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Selected indicators of nutritional status among rural elderly females in Malaysia

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Selected indicators of nutritional status among rural elderly females in Malaysia

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Iowa State University, 1989

Selected indicators of nutritional status among

rural elderly females in Malaysia

by

Zaitun Yassin

A Dissertation Submitted to the

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INTRODUCTION

The demographic trends that reflect dramatic increases in both individual longevity and the proportions of older persons in the populations of developed nations are fast becoming worldwide phenomena. Population aging, which occurred over a period of many decades in developed nations, is taking place more rapidly in developing nations. According to Nusberg (1982), the probable result is that the Third World's share of the total world's people who are 60 years or older will increase from 52% in 1975 to 62% in the year 2000 and 72% in the year 2025. For example, from 1980 to 2000 South and East Asia will experience an elderly "population explosion" of those age 65 and older, with an increase of from 44 to 84 million elderly in South Asia and from 68 to 116 million elderly in East Asia (Myers, 1986). Thus, many areas of the world which are presently designated as less developed or developing will have increased social and economic responsibility for more elderly people in their population.

It is also important to note that the most rapid population increases are expected for persons over 80 years. This category of the elderly is most in need of the types of medical care and services which are virtually nonexistent in many parts of the Third World. Nearly 14% of the "older" population worldwide is estimated to be 80 years of age or over. The figure is 16.8% in developed countries compared with 11.1% in less developed countries. Between 1980 and 2000 the number of people over 80 years in North America is expected to rise by 57%, with

more substantial increases expected in West Africa (143%), tropical
South America (138%), Southeast Asia (113%), and China (92%) (Myers,
1982). Such changes, when coupled with increasing poverty, over-
urbanization, and the rural exodus of young adults, may magnify the
social and economic problems of developing countries and become a
barrier to development.

Demographic Trends in Malaysia

Malaysia is a developing country expected to experience a rapid
increase in the number and proportion of elderly in the population over
the next decades. Malaysia lies in the heart of Southeast Asia. It
occupies two distinct regions, Peninsular Malaysia which borders
southern Thailand, and Sabah and Sarawak on the northwestern coast of
the island of Borneo or Kalimantan. Malaysia has a population of about
13.9 million and a diversity of races, according to the 1980 census.
In this racial diversity there is unity in that Malaysians, who are
made up of 53.9% Malays and other indigenous people, 34.9% Chinese,
10.5% Indians, and 0.7% others, live and work together (Malaysia
Department of Statistics, 1983).

The major demographic forces that change the size of a population
and its age composition are levels of fertility and mortality. In the
past two decades, Malaysia's population has experienced a marked
decline in both fertility and mortality. There was a decline in crude
birth rate (CBR) from 38.7 to 32.2 per thousand between 1970 and 1980.

During the same period, the crude death rate (CDR), already relatively low by developing country standards, declined further from 9.9 to 7.8 per thousand. The decline in CDR between 1970 and 1980 was reflected in the improvement in life expectancy at birth for both sexes from 61.3 to 63.3 years, with males experiencing an increase from 59.5 to 61.5 years and females from 63.1 to 65.1 years (United Nations, 1982). Consequently, with these changes in birth and death rates, Malaysia's population is slowly aging.

According to the 1980 census (Malaysia Department of Statistics, 1983), 3.6% of the population in Peninsular Malaysia consisted of people aged 65 years and above. In the year 2000, the estimated projection for this segment of the population is 4.8%. However, there are slight differences in the concept of aged or elderly between the developed and developing countries. In ASEAN (Association of Southeast Asian Nations) countries, elderly is defined as those aged 60 years and over. This definition for the elderly is also true for most other developing countries, particularly those with high mortality rates, where the term elderly is applied to individuals at younger ages than in developed countries. Age at retirement, also a criterion used to mark the term elderly, is 55 years old in Malaysia. If the compulsory retirement age for the work-force remains at 55 years old, then the future working population in Malaysia will have to support a bigger proportion of the retired elderly, which is projected to increase from 8.1% in 1980 to 10.4% in the year 2000 (Malaysia Department of Statistics, 1983).

Malaysia's elderly population is still relatively small in comparison to those in developed countries like the United States. Nevertheless, planners and researchers should not be complacent about the present situation. Trends indicate a continuing increase in the number and proportion of older individuals in the country. Therefore, the issues affecting the elderly population should be examined now rather than later when the situation has become a major problem to the country.

The population in Malaysia is mainly rural. The 1980 census provides a figure of 63% of the population in Peninsular Malaysia residing in the rural areas (Malaysia Department of Statistics, 1983). Some of the characteristics that distinguish rural from urban areas are greater poverty, underemployment, inadequate housing, and fewer social and health facilities. According to the Household Income Survey of 1984, 18% of households in Peninsular Malaysia could be classified as poor, and of these, 83% were located in the rural areas (Malaysia, 1986).

On the global level, rural areas have tended to have higher proportions of older persons than urban areas (Myers, 1982). This is especially true in less developed countries like Malaysia. The same pattern exists for more developed countries, although the differentials are rather small. Selective out-migration of younger persons to urban areas tends to leave behind in the rural areas a considerably older population. In 1980, 52.4% of elderly females aged 65 and over were found in the rural areas (Malaysia Department of Statistics, 1983).

In examining the aging trends in Malaysia, attention must be directed to ethnic variations. Ethnically, the Chinese have experienced a growth in their aging population much earlier than the other two major ethnic groups because of their comparatively lower fertility level and greater longevity. In 1980 there were 7.6% Chinese aged 60 and older compared to 5.4% Malays in Peninsular Malaysia (Malaysia Department of Statistics, 1983). Socioeconomically, the Chinese have been mainly urban-based where the standard of living is higher than in the rural areas. On the other hand, the Malay population, living primarily in rural areas (66%), are from the lower socioeconomic strata, are under-employed, and do not enjoy all of the social and health facilities available to their urban counterparts. Consequently, the rural Malay elderly have much more difficulty coping with social, economic, and physiological problems related to the aging process.

Among the elderly the sex ratio (number of males per 100 females) tends to decrease with increasing age because of the differential mortality that favors females. When the sex ratio at older ages is too low, the implication is a greater need for social and financial support and health facilities for the female aged. In 1980 the proportion of individuals in Peninsular Malaysia 60 years and older who were female was 51.2%, whereas 48.8% were male. There is also a higher proportion (54.7%) of females widowed at age 60, as compared to 13.6% for males (Malaysia Department of Statistics, 1983). Widowhood can be a

traumatic event, especially in traditional societies in which women are heavily dependent upon their menfolk for economic and social support.

A Statement of the Problem

There is a paucity of available data on the elderly in Malaysia, primarily due to the fact that Malaysia is still categorized as a "young" country. The problems associated with the elderly have not yet surfaced or have been unintentionally ignored. Typical of most developing countries, Malaysian society has its own system of family and kinship which provides for the needs of the elderly. Cultural norms encourage this trend since filial piety is deeply respected among the populace. However, in the wake of changing social trends due to modernization of society, there has been growing concern for the welfare and well-being of the elderly.

Previous nutritional studies in Malaysia have placed special emphasis on the well-being of young children and women in the reproductive phase of life (Chen, 1977; Chen, 1978; Chong and Hanis, 1982; Chong et al., 1984; Kandiah and Ooi, 1984; Tee et al., 1984; Teoh, 1976). Little or no attention has been paid to the problems of the elderly. A review of the annotated bibliography of nutrition research in Malaysia, 1900 to 1984 (Tee, 1980, 1984), did not reveal any study on nutrition and the elderly. The only closely related study, entitled "Health care of the elderly in Malaysia," was reported by Andrews et al. (1986).

The elderly are anticipated to have many health and nutritional problems that will demand increasing attention and resources from the government. Therefore, studies of the Malaysian elderly have the potential to be tremendously useful to the Malaysian government as it projects future health care needs.

The purpose of this study, therefore, was to examine nutritional status indicators of elderly Malay females 55 years and older in selected rural areas in Malaysia. Four specific objectives were to:

1. examine living conditions, health indices, social activities, and other descriptive characteristics of the sample and their relationships to the nutritional status indicators

2. examine food consumption patterns of the sample using food frequency records

3. identify selected perceptions toward food which may influence food intake and nutritional status

4. assess selected anthropometric indices of the sample

The following chapters present data collection methodology, results, and conclusions. The chapters are organized as follows:

- Chapter 2 - general methodology and a description of the sample

- Chapter 3 - review of literature, specific methodology, and results and discussion regarding living conditions, health indices, and social activities of the sample

- Chapter 4 – review of literature, specific methodology, and results and discussion regarding dietary patterns, frequency of food intake, and perceptions about food

- Chapter 5 – review of literature, specific methodology, and results and discussion regarding anthropometric characteristics of the sample

- Chapter 6 – policy and program implications

GENERAL METHODOLOGY AND DESCRIPTION OF SAMPLE

General Methodology

Two sub-districts, Nilai and Lenggeng, in the state of Negri

Sembilan, on Peninsular Malaysia (Figure 1) were purposively selected

for the study. The proportion of elderly 55 years and older in Nilai

and Lenggeng is about 13% and 20%, respectively, (Malaysia Department

of Agriculture, 1985) compared to the national figure of 8% (Malaysia

Department of Statistics, 1983). Not only were these sub-districts

readily accessible from the home base of the researcher, thus saving

time and money, but they also contained an adequate number of

individuals for the study. Furthermore, Nilai and Lenggeng were two of

the sub-districts used as extension practical areas by students from

the University of Agriculture, Malaysia. Thus, good rapport had been

established with the officials from the sub-districts and villages, and

also with the villagers.

District and village officials from 14 villages in Nilai and 13

villages in Lenggeng were contacted and informed about the study. Data

were collected in these villages for seven weeks during the months of

June and July, 1988.

Instrument development

An interview form was developed to provide information on

demographic and environmental variables; health status and social

activities; food preparation, expenditures, and procurement patterns;
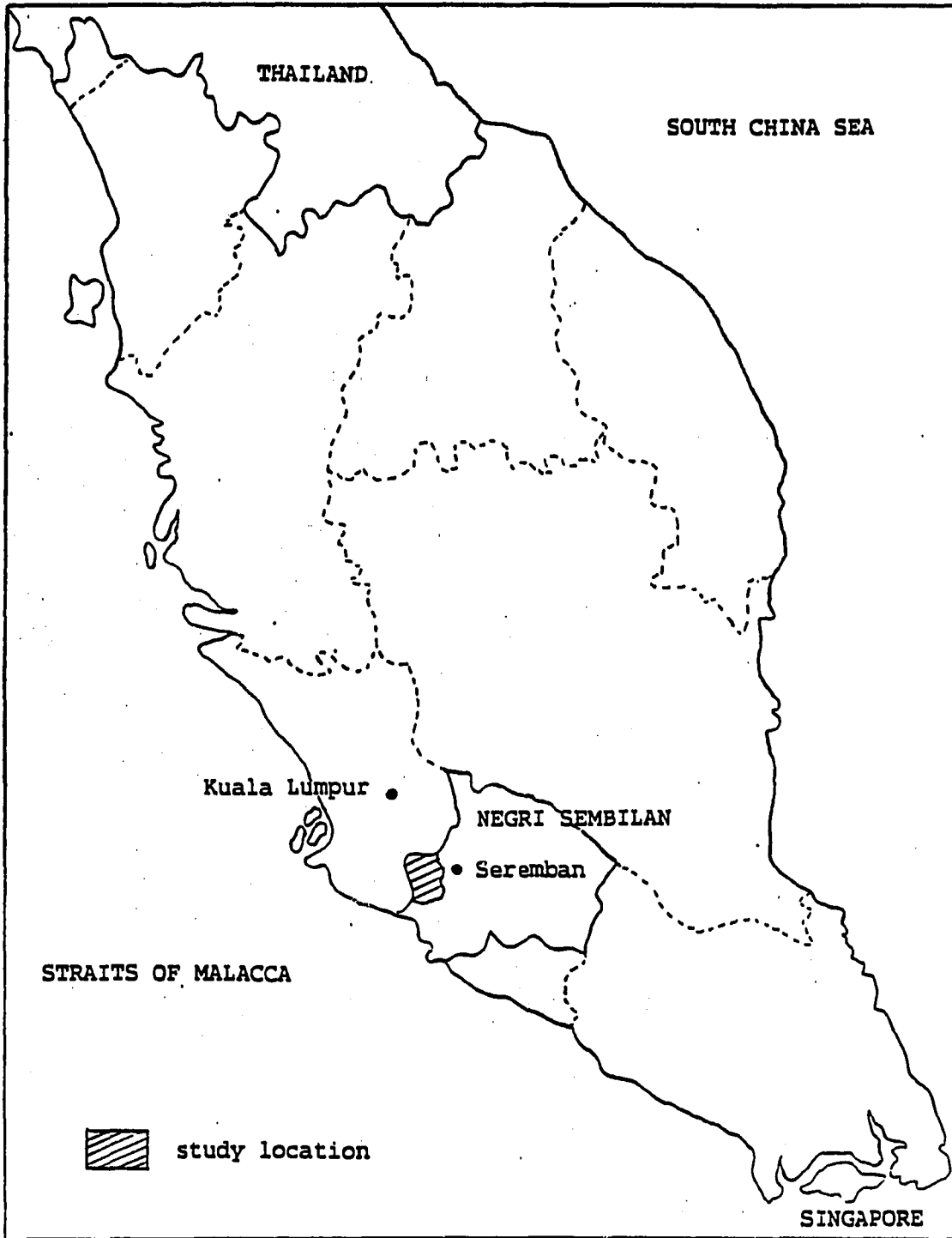
FIGURE 1. Map of Peninsular Malaysia showing the study location

meal patterns and perceptions about food; frequency of consumption of selected foods; and anthropometric measurements.

The interview form (in English) was reviewed by nine faculty members in the College of Family and Consumer Sciences at Iowa State University and in the Department of Human Development Studies at the University of Agriculture, Malaysia. The expert reviewers were requested to study each item for clarity, brevity, plausibility, appropriateness, and accuracy, as well as whether the items were adequate to achieve the objectives of the study.

Revisions were made before translating the interview form into the local language (Bahasa Malaysia). Pilot testing was carried out using 20 respondents with characteristics similar to the research sample but living in a rural village not included in the study area. Data from the pilot study were analyzed, and necessary modifications and revisions were made for the final instrument (Appendix A). The methodology for the study and the research instrument were approved by the Committee on the Use of Human Subjects in Research at Iowa State University.

Selection of participants

The population sampled was limited to Malay females 55 years of age and older residing in selected rural villages in the two sub-districts of Nilai and Lenggeng. Due to the lack of a complete list of household counts or eligible respondents, it was not possible to do a random selection for the sample. Subjects were located by visiting the

headman in each village and obtaining permission to visit most of the households for the study. For every household visited, all female individuals 55 years and older were invited to participate in the study, even if more than one lived in the same household. Some members of the households also cooperated by giving names and locations of other eligible respondents in that particular village or the neighboring villages.

A modified informed consent form (Appendix B) was read to each potential respondent explaining the purpose of the research, the procedure to be followed, and her time commitment in the study. All healthy, ambulatory females 55 years of age and older who were willing to participate in the study were included in the sample. Three attempts were made to complete each interview, after which a note was made of any refusals, absences, or other evidence of unwillingness to participate. Out of the total 347 elderly contacted, 30 refused to be interviewed for various reasons. This provided a refusal rate of 8.6%.

Data collection

Personal interviews were conducted in the local language by six trained interviewers, including the researcher, in the homes of the respondents. The five interviewers who assisted the researcher were selected from a list who responded to an advertisement placed on the Department of Human Development Studies bulletin board. Three were females who were recent graduates of the University of Agriculture with a B.S. in Human Development (General Home Economics). The other two

were male graduates with a B.S. in Agribusiness. All had prior experience in field surveys of rural households.

The interviewers were trained for five days in the use of the interview form and the conduct of the survey. As suggested by Krondl et al. (1982), the training session also emphasized replicability of techniques; eliciting information without suggesting answers; consideration of poor memory, eyesight, and hearing; pacing of the interviews; and, of particular importance to the elderly population, patience, empathy, and respect.

The researcher accompanied each interviewer during the initial part of the survey to observe the conduct of the interview as well as the completeness and quality of the data collected. Each interview took about 30 to 45 minutes to conduct. Each questionnaire was checked and edited by the interviewer at the end of each day and cross-checked by the other interviewers and researcher at the end of each week for missing information or incomplete answers.

The anthropometric measurements were collected by the researcher either on the same day, a few days later, or about one week after the interview was conducted. About 15 to 20 minutes were spent to measure each respondent.

Data coding and analysis

Data were coded for subsequent computer processing and analysis. The Statistical Package for the Social Sciences-X (SPSS-X) computer program was used to analyze the data (SPSS, Inc., 1983). Frequencies

and measures of central tendency were determined for all the items.
Chi-square tests were performed to investigate differences between
nominal level variables and correlations were investigated by computing
Pearson's Product Moment correlation coefficients. The statistical
probability of <0.05 was considered to be significant.

Description of the Sample

Selected demographic characteristics of the participants are
presented in Table 1. About 56% of the subjects were from the sub-
district of Lenggeng, while 44.2% were from the sub-district of Nilai.
The mean age was 64.5 years, and the ages ranged from 55 to 110 years.
More than half were in the 55 to 64 age group.

The majority (74.5%) had monthly incomes of Malaysian $500 or less
(US $1.00=Malaysian $2.70). The average monthly income was M$406 and
the incomes ranged from about M$50 to M$2,700 per month. The majority
(73.8%) of the subjects indicated that contributions from family
members who did not live in the same household was one source of
income. Only 6.0% of the respondents received financial support from
the Social Welfare Department. A large proportion (87.1%) of the
respondents received a monetary contribution regularly, and the source
of the contribution was typically their children (79.5%). The average
monetary value of the contribution was M$195, and was received by 92.0%
at least once a month. This finding clearly indicates that children,
and to a lesser extent other family members, were a substantial source

TABLE 1. Demographic characteristics of rural elderly Malaysian female
          subjects (n=317)

Characteristic	No. of respondents	Percent
Sub-district		
Lenggeng	177	55.8
Nilai	140	44.2
Age group (years)		
55 - 64	180	56.8
65 - 74	97	30.6
75 - 84	33	10.4
85 and over	7	2.2
Income per month (Malaysian $)		
M$200 or less	81	25.5
M$201 - M$300	68	21.5
M$301 - M$400	50	15.8
M$401 - M$500	37	11.7
M$501 or more	81	25.5
Sources of income[a]		
family members living outside the household	234	73.8
respondent's or spouse's salary	128	40.4
family members living in the same household	116	36.6
sales of agricultural products and animals	61	19.2
welfare	19	6.0
Monetary contribution received regularly		
from children	252	79.5
from others	24	7.6
none	41	12.9
Frequency of receiving contribution[b]		
at least once a month	254	92.0
less than monthly	22	8.0

[a] Multiple responses possible.

[b] n=276.

Table 1. continued

Characteristic	No. of respondents	Percent
Employment status		
housewife	240	75.7
work part time	70	22.1
had worked and retired	7	2.2
Education (years)		
none	202	63.7
1 - 4	77	24.3
5 - 7	36	11.4
8 or more	2	0.6
Literacy[a]		
able to read	88	27.8
able to write	67	21.1
Marital status		
married	144	45.4
widowed	155	48.9
divorced	18	5.7
No. of living children		
none	10	3.2
1 - 4	115	36.3
5 - 8	138	43.5
9 or more	54	17.0

of financial support for the elderly respondents. Employment may also have provided income for some. Although more than three-fourths of the respondents had never been employed outside the home, 22.1% still worked part-time as farmers, laborers, or rubber tappers.

About 64% of the sample had never attended school. Only 12.0% had five or more years of formal education. The low level of education was reflected in the respondents' ability to read and write. About 28% and 21% were able to read and write, respectively. The World Health Organization (WHO) conducted a study in 1984 on the health care of the Malaysian elderly using a sample of 1,000 which reflected the regional, urban/rural, and ethnic mix of those aged 60 and over in Peninsular Malaysia. The study indicated a higher percentage (89%) of rural elderly females who had never been to school, and only 5% with formal education of at least five years (Andrews et al., 1986). Similarly, in a more recent study conducted by the National Population and Family Development Board, a project under the ASEAN Population Program, Masitah (1988a) reported that 87.5% of the rural elderly Malaysian females did not have any formal education.

On the average, 42.5 years was the length of time the respondents had been married. About 45% of these elderly were still married, while 54.6% were either widowed or divorced. Similar results were observed in the WHO study (Andrews et al., 1986). Among the elderly population, widowhood is a common feature. Some of the factors contributing towards a high proportion of widowhood, particularly among elderly females, are a longer life expectancy for females compared to males and wide age differences between males and their female spouses. Myers (1982), in a cross-national analysis of several less and more developed countries, reported that the percentage of older females who are

married ranges between 25% and 30% and those who are widowed between 50% and 65%. The lower values for those still married in Myers' analysis may be due to the different age range used, 65 years and older, compared to 55 years and older in this study. The majority (60.5%) of the respondents had five or more living children. Thus, it was not uncommon for this cohort to have large family sizes.

Data on property ownership and material possessions are summarized in Table 2. About 95% of the respondents owned some land, at the very least the piece of land the house was built on. House ownership was common, with 88.6% of the elderly interviewed living in their own houses. However, Chong and co-workers (1984) found that a higher proportion (95%) of their sample from several rural villages in Malaysia owned the houses they were living in. The difference may be due to the characteristics of the respondents. In the study by Chong et al. (1984), those interviewed were heads of household, compared to this study's sample of elderly females 55 years and older.

The possession of radio and television was quite common, with about 86% and 83% of the sample, respectively, reporting ownership of these items. As a mode of transportation, about half of the subjects' households owned a motorcycle or bicycle. Only 14.8% owned a car. In these relatively affluent rural villages, it was not surprising to find that almost two-thirds of the households had a refrigerator, electric iron, electric fan, and sewing machine. In the study by Chong et al. (1984), ownership of a refrigerator was almost nonexistent.

TABLE 2. Property ownership and material possessions of subjects'
households (n=317)

Ownership of property[a]	No. of respondents	Percent
Land	300	94.6
Home	281	88.6
Radio	272	85.8
Television	262	82.6
Electric iron	214	67.5
Sewing machine	209	65.9
Electric fan	207	65.3
Refrigerator	201	63.4
Bicycle	162	51.1
Motorcycle	160	50.5
Washing machine	61	19.2
Car	47	14.8
Video player	22	6.9

[a]Multiple responses possible.

Poultry rearing was by far the most common form of animal husbandry, and about 91% of these subjects' household reared chickens (Table 3). Similar results were reported by Chong et al. (1984). The average number of chickens raised was 13.7, and they were mostly for

home consumption. Other animals raised were cattle (20.5%), ducks
(17.4%), goats (12.0%), and buffaloes (2.8%).

