton and the graduate students who assisted with collecting the data. Smith had worked in many Alaska communities from 1994 to 2008 (8–11). Easton worked in the Alaska Territory from 1948 to 1950 as one of the first dietetic consultants (12). She assisted Smith with fieldwork on 4 previous grants. Easton’s status as a senior over 80 years old helped to facilitate the participation of village Elders. Elders appeared to be very comfortable with having a researcher of a similar age and, frequently, they addressed questions about coordination of the study to her rather than to the other members of the team.

1Agutuk is a classic Inupiaq food made from berries and caribou fat. The research team furnished the berries and the Village Council provided the caribou fat.
**Table 1.** Brief description of data collection in the Inupiaq Elders’ Study.

| Variable                          | Tool                                                                 | Estimated minutes to administer |
|-----------------------------------|----------------------------------------------------------------------|---------------------------------|
| Self-reported general health      | **General Health (GH)**, The SF-12v2 Health Survey. 12 questions (13,14). | 5                               |
|                                   | **Body Mass Index (BMI)**, A relationship between height and body weight (15). |                                 |
| Physical abilities                | **Physical Functioning Composite Score (PCS)**, The 12-question multidimensional generic measure of self-reported quality of life (13,14) provides 2 normalized scores: a physical component score (SF-12 PCS) includes physical activity, role physical, body pain, general health and vitality. Scores range from 1 to 100. | 20                              |
|                                   | Activities of Daily Living (ADLs). Daily living tasks include bathing, eating and dressing (16). Scores range from 1 to 6 “yes” or “no” answers. | 5                               |
|                                   | **Limitations in Instrumental Activities of Daily Living (IADLs)**, Instrumental activities of daily living are more complex activities of daily living that require syntheses of environmental input from multiple sources such as preparation of meals, shopping and cleaning (17). 7 “yes” or “no” questions. | 5                               |
| Mental abilities                  | **Mental Functioning Composite Score (MCS)**, Mental component score (SF-12 MCS) includes social functioning, role of emotional and mental health. The 12-question multidimensional generic measure of self-reported quality of life (13,15) provides 2 normalized scores: a physical component score (SF-12 PCS) includes physical activity, role physical, body pain, general health and vitality. Scores range from 1 to 100. |                                 |
|                                   | **Depression Scale**, 12 “yes” or “no” questions (18). |                                 |
| Involvement in family and community activities | **Use of Language**, Questions from the *Comparative Study of Social Transition of the North: Alaska and Russian Far East*, NSF OPP 9496351 (19), 6 Likert-scale questions scored 1–5. | 1–5                             |
|                                   | **Participation in Cultural Activities**, Questions from the *Comparative Study of Social Transition of the North: Alaska and Russian Far East*, NSF OPP 9496351 (19), and questions from the *Identifying Needs of Our Elders: Version II*, developed by the National Resource Center on Native American Aging at the University of North Dakota, 2003 (20). 15 Likert-scale questions scored 1–5. | 15–30                           |
| Food intake                       | **Block 98 Item Food Frequency** and a supplemental sheet of Alaska Inupiaq foods (21). 499 questions or responses. | 45–60                           |
| Food insecurity                   | **Food Insecurity**, was measured using 4 questions based on USDA protocols that were adapted for use with Alaska Native communities that secure a large proportion of food by hunting, harvesting or gathering and use cash-based grocery stores on a limited basis (22). | 10                              |
| Total number of questions         | | 574                             |
| Total time                        | | 155 minutes                     |
Data analysis and statistics

All data were self-reported and are important indicators because they reflect both the quality of aging and the individuals’ perception of their ability to function within their environment. Data were studied by age, gender and location that created eight subsets: rural males ≤59 years of age (RM≤59), urban males ≤59 years of age (UM≤60), rural males ≥60 years of age (RM ≥ 60), urban males ≥60 years of age (UM≥60), rural females ≤59 years of age (RF≤59), urban females ≤59 years of age (UF≤59), rural females ≥60 years of age (RF≥60), and urban females ≥60 years of age (UF≥60). Responses by percentages are presented due to the small sample sizes that prevented further analyses. Where possible, data by groups were compared using t-test, χ², and Mann-Whitney U-tests depending on the type and distribution of the data. Strengths of relationships among variables were measured by Spearman’s rho correlations.