TABLE 3. Distribution of subjects' households which raised livestock
(n=317)

Animals raised[a]	No. of respondents	Percent
Chickens	288	90.9
Cattle	65	20.5
Ducks	55	17.4
Goats	38	12.0
Buffaloes	9	2.8

[a]Multiple responses possible.

A possession score was computed for each subject using 15
variables selected from ownership of property and animals raised (land,
car, motorcycle, bicycle, refrigerator, electric iron, sewing machine,
electric fan, washing machine, radio, television, video player, cattle,
buffaloes, and goats). The subject was given one point for each of the
15 items owned or animals raised by the household. As shown in Table
4, more than two-thirds of the subjects' household had a possession
score of at least six, while 36.6% possessed nine or more of the 15
items.

TABLE 4. Distribution of subjects' household possession scores (n=317)

Possession score	No. of respondents	Percent
0 - 5	95	30.0
6 - 8	106	33.4
9 - 15	116	36.6

Statistical Relationships among Demographic Variables

Table 5 presents the statistically significant correlation coefficients among selected demographic variables. Older respondents were likely to report lower incomes, fewer living children, and fewer possessions, as reflected by the possession score. In addition, respondents with higher incomes were likely to have higher levels of education, a greater number of living children, and more possessions. Number of living children and years of education were also positively correlated with possession score.

As shown in Appendix C, the proportion of respondents who were married declined with age (x^2=48.82, df=3, p<0.001). Similar findings were observed in the WHO study (Andrews et al., 1986). There was also a large proportion of widowed or divorced respondents in the lower income categories (x^2=17.33, df=3, p<0.001) and who had low possession scores (x^2=12.23, df=2, p<0.01).

TABLE 5. Correlation coefficients among selected demographic variables
(n=317)

Demographic variable	Age	Income	Education	No. of living children
Income	-0.20**			
Education	0.01	0.25**		
No. of living children	-0.30***	0.17**	0.02	
Possession score	-0.34***	0.56***	0.21*	0.22***

*p<0.05.

**p<0.01.

***p<0.001.

The distribution of respondents' educational and literacy levels by selected demographic variables is presented in Appendix C. In general, the educational level and literacy of the respondents were related to age, income, and possession score. The proportion who had attended school (X^2=46.36, df=3, p<0.001), and who could read (X^2=21.33, df=3, p<0.001) and write (X^2=19.55, df=3, p<0.001) declined with age. Those who had never attended school were likely to be in the lower income categories (X^2=12.54, df=3, p<0.01). Similarly, respondents with higher possession scores were likely to be those who had attended school (X^2=25.34, df=2, p<0.001) and were able to read (X^2=15.95, df=2, p<0.001) and write (X^2=15.04, df=2, p<0.001).

The age of the respondents tended to influence the employment status, as shown in Appendix C. There was a larger proportion of respondents who were still working in the younger age group (X^2=13.09, df=3, p<0.01). The other demographic variables were not significantly related to employment status.

LIVING CONDITIONS, HEALTH INDICES, AND SOCIAL ACTIVITIES

Review of Literature

A suitable environment, satisfactory housing, optimal health, and continuing social contacts and participation are essential for the well-being of the elderly. The residential setting of an older person may also foster primary group ties, both familial and nonfamilial. This can be very significant for the social and psychological well-being of the individual (Streib and Beck, 1980).

Environmental and living conditions

A wide array of living conditions and arrangements are available to the elderly in most developed countries. In the U.S., for example, the majority of older people live either alone or with a spouse. Some live independently within the larger community, while others live within specified communities such as retirement or religious communities. Institutional arrangements can vary from relative independence with communal dining and recreational facilities to skilled nursing care (Antonucci, 1985)

In a developing country like Malaysia, the choice of living situations for the elderly is quite limited. Most Malaysian elderly either live with a spouse and/or with their children or other relatives. Only a small percentage tends to live alone (Andrews et al., 1986). The proportion of elderly living alone is greater in the rural areas than in the urban areas. This may be due to the exodus of

younger men and women to the urban centers to seek employment and economic opportunities, thus leaving the old in the rural areas (Chen, 1985). Another reason is that the elderly usually prefer to stay in the privacy of their rural homes rather than moving in with children in the urban areas. They may feel "enclosed" and their movement restricted, especially if their children are living in high-rise flats or public housing.

Similarly, Troll (1971) reported that most elderly people in the U.S. prefer, whenever possible, to live in their own homes and not with their children. This is particularly true if the older couple is still married. Moving in with children is resorted to only when there is not enough money to live alone, when health is so poor that self care is impossible, or, to a lesser extent, when a spouse has died.

Retirement communities like those available in the U.S. are non-existent in Malaysia. Institutions for the elderly are rare, although there are a limited number of homes for the elderly administered by the Ministry of Social Welfare, especially for those who are childless or were never married and who do not have any relatives to take care of them. In fact, in its concern to preserve family care for the elderly, the Malaysian government has stopped building such institutions or homes for the elderly (Concepcion, 1987).

Instead of placing the elderly in institutions, the government is providing financial assistance to needy elderly under the Assistance to the Aged Program. With the help of friends, relatives, social workers,

and the community, needy elderly persons remain in their own familiar
environments. Small cottages are also provided for the elderly in the
villages. Such cottages are normally built by the local community on a
"gotong-royong" (self-help) basis (Leong, 1984). Such programs are
also being implemented in Indonesia so that the family and community
will collectively take care of the elderly, thus maintaining the socio-
cultural values of the community (Concepcion, 1987).

Lately, there has also been a distinct increase in the number of
privately run nursing homes, especially in urban centers, providing
services mainly to the more well-to-do Chinese elderly population
(Abdullah, 1987). These institutions are operating on a commercial
basis, thus varying fees are charged depending on the type of services
provided. In view of the vulnerability of the elderly population, the
Malaysian government is looking into the feasibility of setting up some
form of legislation to regulate the running of these institutions.

Family structure and kinship system

Family structure in a Malay household is usually bilateral, and
there are strong ties to both the wife's and husband's extended
families. Most Malaysians, especially rural Malays, have lived within
the extended family structure for at least a portion of their lives.
Besides the parents and their children, the members of each household
usually include at least the grandparents and, in many instances, even
uncles, aunts, and cousins. Most of these members live under the same
roof, or at least within the same neighborhood. It is not uncommon to
find two or three generations living together in the same household.

In most rural Malay villages, housing units are typically clustered together in close proximity. It is not uncommon to find the house of married children or other relatives a few yards away from that of an elderly person. Thus, separate housing units do not necessarily limit social interaction or prevent extended families not living in the same household from sharing meals together. Similarly, even in more industrialized countries, Dahlin (1980) pointed out that the nature of the difference between living with and living near children is difficult to determine. The nuclear family pattern in which married children live apart from their parents does not necessarily mean that the lives of adult children and their aging parents are separate. Indeed, nuclear families can and have acted much like extended families.

Fifty-five percent of households in Malaysia are of the nuclear type and 28% are of the extended type. Interestingly, there are more extended families in the urban than rural areas, 29% and 27%, respectively (Malaysia Department of Statistics, 1983). The almost equal percentage of extended families in urban and rural areas may be due to the racial distribution of the Malays and Chinese in the urban and rural areas. The extended family structure of rural Malays has been discussed above. The majority (56%) of Chinese are concentrated in the urban area. Their family structure is predominantly patrilineal and patriarchal, and the bride is supposed to move in with her husband's family and be subservient to elder members of the family.

In addition to the often close proximity in living arrangements, family sizes in Malaysia are large. The average household size is 5.2 persons, and tends to be slightly larger in rural than in urban areas (Malaysia Department of Statistics, 1983). Such living conditions are favorable due to heavy reliance among family members for productive and remunerative activities.

A number of social changes have influenced the current pattern of family structure in Malaysia. First, each succeeding generation has enjoyed increasing independence, so that today's adult offspring feel they have fewer financial obligations to repay compared to earlier generations. Second, subsequent generations have been both geographically and socially more mobile than their parents. A third factor is the increasing presence of women in the labor force, either by necessity or by choice. For example, some middle-aged women may be grandmothers, and may also work full-time or part-time. This prevents them from offering services or performing care-taking roles for grandchildren or aging parents.

Another factor which influences the family structure is the trend towards smaller family size. With smaller numbers of children, the burden of providing care for the elderly parents has become heavier. The shift in the ratio of care-givers to care-users, combined with the emergence of the nuclear family, is creating great concerns for the health and nutritional well-being of the older generation.

Health status

Health is one of the most important variables affecting the nutritional status and family life of older persons. Health problems among the elderly are frequently multiple, chronic, and of long-standing duration. These problems include an intricate mixture of physical, psychological, and social components. Hypertension, diabetes, heart disease, constipation, certain malignancies, and osteoporosis are some of the nutrition-related health problem which occur more frequently in older than younger populations. These conditions may be due to a general deterioration in the efficiency of major body systems or the consequences of nutritional neglect at present or at an earlier age (Hickler and Wayne, 1984). After age 75, the prevalence of these conditions increases markedly (Krondl and Coleman, 1987). Food-related activities may also be hindered by diseases of the musculoskeletal system, such as arthritis, thus having secondary effects impacting on the nutritional status of the elderly.

The major causes of death for elderly people in developing countries tend to be respiratory diseases, whereas in the developed countries heart disease, cancer, and cerebrovascular disease predominate. With recent development and modernization, Malaysia is following the mortality trend of the developed nations. Eighteen percent of the deaths of persons aged 55 and older in 1983 were due to cerebrovascular and heart disease, 5.7% to cancer, and only 1.4% to respiratory diseases (Malaysia Department of Statistics, 1985).

Similarly, in China and Japan the three leading causes of death are
heart disease, cerebrovascular disease, and malignant neoplasms
(Martin, 1988).

Because of the prevalence of chronic diseases among the elderly
population, they constitute a group that consumes a greater proportion
of prescription and over-the-counter medications than does any other
age segment. The prevalence of more than one type of chronic disease
or health condition also poses the problem of poly-pharmacy, and the
increased potential of drug-drug interactions. The WHO four country
study in the Western Pacific revealed quite a high usage of prescribed
and over-the-counter medications among rural elderly females in Fiji,
the Republic of Korea, Malaysia, and the Philippines. In addition, the
use of traditional medicine was particularly high in Fiji (52%) and the
Republic of Korea (29%) (Andrews et al., 1986).

A WHO study on the health care of the elderly in Malaysia revealed
that 25% of the respondents reported having recently experienced health
problems, such as accidents, injuries, or chronic illnesses, that
affected their daily activities. Of these respondents reporting
reduced activity due to ill health, 48% were females and 59% were from
rural areas (Chen, 1985). Besides changes in health status, changes in
taste sensation and smell due to the aging process can also affect the
kinds of foods consumed in the daily diet, and may in the long run
affect the overall nutritional status of older persons. Many foods may
taste bland to the elderly, encouraging a preference for strongly

seasoned foods. Other age-related perceptual changes such as visual and hearing impairment can hinder the procurement, preparation, and enjoyment of food among the elderly. Dental problems also affect the intake of certain nutrients and fiber when foods such as meats, fruits, and vegetables are avoided (Geissler and Bates, 1984).

According to the WHO study, 68% of elderly subjects in Malaysia had impaired vision in at least one eye, 48% reported some difficulty in chewing food, 37% had a dental prosthesis, and 16% had a hearing disorder (Andrews et al., 1986). Similar findings were reported by Abdul Halim (1988) in a study of 1,254 elderly subjects 55 years and older in three states in Peninsular Malaysia, a project under the ASEAN Population Program.

Perceptions about health   Self-perception of one's own health status is a very important predictor of life satisfaction among older persons. Significant correlations have been found between subjective assessment of health status and self report of conditions and symptoms, measures of functional status, and physical examinations or physician ratings (Kaplan et al., 1988). In a study of 600 adults in Illinois, Cockerham et al. (1983) concluded that the number of self-reported symptoms was the strongest predictor of perceived health status, followed by age, education, and race. The elderly in the over 60 age group who were more highly educated and reported the fewest symptoms were more likely to have a positive perception about their health status.

Elderly persons' self assessments of health are based largely on comparisons with peers. Several studies have used self-to-peer comparative health questions rather than having the respondents rate their health on a scale of excellent to poor. This approach has been suggested in order to obtain a more accurate measure of how members of a specific age cohort perceive themselves and each other (Cockerham et al., 1983; Fillenbaum, 1979).

Social contacts and participation

The mental and physical well-being of elderly persons can be influenced to a large extent by their social networks and participation in family and communal activities. In the rural areas of Malaysia, social contacts among the elderly are usually restricted to members of the immediate family, other relatives, and people in the neighborhood. The family is usually the primary arena of activity and the major source of material support, daily care, and spiritual support for the elderly. The elderly usually represent a completely integral part of the family system.

In the WHO study (Andrews et al., 1986), 40% of the elderly sample in Malaysia reported that they attended family functions (weddings, funerals, feasts, etc.) at least once every three months, and a similar proportion reported visiting or being visited by relatives at least once a month. Taking care of grandchildren is another form of social contact and interaction available to the elderly. This role is more likely to be taken by younger elderly females than older females or

elderly males. According to Andrews et al. (1986), the care of grandchildren was the responsibility of about 60% of Malaysian elderly females in the WHO study.

Participation in religious, social, and political organizations provides a social environment for the elderly to meet other people in groups. Opportunities for membership in social clubs or organizations are usually very limited in the rural areas in Malaysia. Membership in a political party and involvement in religious groups are the most likely type of community involvement by most rural elderly. In the WHO study, only a small proportion of elderly in Malaysia professed any involvement in clubs, societies, regular meetings, or organizations. Although 26% indicated that they belonged to a social organization of some sort, only about 20% had been to a meeting in the last month (Andrews et al., 1986).

Leisure and recreational activities can promote positive physical and mental well-being among the elderly. However, recreational activities and programs especially targeted for the elderly are few or nonexistent in Malaysia. In a recent ASEAN study, Masitah (1988a) reported that watching television and video-tapes, listening to radio, talking to friends and neighbors, gardening, playing games and sports, and reading were some of the more common leisure activities of the elderly in Malaysia. The pattern of spending leisure hours was similar for males and females, both in urban and rural areas.

Methodology

Data collection

To provide information on the living conditions of the sample, each respondent was asked questions regarding the ownership of the house she was living in, length of time she had been living in the house, and domestic facilities such as source of drinking water, toilet facilities, and garbage disposal. In order to provide information on the family structure within the living arrangement, each respondent was asked to identify the number and relationship to self of others in the house. The respondent was also asked to rate her present living conditions compared to five years ago on a scale of excellent, good, fair, and poor.

Several approaches were used to evaluate the overall perceived health status of the elderly females. Each respondent was asked to rate her overall health compared to other women her age as excellent, good, fair, or poor. Each was also asked if her present health was better, worse, or about the same compared to a year earlier, and to rate the amount of worry her health had caused her during the past year. The respondent was asked to rate her level of physical activity compared to her peer group as more active, less active, or about as active.

Each respondent was asked if any of eight ailments (heart disease, high blood pressure, urinary or kidney problems, respiratory problems, anemia, cancer, diabetes, and arthritis) had disrupted her daily

activities in the past year and, if so, if the ailments had been medically diagnosed. In addition to the above health conditions, the respondent was asked to rate the frequency (all the time, sometimes, or never) that she experienced problems with walking, standing, hearing, seeing, chewing, tasting, smelling, constipation, and diarrhea. Information was also obtained on the respondent's most recent visit with a physician, health care worker, or local medicine man regarding her health, and on the recent use of prescription, over-the-counter, and traditional medication.

In order to indicate functional status in the past year, the respondent was asked how often she had been too sick to do her daily activities on a scale of daily to less than monthly. In addition, questions were asked about who would provide help if she became too sick to do her daily activities and how quickly any of her children could come to her aid, in person, if needed. Information was obtained on the respondent's dental status which included the following: if she was wearing dentures, the type of dentures, and if the dentures fit well.

Each respondent was asked several questions to provide a profile on social activities, participation in organizations, and social contacts. First, questions were asked about membership and participation in social or political organizations. Next, frequency within the past month for the following activities was recorded: attending the mosque or "surau", attending a feast or "kenduri" in the

neighborhood, getting together socially with friends or neighbors, and seeing and talking on the phone with children. The respondent's self-perception of social contact was obtained by asking each respondent to rate her involvement in social life as doing too much, about enough, or would like to do more. In addition, information on the usual means of transport used by the respondent was obtained.

Data analysis

A health score was computed by counting each subject's self-reported diagnosis for eight health conditions: heart disease, high blood pressure, urinary or kidney problems, respiratory problems, anemia, cancer, diabetes, and arthritis. A complaint score was calculated for each respondent using the rating of 'all the time'=3, 'sometimes'=2, and 'never'=1 for the following nine variables: trouble walking, standing, hearing, or seeing; difficulty in chewing; poor taste or sense of smell; and constipation and diarrhea. To provide a measure of social activities, a participation score was computed for each respondent using the following variables: attendance at social or political meetings, attendance at feasts in the neighborhood, attendance at the mosque or "surau", and socializing with friends or neighbors.

Frequency and central tendency statistics were computed for all variables. Correlation coefficients and chi-square values were calculated to determine the interrelationships between various living conditions, health indices, and social activities variables, and their relationships to demographic factors.

Results and Discussion

Environmental and living conditions

Selected environmental and living conditions of the sample are presented in Table 6. Correlation coefficients of selected variables are reported in Appendix D. A majority (88.6%) of the respondents indicated that the houses they were living in belonged to them or their spouses. In a study of 1,254 elderly subjects 55 years and older in three states in Peninsular Malaysia, Masitah (1988b) reported the proportion of rural elderly females who owned the houses they were living in was 67.7%. The houses of the respondents in this study were mostly made of wood with zinc roofs. Only about 1% of the houses were made of wood with roofs of "attap" sheets. Chong et al. (1984), in their study of several rural Malay villages in Peninsular Malaysia, reported that a similar proportion (91%) of houses in a more affluent village were made of wood and zinc sheets, while about 60% of the houses in the poorest village were made of wood and "attap" sheets.

Disposal of human waste was generally satisfactory. Flush or pour-flush types of toilets, either inside or outside the house, were available to 84.5% of the households. Only 12.0% used the rivers or streams as toilets. In the study by Chong et al. (1984), 47% to 69% of households in the poorer villages resorted to streams and rivers for excreta disposal. A majority of respondents in this study disposed of their refuse and garbage by burning or burying. Only a small percentage (3.8%) used the river for garbage disposal. Similar

TABLE 6. Environmental and living conditions of elderly respondents (n=317)

Variable	No. of respondents	Percent
Ownership of home		
owned by respondent or spouse	281	88.6
owned by other family member	35	11.0
rented by respondent or spouse	1	0.3
Type of materials home constructed from		
wood and zinc	286	90.2
brick and tiles	10	3.2
wood and tiles	7	2.2
wood and attap	4	1.3
other	10	3.2
Type of toilet facility		
pour-flush type, outside house	207	65.3
flush type, inside house	61	19.2
use of river	38	12.0
dug out latrine	11	3.5
Garbage disposal[a]		
burning	295	93.1
burying	57	18.0
throwing in river	12	3.8
other	14	4.4
Source of drinking water		
piped water	223	70.3
well	92	29.0
other	2	0.6
Rating of living condition		
excellent	11	3.5
good	103	32.5
fair	167	52.7
poor	24	7.6
don't know	12	3.8

[a]Multiple responses possible.

findings were observed by Chong et al. (1984), although 21% of households in a riverine village disposed of their garbage in the river.

About 70.3% of respondents in this study obtained their drinking water from a piped water supply, while more than one-quarter of the respondents' households still used wells. It is not unusual in rural areas for drinking water, irrespective of its source, to be boiled before consumption. Chong et al. (1984) reported that piped water was only available in one village studied, while the main source of drinking water in most of the other villages was from improperly constructed wells or rivers.

About half of the respondents in this study rated their present living condition compared to five years ago as fair, and only 36.0% rated it as good or excellent. Conversely, 74% of rural elderly in the WHO study (Chen, 1985) rated their residences as good or excellent. The differences between these figures may be due to differences in the questions asked. In this study, the respondent was asked to rate her present living condition compared to five years ago, while in the WHO study the respondent was asked to rate the house she was living in as a place to live. As shown in Appendix D, rating of present living condition was negatively correlated with age ($r=-0.17$, $p<0.01$) and positively correlated with income ($r=0.27$, $p<0.001$) and possession score ($r=0.30$, $p<0.001$). Younger respondents and those with higher incomes and possession scores tended to give more positive ratings of their living conditions.

Living arrangements

Table 7 presents the living arrangements of the elderly respondents. Since the elderly in rural areas are relatively stable, it was not surprising to find that more than half (57.1%) of the respondents had been living in the same house for the past 26 years or more. The average length of residence was 31.6 years. Age was positively and significantly correlated with length of residence in the same house (r=0.26, p<0.001), as shown in Appendix D. Other demographic variables were not significantly related to length of residence. Garcia et al. (1982b) reported a higher proportion (76.4%) of rural elderly females in the Philippines who had been living in the same barangay for more than 25 years. Comparatively, the elderly females in the Philippines studied by Garcia et al. were less mobile than their Malaysian counterparts in this study.

More than one-third of the respondents in this study lived in household units of five or more people. Only 12.0% lived alone. In the WHO study (Andrews et al., 1986), 51% of Malaysian rural elderly females were observed to live in household units of at least five people, while only 11% lived alone. However, in other Western Pacific countries, the proportion of rural elderly females living alone was much lower -- 4% in Fiji, 3% in the Republic of Korea, and 2% in the Philippines (Andrews et al., 1986). Masitah (1988b) observed only 7.8% of elderly Malays 55 years and older living alone. The average household size in this study was 3.9 persons, and it was comparable to

TABLE 7. Living arrangements of elderly respondents (n=317)

Variable	No. of respondents	Percent
Length of residence in house (years)		
less than 10	65	20.5
10 - 25	71	22.4
26 - 50	118	37.2
51 - 75	58	18.3
76 or more	5	1.6
Number of individuals living in household		
1	38	12.0
2 - 4	157	49.5
5 or more	122	38.5
Others living in household[a]		
children	206	65.0
grandchildren	147	46.3
spouse	144	45.4
son-in-law and/or daughter-in-law	70	22.1
Number of respondent's children living in household[b]		
1	119	57.8
2	57	27.7
3 or more	30	14.5
Number of respondent's grandchildren living in household[c]		
1 - 3	113	76.9
4 or more	34	23.1

[a]Multiple responses possible.

[b]$n=206$.

[c]$n=147$.

the national average household size of rural elderly females 55 years and older in Malaysia (Malaysia Department of Statistics, 1983).

A number of demographic variables were significantly correlated with the number of individuals living in the household (Appendix D). Household size was negatively correlated with age (r=-0.11, p<0.05) and positively correlated with income (r=0.43, p<0.001) and possession score (r=0.43, p<0.001). Thus, younger respondents and those with higher incomes and possession scores tended to have larger household sizes. As shown in Appendix D, the chi-square test revealed a significant difference between household size and marital status. Those who were widowed or divorced were more likely than those married to live in a smaller household size (X^2=35.94, df=2, p<0.001).

About forty-five percent of the respondents in this study were living with their spouses and 65.0% were living with their children. A similar proportion of elderly females in Malaysia were living with their spouses in the study reported by Masitah (1988a). In the WHO study, Andrews et al. (1986) reported a steady drop with increasing age in the proportion of Malaysian elderly females living with spouses, while those living with children was about 72%. In this study, of those respondents living with their children, 42.2% were living with at least two children. It is more likely that elderly with more children will live with their children. As pointed out by Chen (1985), an elderly Malaysian person with four to six children has a 75% chance of living with his or her children during old age. As shown in Appendix

D, the number of children living in the household was significantly correlated with age (r=-0.30, p<0.001), income (r=0.27, p<0.001), and possession score (r=0.35, p<0.001). There was a tendency for younger women and those with higher incomes and possession scores to have a greater number of their children living in their households.

As shown in Appendix D, chi-square tests indicated statistically significant differences between number of children in the household and educational level of the respondents (X^2=28.22, df=6, p<0.001) and marital status (X^2=6.44, df=2, p<0.05). Respondents with less than five years or no education were more likely than those with five or more years of education to live alone, while those who were married were more likely than those who were widowed or divorced to live with two or more children in the same household.

About 46% of the respondents in this study were living in the same household with grandchildren, and a majority of these (76.9%) were living with one to three grandchildren. According to Andrews et al. (1986), the care of grandchildren was the responsibility of about 60% of Malaysian elderly females in the WHO study. Although the respondents in this study were not asked about such responsibility, it is very likely that respondents living with grandchildren would assume some care-taking duties because such roles are usually expected and unquestioned.

Health characteristics

Table 8 presents selected health characteristics of elderly respondents in this study. Almost half of the respondents perceived their state of health, when compared to their peers, as fair. Overall, 33.2% perceived their health condition as good to excellent, and 16.2% as poor. In the WHO study, 70% of female elderly in Malaysia felt they were healthy (Andrews et al., 1986). Abdul Halim (1988) observed similar results. However, both studies used an approach different from this study to evaluate the health status -- each respondent was asked if he or she felt healthy with a yes or no response recorded. Comparing their health status to a year earlier, 63.4% of the respondents indicated their health was about the same, while 23.0% reported their health as worse than one year earlier.

Poor health can be a source of worry to the elderly. Almost half of the respondents (48.3%) indicated their health condition was not causing them any worry, while 51.4% reported some or a great deal of worry regarding their health. About 49% of the respondents perceived themselves about as physically active as their peers. Only 18.0% indicated they were more active than their peers.

About one-fourth of the respondents in this study reported that none of the eight ailments common to the elderly (arthritis, respiratory problems, high blood pressure, anemia, heart disease, diabetes, urinary or kidney problems, and cancer) had affected their daily activities in the past year. A majority (65.3%) reported one or two ailments, and 8.9% reported three or four.

TABLE 8. Health characteristics of elderly respondents (n=317)

Variable	No. of respondents	Percent
Perceived state of health compared to peers[a]		
excellent	3	0.9
good	102	32.3
fair	152	48.1
poor	51	16.2
don't know	8	2.5
Health status compared to one year ago		
better than one year ago	41	12.9
about the same	201	63.4
worse than one year ago	73	23.0
don't know	2	0.6
Amount of worry concerning health status		
a great deal	34	10.7
some	129	40.7
none	153	48.3
don't know	1	0.3
Physical activity compared to peers		
more active	57	18.0
about as active	156	49.2
less active	95	30.0
don't know	9	2.8
Total number of ailments (health score)[b]		
0	76	25.9
1	131	44.6
2	61	20.7
3	19	6.5
4	7	2.4

[a] n=316.

[b] n=294.

Table 8. continued

Variable	No. of respondents	Percent
Ailments[c]		
arthritis	203	64.0
respiratory problems	51	16.1
high blood pressure	51	16.1
anemia	31	9.8
heart disease	12	3.8
diabetes	9	2.8
urinary or kidney problems	5	1.6
cancer	2	0.6
Most recent visit with a physician or health care worker		
within the last year	233	73.5
more than one year ago	62	19.6
never	21	6.6
can't recall	1	0.3
Most recent visit with a local medicine man[a]		
within the last year	83	26.3
more than one year ago	31	9.8
never	199	63.0
can't recall	3	0.9
Type of medicines used in the last month[c]		
prescribed	131	41.3
traditional	131	41.3
over-the-counter	86	27.1
Frequency of being too sick to do daily activities during last year		
daily	9	2.8
at least once weekly	25	7.9
at least once monthly	35	11.0
less than monthly	113	35.6
never	135	42.6

[c]Multiple responses possible.

Table 8. continued

Variable	No. of respondents	Percent
Person who can provide help if too sick to do daily activities[c]		
daughter	190	68.6
son	57	20.6
spouse	31	11.2
others	59	21.3
Length of time required by children to come to aid of respondent[d]		
living in the same household	207	66.8
30 minutes or less	48	15.5
8 hours or less	39	12.6
more than 8 hours	16	5.2
Type of dental prostheses[e]		
upper and lower plates	83	63.8
upper or lower plate	47	36.2

[d] $n=310$.

[e] $n=130$.

Of the eight ailments common to the elderly, arthritis was the most frequently reported (64.0% of the respondents). However, only 46.8% reported that it had been medically diagnosed. Since arthritic diseases affect bones, joints, and connective tissue, and impede the body's ability to move, it was not surprising to note that a majority of respondents reported that this ailment disrupted their daily activities. Martinez (1989) observed that 71% of elderly Canadian

females reported having arthritis, and it was the most common ailment.
Similar results were reported for elderly females 60 years and older in
Louisiana (Singleton et al., 1980).

Respiratory problems and high blood pressure were the next most
frequently cited ailments, 16.1% in both cases, and 46.8% and 96.1% of
those citing the ailments, respectively, reported that they had been
medically diagnosed. Similarly, Abdul Halim (1988) observed that 12.9%
of Malaysian elderly 55 years and older had been hospitalized with
hypertension one month prior to the ASEAN study. It is possible that
the proportion of elderly with hypertension in the ASEAN's study was
higher than in this study because hypertension can be treated without
hospitalization. Comparatively higher than in this study, about half
of the elderly females in Canada and Louisiana reported high blood
pressure as a common ailment (Martinez, 1989; Singleton et al., 1980).
The higher prevalence of hypertension in these Western samples compared
to the Malaysian sample could be due to higher prevalence among Western
elderly, more frequent opportunities for diagnosis, or both.

Anemia was reported by 9.8% of respondents in this study, out of
which 87.1% reportedly had the anemia medically diagnosed. Heart
disease was only reported by 3.8% of the respondents, with 91.7% of
these reporting medical diagnosis. Conversely, about 20% of Malaysian
elderly had been hospitalized with heart conditions in the ASEAN study
reported by Abdul Halim (1988). Heart disease was also more commonly
reported by elderly females in Canada and Louisiana, 30% and 27%,
respectively (Martinez, 1989; Singleton et al., 1980).

Diabetes, urinary or kidney problems, and cancer were less frequently cited as ailments by the respondents in this study. However, all reported cases of these three conditions had reportedly been medically diagnosed. Compared to this study, a higher proportion (12.9%) of Malaysian elderly had been hospitalized with diabetes in the sample studied by Abdul Halim (1988). Singleton et al. (1980) observed 11.3% of female elderly in Louisiana reporting diabetes as an ailment.

Table 9 presents the percent of respondents experiencing nine health complaints common to elderly persons. Over 75% of the respondents reported never experiencing problems with poor taste, poor sense of smell, diarrhea, constipation, and hearing.. About 40% reported always or sometimes having trouble walking and standing. Difficulty associated with chewing was also quite common, with 42.4% reporting such problems either all the time or sometimes. Andrews et al.(1986) and Abdul Halim (1988) also reported similar observations. Visual problems were the most common of the nine health complaints among the elderly in this study. About 71% reported having problems with their sight sometimes or all the time. Other studies have reported similar proportions of elderly females in Malaysia to have problems with sight (Abdul Halim, 1988; Andrews et al., 1986).

A visit with a physician or health care worker within the last year was reported by 73.5% of the respondents in this study, while 6.6% reported never having visited these health professionals. Illness was the main reason reported by 35.6% of the respondents for the most

TABLE 9. Percent of respondents experiencing health complaints common
to elderly persons (n=317)

Health complaints	Percent		
	All the time	Sometimes	Never
Poor taste	0.0	4.1	95.9
Poor sense of smell	0.6	3.5	95.9
Diarrhea	0.0	12.7	87.3
Constipation	0.3	15.1	84.5
Trouble hearing	7.3	16.1	76.7
Trouble walking	10.1	28.8	61.1
Trouble standing	7.9	33.2	58.9
Difficulty chewing	15.6	26.8	57.6
Trouble seeing	32.0	38.9	29.1

recent visit with the physician or health care worker. Only 26.3% of
the respondents had visited a local medicine man or "bomoh" within the
last year. Of these, 37.9% reported consulting the medicine man to get
traditional treatment for illness or fever. Andrews et al. (1986)
observed that 43% of elderly females in Malaysia had seen or visited a
physician in the month prior to the WHO study, while very few elderly
reported consulting other health care workers or traditional medicine
men about their health.

Use of prescribed medication within the last month was reported by 41.3% of the respondents in this study, while 41.3% and 27.1%, respectively, reported using traditional and over-the-counter medicines within the last month. Although similar proportions of female elderly in the WHO study had taken prescribed and over-the-counter medicines during the month prior to the survey, only 18% had taken traditional medicines (Andrews et al., 1986). Some of the reasons given by respondents in this study for having taken prescribed medicines were for hypertension (22.1%), pain in the joints (19.1%), and illness or fever (17.6%). About 66% of those who had taken over-the-counter medication reported having taken it for illness and fever, while 23.0% reported having taken it for arthritis or pain in the joints. Traditional medicines were reportedly taken mainly for pain in the joints (47.7%), health maintenance (14.6%), and to increase the appetite (6.9%).

About 43% of the respondents in this study reported that they had never been too sick to do their daily activities during the last year, although a small proportion (10.7%) reported having been too sick at least once weekly or daily. Chen (1985) reported that 24% of elderly females in the WHO study had health conditions which affected their activities, while Abdul Halim (1988) reported that 50.5% of female elderly indicated their health was affecting their daily activities. A majority (87.4%) of the respondents in this study reportedly had someone to help them with daily activities if they became ill, while

12.6% reportedly had no one. Only 1% of elderly females in the WHO study reported having no one to help them if they became ill (Andrews et al., 1986).

Most of the respondents in this study (68.6%) indicated their daughter as the most likely person to provide help with daily activities if they became sick. Son or spouse as a provider of help was reported by 20.6% and 11.2% of the respondents, respectively. According to Chen (1985), 57% of elderly Malaysian males were cared for by their spouses when they became ill, while only 19% of elderly females were cared for by their spouses. This finding would be expected since a majority of elderly females may be widowed or divorced. In addition, health care has traditionally been seen as the responsibility of the females in a family. Since 66.8% of the respondents in this study had their children living in the same household, it was very likely that these children would come to the aid of the female parent when needed. Only 5.2% of the respondents had children who would require more than 8 hours to come to their aid when needed. However, since these respondents lived in rural areas and in close proximity with other households, it is very likely that elderly respondents needing immediate help could get it from other relatives or neighbors.

Dental prostheses were used by 41.0% of the respondents in this study, and 68.5 % had used them for more than five years. A majority (63.8%) had both the upper and lower plates, and 85.3% indicated their

dentures fit well. A similar proportion of rural elderly in Malaysia
with dental prostheses was reported by Chen (1985). However, the above
results could be misleading. In both studies, proportions of elderly
with no teeth and not using a dental prosthesis were not recorded.
Singleton et al. (1980) reported that 7.2% of urban elderly females in
Louisiana had no teeth. It might be expected that a larger proportion
of rural Malaysian elderly might be without teeth and not wearing
dentures because such health aids may be too expensive or not easily
available.

Relationships between health and demographic variables   As
shown in Appendix E, perceived state of health was significantly
correlated with a number of demographic characteristics. Self-
perception of health was negatively correlated with age (r=-0.13,
p<0.05), while it was positively related to possession score (r=0.12,
p<0.05). Younger respondents and those with higher possession scores
were more likely than their opposing counterparts to have positive
perceptions of their health. Rating of health status compared to a
year earlier was positively correlated with educational level (r=0.32,
p<0.001). Respondents reporting higher educational level were more
likely to rate their present health compared to a year earlier more
positively. A significant correlation was also observed between rating
of physical activity and possession score (r=0.15, p<0.05). The rating
of physical activity compared to peers was more likely to be high by
respondents with more possessions.

The frequency of reportedly experiencing nine health complaints, as reflected by a complaints score, was positively correlated with age ($r=0.46$, $p<0.001$) and negatively correlated with possession score ($r=-0.19$, $p<0.01$). Older respondents and those with fewer possessions were more likely to report a greater frequency of the nine complaints.

Relationships among health variables   Self-perception of health compared to peers and rating of health status compared to a year earlier were both significantly correlated with a number of health characteristics (Appendix E). They were negatively related to amount of worry due to health ($r=-0.32$, $p<0.001$; $r=-0.23$, $p<0.001$), complaints score ($r=-0.48$, $p<0.001$; $r=-0.24$, $p<0.001$), and reported frequency of being sick ($r=-0.29$, $p<0.001$; $r=-0.16$, $p<0.01$). Thus, respondents reporting less worry about their health, a lower frequency of common health complaints, or less frequently becoming sick were more likely to perceive their health status positively. In addition, respondents reporting fewer health ailments were likely to have a higher self-perception of health compared to peers ($r=-0.29$, $p<0.001$).

Similar significant relationships were observed between rating of physical activity and other health variables. Negative correlations were observed between this variable and amount of worry due to health ($r=-0.38$, $p<0.001$), health score ($r=-0.30$, $p<0.001$), complaints score ($r=-0.38$, $p<0.001$), and reported frequency of being sick ($r=-0.46$, $p<0.001$). In other words, the ratings of physical activity compared to peers were more likely to be high by respondents reporting less worry

about their health, fewer reported health ailments, lower frequency of complaints, or lower frequency of being sick.

Distribution of respondents by perceived health status and selected health ailments is presented in Appendix E. Chi-square tests revealed several statistically significant differences. Respondents who did not suffer from hypertension were more likely to perceive their health as good while those with hypertension were more likely to perceive their health as poor (X^2=8.35, df=3, p<0.05). Similarly, respondents who were free from respiratory problems were more likely to perceive their health as good while those with respiratory problems were more likely to rate their health as fair or poor (X^2=12.91, df=3, p<0.01). Perceptions of health were more likely to be fair or poor by those suffering from arthritis but good by those without arthritis (X^2=15.54, df=3, p<0.01).

The number of reported ailments, called the health score, and the frequency of experiencing common health complaints, called the complaints score, were both significantly correlated with amount of worry due to health (r=0.41, p<0.001; r=0.42, p<0.001) and reported frequency of being sick (r=0.33, p<0.001; r=0.34, p<0.01). Thus, respondents reporting more worry about their health or becoming sick more frequently were likely to report a greater number of health ailments and a greater frequency of health complaints. In addition, number of reported health ailments and reported frequency of health complaints were positively and significantly correlated (r=0.25, p<0.001).

As shown in Appendix E, chi-square tests revealed significant differences between use of prescribed medicines and selected health variables. Respondents who perceived their health status as good were less likely than those who perceived it as fair or poor to report use of prescribed medicines (X^2=22.91, df=3, p<0.001). The use of prescribed medicines also tended to increase with an increase in the health score (X^2=36.16, df=2, p<0.001) and complaints score (X^2=15.94, df=2, p<0.001). That is, respondents with more reported health ailments and a higher frequency of health complaints were more likely to report use of prescribed medicines.

Significant relationships between availability of help during illness and selected demographic variables are shown in Appendix E. Respondents whose incomes were below M$499 were more likely than those with higher incomes to report that they had no one to help them if they became ill (X^2=13.59, df=3, p<0.01). Perceived availability of help tended to increase with an increase in number of household members (X^2=27.25, df=2, p<0.001).

There was also a significant difference between perceived availability of help and how soon any of the respondent's children could come to her aid when needed (X^2=19.55, df=3, p<0.001). Respondents who had children living in the same household and whose children could come to her aid within 30 minutes or less were more likely than those whose children would require more time to report that help was available, if needed.

Social contacts and participation

More than half of the respondents in this study (56.5%) reported membership in a social or political organization. Membership in the ruling political party "UMNO" was the most frequently cited (94.3% of the respondents). However, as shown in Table 10, a majority (70.9%) of the respondents had been to a meeting of a social or political organization less than monthly during the last year, while 21.2% had never attended a meeting. In a recent study in three states in Peninsular Malaysia, Masitah (1988a) reported that 34.8% of elderly respondents were members of organizations, the highest proportion of which was membership in a political organization. Chen (1985) reported that only 13% of elderly females surveyed in the WHO study in Malaysia belonged to an organization. It is possible that membership in a political organization was not reported by the WHO respondents.

A majority of the respondents were actively involved and in various social, communal, and religious activities. As shown in Table 10, 33.9% attended feasts in the neighborhood at least once monthly or more often. Attendance at the mosque or "surau" for prayers and other religious activities was reported as at least once weekly by 50.2% of the respondents, while 10.4% went to the mosque daily. The distance of the house from the mosque or "surau" could influence how often the elderly went to the mosque. About 61.2% of the respondents lived within 500 meters or less from a mosque or "surau". The mosque or "surau" seemed to be a social environment for elderly in rural areas to

TABLE 10. Frequency with which respondents participated in selected
social contacts and activities during the last year

Variable	No. who participated during last year	Frequency of participation (%)				
		Daily	At least once a week	At least once a month	Less than monthly	Never
Attendance at meetings	179	-	2.2	5.6	70.9	21.2
Attendance at feasts in neighborhood	316	-	1.6	32.3	59.5	6.6
Attendance at mosque or "surau"	317	10.4	50.2	13.6	15.5	10.4
Socializing with friends or neighbors	317	-	79.2	6.3	11.0	3.5

meet their peers and at the same time fulfill their religious

obligations. Similarly, Strange (1987) in her study of two rural

villages in Malaysia, observed that the mosque or "surau" was the only

public place drawing most healthy elderly persons on a regular basis.

Socializing with friends and neighbors was another form of social

contact available to the elderly respondents. About 79% of the

respondents in this study reported meeting socially with friends and

neighbors at least once weekly.

As shown in Appendix F, several social activity variables were

significantly correlated. Age was significantly correlated with

frequency of attending meetings (r=0.31, p<0.001), feasts in the neighborhood (r=0.27, p<0.001), and the mosque or "surau" (r=0.14, p<0.05). Thus, older respondents were more likely to frequently participate in these activities. Frequency of socializing with friends and neighbors was significantly correlated with frequency of attending meetings (r=0.18, p<0.05), feasts (r=0.12, p<0.05), and the mosque (r=0.19, p<0.01). Therefore, respondents who frequently participated in these social activities were also more likely to frequently meet socially with friends and neighbors.

A majority (84.5%) of the respondents rated the adequacy of their social activity as about enough, while 10.7% would like to have been involved in more activities. Only 2.2% felt they were too socially active, while 2.5% did not know. Rating of adequacy of social activity was significantly correlated with attendance at the mosque (r=0.17, p<0.01). In addition, respondents who participated more frequently in the four activities discussed tended to rate their adequacy of social activity more positively (r=0.18, p<0.05).

About 34% of the respondents in this study did not live with their children. Of these, 57.7% reported they met with their children at least weekly, 29.8% at least once monthly, and only 5.8% less than once yearly or never (Table 11). For respondents living with children, it could be assumed that frequency of contact with children would be almost daily. Communicating via the telephone was another form of social contact potentially available to the respondents. However, only

21.1% of the respondents in this study had a telephone in their household. Telephones were more likely to be in the households of those with higher incomes (X^2=47.97, df=3, p<0.001) and a greater number of other household possessions (X^2=38.37, df=2, p<0.001). For respondents not living with their children, a telephone would be a useful tool of communication. Only 11.7% of the respondents not living with their children had a telephone in their household. Nevertheless, about 69% of them talked on the telephone with their children at least once weekly and about 23% at least once monthly.

TABLE 11. Frequency of contact with their children for respondents who did not live with their children

Variable	No. of respondents	Percent
Frequency of meeting with children[a]		
at least once weekly	60	57.7
at least once monthly	31	29.8
less than monthly	7	6.7
less than yearly or never	6	5.8
Frequency of telephone communication with children[b]		
at least once weekly	9	69.2
at least once monthly	3	23.1
less than once a year or never	1	7.7

[a] n=104.

[b] n=13.

Availability and accessibility of transportation is important to
the elderly for visiting children or other relatives, attending
meetings or other social functions, and purchasing food and other
needs. This cohort of rural elderly females in Malaysia was not likely
to be driving their own car, so they had to depend on public or other
modes of transportation. A majority (63.1%) of the respondents
indicated the bus as their usual means of transportation. Masitah
(1988a) observed similar findings among elderly 55 years and older in
Malaysia. An almost equal proportion of respondents in this study,
29.3% and 27.8%, respectively, rode a motorcycle or walked to go from
place to place. Only 21.5% used a car as a mode of transportation.

Implications

Analyses of the living conditions, health indices, and social
activities revealed several important implications for this rural
elderly female sample in Malaysia. Housing of adequate standard,
accessibility and availability of clean and safe drinking water, and
proper toilet facilities are important to the health and welfare of the
elderly. These basic factors appeared adequate for the majority of the
respondents in this study, and this was also supported by their
generally positive ratings of their living conditions.

The data from this study indicate that the majority of these
elderly females were an integral part of the family structure. This
finding is supported by findings from other studies in Malaysia (Chen,

1985; Masitah, 1988a). Besides being the center of social activities, the family provides support, security, and affection to the elderly. However, as a result of modernization and greater migration of the younger population from rural to urban areas, living in an extended family situation is slowly disintegrating for the elderly. Thus, it can be expected that the proportion of elderly living by themselves will increase in the future, particularly in the rural areas.

The actual and self-perceived health status of the elderly are affected by many interacting variables including economic and social factors, environment, living arrangements, and physical and mental status. In this study, a majority of the elderly perceived their health as fair, rated their health status compared to a year earlier as about the same, had no worry about their health, and perceived themselves as physically active as their peers. Arthritis was the major ailment which affected the daily activities of the elderly in this study, although respiratory problems, hypertension, and anemia were also indicated by smaller proportions. Some of these health conditions usually require chronic medication. Therefore, optimum out-patient care and effective patient education can ensure compliance to medication schedules and avoid destabilizing of the condition, thus helping to reduce the need for hospitalization. Overall, age-related chronic diseases were reported more frequently in studies of the elderly in more developed countries like the U.S. and Canada than among this sample of elderly in Malaysia.