RESULTS

Characteristics of the survey respondents

No significant differences were found by age, gender or location for demographic variables (Table II). The 2 largest subgroups were UM≤59 (n=22), followed by RM≥60 (n=13). M<59 were more likely to live alone. Although not statistically significant, rural Elders’ households were larger by one person. The larger number of younger male Elders might be a result of the sampling methods and might not be an indication of the gender characteristic of tribal members moving to Anchorage.

| Table II. Characteristics of Inupiaq Elders. |
|---------------------------------------------|
|                                             |
| Location, n                                 |
| Rural 12 13                                 |
| Urban 22 7                                  |
| Age, y, mean±SD                             |
| Rural 53.9±2.9 69.2±8.7                      |
| Urban 58.3±3.2 68.0±9.1                      |
| t-test 0.088 0.278                           |
| p 0.930 0.784                               |
| Lives alone, frequency                      |
| Rural 4 (33%) 1 (8%)                         |
| Urban 7 (32%) 1 (14%)                        |
| Number in household, mean±SD                |
| Rural 4.2±4.2 3.1±1.4                       |
| Urban 2.5±1.8 2.4±0.9                       |
| t-test 1.266 1.096                           |
| p 0.227 1.219                               |
| BMI, mean±SD                                |
| Rural 25.9±2.9 27.3±6.0                     |
| Urban 26.3±4.9 26.3±4.0                     |
| t-test 0.247 0.302                           |
| p 0.806 0.766                               |
Self-reported health
The Mann-Whitney U test, a 2-sample non-parametric test, was used to determine differences in the patterns of SF-12.v2 self-reported general health (GH). For all groups, except RF≥60, a higher percentage of rural respondents reported their health was “good,” “very good” or “excellent.” More RF≥60 reported their health was “fair” or “poor” than did urban.

Chronic health conditions, Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs)
Hypertension and arthritis were the most commonly reported chronic diseases (Table IV). RM≤59 and RF≤59 reported the lowest frequency of hypertension, compared to other groups where nearly half of the individuals reported hypertension. RF≥60 reported the highest frequency of asthma. Four women and two men ≥60 years of age (6%) reported having diabetes. Urban groups reported higher rates of smoking than rural groups. The highest rates were reported by younger urban males (82%), followed by younger rural males (58%). RM≥60 reported the lowest frequency of smoking (31%).

Body Mass Indices (BMI) (21) were similar for all groups. The highest mean BMI was reported by RF≤59 (28.9±5.4), and the lowest mean BMI was reported by UM≤59 (25.9±2.9), but were not statistically different.

Activities of Daily Living (ADLs)
The most frequently reported ADL was difficulty with walking (Table IV). UM≥60 reported the highest frequency (n=4, 18%). ANOVA techniques found that the total number of ADLs reported by rural and urban Elders by age groups were significantly different (F=3.104, p=0.005).

Instrumental Activities of Daily Living (IADLs)
Only 25% of rural Elders reported at least 1 limitation; similarly, so did 22% of urban Elders (Table IV). RF≥60 reported the most limitations primarily in the areas of shopping (27%), money management (33%) and performing heavy housework (40%).

SF-12 measures of how physical and mental functioning affects daily life.
The SF-12 questionnaire measures an individual’s perception of ability to function in physical and mental domains and how these limitations affect daily life. Scores for both physical functioning and mental functioning

| Table III. SF-12.v2 self-reported general health reported by Alaskan Inupiaq Elders. |
|---------------------------------|----------|----------|----------|----------|----------|
|                                | Male     | Female   |          |          |          |
|                                | <59 yrs  | >60 yrs  | <59 yrs  | >60 yrs  | Total    |
| Excellent, very good, good    |          |          |          |          |          |
| Rural                          | 9 (75%)  | 11 (85%) | 12 (100%)| 10 (67%) | 42       |
| Urban                          | 15 (68%) | 5 (71%)  | 12 (92%) | 5 (71%)  | 37       |
| Fair, poor                     |          |          |          |          |          |
| Rural                          | 3 (25%)  | 2 (15%)  | 0 (0%)   | 5 (33%)  | 10       |
| Urban                          | 7 (32%)  | 2 (29%)  | 1 (8%)   | 2 (29%)  | 12       |

Mann-Whitney U: z=0.005, p=0.963.
### Table IV. Frequency of chronic health conditions, difficulties with Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) reported by Alaskan Inupiaq Elders by age groups.

|                  | Male | Male | Female | Female | Total |
|------------------|------|------|--------|--------|-------|
|                  | <59 yrs | >60 yrs | <59 yrs | >60 yrs | Total |
| Rural            | 12    | 13    | 12     | 15     | 52    |
| Urban            | 22    | 7     | 13     | 7      | 49    |

#### Chronic disease

**Hypertension**

- Rural: 2 (17%)<br> 6 (46%)<br> 5 (42%)<br> 7 (47%)<br> 20 (38%)
- Urban: 11 (50%)<br> 3 (43%)<br> 3 (23%)<br> 3 (43%)<br> 20 (40%)

**Arthritis**

- Rural: 3 (25%)<br> 6 (46%)<br> 3 (25%)<br> 10 (67%)<br> 22 (42%)
- Urban: 6 (27%)<br> 4 (57%)<br> 2 (15%)<br> 4 (57%)<br> 16 (33%)

**Asthma**

- Rural: 0 (0%)<br> 0 (0%)<br> 1 (8%)<br> 3 (20%)<br> 4 (8%)
- Urban: 2 (9%)<br> 2 (29%)<br> 4 (31%)<br> 0 (0%)<br> 8 (16%)

**Diabetes**

- Rural: 2 (17%)<br> 1 (8%)<br> 0 (0%)<br> 2 (13%)<br> 5 (10%)
- Urban: 4 (18%)<br> 1 (14%)<br> 1 (8%)<br> 2 (29%)<br> 8 (16%)

**Smoking**

- Rural: 7 (58%)<br> 4 (31%)<br> 5 (42%)<br> 6 (40%)<br> 22 (42%)
- Urban: 18 (82%)<br> 3 (14%)<br> 7 (54%)<br> 3 (43%)<br> 31 (63%)

#### Activities of daily living

**Total ADLs**

- Rural, mean±SD: 0.0±0.0<sup>a</sup><br> 0.15±0.38<sup>a</sup><br> 0.25±0.62<sup>a</sup><br> 0.067±0.26<sup>a</sup><br> 0.067±0.26<sup>a</sup><br> F=3.104, p=0.005
- Urban, mean±SD: 0.22±0.23<sup>a</sup><br> 1.29±1.98<sup>a</sup><br> 0.15±0.55<sup>a</sup><br> 0.14±0.38<sup>a</sup><br> 0.14±0.38<sup>a</sup><br> *p=0.984
- t-test by location: 2.485<br> 1.501<br> 0.409<br> 0.558
- p-value: 0.021<br> 0.182<br> 0.687<br> 0.584

**Instrumental activities of daily activities**

**Cooking/meal preparation**

- Rural: 0 (0%)<br> 3 (23%)<br> 0 (0%)<br> 2 (13%)<br> 5 (10%)
- Urban: 1 (5%)<br> 1 (14%)<br> 0 (0%)<br> 1 (14%)<br> 3 (6%)

**Shopping**

- Rural: 0 (0%)<br> 3 (23%)<br> 1 (8%)<br> 4 (27%)<br> 8 (15%)
- Urban: 3 (14%)<br> 1 (14%)<br> 0 (0%)<br> 0 (0%)<br> 4 (8%)

**Money management**

- Rural: 0 (0%)<br> 1 (8%)<br> 1 (8%)<br> 5 (33%)<br> 7 (14%)
- Urban: 2 (9%)<br> 1 (14%)<br> 0 (0%)<br> 0 (0%)<br> 3 (6%)

**Heavy housework**

- Rural: 1 (8%)<br> 4 (31%)<br> 1 (8%)<br> 6 (40%)<br> 12 (23%)
- Urban: 2 (9%)<br> 2 (28%)<br> 2 (15%)<br> 0 (0%)<br> 6 (12%)

**Total IADLs**

- Rural, mean±SD: 0.008±0.29<sup>a</sup><br> 0.92±1.61<sup>a</sup><br> 0.008±0.29<sup>a</sup><br> 1.47±2.20<sup>a</sup><br> 1.47±2.20<sup>a</sup><br> F=2.291, p=0.034
- Urban, mean±SD: 0.41±1.10<sup>a</sup><br> 1.14±1.86<sup>a</sup><br> 0.16±0.38<sup>a</sup><br> 0.14±0.38<sup>a</sup><br> 0.14±0.38<sup>a</sup><br> *p=0.034
- t-test by location: 1.003<br> 0.276<br> 0.523<br> 2.261
- p: 0.324<br> 0.785<br> 0.606<br> 0.038
ranged from 0 to 100. Higher scores indicated a higher self-perception of being able to function (Table V).

SF-12 Physical Functioning Composite Scores (PCS): Rural groups reported higher physical functioning scores than urban groups, although, only M<59 reported differences that were statistically significant. Villagers’ comments provided insight as to why higher scores were reported by rural males for the 3 variables examined: the ability to accomplish physical activities, lower levels of pain and more vitality.