The classical age-related problems of poor hearing, poor sight, and difficulty in chewing were prevalent among these elderly. The use of health aids, such as hearing aids, spectacles, and dentures, can have a great impact on the physical, social, and mental well-being of the elderly, and on their participation in activities of daily living. Thus, such appliances should be made accessible and affordable to the elderly, especially those in the rural areas.

This study revealed quite a high usage of health services and medication. Previously, rural family members were likely to attribute any illness or ailment among the elderly to old age and not to seek medical care. With better education and easier accessibility to private and public health services, more attempts are now being made to send the elderly to a physician for medical care. Nevertheless, a small proportion of elderly in this study still resorted to traditional treatment.

With increased usage of prescription and over-the-counter medication among the elderly, there is increased risk of drug-drug and drug-nutrient interactions. Future studies should look at these issues, including identifying the number and types of medication consumed by the elderly. In addition, the effect of traditional medicines on other drugs as well as their effect on absorption and utilization of specific nutrients are important areas of concern. Since traditional medicine was still quite widely used by the elderly in this study, this topic deserves attention and could be the focus of future research.

Daughters and to a lesser extent other family members were clearly a very important source of support and care for the elderly in this study, especially when the elderly female was too sick to do her daily activities. With the increasing number of women in the work force, the provision of such care by adult daughters may not be easily or immediately available. However, since housing units in rural areas are clustered together in close proximity, getting immediate and short-term help from neighbors and relatives is very likely.

Much of the social activities of the elderly revolved around the family. Although reported membership in social or political organizations was quite high, the level of active participation tended to be relatively low. However, participation in several family, communal, and religious activities was quite high. The elderly in this study attended the mosque or "surau" frequently for prayers and other religious activities. They were also quite involved in other informal social contacts. Maintaining a high level of social contacts for the rural elderly despite societal changes will help facilitate physical and mental well-being.

DIETARY PATTERNS, FREQUENCY OF FOOD INTAKE, AND PERCEPTIONS ABOUT FOOD

Review of Literature

Nutrition is an important but frequently overlooked factor that influences the health and well-being of the elderly. Studies in developed countries have shown that the elderly eat less as they grow older, and their diets are frequently low in minerals and vitamins (Weg, 1980). The nutritional status of older adults reflects much more than their current food intake. Lifelong food habits must be considered, as well as all factors affecting those habits.

The causes of lowered food intake often found among the elderly are multiple, including constipation, malnutrition, effects of drugs and other therapy, chronic or acute diseases, dental problems, and a decline in taste and smell capacity. Food fads and quackery may also influence the elderly's food purchasing and intake habits. Additionally, physical disabilities such as poor vision, poor coordination, paralysis, lack of mobility, dementia, and/or actual physical confinement may affect the ability of the elderly to shop for, select, prepare, and sometimes even eat food.

Nutrient intake characteristics of the elderly

Numerous nutrition researchers in developed countries have focused on measuring the nutrient intake of the elderly, and some have also examined various factors associated with these nutrient intakes. Such a focus on the elderly population has not been a priority in many

developing countries like Malaysia. Data in this area are generally limited.

Assessment of nutritional status and dietary adequacy of the elderly in developed countries has resulted in variable and inconclusive findings. The variability may be due to methodological differences, particularly in the areas of sampling and definitions, lack of normative values for the geriatric population, and the difficulty of establishing cause and effect (Bowman and Rosenberg, 1982; Freedman and Ahronheim, 1985; Roe, 1986; Schneider et al., 1986).

Numerous reviews and assessments of dietary habits and nutritional status among the elderly population have been reported in the literature (Brown, 1976; Grotkowski and Sims, 1978; Morley, 1986; O'Hanlon et al., 1983; Yearick et al., 1980). In a recent study, O'Hanlon et al. (1983) examined the relationship between nutrient intake and socioeconomic and other demographic factors among 445 elderly, 145 men and 300 women, 60 to 96 years old. The findings suggest that elderly individuals most likely to be at nutritional risk are women, persons with the least education, and persons who have recently experienced a drastic change in lifestyle.

An assessment of the dietary intake and factors relating to dietary adequacy of 100 noninstitutionalized males and females aged 65 and older revealed that two-thirds of the individuals had intakes of calcium and vitamin A below 67% of the 1980 Recommended Dietary Allowance (RDA). Vitamins and/or mineral supplementation had the

greatest influence on nutritional adequacy, while social, economic, and health factors had only a slight influence (Betts and Vivian, 1985). Ryan and Gates (1989) reported a significant positive relationship between adequacy of eight nutrients and nutrition knowledge among 339 adults 51 years of age and older.

Besides demographic factors, various forms of social support have been reported to have a positive association with good health and adequate nutritional intake, while other forms reportedly have negative consequences. Findings by McIntosh and Shifflett (1984) revealed that social supports which include close physical proximity (marriage, neighbor, and religious salience) in contrast to simple emotional attachments to relatives, friends, and community were significantly associated with higher intakes of specific nutrients. Other researchers have reported various nutrient inadequacies among elderly individuals and their relationships with demographic, social, economic, and health factors (Bengstrom et al., 1988; Singleton et al., 1980).

Studies from the Philippines show variable trends. Mean intake of riboflavin among 55 rural Filipino women 60 years and over was less than 67% of the Filipino RDA, while mean intakes of ascorbic acid and vitamin A were below 50%. On the other hand, the mean intake of energy for the 60 to 69 year old females was 97% of the RDA, while the elderly females 70 years and over had energy intakes exceeding the RDA (Garcia et al., 1982b). In a more recent study of 60 institutionalized and noninstitutionalized elderly males and females 60 years and over,

Florencio and Macatangay (1987) reported that 30 of the
noninstitutionalized urban Filipino elderly failed to meet the
Philippines RDA for energy and the eight nutrients considered in the
study. Similarly, the intakes of several nutrients by rural females in
India 60 years and over were below the Indian RDA compared to their
younger counterparts 25 to 45 years old (Kullah and Ramnath, 1985).

Dietary patterns among the elderly

Aging is accompanied by many changes, including changes in food
selection and dietary patterns. Patterns of food intake determine
nutrient intake. Cross-sectional studies suggest that there are
several differences between the food intake of young and old adults.
Studies in developed countries indicate that the elderly eat more
regularly and skip fewer meals than younger adults. In the recent
United States Department of Agriculture (USDA) Nationwide Food
Consumption Survey (USDA, 1980), 58% of elderly females 75 years and
older ate three meals during the day compared to 39% for females 23 to
34 years old.

Breakfast is frequently described by the elderly as their favorite
meal. In a study of 182 black and white individuals of both sexes 65
years and over, Hunter and Linn (1979) reported that about 70% of the
elderly ate a full breakfast containing foods representing at least
three of the four food groups. Similarly, in the USDA (1980) study,
96% of elderly females 65 to 74 years old and 98% of those 75 years and
over ate breakfast, while breakfast was consumed by only 76% of their
23 to 34 year old counterparts.

Snacking is common among many elderly. Singleton et al. (1982) examined the snacking patterns of 95 noninstitutionalized elderly 60 years and over, and found that 44% of the elderly had snacked during the previous 24 hours. Similarly, 47% of elderly females 65 to 74 years old and 40% of those 75 years and over reported having eaten snacks during a one day data collection period (USDA, 1980). Snacking during the previous 24 hours among 100 elderly males and females 60 years and over in the Philippines were observed to be about 55% (Garcia et al., 1982b). About 60% of the snacks consumed by 95 elderly women in the study by Singleton et al. (1982) were from the four basic food groups, while 18% were cakes, cookies, and pastries.

Although healthy elderly individuals have low food intake compared to younger individuals, they appear to select food of high nutritional quality. In a study of 372 households in Milwaukee County, Wisconsin, Slesinger et al. (1980) reported that milk and meat intake among adults 18 years and older decreased with age, especially among women. On the other hand, intake of fruits, vegetables, breads, and cereals increased. In the USDA (1980) food consumption survey, more elderly people than younger adults, both males and females, reported consumption of milk, bread, cereals, fruits, and vegetables. Although similar proportions of younger and older individuals consumed meat, the elderly consumed relatively smaller amounts of meat. While the energy in the total diet was higher among the younger adults, particularly among the males, the nutrient intake per 1,000 calories was generally higher among the elderly.

In a recent study, Wurtman et al. (1988) examined the patterns of food intake exhibited by young and old adults living and eating under identical controlled conditions. They reported that elderly subjects consumed significantly fewer calories, carbohydrates, and fat than the young subjects. The two age groups also differed significantly in their pattern of food intake from meals and snacks. Elderly adults consumed almost 85% of their total calories from meals, whereas the young adults consumed about 72% from meals. The elderly subjects also consumed significantly fewer snacks than the young adults. Thus, when measured under identical clinical conditions, patterns of food intake between young and elderly individuals appear persistently different, suggesting that age, per se, in addition to changes in age-associated lifestyle may affect dietary patterns.

Dietary patterns between different ethnic groups of the elderly also tend to differ. Netland and Brownstein (1984) examined the dietary patterns of 340 noninstitutuionalized elderly Asians and Caucasians in the San Francisco Bay Area. They reported that a larger proportion of Asians than Caucasians had three meals per day, and Asians tended to snack less frequently. However, due to differing food choices, Asians were significantly more likely than Caucasians to have diets that were deficient in vitamin A, riboflavin, zinc, calcium, and magnesium.

Perceptions about food

There are many factors that influence the food selections and dietary patterns of the elderly population. These factors can lead to the acceptance or the rejection of specific foods under different environmental and physiological conditions. Various factors that potentially influence the elderly's food selection have been studied in developed countries and reported in the literature. Historical and current availability and accessibility of foods, perceived taste, health beliefs, food intolerance, food aversion, and gender appear to strongly influence food selection, while price and convenience appear to be less important determinants (Yeung and Imbach, 1988).

Health belief is a strong motivator of food selection. This factor has been defined to include attitudes or convictions about health and anything that affects health (Reaburn et al., 1979). Health beliefs may be beneficial, neutral, or harmful depending on the type of practices that the beliefs produce and the extent to which the practices are incorporated into routine behavior. With the aging process and the onset of deteriorating physiological functions, the elderly are vulnerable to new ideas, both accurate and inaccurate, on the prevention of and relief from poor health. Thus, the elderly are particularly inclined to adopt questionable health beliefs and practices. In a study of 194 elderly Canadians 65 years and over, Krondl et al. (1982) reported a significant relationship between perceived health beliefs about specific foods and frequency of food use.

Elderly individuals tend to eat foods which they perceived as "good for them", either health-wise or because of personal preference. In a study of 448 elderly subjects (135 males and 353 females) in central Missouri, Holt et al. (1987) reported the subjects' perceptions of foods that are "good for you". Fruits and vegetables was the first response, followed by meats, whole milk, green vegetables, potatoes, beef, green beans, carrots, eggs, and lettuce. Almost 14% of the subjects gave the general category of fruits and vegetables as "good for you".

Studies on food beliefs and sociocultural aspects of food behavior in Malaysia have been reported by a few investigators (Chen et al., 1979; Chong et al., 1984; Manderson, 1981; Zaitun, 1984). However, most of these studies have focused on food beliefs and taboos during the vulnerable stages of childhood, pregnancy, and post-partum.

Chen et al. (1979) examined traditional food beliefs among 216 rural Malay females in Malaysia. The respondents were asked to classify a list of foods according to their perception as being highly beneficial, beneficial, neutral, or taboo during the childhood, pregnancy, and post-partum life stages. The findings revealed that most of the foods perceived as beneficial for toddlers and expectant and post-partum women were also nutritious, although not all nutritious foods were perceived as beneficial. Of special significance was rice, the core food in this area, which was considered by more than 80% of the respondents as highly beneficial for all three physiological groups.

A strong attachment to traditional food beliefs, particularly as they affect Malaysian post-partum women, was also reported by Manderson (1981). Similarly, in the study by Chong et al. (1984), about 76% of the respondents reported a number of nutritious fruits and vegetables which were prohibited or restricted during the post-partum stage among rural Malay women.

The above studies focused on food beliefs and taboos during the vulnerable periods of childhood, pregnancy, and post-partum. Similar beliefs towards the relationship of food intake and health may affect the food intake of Malaysian women during their old age. No studies have been reported which examined the influence of food beliefs on the health and nutritional well-being of the elderly population in Malaysia.

Methodology

Data collection

To provide information on food preparation, expenditures, and procurement patterns, each respondent was asked questions regarding who usually did food purchasing and cooking in the home, type of fuel used for cooking, use of garden produce for home consumption, use of wild plants and shoots as food, amount of money spent on food monthly, and where and how often the household purchased staples and fresh produce. In addition, each respondent was asked to rate her satisfaction with the amount of money she could spend to buy foods using a scale of extremely satisfied to extremely dissatisfied.

Next, the respondent was asked to list problems that prevented her from having enough food or the type of food she would like. Each respondent was also asked to rate her present appetite as very good, good, or poor. Patterns of food intake were obtained by asking each respondent to indicate the frequency of eating breakfast, morning meal or brunch, morning snack, lunch, afternoon snack, evening meal, and evening snack during a week.

Several methods have been developed to measure specific food consumption during a given time period, while other techniques have been used to quantify usual or habitual dietary intake (Roberge et al., 1984). The food frequency checklist has been a useful method to measure the usual food consumption patterns among various age groups. It can provide both qualitative and semiquantitative data. Because the food frequency checklist is an easy and quick method to get information on what foods are eaten or not eaten, how often particular foods are consumed, and how many foods are consumed, it is a particularly useful method to ascertain the pattern of food intake among the elderly population (Roe, 1987).

The frequency of food intake was recorded by asking each respondent to estimate how frequently she had consumed a list of 47 individual food items or food groups during the last year. The list of foods was selected to reflect the foods which generally provide the major nutrients in the diet and are commonly available in rural communities. The frequency of consumption scale was: daily, at least

every other day, at least once per week, at least two to three times per month, at least once per month, several times per year, at least once per year, and seldom or never.

To provide information on perceived health beliefs about food, each respondent was asked to list three foods that she felt were healthiest for women her age to eat or drink and to give a reason why she thought that each food mentioned was a healthy food for women her age. Similarly, each respondent was asked to list three foods that she felt were least healthy for women her age to eat or drink and to give a reason why she thought that each food mentioned was an unhealthy food for women her age.

Data analysis

Frequency of food consumption was reclassified into a 5-point scale, ranging from 5=daily, 4=weekly, 3=monthly, 2=yearly, and 1=never. A score was calculated for each of the 47 food items using the following equation by Reaburn et al. (1979):

$$\text{score} = \frac{R_1S_1 + R_2S_2 + \ldots R_5S_5}{5}$$

where $S_1 \ldots S_5$ = scale ratings

$R_1 \ldots R_5$ = % of respondent selecting a rating

5 = maximum scale rating

Frequency and central tendency statistics were calculated for all variables. Correlation coefficients and chi-square values were computed to determine the interrelationships between various dietary variables and their relationship to demographic variables.

Results and Discussion

Food preparation, expenditures, and procurement patterns

Table 12 presents the food preparation, expenditures, and procurement patterns of elderly respondents in this study. A majority (78.9%) of the respondents reported being responsible for food preparation in the household. Daughters also provided a significant amount of help in food preparation compared to others in the household. Wood was the major source of fuel used for cooking by more than half of the respondents (61.8%). It also appears that gas and kerosene stoves and electric rice cookers were used simultaneously with each other or with wood for cooking in many households. Conversely, Chong et al. (1984) reported that more than 90% of households in two rural Malay villages in their study were using wood as a main source of fuel for cooking, and only about 1% were using gas.

Both cultivated and wild plants contributed to the household food supply of many respondents. About 28% of the respondents in this study reported having a vegetable garden, 97.7% of whom stated that they used some of their garden produce for home consumption. Gathering the young shoots and leaves of wild plants for food is not uncommon among

TABLE 12. Food preparation, expenditures, and procurement
characteristics of elderly respondents (n=317)

Variable	No. of respondents	Percent
Person responsible for household food preparation[a]		
respondent	250	78.9
daughter	105	33.1
spouse	4	1.3
other	30	9.5
Type of fuel used for cooking[a]		
wood	196	61.8
gas	174	54.9
kerosene	136	42.9
electricity	67	21.1
charcoal	5	1.6
Frequency of gathering wild plants or shoots for food		
daily	11	3.5
at least weekly	195	61.5
at least monthly	41	12.9
less than monthly	17	5.4
never	53	16.7
Amount of money spent for food monthly (Malaysian $)[b]		
less than M$100	71	22.5
M$100 - M$199	94	29.7
M$200 - M$299	102	32.3
M$300 or more	49	15.5
Satisfaction with the amount of money available to spend on food		
extremely satisfied	6	1.9
satisfied	242	76.3
neither satisfied nor dissatisfied	25	7.9
dissatisfied	42	13.2
extremely dissatisfied	2	0.6

[a]Multiple responses possible.

[b]n=316.

Table 12. continued

Variable	No. of respondents	Percent
Person responsible for household food purchasing[a]		
respondent	148	46.7
spouse	82	25.9
daughter	60	18.9
son	45	14.2
other	48	15.1
Where household shopped for staples (rice, oil, etc.)		
nearby town	212	66.9
local store	76	24.0
weekly market	20	6.3
vendor	6	1.9
other	3	0.9
Frequency of shopping for staples		
several times a week	30	9.5
once weekly	86	27.1
at least once a month	195	61.5
less than monthly	5	1.6
other	1	0.3
Where household shopped for fresh produce (fish, meat, vegetables, etc.)		
vendor	158	49.8
nearby town	92	29.0
weekly market	30	9.5
local store	18	5.7
other	19	6.0
Frequency of shopping for fresh produce		
daily	124	39.1
several times a week	140	44.2
once a week	53	16.7

households in rural areas, especially if households are located at fringes of secondary jungle or swamps where such edible plants grow in abundance. Young shoots of tapioca and other plants either cultivated or growing wild around the household compound are also frequently picked as vegetables. Thus, it is not surprising to observe that a majority (61.5%) of the respondents reported gathering wild plants or shoots for food at least weekly, while only 16.7% reported they had never picked wild plants or shoots for food. Laderman (1983) observed 72 varieties of wild plants that were consumed by households in a rural Malay village on the east coast of Peninsular Malaysia. These wild vegetables provided a significant proportion of the households' diets, particularly during the rainy season.

The average amount of money spent for food monthly was about M$175, and it ranged from M$20 to M$500 per month. About half of the respondents spent less than M$200 per month for food, while the other half spent more than M$200 per month. On the average, the amount of money spent for food constituted about 50% of the monthly household income, although the percentage ranged from 5.7% to 117.7%. The wide variability may be due to either over- or underestimating of household incomes and food expenditures, especially by elderly respondents living with adult children or others who were the main providers for the household. A majority (78.2%) of the respondents rated the amount of money they could spend to buy food as satisfactory, while only about 14% felt dissatisfied.

Nearly half of the respondents (46.7%) reported that they were responsible for the general food purchasing for the household. Spouses were reported by 25.9% of the respondents, with other household members reported less frequently. Respondents whose incomes were less than M$500 per month were more likely than those with incomes of M$500 or more to be responsible for household food purchasing (x^2=10.90, df=3, p<0.05).

A majority (66.9%) of the respondents bought their staples like rice, cooking oil, flour, sugar, and dried or canned foods at grocery stores in nearby towns. Less than one-fourth of them made such purchases in the local grocery store. Limitations of food variety and relatively high cost might be some of the reasons why local grocery stores were less frequently patronized. In contrast, Zaitun (1984) reported that about 51% of pregnant Malay respondents in several rural villages on the east coast of Peninsular Malaysia bought their staples in the local grocery store. In this study, there was a bigger proportion of respondents with incomes less than M$500 who made their grocery purchases in the local grocery store than those with incomes more than M$500 ($x^2$=36.48, df=6, p<0.001). No access to transportation, living alone, and limited mobility might be some of the reasons why local stores were patronized by poorer households. A majority (61.5%) of the respondents in this study reported shopping for staples at least once a month. More than one quarter shopped for staples once weekly, while about 10% shopped several times a week.

Only about 30% of the respondents did their grocery shopping for staples at least once a month in the study by Zaitun (1984).

Almost half of the respondents purchased fresh produce like fish, meat, poultry, and vegetables from vendors who travelled in their vans, pick-ups, or motorcycles from one village to another from morning to noon. About 29% reported buying their fresh produce from the markets in nearby towns. About 39% of the respondents made their purchases of fresh produce daily, while about 44% made such purchases several times per week. Conversely, Zaitun (1984) reported that a majority (70%) of the respondents in her study purchased their fresh produce daily. It is not surprising that the proportion of those making purchases of fresh produce daily in this study was less than in Zaitun's study since a large proportion of households in this study owned refrigerators for food storage. The respondents in this study who made purchases of fresh produce daily were more likely to buy them from vendors than from other sources (x^2=79.43, df=6, p<0.001).

Many problems can prevent the elderly from eating adequate diets. Seventy-seven of the 317 respondents reported problems that prevented them from getting enough food or the type of food that they would like. These problems are presented in Table 13. Not having enough money to buy food was the problem most frequently cited by the 77 respondents (44.2%). A majority of those who reported this problem had incomes less than M$500 ($x^2$=18.45, df=3, p<0.001). More than one-third of the 77 respondents reported poor appetite as a problem that prevented them

from getting enough to eat. Respondents reporting more health ailments (X^2=10.14, df=2, p<0.01) or a higher frequency of common health complaints (X^2=7.81, df=2, p<0.05) were more likely than those with fewer health ailments or health complaints to report poor appetite as a problem. Other less frequently cited problems included the grocery store being too far away, having no teeth to eat, and having nobody to help in food purchasing and preparation. When all 317 respondents were asked to rate their present appetite, 0.9% rated it as very good, 87.0% as good, 10.8% as poor, and 1.3% didn't know.

TABLE 13. Problems cited as preventing the respondents from getting enough food or the type of food they would like (n=77)

Problem	No. of respondents	Percent
Inadequate money to buy food	34	44.2
Poor appetite	28	36.4
Grocery store too far away	11	14.3
No teeth	7	9.1
Nobody to help in food purchasing and preparation	4	5.2
Dentures do not fit well	2	2.6
No transportation	1	1.3
Other	9	11.7

Meal patterns

As shown in Table 14, most respondents in this study ate three meals daily. Over 90% of them reported eating breakfast, lunch, and dinner on a daily basis. Siti Nor (1984) reported that only 59% of college students 18 to 21 years old in Malaysia ate breakfast daily. Most likely these meals reported by the elderly respondents were eaten at home. For rural elderly, particularly females, eating in restaurants or food outlets is very uncommon. When rural elderly females eat away from home it is most likely at a neighborhood feast or at the household of adult children living in close proximity.

TABLE 14. Meal patterns of elderly respondents (n=317)

Variable	No. of respondents	Percent
Meals eaten daily[a]		
breakfast	293	92.4
lunch	305	96.2
dinner	291	91.8
Snacks eaten daily[a]		
brunch	53	16.7
mid-morning snack	12	3.8
mid-afternoon snack	172	54.3
evening snack	8	2.5

[a]Multiple responses possible.

The snacking patterns of elderly respondents in this study were quite variable. About 17% of the respondents reported eating brunch, while a mid-morning snack or an evening snack were eaten by only 3.8% and 2.5% of the respondents, respectively. On the other hand, over half (54.3%) of the respondents reported consuming a mid-afternoon snack. This particular pattern of food intake is not unusual among Malay households. The term "tea-time" has been coined to designate the time between 4 to 5 o'clock in the evening, during which tea is prepared and served with a variety of snacks like fried bananas or sweet potatoes, wheat flour or banana fritters, and cookies or crackers. Although household members may not sit down together for the late afternoon tea, the snacks and tea are usually made available for household members who will be returning from the farm or other jobs and for children who are out playing. Occasionally, snacks are exchanged between neighboring houses. The late afternoon tea might also provide opportunities for neighboring elderly to visit one another and socialize.

Frequency of food intake

The frequency of intake for 47 food items or groups is presented in Appendix G, and the correlation coefficients of selected food items or groups and demographic variables are reported in Appendix H. Using the equation suggested by Reaburn et al. (1979), an analysis of the total groups' intake frequency for the 47 food items or categories revealed a range of scores between 21.98 to 99.68, with higher scores

indicating more frequent intake for this group of females. This range was arbitrarily divided into three frequency categories: (a) High-use foods (score=80.00 - 100.00), (b) medium-use foods (score=50.00 - 79.99), and (c) low-use foods (score=0.00 - 49.99). Food items or groups classified into the three categories are shown in Table 15.

Four food items -- rice, cooking oil, sugar, and products made from wheat flour -- which are major sources of calories in the Malaysian diet were in the high food-use category. Rice had the highest score of 99.68 and was the most frequently consumed food, reported as daily by 98.4% of the respondents. Rice is the staple or core food in Malaysia and provides a substantial source of calories and protein in the diet. According to Qureshi (1987), using 1982-84 food balance sheets, the contribution of calories from rice in Malaysia is about 75%. About 36% of total available protein in the Malaysian diet is from rice (Chong, 1981). Chong et al. (1984), in their study of several rural villages in Malaysia, reported that 51% of the calories and 35% of the protein in the diet were from rice.

Cooking oil contributes about 11% of the calories in the Malaysian diet, according to food balance sheets (Qureshi, 1987). About 94% of the respondents in this study reporting using cooking oil daily. The consumption of sugar was also quite frequent among the elderly respondents. About 84% reporting daily consumption. Sugar is usually added to coffee, tea, and other beverages. About 13% of the calories in the Malaysian diet is from sugar (Qureshi, 1987). Products made

TABLE 15. High, medium, and low food use frequency scores for 42 food
items or groups

Food	Score
High-use (scores=80.00 - 100.00)	
rice	99.68
cooking oil	98.54
dried anchovies	95.18
granulated sugar	94.88
fresh fish	94.20
rambutan (*Nephelium lappaceum*)	91.40
coconut milk	90.22
durian (*Durio zibethinus*)	89.42
eggs	81.24
green leafy vegetables (mustard leaves, spinach, etc.)	81.00
variety pudding or fritters made from wheat flour	80.22
Medium-use (scores=50.00 - 79.99)	
soy products (tofu, tempe, sprouts, etc.)	73.82
bananas	73.26
white bread	72.54
non-leafy vegetables (beans, okra, eggplant, tomatoes, etc.)	72.44
crackers	69.78
tea	69.48
coffee	68.06
potatoes	67.52
condensed milk	66.58
rice noodles	64.98
oranges	64.52
dried salted fish	61.56
chicken	60.38
shrimp	60.30
beef	59.38
wheat flour noodles	54.32
peanuts	54.18
legumes (dhal, lentils, mung beans, etc.)	54.04
beef or chicken liver	50.96
Low-use (scores=0.00 - 49.99)	
cockles and clams	49.08
papaya	47.58
sweet potatoes	47.18
horlicks, milo, ovaltine	47.14

Table 15. continued

Food	Score
cookies	44.70
tapioca	44.66
margarine	41.62
canned sardines	40.78
jam	40.56
butter	38.60
evaporated milk	36.86
jackfruit	36.64
dried powdered milk	35.64
guava	28.90
aerated drinks	26.58
ice-cream	26.38
pasteurized milk	21.98

from wheat flour were reportedly consumed by 85.5% of the respondents once weekly or more often. In their study of rural households in Malaysia, Chong et al. (1984) reported that oils and sugar contributed about 11% and 14% of the calories in the diet, respectively, while products made from wheat flour contributed 10% of the calories and 13% of the protein in the diet.

Three protein foods -- dried anchovies, fresh fish, and eggs -- were classified in the high-use foods category. Dried anchovies are ubiquitous in the diet of rural Malays. Besides preparing them as a main dish or simply stir-fried, dried anchovies are usually added in small amounts to fried rice, fried noodles, stir-fried green leafy vegetables, and other fried foods. It was not surprising that dried

anchovies had a high food-use score of 95.18, and about 81% of the
respondents reporting consuming them daily. Since these data were
qualitative, it was not possible to determine the significance of the
nutritional contribution of dried anchovies in the diet of the elderly.

An outstanding feature of the rural Malay diet is the relatively
high consumption of fresh fish. About 74% of the females in this study
reported daily consumption. Consumption of eggs was reported by about
84% of the respondents as once weekly or more often. Animal products,
including fish and eggs, are estimated as contributing about 12% of the
calories to the Malaysian diet (Qureshi, 1987). Chong et al. (1984)
reported that fish contributed about 4% of the calories in the diet of
rural households in their study, while fish and eggs contributed 34%
and 3% of the protein in the diet, respectively.

Two seasonal fruits -- "rambutan" and "durian" -- were classified
in the high food-use category. About 72% and 65% of the respondents,
respectively, reportedly consumed these fruits daily. It is very
likely that when these fruits are in season, as they were during the
time of the study, they are eaten more frequently than any other
fruits. Also in the high food-use category were green leafy
vegetables. They were reportedly consumed by 88.1% of the respondents
once weekly or more often. Another plant-based food, coconut milk, was
also listed in the high food-use category. About 88% of the
respondents reportedly consumed coconut milk daily or every other day.
Use of coconut milk is very frequent and common in Malay cooking, and
is included in many main dishes and desserts.

Nineteen items were listed in the medium food-use category. Food items in this category which contribute mainly calories in the diet were white bread, crackers, potatoes, condensed milk, and noodles. Dried salted fish, soy products, chicken, shrimp, beef, legumes, and liver were some of the high protein foods in the medium food-use category. Fruits and vegetables which were consumed moderately were bananas, oranges, and non-leafy vegetables like green beans, egg-plant, tomatoes, and okra. Several miscellaneous items were also in the medium food-use category, including tea, coffee, and peanuts.

In the low food-use category, 17 items were listed. Of special significance was the relatively low consumption of milk and milk products. About 95% of the respondents reportedly never consumed pasteurized milk. Only about 17% reportedly drank milk reconstituted from dried powdered milk daily or every other day. A majority of the respondents also reportedly seldom or never consumed ice-cream (79.0%) or evaporated milk (68.5%). In general, Malaysians, particularly Malays, are not a milk consuming population. Furthermore, pasteurized milk is not readily available, especially in the rural areas, and is relatively expensive. Therefore, it is not surprising to observe the particularly low consumption of milk and milk products in the diets of the elderly respondents in this study.

Three fruits, papaya, guava, and jackfruit, were also classified as less frequently eaten. Several of the other items in the low food-use category such as cookies, margarine, jam, butter, beverages

(horlicks, milo, and ovaltine), and aerated drinks are peripheral foods in the Malaysian diet. Others such as cockles and clams, sweet potatoes, tapioca, and canned sardines were possibly seldom or never eaten because of food preferences or strongly held beliefs about the food.

In general, as seen in Appendix H, there was a trend for reported intake frequency to decrease with age. While correlation coefficients between age and intake frequency did not reach levels of significance for all foods, the coefficient was negative for all foods. Similarly, as health ailments increased, reported intake frequency tended to decrease, but reached significant levels for few foods. Conversely, there was a trend for reported food intake frequency to increase with increasing income and increasing possession score, reaching significant levels for over one-half of the foods. Correlation coefficients did not follow such obvious trends when intake frequency was correlated with years of education and number living in the home, and few coefficients reached significant levels.

Perceptions about food

Some of the foods which were perceived as healthful for the elderly to eat or drink are listed in Table 16. Each respondent was asked to list three such foods. Vegetables, either in general or as specific vegetables, were most frequently cited as healthy foods (47.9% of the respondents). The most commonly mentioned specific vegetables were tapioca shoots, mustard greens, and spinach. Similarly, Todhunter (1976) in her study of 529 elderly 60 years and

TABLE 16. Foods perceived as healthful for the elderly (n=317)

Food item or group[a]	No. of respondents	Percent
Vegetables	152	47.9
Fruits	75	23.7
Rice	72	22.7
Fish or dried anchovies	62	19.6
Eggs, beef, or chicken	59	18.6
Milk	42	13.2
Bread or wheat flour products	31	9.8
Other	66	20.8

[a]Multiple responses possible.

over, reported that vegetables were named more often than any other food as good for health by U.S. black and white elderly of both sexes. On the other hand, only 16% of 106 Italian females 65 years and over perceived vegetables as the most suitable food for elderly people (Fidanza, 1984). In a study of 278 rural adult females 18 to 60 years old in Malaysia, Manderson (1981) reported that more than 34% of the respondents listed vegetables as foods recommended during pregnancy. However, vegetables being perceived as a superior food in this study is in contrast to the ideological pattern noted by Wolff (1965) in which

vegetables, to the Malays, are simply condiments to improve the taste of rice and not considered a necessary part of a meal.

About 24% of the respondents perceived fruits, in general, or specific fruits as healthful for women their age to eat. Bananas, oranges, papaya, mangoes, and starfruit (Averrhoa carambola) were some of the specific fruits named by the respondents as healthful. Fruits were indicated as the most suitable food for the elderly by only 8% of Italian female elderly in the study by Fidanza (1984).

Rice was the specific food item most frequently perceived as healthful by the respondents in this study (22.7%). Throughout Asia, rice is a frequently over-valued food. It is generally perceived that rice is of major importance in the diet and all other items in the diet are relatively unimportant. In fact, among the rice eating Asian population, a person would feel that he has not eaten for the day unless he has eaten rice. Wolff (1965) reported that to the Malays rice is perceived as essential for survival and one of two foods worthy of its name, the second being fish. Rice was also perceived by more than 88% or the respondents in the study by Chen et al. (1979) to be highly beneficial for toddlers and expectant and post-partum women. Conversely, pasta, the core food of Italians, was rated by the majority of a sample of Italian elderly females as the most suitable food for the elderly (Fidanza, 1984).

Fish and dried anchovies were perceived by 19.6% of the respondents in this study as healthful foods for women their age. More

than 50% of the respondents in the study by Chen et al. (1979) perceived fish and dried anchovies as beneficial for toddlers and expectant and post-partum women. However, Fidanza (1984) noted that no mention was made of fish as the most suitable food for the Italian elderly. About 19% of the respondents in this study indicated other high protein foods like eggs, beef, and chicken as healthful for women their age. These high protein foods were also perceived as beneficial for toddlers and pregnant and post-partum women by more than 50% of the respondents in the study by Chen et al. (1979). Manderson (1981) also reported that more than 28% of adult Malay females said that they would recommend beef and eggs during pregnancy. About 37% of a sample of Italian elderly women perceived meat as the most suitable food for the elderly, but no mention was made of eggs or chicken (Fidanza, 1984).

Although the frequency of drinking milk among the respondents in this study was relatively low, 13.2% of them perceived milk as a healthful food for women their age. Chen et al. (1979) reported that milk was also perceived to be highly beneficial for pregnant and post-partum women by 30% to 50% of rural Malay women. Only 8% of a sample of elderly Italian females indicated milk as the most suitable food for the elderly (Fidanza, 1984).

Bread and products made from wheat flour were perceived to be healthful foods by 9.8% of the respondents in this study. Chen et al. (1979) also reported that more than 60% of their respondents perceived bread and noodles made from wheat flour to be beneficial for all three

of the vulnerable conditions that they studied. About 21% of the elderly in this study named several other foods which were perceived as healthful. The most frequently cited examples were medicinal tonics, chicken liver, soft foods, and plain, cold water.

The respondents gave many reasons why the reported foods were perceived as healthful for the elderly (Table 17). The most frequently cited reason was that a food was nutritious (37.2% of the respondents). About one-fourth (25.6%) of the respondents indicated that a reported food provided energy or increased strength, while 24.9% mentioned help in digestion or increasing the appetite. Additional reasons given by 15% to 20% of the respondents were maintaining a healthy body (20.2%), "filling" (18.6%), and appetizing or tasty (16.4%). Reasons less frequently cited by 13.6% included to strengthen bones and teeth, prevent pains in joints, or increase fluid in the body.

Chi-square tests revealed a number of significant relationships between selected healthful foods and the reasons given explaining why they were healthful. Respondents who reported rice as healthful were likely to give "filling" as a reason (X^2=107.48, df=1, p<0.001), while those reporting fruit were likely to indicate help in digestion or increasing the appetite as reasons (X^2=52.92, df=1, p<0.001). A large proportion of the respondents reporting vegetables or fish or anchovies as healthful foods indicated nutrition as the main reason (X^2=55.11, df=1, p<0.001; X^2=9.32, df=1, p<0.01).

TABLE 17. Reasons why foods were perceived as healthful for the elderly (n=317)

Reason[a]	No. of respondents	Percent
Nutritious	118	37.2
Provides energy or increases strength	81	25.6
Helps in digestion or increases appetite	79	24.9
Maintains a healthy body	64	20.2
Filling	59	18.6
Appetizing or tasty	52	16.4
Other	43	13.6

[a]Multiple responses possible.

Several foods were perceived by these elderly females as least healthy for elderly women to eat or drink. Each respondent was asked to name three such foods. As shown in Table 18, 12.6% mentioned bamboo shoots and 43.5% named other vegetables, mostly specific vegetables rather than vegetables in general. Other frequently cited specific vegetables were "cekor manis" (Sauropus androgynus), fern shoots, tapioca shoots, spinach, mustard greens, green beans, tapioca, sweet potatoes, and eggplant. Chen et al. (1979) reported that about 21% of the rural Malay women in their study perceived gourds or squash to be

TABLE 18. Foods perceived as least healthy for the elderly (n=317)

Food item or group[a]	No. of respondents	Percent
Vegetables (not including bamboo shoots)	138	43.5
Fruits (not including jackfruit)	57	18.0
Cockles and shrimp	51	16.1
Jackfruit	50	15.8
Coffee or tea	44	13.9
Fish, canned or fresh	42	13.2
Bamboo shoots	40	12.6
Eggs, beef, or chicken	36	11.3
Mutton	32	10.1
Salty foods or salted fish	26	8.2
Spicy or hot food	24	7.6
Ice-water	23	7.3
Milk	22	6.9
Other	65	20.5

[a]Multiple responses possible.

taboo during the post-partum period, while about 13%, 13%, and 17% avoided bamboo shoots, eggplant, and cucumbers, respectively.

Similarly, 24.5% of rural adult women in Malaysia in the study by Manderson (1981) avoided vegetables, in general, during confinement or post-partum, and 4% to 8% avoided specific vegetables like cucumbers, spinach, and gourds. Conversely, only 6% of a sample of elderly Italian women reported vegetables as dangerous foods for elderly people (Fidanza, 1984).

Jackfruit (Artocarpus integrafolia) was the single specific fruit most frequently reported by the respondents in this study (15.8%) as least healthy for the elderly. Eighteen percent reported fruits, in general, or other specific fruits as least healthy. Papaya, oranges, bananas, guava, and pineapple were some of those frequently reported. A number of specific fruits have been reported as taboo among Malays during post-partum (Chen et al., 1979). About 13% to 22% of rural Malay women in Chen et al.'s study recommended avoiding lime, papaya, guava, jackfruit, watermelon, starfruit, and pineapple during that vulnerable period. In the study by Manderson (1981), fruits, in general, were avoided during confinement by 10.1% of the women, while another 6.5% avoided pineapple.

About 16% of the respondents in this study reported that cockles and shrimp were' least healthy for women their age to eat. Cockles and shrimp were also perceived as taboo and to be avoided during the post-partum period by about 7% of rural Malay women (Chen et al., 1979). Similarly, Manderson (1981) reported that 7.2% of adult women in Malaysia avoided shrimp during that critical period.

About 14% of the respondents in this study perceived coffee and tea as least healthy for women their age to drink, while several specific fish were reported by 13.2% and salty food or salted fish by 8.2% of the respondents. The most frequently cited specific fish were canned sardines, fresh-water fish, catfish, and "kembong" (Rastrelliger kanagurta). In another study, catfish was avoided by about 6% and salted fish by about 11% of rural Malay women during post-partum (Chen et al., 1979). "Kembong" was proscribed during confinement by 6% of adult women in the study by Manderson (1981).

High protein foods like eggs, beef, and chicken were perceived as least healthy for the elderly by 11.3% of the respondents in this study, and mutton by 10.1%. Less than 3% of the respondents in the studies by Chen et al. (1979) and Manderson (1981) reported these high protein foods as taboo during the vulnerable stages that they studied.

Smaller proportions of the respondents in this study perceived spicy or hot food (7.6%), iced or refrigerated water (7.3%), or milk (6.9%) as foods or drinks least healthy for the elderly. Iced water was avoided or proscribed during confinement by 4% of the women in the study by Manderson (1981).

About 21% of the respondents in this study named several other miscellaneous foods which were perceived as least healthy for women their age. Oily or fatty foods, sugar and sweet foods, hard foods, and aerated beverages were frequently mentioned. Fidanza (1984) reported that fatty foods were rated by 67% of a sample of elderly Italian women as the most dangerous food for elderly people.

Some of the reasons given for citing foods as least healthy for
the elderly are presented in Table 19. The six most frequent responses
were perceived side effects caused by a food. About 29% of the
respondents indicated flatulence as the main reason why some foods were
perceived as least healthy. Manderson (1981) classified as "windy
foods" several foods likely to cause flatulence, including jackfruit,
gourds, eggplant, sweet potatoes, tapioca , and tubers, in general.
Pain in the joints were cited by about 23% of the respondents in this
study, while about 19% and 18% indicated gastro-intestinal problems and
headache, respectively, as the reasons why some foods are not suitable
for the elderly. Some of the least healthy foods mentioned were
perceived to cause itchiness by 14.8% of the respondents. Some of the
foods classified as "itchy foods" in the study by Manderson (1981) were
"kembong", tuna fish, shrimp paste, cockles, crabs, squid, and shrimp.

Vomiting or suppressing the appetite were cited by 14.5% of the
respondents in this study as a reason why some foods were least
healthy. Some of the reported foods were also perceived to be
unappetizing (12.9%), "cooling" (12.9%), a cause of high blood pressure
(12.6%), and bad for health (8.5%). Other less frequently cited
reasons were too much fat, bad for asthma, warms up the body, and
weakens the body.

Significant associations were found between selected foods
perceived as least healthy for the elderly and the reasons cited for
listing these foods as least healthy. Respondents who reported cockles

TABLE 19. Reasons why foods were perceived as least healthy for the
elderly (n=317)

Reason[a]	No. of respondents	Percent
Causes flatulence	92	29.0
Causes pain in joints	72	22.7
Causes gastro-intestinal problems	60	18.9
Causes headache	56	17.7
Causes itchiness	47	14.8
Causes vomiting or suppresses appetite	46	14.5
Unappetizing	41	12.9
"Cooling"	41	12.9
Causes increase in blood pressure	40	12.6
Bad for health	27	8.5
Other	62	19.6

[a]Multiple responses possible.

and shrimp as foods least healthy for the elderly were likely to
indicate itchiness as a reason (X^2=179.69, df=1, p<0.001). Manderson
(1981) observed that about 53% and 16% of the female respondents in her
study listed shrimp and cockles, respectively, as "itchy foods".
Zaitun (1984) also reported that about 75% of the respondents in her

study believed that post-partum women should avoid shrimp, cockles, and tuna fish, which might cause itchiness.

Respondents in this study who reported jackfruit as a least healthy food for the elderly were also likely to indicate flatulence as a reason (x^2=110.40, df=1, p<0.001). About 26% of the women in the study by Manderson (1981) reported jackfruit as a "windy food".

Respondents who reported salted fish or salty foods or mutton as least healthy foods were likely to report that the food causes high blood pressure (x^2=112.67, df=1, p<0.001; x^2=48.96, df=1, p<0.001). Pain in the joints was the reason most likely to be reported by respondents who named iced or refrigerated water as least healthy to drink for the elderly (x^2=33.96, df=1, p<0.001), while those reporting milk as least healthy were likely to indicate vomiting or suppressing the appetite as reasons (x^2=41.83, df=1, p<0.001). Finally, respondents reporting spicy or hot foods were likely to indicate gastro-intestinal problems as the main reason (x^2=84.48, df=1, p<0.001).

Implications

Findings from the above data have several important implications for the nutritional and health care of the elderly females in Malaysia. A majority of the respondents in this study were partially responsible for food purchasing and preparation of meals in the home. Firewood, although not the most efficient form of fuel, was widely used for

cooking. However, in rural areas fire wood is the cheapest form of fuel, and, in many cases, easily available. With respect to food procurement, a majority of respondents reported gathering wild plants or shoots which can provide a substantial source of nutrients in their diet. Produce from vegetable gardens was also widely used for home consumption. Therefore, these factors should be taken into consideration in planning nutrition education for this segment of the population. For example, nutrition education could be delivered directly to most of these individuals rather than through other family members or care-givers since most were directly involved in acquiring and preparing food in the home. In addition, any suggested food intake alteration should be adaptable to the primary means of cooking and should incorporate not just purchased foods but also food gathered from the environment or produced at home.

The food expenditure patterns were quite varied. However, a majority felt satisfied with the amount of money they could spend to buy food. Respondents with lower household incomes and larger household sizes spent a larger proportion of their monthly incomes for food. However, monthly household income and expenditure for food may have been difficult to accurately estimate. Seasonal variation in income, household pooling of resources, contributions from members living outside the household, irregularity of food purchasing patterns, and general reluctance to report income may also have contributed to inaccurate reporting. However, it appears that inadequate monetary

resources for purchasing food was not a major problem for most of the elderly females in this sample.