The data for women were not as straightforward. UF≤59 reported higher PCS scores, while RF≥60 reported scores that were slightly higher or equal to urban scores.

Table V. Means and standard deviations of SF-12.©2 reported physical (PCS) and mental component scores (MCS) by Alaskan Inupiaq Elders.

|                         | Male          | Female         | Total          |
|-------------------------|---------------|----------------|----------------|
|                         | <59 yrs       | >60 yrs        | <59 yrs        | >60 yrs        |                 |
| Rural                   | 12            | 13             | 12             | 15             | 52              |
| Urban                   | 22            | 7              | 13             | 7              | 49              |

PCS Component Scores

Ability to accomplish rigorous physical activity (SF-12 Physical Functioning) F=2.244, p=0.037

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 55.7±2.5 a   | 47.9±13.1 a   | 2.895              | 0.007   |
| Urban         | 47.8±9.2 a   | 42.9±6.7 a    | 3.603              | 0.003   |
|               | 43.6±15.2 a  | 49.2±11.0 a   |                    |         |
|               | 35.0±13.3 a b| 39.3±8.6 a    |                    |         |
|               | p=0.379      | p=0.408       |                    |         |

Free of Body Pain (higher scores indicate less pain) F=6.287, p<0.001

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 43.0±17.1 a  | 44.9±11.1 a   | 3.603              | 0.003   |
| Urban         | 24.1±8.4 a   | 31.2±9.9 a b  | 2.711              | 0.011   |
|               | 43.6±15.2 a  | 49.2±11.0 a   |                    |         |
|               | 35.0±13.3 a b| 39.3±8.6 a    |                    |         |
|               | p=0.176      | p=0.072       |                    |         |

Total PCS Scores F=3.096, p=0.006

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 51.0±6.2 a   | 44.3±12.0 a   | 5.170              | 0.014   |
| Urban         | 39.8±6.1 a   | 37.8±5.2 a    | 2.611              | 0.066   |
|               | 54.3±10.8 a  | 38.6±10.6 a a |                    |         |
|               | p=0.664      | p=0.067       |                    |         |

MCS Component Scores

Mental Health F=2.502, p=0.021

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 55.9±6.6 a   | 57.0±7.9 b    | 2.105              | 0.043   |
| Urban         | 54.6±7.2 a b | 47.1±8.2 a b  | 2.637              | 0.007   |
|               | 54.3±7.5 a b | 49.1±12.6 a b |                    |         |
|               | p=0.071      | p=0.200       |                    |         |

Vitality F=1.957, p=0.069

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 62.0±9.1 a   | 59.4±12.9 a   | 2.206              | 0.043   |
| Urban         | 54.6±7.2 a   | 50.6±7.6 a    | 1.634              | 0.120   |
|               | 54.5±10.8 a  | 54.7±8.6 a    |                    |         |
|               | 59.2±11.3 a  | 49.4±7.4 a    |                    |         |
|               | p=0.070      | p=0.744       |                    |         |

Total MCS Score F=1.748, p=0.108

|               | Rural        | Urban         | t-test by location | p-value |
|---------------|--------------|---------------|--------------------|---------|
|               | <59 yrs      | >60 yrs       |                    |         |
| Rural         | 56.2±5.8 a   | 54.2±8.2 a b  | t=1.348            | 0.188   |
| Urban         | 52.5±9.5 a   | 48.4±11.8 a b | t=1.296            | 0.211   |
|               | 54.3±7.7 a   | 51.7±10.1 a   |                    |         |
|               | 51.7±10.1 a  | 42.4±14.4 a   |                    |         |
|               | p=0.106      | p=0.744       |                    |         |
SF-12 Mental Functioning Composite Scores (MCS): Analysis by age, gender and location indicated significant differences among younger males in 2 areas: mental health and vitality. All rural males had significantly higher mental health scores. Vitality scores were higher according to the rural age and gender categories compared to similar urban cohorts, although statistical differences were found only with the RM<59 and RF≥60. RM<59 reported higher vitality scores than urban males of similar age.

Measures of depression
Differences in responses among commonly used measures of depression showed no patterns. However, where differences occurred, rural scores were lower, suggesting fewer tendencies towards depression.

It is possible that the individual questions used for measuring depression were more useful for some age groups. It appeared that each generation and gender responded differently to the questions proposed. M<59 reported significant differences between rural and urban responses for the variable “I feel that I have nothing to live for.” M≥60 reported significantly different scores for the variable “Little things bother me.” F≤59 reported significantly different scores for the variable “I have lost interest in things.” F≥60 reported significantly different scores for the variable “I cry for no reason.”