The food purchasing patterns revealed several trends. Households with higher incomes which had easy access to transportation were likely to purchase their staples and fresh produce from grocery stores and markets in nearby towns and relatively infrequently. On the other hand, local grocery stores and vendors were likely to be patronized by households with lower incomes and which had no access to transportation. Under such circumstances, these poorer households were subjected to limited choice of food items and possible price exploitation.

Only a small proportion of the respondents reported problems which prevented them from getting enough food or the type of food they would like. A majority reported that their present appetite was good, and the meal pattern data indicates that most ate three meals daily. However, since these were qualitative data, the composition of the meals consumed, especially breakfast, should be studied. To some of the elderly, drinking a cup of coffee or tea with some snacks like cookies or crackers might constitute breakfast.

The frequency of food intake revealed the consumption of a variety of food items common to the Malaysian diet. Three of the major food groups were well represented in the high food-use category. The fourth food group, milk, was not. Recommending the consumption of milk and milk products to the elderly Malaysians will not be a wise decision due

to the high cost and limited availability of these food items.
However, to ensure adequate intake of calcium, the elderly should be
encouraged to increase consumption of other familiar and readily
available sources of calcium such as dried anchovies, canned sardines,
cockles, and shrimp paste. Consumption of fruits other than the two
fruits in season at the time of this survey was obviously infrequent.
In view of the high nutritional quality, soft texture, and wide
availability of local fruits such as papaya, the increased consumption
of such fruits should be encouraged among the elderly.

The selection of adequate diets by elderly individuals depends
upon patterns of eating developed as children, modified throughout
life, and tempered by personal food beliefs and attitudes. Food
beliefs and taboos have been known to exert an undesirable impact on
the dietary pattern of rural Malays. Some of these beliefs are so well
ingrained that they have been practised and passed on relatively
unchanged from generation to generation, while others are beginning to
fade away.

Perceptions and beliefs about the health characteristics of
certain foods were quite prevalent among the respondents in this study.
Some of these perceptions were practised with the firm belief that
certain foods would prevent diseases and ill-health or ameliorate
certain discomforts. However, there is little or no scientific
justification for most of these perceptions. Most of the foods which
were perceived as most healthful for the elderly were also nutritious,

although nutritious foods were also perceived as least healthy. This was particularly true for fruits and vegetables. Some of these health beliefs might restrict the variety of foods consumed and, consequently, nutrient supply might be limited in the diet. The relationship between food perceptions and food choices are difficult to specify. For some people and some foods, belief in a food's health benefit will facilitate its use, while for other foods sensory appeal and other factors may be more predictive of its use.

Overall, the analyses of the dietary patterns, food intake frequency, and perceptions about food provide only a qualitative profile of the nutritional status of elderly Malay females in this study. This is the obvious limitation when using this type of methodology. It is not possible to conclude from these findings the adequacy of the nutrient intake or to compare with other standards. More detailed research is needed in order to assess the composition and nutritional adequacy of the diet. There is also a need to identify the best methodological tools for understanding the multiplicity of factors affecting food choices and dietary intakes. A good understanding of food perceptions and health beliefs which influence food selection among elderly individuals is important if appropriate education programs are to be devised to improve nutritional well-being.

Despite the limitations of this study, these exploratory findings can serve as a base for future evaluations of nutritional and health status of the elderly in Malaysia. Nutritionists and health

professionals in Malaysia have a real challenge to face. With the potential increase in the number of elderly, there is an urgent need to provide accurate and practical information about health and dietary concerns.

ANTHROPOMETRIC CHARACTERISTICS

Review of Literature

Anthropometry is the measurement of body size, weight, and proportions. While these non-invasive measures are inexpensive, painless, and generally require little sophisticated equipment, they do require some skills and specific techniques in administration. Body measurements have been widely used to evaluate nutritional status and to monitor the effects of nutritional interventions in children and adults. Of all the parameters used to assess nutritional status, anthropometric measures are the ones most apparently affected by the aging process.

In recent years, there has been an increase in the use of anthropometry in studies of nutritional status in the elderly (Burr and Phillips, 1984; Chumlea et al., 1984b, 1985a, 1986, 1988; Netland and Brownstein, 1985; Revicki and Israel, 1986). With the aging process, changes in physical size and body composition are expected to occur. Several generalizations can be made regarding the effects of aging on anthropometric measures and body composition.

Height and indicators of stature

Cross-sectional and longitudinal studies have shown that standing height decreases with age, and the decline is race- and sex-dependent (Bowman and Rosenberg, 1982; Dequeker et al., 1969; Mitchell and Lipschitz, 1982a; Noppa et al., 1980; Trotter and Glesser, 1951).

Estimates of height loss during post-maturity range from 1.2 cm/20 years (Trotter and Glesser, 1951) to 2.6 cm/20 years (Dequeker et al., 1969). Differences in height decreases between racial groups were documented in a study conducted in the southeastern United States involving over 600 whites and blacks between the ages of 50 and 104 years. This study showed that black females lose about 4.9 cm in height every 10 years compared to 2.8 cm in white females (McPherson et al., 1978)

Data from the National Health and Nutrition Examination Survey II (NHANES II) showed that white females aged 65 to 74 years were 5.3 cm shorter than their younger counterparts 18 to 24 years old (Najjar and Rowland, 1987). Similarly, longitudinal data from Garcia and co-workers (1982a) have shown that there is a significant decline in height after age 45 in women.

Thinning of the vertebrae, kyphosis or curvature of the spine which gives an individual a hunch-backed appearance, and osteoporosis are some of the reasons for the decrease in height with aging (Mitchell and Lipschitz, 1982a). It is also interesting to note that the reduction in height is not due to decreases in appendicular skeleton, such as legs, but rather to a shortening in the length of the axial skeleton or vertebral column (Piscopo, 1985). Thus, it can be expected that there will be a decline not only in standing height, but also in sitting height with aging. In subjects in NHANES II, sitting height remained constant in younger white females, but declined steadily in older white females after age 45 (Najjar and Rowland, 1987).

Arm span is highly correlated with standing height, and thus, when height or recumbent length cannot be measured, arm span may be relevant in anthropometric assessment of the elderly. Arm span and height are nearly equal at the start of the adult life. A study of 140 Belgian women aged 30 to 94 years revealed that while the arm span was almost the same in the youngest and oldest age groups, the relationship of arm span to recumbent length varied with age. Recumbent length exceeded arm span by 1 cm in the fourth and fifth decades. From the sixth decade onwards, arm span exceeded recumbent length, and at an increasing rate in successively older age groups. The mean recumbent length was 8 cm shorter than the mean arm span in the ninth decade (Dequeker et al., 1969).

Knee height has been used to estimate the stature or standing height of an individual who is nonambulatory or bedridden. This measure can also be very useful for elderly who has such obvious spinal curvature that a direct measurement of stature would be unreliable. Unlike stature, knee height changes very little with increasing age and has been reported to be highly correlated with stature. For example, knee height was found to be highly correlated with stature in a sample of 236 white ambulatory elderly persons aged 65 to 104 years (Chumlea et al., 1985a). Using the variables knee height and age, mathematical formulas are available to estimate stature (Chumlea et al., 1987).

Weight and indicators of adiposity

Direct and indirect measures of adiposity or body fat are frequently used in nutritional assessments. With aging, there is a general increase of total body fat and a cumulative decrease in lean body mass in well nourished individuals, as documented in both cross-sectional and longitudinal studies (McEvoy and James, 1982; Noppa et al., 1980). There is a rise in body fat from 23.1% in the fifth decade to 55.3% in the seventh decade in elderly women as assessed by densitometric measurement (Young et al., 1963). On the other hand, lean body mass remains fairly constant up to about 50 years, but thereafter the decline is significant (Forbes and Reina, 1970). An increased amount of fat is deposited primarily around internal organs, especially in females, and tends to be truncal, while the amount of subcutaneous fat increases only slightly (Mitchell and Lipschitz, 1982a). Consequently, the ratio of subcutaneous fat to total body fat decreases with age.

In some studies, changes in lean body mass and fat content with age have been determined using sophisticated equipment and techniques such as measurement of total body potassium, radiography, electrical impedance, and calculations of total body density (Mitchell and Lipschitz, 1982a). Because they are too expensive and time consuming or require equipment not widely available, these procedures have not been routinely used in clinical practice or large field studies. Therefore, simpler anthropometric measurements which are indirect

measures of adiposity are often widely applied both in clinical and field settings (Abdel-Malek et al., 1985; Chumlea et al., 1984b; Durnin and Womersley, 1974; Lohman, 1981; Micozzi et al., 1986).

Weight, the most widely used indirect indicator of adiposity, is affected by normal aging. In developed countries, most adult males gain weight until the early 40s, while females attain their maximum weight in the early 50s. For the next 15 to 20 years, weight usually remains fairly constant, and thereafter decreases progressively (Mitchell and Lipschitz, 1982a). The weight of white females in NHANES II showed similar trends (Najjar and Rowland, 1987). Garcia et al. (1982a) reported that weight in women declines after about 50 years of age.

When weight cannot be measured directly because of infirmity or bone fractures requiring traction or casting, it can be estimated from a formula using a number of measurements taken with the subject in a recumbent position -- calf circumference, knee height, mid-arm circumference, and subscapular skinfold thickness, as suggested by Chumlea et al. (1987).

Because body weight reflects total body mass, not just body fat, mathematical formulas which use weight and stature to estimate body fat are often used. These formulas are known as body mass indices (BMIs). The Quetelet index (weight/stature^2) is the most widely accepted BMI, and is generally correlated with skinfold thickness measurements of body fat (Revicki and Israel, 1986; Yearick, 1978). Using

anthropometric data from NHANES I and II, Micozzi et al. (1986) reported that BMI is highly correlated to measured and calculated estimates of body fat, including subscapular skinfold thickness and arm fat area. They also suggested the use of $W/H^{1.5}$ or, in some instances, W/H as a more accurate indicator of excess weight or body fatness, particularly in women. In a study of 1,500 elderly subjects in South Wales, Burr and Phillips (1984) revealed that BMI declined with age after 70 years in both males and females. The relationship of BMI to morbidity and mortality ratios has also been reported (Harris et al., 1988; Ohlson et al., 1985). However, some researchers do not consider the index useful in many elderly persons because measurement of stature is not possible or of questionable value. Chumlea et al. (1985a) disagree, and state that stature can be estimated accurately from knee height. If this estimate of stature is accepted, the Quetelet index can be used to estimate body fat in almost all elderly persons.

Skinfold (fatfold) measures are another widely used indicator of adiposity. Although skinfolds can be measured at many body sites, the triceps, or midpoint on the back of the upper arm, is most frequently used. Triceps skinfold measurements in the elderly are highly variable, more so for women than men. The variability may be due to alterations in skin thickness and elasticity or fat compressibility which usually accompany the normal aging process. Nevertheless, skinfold measurements can be very useful in the elderly. The measurements are simple and less affected by state of hydration than

weight, and are relatively independent of height, which can be difficult to measure in nonambulatory individuals (Bowman and Rosenberg, 1982).

Although the triceps is the site most frequently used for measuring the skinfold, research suggests that other sites may yield equal or better estimates of adiposity. Chumlea et al. (1984b), in their study of healthy adults 54 to 85 years of age, found that abdominal and subscapular skinfolds were those most highly correlated with percent body fat in females. However, Mitchell and Lipschitz (1982a) report that extremity skinfold measurements (triceps, biceps, and thigh skinfolds) seem to be the most accurate measures of body fat for females. It was concluded by Cronk and Roche (1982) that the degree of fatness in females of all ages can best be estimated by triceps skinfold and BMI.

Fatness or leanness can also be indirectly assessed by girth or circumferential measurements. These measurements have been recommended since not only total and percent body fat but also fat distribution may be of prognostic significance for chronic diseases. Previous studies indicate that accumulation of upper abdominal fat has an adverse effect on mortality, whereas fat deposition around the thighs may not contribute to such adverse prognosis (Roe, 1986).

Waist circumference has been used as an index of deep adipose tissue, and is negatively correlated with fat free mass. The hip or buttocks circumference measures the external pelvic size and reflects

the amount of adipose tissue in that region. The hip circumference is an indicator of lower body fatness since the adipose tissue in that region is mainly subcutaneous and relates to the lower segment of the body. These two circumferences are used to calculate the waist to hip ratio (WHR), an indicator of the degree of masculine distribution of adipose tissue. A more masculine pattern of adipose tissue distribution is reflected by a higher WHR, and is indicative of increased risk of several chronic diseases. In a study of 32,856 women, Hartz and co-workers (1984) found that the WHR was significantly associated with diabetes, hypertension, and gallbladder disease in women aged 40 to 59 years old. Similarly, in a longitudinal study it was revealed that the risk for diabetes was positively and significantly associated with WHR (Ohlson et al., 1985).

The circumference of the middle of the upper arm, known as mid-arm circumference, is often combined with the triceps skinfold measurement to calculate mid-arm muscle circumference and the areas of mid-arm muscle and adipose tissue (Gurney and Jelliffe, 1973). These estimates of body composition can be used to monitor change in body mass over time and detect wasting in frail elderly since this measure is highly correlated with body mass index (Roe, 1986). Mid-arm muscle area is also an accepted index of body protein stores and is useful in identifying and monitoring protein-energy malnutrition in the elderly (Chumlea et al., 1986).

It is evident that upper arm anthropometry changes with age. Burr and Phillips (1984) reported that estimates of fat and muscle volume based on upper arm measurements show a decline with age, and that the decline for triceps skinfold thickness for women was especially rapid. However, data from a sample of 746 white elderly persons aged 60 to 89 years revealed that, compared to elderly men, elderly women had larger triceps skinfold thicknesses but smaller mid-upper arm circumferences, mid-upper arm muscle circumferences, and mid-upper arm muscle area measurements (Falciglia et al., 1988).

Hand grip measurement

Hand grip represents a fairly good indicator of body static strength, and it measures the muscular torque (grip) of the hand and forearm (Piscopo, 1985). From a comprehensive study of more than 6,000 healthy U.S. males and females from ages 10 to 69 years, Montoye and Lamphiear (1977) reported a rapid increase in strength during adolescence, with a gradual decrease after early adulthood. From about ages 20 to 50, there was little decrease in absolute grip strength. The decrease in strength per unit of body weight beginning about age 25 was greater than the decrease in absolute strength in both males and females. This decrease in strength reflected a gain in body weight, especially body fat, and a resulting change in body composition.

In a longitudinal study, Garcia et al. (1982a) reported a significant linear decline in hand grip measurements with age in elderly female subjects in the U.S. Similarly, a cross-sectional study

of rural Filipinos indicated that hand grip strength declines with age in both males and females (Garcia et al., 1982b).

Anthropometric assessment of adults in Malaysia

Published information on the nutritional status of the Malaysian elderly, including anthropometric characteristics, are nonexistent (Tee, 1980, 1984). Most anthropometric assessments have focused on infants and children (Chen, 1976; Chen, 1977; Chen and Dugdale, 1970; Chong and Hanis, 1982; Chong and Lim, 1975). However, a few selected anthropometric studies have been reported for the adult population in Malaysia.

Jones (1976) reported the prevalence of obesity in an urban Malaysian sample. The sample consisted of 300 adult women and 300 adult men aged 20 to 70 years from all three major ethnic groups. Using the Quetelet index, obesity was found to be least common before the age of 30 years among all ethnic groups, and least prevalent among Chinese men. After 30 years of age, 21% to 40% of Chinese women, and Malay and Indian men and women were found to be obese. Among the women, obesity was especially prevalent in Indians aged 31 to 40 and in Chinese over 50 years of age.

In a more recent study of several rural villages, Chong et al. (1984) reported that, based on the Quetelet index for 1,487 adults, there was a higher proportion of lean adults (45% in males and 31% in females) compared to obese adults (5% in males and 15% in females) in the villages. Similarly, Wan Abdul Manan (1987) reported that 32.5%

and 29.9% of adult males and females were lean, respectively, while only 4.5% of adult females were considered to be obese. A comprehensive anthropometric study of a sample of about 6,000 individuals ages 5 to 60 years was conducted in Peninsular Malaysia by Toretta et al. (Unpublished) in 1982, but the data have not yet been reported.

Limitations of anthropometry when used with the elderly

Although anthropometric assessment has been increasingly used to evaluate the nutritional status of the elderly population, one should be aware of some of the limitations involved in using these procedures with elderly individuals. As pointed out by Chumlea et al. (1987), current nutritional anthropometric procedures are not entirely satisfactory for all elderly persons.

For example, many elderly persons, especially the very old in institutions or hospitals, are chair-bound or bedfast due to various conditions like arthritis, accidents, diseases, or surgery. Measurement of reliable and acceptable anthropometric indices for these and other nonambulatory persons can pose a real problem.

Taking an accurate height measurement is difficult if not impossible in some elderly persons. The most common physical change which affects the measurement of height is change in the vertebrae and the inter-vertebral discs affecting posture, and in turn height, particularly in post-menopausal women. In addition, curvature of the spine often makes it extremely difficult for some elderly persons to

stand up straight enough for an accurate height measurement to be made. There may also be large amounts of adipose tissue on the buttocks, particularly among some ethnic groups. In such cases, it may be difficult for the individual to stand erect with the buttocks, shoulders, and head all touching the vertical measuring surface.

Another problem with height measurements among the elderly is that they may yield an unreliable BMI because of the variable height loss with age (Roe, 1986). Recumbent length, total arm length, knee height, and arm span have all been proposed as alternative methods to estimate stature (Chumlea et al., 1985a, 1985b; Dequeker et al., 1969; Mitchell and Lipschitz, 1982b). However, it should be recognized that none of these alternative methods is flawless. More research on their validity and reliability is needed before they can be recommended as routine procedures, even though these alternative measurements have been shown to be highly correlated with stature for some samples.

Accurate measurements of triceps skinfold thickness and mid-arm circumference may also be difficult to obtain from some elderly persons. Some of the difficulties include sagging skin, increased compressibility of fatfolds on the back of the arm, difficulty in making the measurement in a recumbent or noncooperative patient, and high inter-observer error (Roe, 1987). Errors in measurement of skinfolds to assess body fatness are reportedly greatest in the elderly (Chumlea et al., 1984a).

In addition to precise and accurate measurement procedures, the usefulness and validity of anthropometric assessment depend upon the use of appropriate standards for data interpretation. Presently, there are no universally accepted weight for height reference values for persons over 65 years of age. The most widely used references are the data from NHANES I and II (Abraham et al., 1979; Frisancho, 1984; Najjar and Rowland, 1987). Reference values for other anthropometric norms in the elderly have also been reported based on the data from NHANES I and II (Bishop, 1984). However, these norms may not be appropriate for developing countries or all ethnic groups.

It is important to recognize that there are no reference values based on anthropometric measurements of elderly who are over 74 years of age, and that when such values are reported in tables, they are based on extrapolations (Roe, 1987). Data on the anthropometric measurements of the very old have been reported by several investigators (Burr and Phillips, 1984; Chumlea et al., 1986; Falciglia et al., 1988). However, the data are derived from small samples of elderly white individuals.

Methodology

Data collection

Selected body measurements were made by the researcher according to standard anthropometric techniques (Cameron, 1984; Lohman et al., 1988). Data were collected from 305 respondents. Eleven respondents

were not available in their homes after repeated visits and one declined to be measured. Hand grip strength was not measured in 37 elderly.

Body weight, without shoes and in light indoor clothing, was obtained to the nearest 0.5 kg using a SECA portable spring scale (capacity 150 kg with 0.5 kg graduation, made in Germany). Height without shoes was measured using two wooden meter sticks placed end to end and securely attached with masking tape to the wall, and a right angle. Sitting height, the distance from a horizontal sitting surface to the top of the head, was taken using these same tools.

The knee height was measured using an anthropometric caliper (Mediform Printers and Publishers, Beaverton, Oregon) on the left leg. Knee height is the distance from the sole of the foot (without shoes) to the anterior surface of the thigh, measured while in a seated position (Chumlea et al., 1985a). The arm span is the distance between the tips of the longest fingers, and it was measured with a two meters long tape when the arms were out-stretched laterally and maximally at the level of the shoulders and in contact with a flat wall (Lohman et al., 1988). Height, sitting height, knee height, and arm span were recorded to the nearest 0.1 cm.

Circumferences of the waist, hip, and mid-arm were measured with a non-stretchable tape and recorded to the nearest 0.1 cm. A Lange skinfold caliper (Cambridge Scientific Industries, Cambridge, Maryland) was used to measure the triceps skinfold thickness of the right and

left arms and recorded to the nearest 0.5 mm. Grip strength of the right and left hands was measured by using a hand dynamometer (Model 78010, 0-50 kg, LaFayette Instrument Co., LaFayette, Indiana).

Data analysis

Body mass index (BMI) or Quetelet index was calculated as weight (kg) divided by the square of height (m^2):

$$BMI = weight\ (kg)\ /\ height\ (m^2)$$

Waist-hip ratio (WHR) was computed as waist circumference (cm) divided by hip circumference (cm):

$$WHR = waist\ (cm)\ /\ hip\ (cm)$$

Knee height (cm) and age to the nearest whole year were used to estimate stature in the elderly females using the following formula as suggested by Chumlea et al. (1987):

$$Estimated\ stature = [1.83\ X\ knee\ height] - [0.24\ X\ age] + 84.88$$

The arm muscle circumference (AMC), mid-arm muscle area (MAMA), and mid-arm fat area (MAFA) were calculated using measurements of the non-dominant arm in the following formulas derived from Gurney and Jelliffe (1973):

AMC = [mid-arm circumference (cm)] - {3.14[triceps skinfold (mm)]}/10

$$MAMA = (AMC)^2 / (4 \; X \; 3.14)$$

$$MAFA = [(mid\text{-}arm \; circumference)^2 / (4 \; X \; 3.14)] - MAMA$$

In addition to frequency and central tendency statistics, correlation coefficients were calculated for the interrelationships between various anthropometric variables and their relationships to demographic factors. Percentiles within each age group were also computed.

Results and Discussion

Height and indicators of stature

The mean and standard deviation of height and indicators of stature of 305 elderly Malay respondents by age groups are presented in Table 20, a correlation matrix of age, height, and indices of stature is presented in Appendix I, and the percentile distributions are presented in Appendix J. The average height of the sample was 147.2 cm, and was 5.9 cm less than the computed stature from knee height. The average height was comparable to the average height of adult females 18 years and over in the study by Chong et al. (1984). The average sitting height of the sample was 74.7 cm, while the average knee height was 45.8 cm. The arm span measured 4.7 cm more than the

height, and the value was comparable to the estimated stature.

Compared to elderly Belgian women of the same age group, the difference in mean arm span was only 1.6 cm (Dequeker et al., 1969).

TABLE 20. Mean and standard deviation by age group of standing height and indicators of stature of elderly respondents (n=305)

	Age group (years)							
	55 - 59 (n=110)		60 - 69 (n=123)		70 and over (n=72)		Total (n=305)	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Standing height (cm)	149.2	5.0	147.0	5.2	144.4	5.4	147.2	5.5
Stature computed from knee height (cm)	155.3	3.8	153.3	6.0	149.4	4.1	153.1	5.4
Sitting height (cm)	76.4	3.3	74.6	4.7	72.2	4.5	74.7	4.5
Knee height (cm)	45.9	2.1	45.9	3.3	45.3	2.0	45.8	2.6
Arm span (cm)	152.7	6.4	151.8	6.0	151.0	5.8	151.9	6.1

As shown in Appendix I, height was negatively correlated with age (r=-0.37, p<0.001). The negative correlation may be due to the decline in stature with advancing age. As shown in Table 20, the younger 55 to 59 year old women were 4.8 cm taller than the 70 years and older age group. The shorter stature may also reflect a secular trend. The younger women may have had a better chance of attaining their full

genetic potential for height than their older counterparts due to better diet and/or living conditions.

Similar trends have been reported in other samples in cross-sectional studies (Dequeker et al., 1969; Garcia et al., 1982b). In a longitudinal study in Sweden, Noppa et al. (1980) reported not only a secular increase in height, but also a true biological height reduction starting at age 40 in women. However, it should be noted that the decline is race- and sex-dependent, and care should be observed when generalizing about specific stature decrements among all people.

The negative relationship (r=-0.42, p<0.001) of sitting height with age may be due to a decline in sitting height with the aging process. Since a decline in height with aging occurs in the upper body region, any changes in height with advancing age is reflected by changes in sitting height. The oldest age group had a lower value than the younger women (Table 20). Decreased sitting height with age is caused in part by the shortening of the vertebral column. Poor posture may also be a contributing factor among those elderly who habitually carry themselves in a postural slump with exaggerated flexion of the knees and hips. Sitting height declined by 1.8 cm/10 years, and this result is comparable to the data for elderly white females in NHANES II (Najjar and Rowland, 1987).

Arm span was only slightly correlated with age (r=-0.12, p<0.05), while knee height showed no significant relationship with age. These results supported the contention that arm span and knee height change

very little with increasing age, as shown in Table 20, and thus can be useful indices to estimate stature in the elderly. Similarly, Dequeker et al. (1969) reported no consistent reduction in arm span with age in Belgian elderly women. On the other hand, Chumlea et al. (1985a) reported that knee height was significantly and negatively associated with age. As expected, like standing height, the estimated stature using knee height and age was negatively correlated with age (r=-0.46, p<0.001).

A number of significant correlations were found between stature and indicators of stature. Sitting height was positively correlated with stature (r=0.69, p<0.001) and with stature computed from knee height (r=0.18, p<0.01). Arm span was more highly correlated with stature (r=0.71, p<0.001) than the other indicators of stature. Arm span was also highly correlated with stature as computed from knee height (r=0.52, p<0.001) and with sitting height (r=0.45, p<0.001). Arm span and knee height were also significantly correlated (r=0.53, p<0.001). However, arm span may not be a practical measurement to be used with all elderly individuals. Mitchell and Lipschitz (1982b) pointed out that some elderly may have difficulties in stretching out their arms maximally, and some may have alterations in chest measurement due to lung disease, kyphosis, and osteoporosis. As an alternative, they have suggested the use of total arm length to estimate height, especially in bedfast elderly individuals.

The correlation between knee height and height was significant (r=0.51, p<0.001). Knee height has been shown to be highly correlated with stature, and has been used to estimate height of elderly individuals who cannot stand or have very obvious spinal curvature (Chumlea et al., 1985a). However, the correlation between actual height and estimated height from knee height was only r=0.59, p<0.001. One would expect this correlation to be close to r=1.00 if the formula used was a good predictor of standing height. Therefore, knee height may not be a valid estimate of actual height for elderly Malay females, or the formula used may need to be modified to adjust for racial or genetic differences.

The difference in technique of measuring knee height may have contributed to this lower-than-expected correlation. In this study, knee height was measured in a seated position rather than recumbent. Chumlea et al. (1985a) found that knee height measured in a recumbent position is more accurate than that measured while the respondent is seated, as evidenced by a smaller inter-observer error for recumbent measurement. In fact, Chumlea et al. (1985a) also cautioned about the use and interpretation of computed height from knee height with nonWestern, nonwhite samples since the equation was developed from a sample of 236 elderly white males and females in the United States.

Comparison with NHANES II data   The mean and standard deviation of standing height and sitting height of 55 to 74 year olds in the sample are shown in Table 21, and are compared to U.S. white females in

TABLE 21. Comparison of standing and sitting height between elderly females in the U.S. and Malaysia

| Variable | 55 - 64 years old | | | | 65 - 74 years old | | | |
| | NHANES II (n=1,176) | | Sample (n=173) | | NHANES II (n=1,245) | | Sample (n=93) | |
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Standing height (cm)	160.1	6.3	148.7	5.2	158.1	6.2	146.0	4.9
Sitting height (cm)	85.0	3.4	75.9	3.4	83.3	3.4	74.1	5.1

NHANES II (Najjar and Rowland, 1987). For standing height, Malaysian elderly females 55 to 64 years old were 11.4 cm shorter than the U.S. white females of the same age group. Similarly, sitting height of elderly Malay females was about 9.0 cm less than U.S. white females in both age groups. The lower values may be due to genetic differences.

Comparison with Asian samples   Rural Filipino women 60 to 69 years old were almost of the same mean height as the same age group of Malay women in this sample, 147.1 cm and 147.0 cm, respectively (Garcia et al., 1982b). Similarly, Indian women 60 years and over were of similar mean heights to the elderly in the sample (Kullah and Ramnath, 1985). However, compared to elderly female Asians 65 years and over living in the United States, the elderly Malay females were 6.7 cm shorter in mean height (Netland and Brownstein, 1985). American-Asians may have experienced better nutrition and health care while living in the United States, as reflected by the difference in body measurements.

Weight and indicators of adiposity

Table 22 lists the mean and standard deviation of body weight and indicators of adiposity of 305 elderly Malay respondents by age group, and the correlation matrix of age, weight, and indicators of adiposity are presented in Appendix I. The percentile distributions are reported in Appendix J.

The mean body weight for these elderly women between the ages of 55 to 110 years was 49.8 kg. The sample was 3.5 kg heavier in mean body weight than adult Malaysian females in the study by Chong et al.

TABLE 22. Mean and standard deviation by age group of body weight and indicators of adiposity of elderly respondents (n=305)

| Variable | Age group (years) | | | | | | | |
| | 55 – 59 (n=110) | | 60 – 69 (n=123) | | 70 and over (n=72) | | Total (n=305) | |
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Body weight (kg)	54.5	11.0	49.8	12.4	42.8	8.8	49.8	12.0
BMI (kg/m^2)	24.5	4.7	22.9	5.1	20.5	3.9	22.9	4.9
Waist circumference (cm)	75.6	11.5	72.5	12.2	68.9	10.2	72.8	11.8
Hip circumference (cm)	91.2	9.1	88.4	10.7	83.5	8.1	88.2	10.0
Waist-hip ratio	0.83	0.07	0.82	0.07	0.82	0.07	0.82	0.07
Arm circumference, R (cm)	28.6	3.8	26.8	4.2	24.0	3.5	26.8	4.2
Arm circumference, L (cm)	28.2	3.9	26.5	4.4	23.7	3.5	26.4	4.4
Arm muscle circumference (cm)	21.7	2.4	21.1	2.8	19.6	2.3	21.0	2.7
Arm muscle area (cm^2)	38.1	8.4	36.1	10.0	30.9	7.2	35.6	9.3
Triceps skinfold, R (mm)	19.7	7.3	16.0	6.9	11.9	5.1	16.4	7.3
Triceps skinfold, L (mm)	20.4	7.0	17.2	6.6	13.0	5.7	17.4	7.1
Arm fat area (cm^2)	26.2	10.9	21.2	10.7	14.5	7.7	21.4	11.1

(1984), and the values for BMI for this sample and the Chong et al. sample were 22.9 and 20.9, respectively. Body weight was negatively associated with age (r=-0.38, p<0.001). A decrement of 11.7 kg was observed between the youngest and oldest age groups, as shown in Table 22. Other studies have reported that the body weight of females tends to increase with age up to about age 45 to 50, and then decline with the aging process (Garcia et al., 1982a; Noppa et al., 1980).

Mean BMI in the older respondents, 70 years and over, was 19.5% less than that in the 55 to 59 years age group. There was a decline in BMI with aging as evidenced by its negative correlation with age (r=-0.31, p<0.001). A similar age-related decline in BMI was observed among female elderly in United Kingdom (Burr and Phillips, 1984), but not among healthy, active Chinese elderly in Hong Kong (Woo et al., 1988). The decline in BMI with age may be due to a longitudinal change in body composition with advancing age rather than a survival effect favoring leaner individuals.

The mean girth measurements of waist and hip were lower than those reported for Swedish women, 72.8 cm and 88.2 cm, respectively, (Noppa et al., 1980). Waist and hip circumferences decreased with age -- the correlations were r=-0.21 and r=-0.31, respectively, both significant at p<0.001. The youngest women's waist and hip circumferences were 6.7 cm and 7.7 cm more than their oldest counterparts, respectively. However, Noppa et al. (1980) reported a significant mean increase in waist and hip circumferences with age, but in a relatively younger group of 44 to 66 year olds.

The right and left mean arm circumferences were 26.8 cm and 26.4 cm, respectively. Calculation of the mean arm muscle circumference was 21.0 cm, and the mean arm muscle area was 35.6 cm^2. Measurements of upper arm circumference and calculated arm muscle circumference and arm muscle area for the sample were less than for elderly white females of the same age group (Bishop, 1984; Falciglia et al., 1988).

The right and left arm circumferences were significantly and negatively correlated with age, with r=-0.41, and r=-0.39, respectively, both significant at p<0.001. The negative correlation between age and arm muscle circumference (r=-0.30, p<0.001) and arm muscle area (r=-0.28, p<0.001) indicate a decline of these indicators with the aging process. The mean arm muscle circumference in the youngest age group was 9.7% more than for the oldest women. Similarly, the mean arm muscle area of women aged 55 to 59 was 18.9% more than that of their 70 years old and older counterparts. A similar age-related decline was observed by Falciglia et al. (1988), whereby the mean arm circumference of women aged 60 to 69 years was 3.7% greater than in the 70 to 79 age group.

The mean for the right and left triceps skinfold thicknesses was 16.4 cm and 17.4 cm, respectively, while the calculated mean arm fat area was 21.4 cm^2. Age was negatively correlated with both right triceps skinfold (r=-0.41, p<0.001) and left triceps skinfold (r=-0.41, p<0.001). There was a difference of 7.8 cm in the right triceps measurement between the youngest and oldest age groups. The decrease

in measurement is most probably related to aging. Falciglia et al.
(1988) reported a similar trend, while in a longitudinal study of
Swedish women, Noppa et al. (1980) observed a significant mean increase
of triceps skinfold with age of about 0.6 mm per year. The arm fat
area was also negatively correlated with age (r=-0.38, p<0.001), and
the mean of the youngest group was 44.6% higher than the mean of the
oldest group of elderly in the sample. The arm fat area tends to
decline with age after 65 years (Bishop, 1984).

There were very strong positive correlations between body weight
and other indicators of adiposity. The correlation was r=0.80 or
greater, at p<0.001, for weight and all other indicators of adiposity
except WHR. There is a tendency for weight to be highly associated
with other fatness and girth measurements, especially in women (Micozzi
et al., 1986; Young and Sevenhuysen, 1989). Ohlson et al. (1985) also
observed significant correlations between weight and other indicators
of body fatness in Swedish men.

BMI correlated minimally with height (r=0.18, p<0.05), but was
highly and significantly correlated with weight (r=0.95, p<0.001). It
has been recommended that a BMI which correlates minimally with height
and maximally with weight is most desirable as a measure of body
adiposity (Revicki and Israel, 1986).

The correlations between BMI and other measured and calculated
estimates of body fatness were also highly significant. BMI was more
highly correlated with both right and left arm circumferences (r=0.89

and r=0.92, respectively, both at p<0.001), which includes both fat and lean body mass, than with right and left triceps skinfold (r=0.82 and r=0.79, respectively, both at p<0.001). Similar observation was reported by Micozzi et al. (1986), but they made a cautionary statement that although arm circumference may be more highly correlated with BMI because its measurement is more reliable, it may not be as biologically meaningful as triceps skinfold measurement.

BMI was also significantly correlated with waist circumference (r=0.92, p<0.001) and hip circumference (r=0.92, p<0.001). Correlations of WHR with BMI, and WHR with weight were only r=0.51 and r=0.43, respectively, at p<0.001. This might be expected since WHR is an indication of fat distribution rather than amount of body fat, per se. Similar findings were observed in Swedish men by Ohlson et al. (1985) and in Canadian Indians by Young and Sevenhuysen (1989).

Prevalence of underweight and obesity   Table 23 presents the prevalence of underweight and obesity among elderly respondents using the BMI classification suggested by Thomas et al. (1976). More than one-third of the elderly respondents were in the obese categories, while 24.6% were in the underweight categories. There was a higher prevalence of obesity among the elderly respondents in this study compared to adult females in Malaysia (Chong et al., 1984) and elderly females in the Philippines (Garcia et al., 1982b). The prevalence of obesity in this sample tended to decline with age. As shown in Table 23, there was a higher proportion (19.3%) of obese elderly in the

youngest age category (x^2=29.81, df=6, p<0.001). The prevalence of underweight among the elderly females in this study was comparable to that of the adult females studied by Chong et al. (1984) and elderly females in the Philippines (Garcia et al., 1982b), 31% and 25%, respectively. Unlike the trend in obesity, the proportion of elderly Malay who were underweight in this study is almost equally distributed among the age categories.

TABLE 23. Prevalence of underweight and obesity by age group among elderly respondents (n=305)

Age group (years)[a]	Underweight BMI<19		Desirable weight BMI=19-24		Overweight BMI>24	
	no.	%	no.	%	no.	%
55 - 59	18	5.9	33	10.8	59	19.3
60 - 65	18	5.9	35	11.5	31	10.2
66 - 74	20	6.6	30	9.8	22	7.2
75 and over	19	6.2	15	4.9	5	1.6
Total	75	24.6	113	37.0	117	38.4

[a]x^2=29.81, df=6, p<0.001.

Comparison with NHANES II data   The mean and standard deviation of body weight and selected indicators of adiposity of 55 to 74 year olds in the sample are shown in Table 24, and are compared to U.S.

TABLE 24. Comparison of body weight and indicators of adiposity between elderly females in the U.S. and Malaysia

Variable	55 - 64 years old				65 - 74 years old			
	NHANES II (n=1,176)		Sample (n=173)		NHANES II (n=1,245)		Sample (n=93)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Body weight (kg)	67.2	14.4	53.4	12.1	66.2	13.7	46.9	10.1
BMI (kg/m^2)	26.2	5.5	24.1	5.1	26.5	5.4	21.9	4.3
Arm girth, right (cm)	31.3	4.5	28.1	3.9	31.0	4.4	25.8	3.8
Triceps skinfold, right (mm)	27.0	9.4	18.7	7.2	25.5	8.8	14.3	6.1

white females in NHANES II (Najjar and Rowland, 1987). U.S. white females 55 to 64 years old were 13.8 kg heavier in mean weight than the Malaysian elderly females of the same age group. Similarly, means for triceps skinfold, BMI, and arm circumference were higher for U.S white females than elderly Malay females in both age groups.

Comparison with Asian samples   The mean body weight of Malay women 60 to 69 years in this sample was 9.8 kg heavier than that of the same age group of rural Filipino women (Garcia et al., 1982b). Similarly, the elderly in this sample were 8.5 kg heavier in mean body weight than Indian women 60 years and over (Kullah and Ramnath, 1985). On the other hand, elderly female American-Asians 65 years and over were 8.1 kg heavier in mean body weight than the elderly Malay of the same age category in this study (Netland and Brownstein, 1985).

Mean arm circumference and triceps skinfold of individuals in the sample aged 60 to 69 years old were 2.9 cm and 4.0 mm, respectively, higher than the mean for rural Filipino women of the same age group (Garcia et al., 1982b). Netland and Brownstein (1985) reported a mean triceps skinfold for American-Asians that is 5.7 mm higher than the mean for this sample. It can be expected that the prevalence of obesity in the group of American-Asians was higher than in the Malay elderly females, as indicated by the higher triceps skinfold value.

In a study of healthy Chinese 60 years and older in Hong Kong, Woo et al. (1988) reported mean values for BMI and arm muscle circumference of 22.7 and 20.2 cm, respectively, comparable to the mean values found

in this study. Although the mean arm muscle area for the Malay elderly was 9.8 cm^2 more than the mean for the Chinese elderly females, the difference was most likely due to a correction factor used in the formula by Woo et al. (1988).

Hand grip strength

Table 25 presents the mean and standard deviation of hand grip strength of the sample, and the percentile distribution is reported in Appendix J. The majority (91.2%) of the respondents were right-handed, and this is reflected in greater hand grip strength of the right compared to the left hand. The mean hand grip strength of the right and left hands was 15.3 kg and 13.0 kg, respectively. From Table 26 it is evident that rural Filipino women in the same age group had greater grip strength than the Malay elderly females (Garcia et al., 1982b). Similarly, the sum of grip strength of white females 50 to 59 years of age in the U.S. was 8 kg greater than the sum of grip strength of the sample in the 55 to 59 age group (Montoye and Lamphiear, 1977).

Both right hand grip (r=-0.27, p<0.001) and left hand grip (r=-0.31, P<0.001) were negatively correlated with age. Thus, there was a tendency for hand grip strength to decline with age. Similar findings has been reported in both cross-sectional and longitudinal studies (Garcia et al., 1982a, 1982b; Montoye and Lamphiear, 1977). The age related trend was also apparent in the percentile distribution. The decline in grip strength may be associated with changes in body composition and/or health status of the aging individuals.

TABLE 25. Mean and standard deviation of hand grip strength of elderly respondents by age group (n=280)

| Hand grip strength (kg) | Age group (years) | | | | | | Total (n=280) | |
| | 55 - 59 (n=100) | | 60 - 69 (n=116) | | 70 and over (n=64) | | | |
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Right	17.2	4.5	14.8	5.4	13.2	4.6	15.3	5.1
Left	14.8	4.3	12.6	5.0	10.8	4.7	13.0	4.9

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TABLE 26. Comparison of hand grip strength between Malaysian and
Filipino women 60 years old and over

| | 60 - 69 years old | | | | 70+ years old | | | |
| | Filipino (n=37) | | Sample (n=116) | | Filipino (n=18) | | Sample (n=64) | |
Hand grip strength (kg)	Mean	S.D	Mean	S.D.	Mean	S.D	Mean	S.D.
Right hand	21	4	15	5	18	6	13	5
Left hand	20	4	13	5	16	5	11	5

Implications

Results of the anthropometric assessment revealed several trends
in indicators of stature and adiposity as they relate to the aging
process in elderly females in Malaysia. Standing height, sitting
height, computed stature from knee height, and arm span all correlated
negatively and significantly with age. Whether the changes of height
and indicators of stature with age are truly biological or secular in
origin is not clear. These questions can only be answered by
longitudinal observations. In addition, as height changes
significantly with age, calculations involving the use of height, such
as oxygen consumption, maximal breathing, and vital capacity, may
produce an error that is not constant but increased with advancing age.

Sitting height, knee height, estimated stature from knee height, and arm span all correlated significantly with measured standing height. However, a lower-than-expected correlation value for stature estimated from knee height indicates that the formula used may not be a good estimate of actual height for elderly females in Malaysia, and the validity of the formula used may be limited to Western white samples.

The Malaysian elderly females in this study were, in general, shorter than U.S. white females of the same age in NHANES II, as indicated by lower mean standing and sitting height values. However, compared to other elderly Asian samples living in Asia, they were of similar mean height but shorter than elderly Asians living in the United States. Therefore, both environmental and genetic influences on height are apparent.

In this study, the cross sectional observations revealed a decline in most indicators of adiposity with age. As with stature, whether these changes are age-dependent or secular in nature can only be confirmed by longitudinal studies. Body weight was significantly correlated with all measures of adiposity. The correlations were especially strong with BMI and circumferences of waist, hip, and upper arms. Similarly, BMI was more highly correlated with body weight and circumferences of waist, hip, and upper arms than with other indicators of adiposity. Thus, BMI as a measure of adiposity is possibly related not only to total body fat but also to fat distribution, especially in the waist and hip regions. However, the biological significance of arm

circumference as a measure of body fatness compared to triceps skinfold
may be of questionable value since arm circumference includes both fat
and lean body mass.

The prevalence of obesity in the Malay elderly in this sample is
quite high compared to other Malaysian and Asian female samples. This
high rate of obesity should be of concern to health workers and
planners since obesity has frequently been cited as an important risk
factor in the development of several chronic diseases. Similarly, a
high proportion of elderly in this sample was classified as
underweight. Being on the other extreme of weight measurement may
indicate emaciation or loss in lean muscle. Such conditions, when
associated with illness or injury, increase the risk of morbidity and
mortality among the elderly population.

Compared to U.S. white females of the same age, the elderly
females in this study weighed less and had lower triceps skinfold
thicknesses, BMI values, and mid-arm girths. On the other hand,
females in this sample were heavier than Filipino and Indian women of
similar genetic background. Hand grip strength of this sample tended
to decline with age. This may be associated with a decline in overall
strength and/or health status of the individuals.

Overall, the nutritional status of the elderly women in this
sample, as reflected by anthropometric assessment, appeared variable.
Mean values for anthropometric measurements were comparable to other
Asian women of the same age living in similar environments. However,

BMI values indicate subgroups weighing both more and less than is considered conducive for optimal health. Future research should focus on these two groups to discover causes for these two extremes in weight. Furthermore, as for assessment of all elderly, there is a need for valid, standard measurement techniques and standard reference values to use in anthropometric assessment of the Malay elderly. Using standard techniques will aid in comparison between samples as well as the development of population-specific standard reference values.

POLICY AND PROGRAM IMPLICATIONS

The vast majority of research on the health and welfare of the elderly has been carried out in developed countries, where there has been the greatest increase in absolute numbers and proportion of the elderly in the population in the past. However, it is now recognized that the biggest increase in numbers of the elderly in absolute terms will occur in developing countries in the next few decades. Urbanization, industrialization, modernization, and socioeconomic changes are rapidly affecting the lifestyle and well-being of the elderly in many developing countries like Malaysia. Unfortunately, baseline data to guide the Malaysian government to formulate policies and plan programs with respect to the elderly population are generally lacking. To depend on developed countries for basic data is less than satisfactory because people and societies are not the same.

With the present demographic patterns and trends, it will be some time before the aging of the Malaysian population emerges as a critical issue. Therefore, Malaysia is in a sound position to take careful stock of its current situation and develop a comprehensive data base to identify key ares of concern. Further in-depth research important for policy and program formulation should be a priority.