Cultural variables
Elders were asked to rank the frequency of their participation in cultural activities using a 5-point Likert scale. Mean scores were high for both groups, and no statistical differences were found. Variables included speaking the Inupiaq language, picking berries, participating in hunting and fishing, participating in cultural events, sharing food with elders, and using tribal medicine.

Food intake
No significant differences in food intake were found between Elders by age, location or gender. UM<59 reported the highest mean energy intake of 5,468±3,406 calories. RF≤59 reported the lowest at 2,346±985 calories. Highest mean reported intake of protein was reported by UM<59 at 243±184 grams, and UF≤59 reported the least at 103±80 grams. Eight females and three males reported protein intakes less than 60 grams: of females, 7 were ≤59 years of age and 1 was 73 years old; of the males, 1 male was ≤59 years of age, and 2 were >60. Mean fat intake as a percent of total calories was 37% for all 8 groups.1 Elders reported carbohydrate intakes that ranged from 41% to 48% of total calories.

Food insecurity2
Causes of food insecurity in rural communities may differ from urban communities (Table VII). Rural more so than urban respondents reported greater concerns about food, for example, “Food didn’t last and we couldn’t get more” and “Times when household did not have enough to eat” and “We did not have enough money to buy food.” However, urban respondents more frequently reported that

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1A total of 20% to 35% fat as percent of total calories has been recommended by The American Heart Association's Revised Guidelines (23). Carbohydrates as a percentage of total calorie intake is recommended to be 45% to 65% (24).
2Food insecurity is used in this paper because it is the more commonly used term when describing groups and general concerns about the potential of having limited food supplies.
they “Ate less than 2 meals per day.” Males reported food insecurity at higher rates than did women. M<59 reported the greatest food insecurity, while UF≥60 reported the least food insecurity.

**Relationships among variables**

Measuring relationships among variables used combined data from all participants as a group (n=77) (Table VIII). Age proved to have significant relationships to food insecurity scores (rho=−0.29, p=0.012) and general health (rho=0.25, p=0.029). Increased age was

**Table VI.** Means and standard deviations of characteristics of depression as reported by Alaskan Inupiaq Elders living in rural and urban locations.

|                     | Male | Female |
|---------------------|------|--------|
|                     | <59 yrs | >60 yrs | <59 yrs | >60 yrs | ANOVA |
| Rural               |        |        |        |        |       |
| I have lost interest in things |        |        |        |        | F=2.077, p=0.054 |
| Rural               | 1.17±0.39 | 1.54±0.78 | 1.50±0.80 | 1.8±1.15 |       |
| Urban               | 2.14±0.91 | 2.0±1.00 | 2.08±0.95 | 1.57±0.79 |       |
| t-test              | 1.261   | 0.529   | 3.517    | 0.475    |       |
| p                   | 0.223   | 0.603   | 0.001    | 0.640    |       |
| I feel lonely       |        |        |        |        | F=1.105, p=0.367 |
| Rural               | 1.50±0.67 | 1.42±0.87 | 1.33±0.78 | 1.6±0.74 |       |
| Urban               | 2.14±1.21 | 1.90±1.00 | 1.54±0.66 | 1.71±0.95 |       |
| t-test              | 1.497   | 1.510   | 1.497    | 0.309    |       |
| p                   | 0.153   | 0.141   | 0.153    | 0.760    |       |
| There are times that I feel hopeless |        |        |        |        | F=0.826, p=0.568 |
| Rural               | 1.83±0.84 | 1.54±0.78 | 1.42±0.67 | 1.47±0.74 |       |
| Urban               | 1.76±0.77 | 2.0±1.00 | 1.54±0.88 | 1.29±0.76 |       |
| t-test              | 0.237   | 0.388   | 0.529    | 0.529    |       |
| p                   | 0.814   | 0.702   | 0.603    | 0.603    |       |
| Little things bother me |        |        |        |        | F=1.349, p=0.237 |
| Rural               | 2.0±1.54 | 1.31±0.75 | 1.17±0.39 | 1.60±0.83 |       |
| Urban               | 2.0±1.03 | 1.86±1.07 | 1.92±0.76 | 1.86±1.46 |       |
| t-test              | 0.000   | 3.092   | 1.337    | 0.530    |       |
| p                   | 1.000   | 0.005   | 0.195    | 0.602    |       |
| I feel that I have nothing to live for |        |        |        |        | F=0.791, p=0.597 |
| Rural               | 1.02±0.41 | 1.15±0.39 | 1.0±0.00 | 1.40±1.03 |       |
| Urban               | 1.27±0.41 | 1.29±0.76 | 1.15±0.38 | 1.14±0.38 |       |
| t-test              | 2.179   | 0.567   | 1.477    | 0.619    |       |
| p                   | 0.042   | 0.604   | 0.165    | 0.260    |       |
| I cry for no reason |        |        |        |        | F=2.342, p=0.030 |
| Rural               | 1.17±0.58 x  | 1.08±0.28 a | 1.25±0.62 ab | 1.07±0.26 a | p=0.358 |
| Urban               | 1.43±0.68 ab  | 1.29±0.49 a  | 1.69±0.75 a  | 2.0±1.53 b  | p=0.077 |
| t-test              | 1.126   | 0.602   | 1.598    | 2.360    |       |
| p                   | 0.269   | 0.553   | 0.124    | 0.029    |       |
| I have lots of energy (higher scores indicated higher energy) |        |        |        |        | F=2.810, p=0.011 |
| Rural               | 4.17±1.34 ab | 4.23±1.01 a | 3.58±1.16 ab | 4.0±1.41 a | p=0.058 |
| Urban               | 3.42±0.77 ab  | 2.57±0.98 ab  | 3.38±0.77 ab  | 2.86±1.35 b  | p=0.079 |
| t-test              | 1.978   | 3.537   | 0.508    | 1.791    |       |
| p                   | 0.057   | 0.002   | 0.617    | 0.088    |       |

**Table VIII:**

|                     | Rural | Urban |
|---------------------|-------|-------|
| I have lost interest in things | <59 yrs | >60 yrs | <59 yrs | >60 yrs |
| Rural               | 12    | 13    | 12    | 15    |
| Urban               | 22    | 7     | 13    | 7     |

Bold indicates significance p <0.05. Analysis of variance (ANOVA) homogeneous subsets determined at alpha =0.05.
negatively correlated with lower frequency food insecurity suggesting that, as Elders increased in age, their food needs were increasingly provided by the community, resulting in a more stable food status. With 26% of the Elders reported food insecurity, this could suggest that it is the “younger old” who experience the most food insecurity.

Higher SF-12 v2 Mental Functioning Component summary Scores (MCS) were found to have significant relationships with nutritional variables: higher intake of protein (rho=0.23, p=0.047) and lower frequency of food insecurity (rho=-0.27, p=0.019). Sixty-four percent of protein intake for rural Elders came from harvested food, but harvested foods contributed only 42% of protein intake reported by urban Elders. Harvested foods substantially contributed to reported iron intake, constituting 54% of iron intakes for rural Elders, and 40% of iron intakes for urban Elders. Harvested foods contributed only 25% of the total fat in the diets of both the rural and urban Elders. The correlations could suggest the importance of the role of harvested foods on the mental well-being of this age group. Elders felt that it was not only in the consumption of harvested meats that “made them feel better” but also in the activities of food harvesting such as picking berries, fishing and hunting.

| Table VII. Frequency of food insecurity indicators reported by Alaskan Inupiaq Elders. |
|-------------------------------------------------|
|                                                |
| **Male**                                        |
|                                                |
| **<59 yrs**          | **>60 yrs**          |
| Rural  | 12    | 13    | 12    | 15    | 52    |
| Urban  | 22    | 7     | 13    | 7     | 49    |
| **Female**                                      |
|                                                |
| **<59 yrs**          | **>60 yrs**          |
| Rural  | 5 (42%) | 3 (23%) | 3 (25%) | 5 (33%) | 16 (31%) |
| Urban  | 7 (32%) | 1 (14%) | 2 (15%) | 0 (0%)  | 10 (20%) |
| **Times when household did not have enough to eat – yes responses** |
| Rural  | 2 (17%) | 3 (23%) | 2 (8%)  | 3 (20%) | 10 (19%) |
| Urban  | 5 (14%) | 1 (14%) | 1 (8%)  | 0 (0%)  | 7 (14%)  |
| **We did not have enough money to buy food – yes responses** |
| Rural  | 0 (0%)  | 1 (8%)  | 1 (8%)  | 5 (33%) | 7 (13%)  |
| Urban  | 2 (9%)  | 1 (14%) | 0 (0%)  | 0 (0%)  | 3 (6%)   |
| **Ate less than two meals per day – yes responses** |
| Rural  | 1 (8%)  | 1 (8%)  | 1 (8%)  | 0 (0%)  | 3 (6%)   |
| Urban  | 9 (41%) | 2 (29%) | 1 (8%)  | 0 (0%)  | 12 (24%) |

Small number of responses prevented further analyses.

| Table VIII. Spearman’s rho correlation among and between select nutrition parameters, community support variables and demographic characteristics as reported by Alaskan Inupiaq Elders (n=75). |
|-------------------------------------------------|
|                                                |
| **Age**                                         |
| **Energy intake**                               |
| **Protein intake**                              |
| **Food insecurity**                             |
| **rho**                                         |
| **p**                                           |
| **rho**                                         |
| **p**                                           |
| **rho**                                         |
| **p**                                           |
| **Age**                                         |
| -0.17                                          |
| 0.135                                          |
| 0.138                                          |
| 0.294                                          |
| -0.29                                          |
| 0.012                                          |
| **BMI**                                         |
| 0.18                                           |
| 0.129                                          |
| -0.41                                          |
| 0.001                                          |
| 0.04                                           |
| 0.001                                          |
| 0.01                                           |
| 0.341                                          |
| **General Health**                              |
| 0.25                                           |
| 0.029                                          |
| -0.07                                          |
| 0.552                                          |
| -0.10                                          |
| 0.402                                          |
| 0.18                                           |
| 0.128                                          |
| **Mental Functioning**                          |
| -0.03                                          |
| 0.780                                          |
| -0.04                                          |
| 0.159                                          |
| 0.23                                           |
| 0.047                                          |
| -0.27                                          |
| 0.019                                          |
| **Physical Functioning**                        |
| -0.12                                          |
| 0.302                                          |
| 0.02                                           |
| 0.858                                          |
| 0.11                                           |
| 0.336                                          |
| -0.01                                          |
| 0.913                                          |
| **Total # of ADLs**                             |
| 0.09                                           |
| 0.421                                          |
| 0.03                                           |
| 0.805                                          |
| 0.04                                           |
| 0.711                                          |
| -0.08                                          |
| 0.511                                          |
| **Total # of IADLs**                            |
| 0.11                                           |
| 0.331                                          |
| 0.01                                           |
| 0.944                                          |
| -0.02                                          |
| 0.858                                          |
| 0.06                                           |
| 0.592                                          |

Significance established at p<0.05.
DISCUSSION

In general, data indicate that Alaskan Inupiaq Elders are aging well and reporting few physical and mental problems. The data also suggest that Elders living in rural villages appear to be more satisfied with their lifestyles than their urban counterparts.

The Elders surveyed were physically active and involved in community activities. All Elders reported high levels of physical functioning on the SF-12 physical component scores and relatively few problems with ADLs and IADLs. When reviewing the data, village members suggested that it was possible that reporting problems about declining physical abilities was contrary to the serenity of respected Elder status, and thus the occurrence may have been under-reported. There is also the possibility that the assessment tools may have been interpreted differently by Inupiaq individuals than by respondents from other cultural backgrounds. Among the participants, older rural women reported higher scores for problems with heavy housework, which might have resulted from their recognizing their need for assistance in performing more labour-intensive household tasks such as fetching water and collecting firewood more so than urban women did. Although, villagers’ comments indicated that it is possible that cultural responsibilities provide support for the matriarchal role of older females within Inupiaq communities thus enabling them to function well despite their actual physical limitations.

Younger males may have perceived that the rural lifestyle is more desirable, perhaps because their cultural identity is closely tied to activities of providing food for their families and the community, activities that are often not possible when living away from the village as reflected in the higher physical ability, less pain and higher vitality scores generally reported by rural males. Younger males in both rural and urban settings reported more difficulties with Activities of Daily Living than did older males and females. While the most commonly reported ADL was walking, older individuals in the village may be not be expected to walk long distances.

Continued involvement in village activities that include the eating of protein-rich wild game and involvement in tribal government leadership roles may have resulted in higher life satisfaction scores for rural younger males and for older women. Cultural roles filled in rural Native communities may not be the same when individuals live in the urban setting of Anchorage. Elders living in urban communities may find themselves in a social structure with different goals; goals that may not be as supportive of Elders as those found in rural villages. The social relationships in urban communities are not well understood and should be examined in future studies.

Food insecurity rates were high in all age groups, although measuring possible contributing social and economic factors that could precipitate food insecurity status was beyond the scope of this initial baseline study and should be explored in future studies. Younger urban males reported high energy intake and also high levels of food insecurity. This finding has also been reported by other food-insecure populations (25). This suggests that food insecurity for younger urban males may have focused on purchased foods in rural communities rather than on the lack of wild foods that were harvested or gathered.
Younger urban males may have been unable to fulfill traditional family responsibilities for providing food for those who were older, and perhaps unable to support younger families, as well.

In rural communities, the comment “Food didn't last and we couldn't get more” did not specify if shortages were the result of the lack of purchased or harvested foods, or both. Elders indicated that food supplies at small village stores could be unstable because Arctic weather sometimes prevented or delayed barge deliveries of a village’s yearly food supply. Elders expressed that they were more comfortable with the changes in the varying availability of fish and large animals from year to year because they had cultural habits that have historically buffered them from starvation. It was the continual changes in state, federal and international regulations concerning the harvest of wild foods and disparaging comments about their lifestyle by political groups living outside of Alaska that seemed to provide additional levels of uncertainty about their food supply as well as the continuation of Inupiaq food traditions. In light of the high energy and protein intakes reported, it did not appear that individuals were experiencing starvation. General anxieties about the provision systems of all food in Inupiaq villages may have been expressed through the food insecurity questions.

Mean BMIs for all groups were within acceptable ranges for individuals over 50 years of age (26), even though they appear to have high calorie intakes. It is wise to note that Native populations have been historically characterized with short muscular frames, and, based on available data, the mean body weight appears to have declined over the last 100 years (10). Self-reported low levels of energy (in response to the comment “I have lots of energy”) and vitality are frequently considered to be indices of the presence of depression. The higher levels of energy and vitality indicated by rural respondents reinforce the possible lower depression levels of the rural group. While this finding was encouraging, all Elders expressed concern that many mental health issues exist in their villages and the issues continue to be challenging.

No significant differences were found in the mean cultural scores across age groups, location and gender, and may document the strength of tribal values present in this population. Rural communities seem to consider assisting Elders as an integral part of following traditional village life patterns. In rural communities, the access to systems accommodates individuals as they age, which could help older individuals cope with changes in mental and functional status; consequently, individuals continue to see their health status as favorable (27).

Both settings indicated strong tribal ties and traditions. For example, there were no differences in reported participation in cultural activities, such as “picking berries,” although the availability of berries in Anchorage is limited. It must be noted that all the urban respondents had lived in Anchorage for less than 5 years. Greater differences may be found if migration continues and if Inupiaq Elders reside longer in urban communities.

Reported mean food intake by Inupiaq Elders was high, but so were the standard deviations. Large standard deviations indicate the tremendous individual variety of diet patterns, and could also mask the low intakes of essential calories and protein for some individuals.
The depth of the tested questionnaires gave confidence that the description of the Inupiaq Elders was a true picture, even though few of the survey tools have been tested for use with Native populations. The high participation rate in the 2 rural locations and the diverse topics covered by the assessment tools appears to provide a valid view of the Inupiaq Elders who participated in this study, at least at the time of the study.

The traditional Tribal Councils and Elders’ Councils assisted researchers with the interpretation of the data and felt that the data accurately reflected their lives, and could even represent common themes in other villages as well. The data could differ, however, as economic conditions change, such as an increase in the price of gas for transportation to fish and hunt, as well as changes in harvesting regulations, access to game resources, technological advances and the weather. The authors are less sure that the urban data represent Inupiaq individuals as a whole because of differences in the sampling techniques and the less stable urban populations.

While the subgroups were small, the characteristics of the younger urban male group may warrant further study. The high quality of aging found among older groups warrants further definition.

Conclusions

Inupiaq cultural values form a foundation for a deep appreciation and respect for older individuals. Rural village locations appear to provide a supportive environment resulting in higher satisfaction through the aging process. Reinforcing and enhancing services based on cultural traditions to assist Native Elders in rural locations might enhance their quality of aging more so than moving them to urban communities.

Data from younger male Elders, those less than 60 years of age, indicated the greatest discontent at this stage of their lives with the highest reported level of food insecurity, calorie intake and rates of smoking. The small size of the sample, the limited number of variables and the use of self-reported data were insufficient to determine relationships to health status, although these variables are frequently associated with increased chronic disease. Rural respondents expressed that aging in traditional lands was more pleasant than in urban communities. The costs and benefits of providing services or supporting existing informal community services in rural communities should be explored. Further studies are needed to examine if these findings will be reflected in the aging population as it changes over time, and if these findings are replicated in other villages in the Arctic.

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