The research presented in this report is important for several reasons. First, it provides relevant baseline information on some aspects of elderly females in selected rural areas in Peninsular Malaysia. Of particular significance are data on dietary patterns,

food intake frequency, perceptions about food, and anthropometric characteristics of the elderly which have not previously been reported. Second, this research is important in providing a relatively comprehensive view of the interrelationships of demographic information, living conditions, health indices, and social activities of the elderly with the nutritional indicators. Based on the findings presented in this report, several policy and program implications are presented.

With respect to economic well-being, interdependence between the elderly and their families is well documented. The major source of financial support for the elderly are their children and other family members. However, in the face of rapid demographic and social changes, policy makers need to give attention to the degree to which this type of practice will continue.

Home ownership is the pride of the elderly in rural areas. Maintaining adequate housing with easy access to clean water and adequate toilet facilities is important to the elderly, since institutionalization is seen by most as an undesirable alternative. In order to maintain the elderly in the community and in their own familiar environment as long as is feasible, financial and social support should be provided to those in need.

One significant finding of this research is the degree to which the elderly are still an integral part of family structure in rural areas. Such living arrangements should be encouraged. The main source

of support for the elderly are their children and, to a lesser extent, other family members. Therefore, the role of the family in the provision of care and support to the elderly should be recognized in policy formulation and program development. Efforts should also be made to instill this sense of filial responsibility to the young generation through social and religious education.

However, it should not be generally assumed that all elderly in the future will have children available to look after them. Smaller families, childless marriages, urban migration, and an increasing number of women in the labor force will mean that different generations of a family may live in different places, and it will not always be possible for the elderly in need of care to be provided for through the family. Furthermore, policies in urban housing are usually not conducive to multigenerational living arrangements. Future community-oriented policy and program development should develop a safety net for those elderly who cannot depend on their families for support and care.

Since social programs for the elderly are few or nonexistent in rural areas, most of the social activities of rural elderly revolve around the family and the community. In order to keep the elderly physically and mentally active, policies and programs which are developed should encourage family and community-based social and leisure activities. Multigenerational activities which provide the opportunity for the young and old to relate should also be explored.

With the aging process, the health of the elderly is expected to deteriorate, and multiple ailments or health complaints are quite common among some elderly individuals. In order to alleviate some of these health conditions and maintain the health and fitness of the aging population, a considerable amount of resources have to be allocated. Health policies and programs need to be formulated to ensure equitable access to health care for all elderly in need and to promote preventive measures to minimize the consequences of chronic diseases and other debilitating conditions.

Although Malaysia has comprehensive health and medical services, there is no special program for the elderly and no geriatric hospital or specialized wards. Primary health care is basically available in most rural areas, although the focus has been on maternal and child health services. Thus, the opportunity to base health education and prevention programs for the elderly within the primary health care service should be explored.

Prevention should be the keyword in maintaining a healthy elderly population. However, the present health care system in Malaysia and many other developing countries is designed to assist individuals after they have become ill or functionally incapacitated. Since health care for the elderly is expensive, the total budget for this service will be expected to increase with the increase in the proportion of elderly in Malaysia. The financial burden may be minimized if elderly individual can achieve optimal health. Therefore, the potential of establishing

preventive health and fitness programs should be initiated and targeted at young and middle-aged adults as well as older individuals.

A better understanding of the nutritional status of the elderly requires a precise description and definition of their nutrition problems. Thus, wherever possible and feasible, dietary, clinical, and biochemical methods and indicators should be used. In this research, data on dietary patterns, food perceptions, and anthropometric measurements were collected.

The qualitative dietary data revealed what appears to be satisfactory dietary patterns and food intake among most of the elderly females, although certain health beliefs may prevent or restrict the consumption of some nutritious foods which are usually easily available in the rural areas. Based on the anthropometric measurements, the nutritional status of the elderly appeared to be variable. Extremes in some anthropometric parameters are considered indicative of poor health and nutritional status, thus need to be investigated further.

Findings from these food intake and anthropometric data have implications for the nutritional care of the elderly in Malaysia. By identifying prevalent health beliefs and perceptions towards food, strategies can be developed which use these factors as motivators for promoting positive behavior change. The formulation of nutrition policies and programs must take into consideration local customs and taboo practices. However, it should be borne in mind that beliefs about food or health, per se, are not the sole cause of dietary

inadequacy. Inadequate or imbalanced food intake is caused by a complex series of factors including socioeconomic, demographic, educational, agricultural, and other factors.

A great deal is still unknown about nutrition and the elderly in Malaysia. Research is needed to establish dietary, anthropometric, and biochemical standards which are useful for judging the nutritional status of the elderly population. If administrators are to have more solid basis for policy and program implementation, there is an obvious need for nutritional research on a representative national sample that would examine not only dietary, clinical and biochemical parameters, but also, their interrelationships with demographic and sociocultural factors. A number of constraints exist in collecting and interpreting these data which include shortage of expertise and resources, problems of collecting biological samples, and lack of local standards for the elderly population. Despite these constraints, even limited assessment data can add valuable information to the scarce pool of knowledge regarding the nutritional status of the Malaysian elderly.

Overall, the profile of the rural elderly represented by these data is one of females in relatively good health, living in a relatively good physical environment, participating actively in their families and communities, and having relatively satisfactory indicators of nutritional status. These data present an opportunity for cross-cultural comparisons with other elderly females and for longitudinal studies of the elderly in Malaysia. While implications for all elderly

individuals should be considered, the results of this study cannot be generalized beyond this study's sample. If possible, further investigation could be made in a study that involves a random selection of elderly from the three major ethnic groups and of both sexes. Attention should also be given to obtaining a representative range of socioeconomic status and residents from both rural and urban areas.

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APPENDIX A: RESEARCH INSTRUMENT IN ENGLISH AND BAHASA MALAYSIA

INTERVIEW SCHEDULE

Title of study: Selected indicators of nutritional status among
                   rural elderly females in Malaysia

<u>IDENTIFYING INFORMATION:</u>

I.D. #   : _____   Name   : _____

Date   : _____   Address   : _____

Time   : _____   Interviewer : _____

(All information which would permit identification of the individual
will be held strictly confidential, will be used only by persons
engaged in and for the purposes of the study, and will not be disclosed
or released to others for any other purposes).

<u>DEMOGRAPHIC DATA:</u>

1.   What is your birthdate? _____/_____/_____
                             month   day   year

     (Confirm with the identity card)

2.   What is your current marital status?

               _____ married
               _____ widowed
               _____ divorced
               _____ separated
               _____ single (never married)

3.   If you are married, how long have you been married to your
     present husband? _____ years

4.   If you are widowed, divorced or separated, how long have you
     been widowed, divorced or separated? _____ years

5.   How many children did you give birth to? _____

6.   At what age did you have your first child? _____ years old

7.   At what age did you have your last child? _____ years old

8. How many of your living children are sons and daughters?

        _____ number of living sons
        _____ number of living daughters

    (If widowed, divorced, separated or single go to question 11)

9. If you are married, is your husband employed at the present time or previously?

        _____ yes, full time (>40 hours/week), presently
        _____ yes, part time (<40 hours/week), presently
        _____ yes, previously and retired
        _____ not employed and not retired
        _____ other (specify) _____

10. What is your husband's present (or last previous) type of employment?

    _____
             (specify type of employment)

        _____ professional, administrative
        _____ technical (teacher, secretary)
        _____ armed forces, police
        _____ small business, proprietor
        _____ farmer, smallholder, fisherman, laborer
        _____ other (specify) _____

11. Are you employed at the present time or previously?

        _____ yes, full time, presently
        _____ yes, part time, presently
        _____ yes previously and retired
        _____ not employed and not retired
        _____ other (specify) _____

12. What is your present (or last previous) type of employment?

    _____
             (specify type of employment)

        _____ professional, administrative
        _____ technical (teacher, secretary)
        _____ small business, proprietor
        _____ farmer, smallholder, laborer
        _____ housewife
        _____ other (specify) _____

13. What is the approximate gross monthly income of this household, from all sources?

$_____

14. How much and what is the source of this household's income? (Check all that apply)

Amount ($)	Source
_____	spouse and/or personal salary
_____	contribution of family members who live in household
_____	contribution of family members who live outside household
_____	pension
_____	welfare
_____	sales of agriculture products and animals
_____	other (specify) _____

15. Do your children or other family members regularly give you money to help with your living expenses or pay your bills?

_____ yes
_____ no
_____ don't know

16. If yes, who regularly gives you money? _____

how often? _____

how much? _____

17. Do you own any of these possessions? (check all that apply)

_____ land	_____ video recorder
_____ refrigerator	_____ sewing machine
_____ radio	_____ electric iron
_____ T.V.	_____ electric fan
_____ motorcycle	_____ washing machine
_____ bicycle	_____ other (specify) _____
_____ car	

18. Do you raise any of these animals?
    (Check all that apply and indicate number)

    _____ cattle   _____ numbers
    _____ buffaloes   _____
    _____ goats   _____
    _____ chicken   _____
    _____ ducks   _____
    _____ other (specify)
    _____   _____

19. Have you ever been to school?

    _____ yes
    _____ no

    How many years of education did you complete? _____ years

20. Can you read the newspaper?

    _____ yes
    _____ no

    If no, why _____

21. Can you write a letter?

    _____ yes
    _____ no

    If no, why _____

HOUSING AND ENVIRONMENTAL CONDITIONS:

22. What type of material is this home made from?

     _____ brick and tiles
     _____ wood and tiles
     _____ wood and zinc
     _____ wood and attap
     _____ bamboo and attap
     _____ other (specify) _____

23. Is this home owned or rented by you or your family?

     _____ self or spouse rents
     _____ other family member rents
     _____ self or spouse owns
     _____ other family member owns
     _____ other (specify) _____

24. How long have you been living in this home?

     _____ number {days   (circle one)
                  {weeks
                  {months
                  {years

25. How many people normally live here with you?

     _____ number

26. Who lives here with you? (check all that apply and indicate
     number)

     _____ no one   _____ son-in-law
     _____ spouse   _____ grandchild
     _____ daughter   _____ parent(s)
     _____ son   _____ brothers or sisters
     _____ daughter-in-law   _____ other relatives
     _____ other (specify) _____

27. Where do you obtain your drinking water supply for this
     household? (check all that apply)

     _____ community piped water
     _____ piped water
     _____ well
     _____ river
     _____ rain water
     _____ other (specify) _____

28. What type of toilet is used by this household?

_____ flush toilet inside the house
_____ flush toilet outside the house
_____ hole-in-ground outside the house
_____ river
_____ other (specify) _____

29. How does this household dispose of the garbage?
(check all that apply)

_____ by burying in the ground
_____ by burning
_____ by throwing in the river
_____ by other means (specify) _____

30. How do you rate your present living condition, compared to five years ago? Would you say it is excellent, good, fair, poor or you don't know?

_____ excellent
_____ good
_____ fair
_____ poor
_____ don't know

HEALTH STATUS:

31.   How do you rate your present health condition compared to other women your age? Would you say it is excellent, good, fair, poor or don't know?

        _____ excellent
        _____ good
        _____ fair
        _____ poor
        _____ don't know

32.   Do you have any of the following health problems or conditions which have disrupted your daily living in the past one year? (check all that apply)

		yes	no	if yes, has it been medically diagnosed	don't know
a.	heart disease	___	___	___	___
b.	high blood pressure	___	___	___	___
c.	urinary or kidney problems	___	___	___	___
d.	respiratory problems (bronchitis, asthma)	___	___	___	___
e.	anemia	___	___	___	___
f.	cancer	___	___	___	___
g.	diabetes	___	___	___	___
h.	arthritis	___	___	___	___
i.	other (specify)	___	___	___	___

_____

33. How frequently do you experience any of these health conditions common to elderly persons your age? (check all that apply)

	all the time	sometimes	never
a. trouble walking	____	____	____
b. trouble standing	____	____	____
c. trouble hearing	____	____	____
d. trouble seeing	____	____	____
e. difficulty in chewing	____	____	____
f. poor taste	____	____	____
g. poor sense of smell	____	____	____
h. constipation	____	____	____
i. diarrhea	____	____	____

34. Compared with one year ago, would you say that your health now is : better, worse, about the same as it was then or don't know?

_____ better
_____ worse
_____ about the same
_____ don't know

35. During the past year, has your overall health caused you a great deal of worry, some worry, no worry at all or don't know?

_____ a great deal of worry
_____ some worry
_____ no worry at all
_____ don't know

36. How recently did you visit a physician or health care worker regarding your health? Would you say never, less than one year, more than one year or you can't recall?

_____ never
_____ less than one year
_____ more than one year
_____ can't recall

37. What was the reason for your most recent visit with
    a physician or health care worker?

    _____ periodic check up
    _____ an illness (specify) _____
    _____ an injury (specify) _____
    _____ surgery (specify) _____
    _____ other (specify) _____

38. How recently did you visit a local medicine man regarding
    your health? Would you say never, less than one year, more
    than one year or you can't recall?

    _____ never
    _____ less than one year
    _____ more than one year
    _____ can't recall

39. What was the reason for your most recent visit with the local
    medicine man?

    _____

40. During the last month have you taken any medicines
    prescribed by a doctor?

    _____ yes
    _____ no
    _____ don't know

41. If yes, for what condition? _____

42. During the last month have you taken any medicines which are
    not prescribed by a doctor, such as medications you may buy
    at a shop?

    _____ yes
    _____ no
    _____ don't know

43. If yes, for what condition? _____

44. During the last month have you used any traditional medicine?

    _____ yes
    _____ no
    _____ don't know

45. If yes, for what condition? _____

46. During the last year, how often have you been too sick to do your daily activities?

_____ daily
_____ at least once a week
_____ at least once a month
_____ less than monthly
_____ never

47. Do you have anyone to help you if you get too sick to do your daily activities?

_____ yes
_____ no

If yes, who? (check all that apply)

_____ spouse
_____ daughter
_____ son
_____ others (specify) _____

48. How quickly can any of you children get here if you need them?

_____ child/children live in the same household
_____ number {minutes   (circle one)
              {hours
              {days

49. Compared to other women your age, would you say you are physically more active, less active, about as active or don't know?

_____ more active
_____ less active
_____ about as active
_____ don't know

50. Do you wear dentures?

_____ yes
_____ no (If no, go to question 54)

51. How long have you worn dentures?

_____ less than one year
_____ between one to five years
_____ more than five years

52. Do you have

      _____ an upper plate only?
      _____ a lower plate only?
      _____ both upper and lower plates?

53. Do your dentures fit well?

      _____ yes
      _____ no
      _____ don't know

SOCIAL ACTIVITIES:

54. Are you a member of any social or political organization?

        _____ yes (specify) _____

        _____ no (If no, go to question 56)

55. During the last year how often have you attended a social or political organization meeting?

        _____ at least once a week
        _____ at least once a month
        _____ less than monthly
        _____ never

56. During the last year how often have you attended a feast in your neighborhood?

        _____ at least once a week
        _____ at least once a month
        _____ less than monthly
        _____ never

57. How far is the mosque or 'surau' from your house?

        _____

During the last year how often have you gone to the mosque or 'surau' for prayers or other activities?

        _____ daily
        _____ at least once a week
        _____ at least once a month
        _____ less than monthly
        _____ never

58. During the last year how often have you gotten together socially with friends or neighbors?

        _____ at least once a week
        _____ at least once a month
        _____ less than monthly
        _____ never

59. Thinking of your social life, would you say you are doing about enough, too much, would you like to be doing more or don't know?

        _____ too much
        _____ about enough
        _____ would like to do more
        _____ don't know

60. How often do you see any of your children/sons/daughters?

        _____ child/children live in the same household
        _____ less than once a year/never
        _____ times per {day   (circle one)
                         {week
                         {month
                         {year

61. Do you have a telephone in this household?

        _____ yes
        _____ no (if no, go to question 63)

62. How often do you talk on the telephone with any one of your children/sons/daughters?

        _____ less than once a year/never
        _____ times per {day   (circle one)
                          {week
                         {month
                         {year

63. What is your usual means of transport?
(check all that apply)

        _____ own/spouse's car
        _____ children's/son's/daughter's car
        _____ motorcycle
        _____ private taxi
        _____ public transport (bus)
        _____ walking
        _____ other (specify) _____

FOOD PREPARATION, EXPENDITURES, AND PROCUREMENT PATTERNS:

64. Who usually does the food preparation and cooking in this household? (check all that apply)

_____ self
_____ spouse
_____ daughter
_____ other (specify) _____

65. What type of cooking fuel is used in this household? (check all that apply)

_____ wood
_____ charcoal
_____ kerosene
_____ gas
_____ electricity

66. Do you have a vegetable garden?

_____ yes
_____ no (if no, go to question 68)

67. Do you use some of your garden produce for home consumption?

_____ yes
_____ no

68. How often do you or your household gather wild shoots or plants for home consumption?

_____ daily
_____ at least weekly
_____ at least monthly
_____ less than monthly
_____ never

69. How much does your household usually spend for food?

$_____ monthly

70. How satisfied are you with the amount of money you can spend to buy foods?

_____ extremely satisfied
_____ satisfied
_____ neither satisfied nor dissatisfied
_____ dissatisfied
_____ extremely dissatisfied

71. Who usually does the food purchasing for this household? (check all that apply)

_____ self
_____ spouse
_____ son
_____ daughter
_____ other (specify) _____

72. Where do you or your household most frequently purchase your groceries like rice, cooking oil, flour, sugar, and dried food stuff?

_____ local store
_____ nearby town
_____ vendors
_____ weekly market
_____ other (specify) _____

73. How often do you or your household usually purchase your groceries like rice, cooking oil, etc.?

_____ daily
_____ several times a week
_____ once a week
_____ at least once a month
_____ less than monthly
_____ other (specify) _____

74. Where do you or your household most frequently purchase your fresh foods like fish, meat, poultry and vegetables?

_____ local store
_____ nearby town
_____ vendors
_____ weekly market
_____ other (specify) _____

75. How often do you or your household usually purchase your fresh foods like fish, meat, etc.?

_____ daily
_____ several times a week
_____ once a week
_____ at least once a month
_____ less than monthly
_____ other (specify) _____

76. Is there anything that prevents you from having enough food or the type of food that you would like?

_____ yes
_____ no
_____ don't know

77. If yes, what are these problems?
(check all that apply)

_____ no transportation
_____ not enough money to buy the food
_____ grocery stores are too far
_____ nobody to help in purchasing the food
_____ nobody to help in preparing the food
_____ no appetite to eat
_____ dentures do not fit very well
_____ other (specify) _____

FOOD PATTERNS AND PERCEPTIONS:

78. How many days per week do you have the following meals?
     (For each item, code number of days per week as 0 - 7,
     9 = unknown, don't know)

     _____ breakfast
     _____ morning meal as brunch
     _____ mid-morning snack
     _____ lunch
     _____ afternoon snack
     _____ evening meal
     _____ evening snack

79. Please tell me three foods that you like and feel are
     healthiest for women your age to eat or drink.

     A. _____

     B. _____

     C. _____

80. For each of these, please tell me why you think that it is a
     healthy food for women your age.

     Food A. _____

     Food B. _____

     Food C. _____

81. Please tell me three foods that you don't like and feel are
     least healthy for women your age to eat or drink.

     A. _____

     B. _____

     C. _____

82. For each of these, please tell me why you think that it is an
     unhealthy food for women your age.

     Food A. _____

     Food B. _____

     Food C. _____

83. How do you rate your present appetite, is it very good, good, poor or don't know?

_____ very good
_____ good
_____ poor
_____ don't know

<u>FOOD FREQUENCY</u>:

84.   Now I would like to know how frequently you have been eating
        the following food items during the last year?
        (when in season and including ingredients in cooked food)

                1.   daily
                2.   at least every other day
                3.   at least once per week
                4.   at least two or three times per month
                5.   at least once per month
                6.   less than monthly, but several times per year
                7.   at least once per year
                8.   seldom or never

<u>List of foods</u>   <u>Frequency</u>

                                        1   2   3   4   5   6   7   8

<u>rice</u>

<u>noodle-sticks</u> <u>from</u> <u>rice</u> <u>flour</u>

<u>yellow</u> <u>noodle</u> <u>from</u> <u>wheat</u> <u>flour</u>

<u>white</u> <u>bread</u>

<u>cookies</u>

<u>crackers</u>
Malay variety pudding and fritters
<u>from</u> <u>wheat</u> <u>flour</u>

<u>potatoes</u>

<u>sweet</u> <u>potatoes</u>

<u>tapioca</u>

<u>legumes</u> <u>(dhall,</u> <u>lentils,</u> <u>mung</u> <u>beans)</u>

<u>peanuts</u>

<u>soy</u> <u>products</u> <u>(tofu,</u> <u>tempe,</u> <u>sprouts)</u>

green leafy vegetables (mustard
<u>leaves,</u> <u>spinach,</u> <u>etc.)</u>

List of foods

Frequency

	1	2	3	4	5	6	7	8

non-leafy vegetables (beans, okra,
eggplant, tomato)

bananas

guava

jackfruit

oranges

papaya

rambutan

durian

dried anchovies

dried salted fish

cockles and clams

fresh fish (white or fatty)

shrimp

canned sardines

eggs

beef

chicken

beef or chicken liver

pasteurized milk

dried, powdered milk

evaporated milk

condensed milk

ice-cream

List of foods   **Frequency**

                              1   2   3   4   5   6   7   8

granulated sugar _____

jam _____

butter _____

margarine _____

cooking oil _____

coconut milk _____

coffee _____

tea _____

horlicks, milo, ovaltine _____

aerated drinks like Coke, 7-Up, etc. _____

NOTE: (Please write down any problems or unusual situations
         during the interview)

ANTHROPOMETRIC MEASUREMENTS:

85. body weight   _____ kg.

86. standing height   _____ cm.

87. sitting height   _____ cm.

88. knee height   _____ cm.

89. arm span   _____ cm.

90. waist circumference _____ cm.

91. hip circumference   _____ cm.

92. waist to hip ratio   _____ cm.

93. upper arm girth   _____ cm. (right)

                          _____ cm. (left)

94. triceps skinfold   _____ mm. (right)

                          _____ mm. (left)

95. hand grip strength, kg.   (average)

        right   _____ _____ _____ _____

        left   _____ _____ _____ _____

96. Are you usually right-handed or left-handed?

        _____ right-handed
        _____ left-handed
        _____ use left and right hands equally
        _____ don't know

BORANG SOALSELIDIK

Tajuk kajian: Petunjuk-petunjuk terpilih taraf pemakanan di
                kalangan wanita tua luarbandar di Malaysia

MAKLUMAT PENGENALAN:

No. responden: _____   Nama   : _____

Tarikh   : _____   Alamat   : _____

Masa   : _____   Penemubual : _____

(Semua maklumat yang dapat mengenali individu akan dirahsiakan, hanya
digunakan oleh mereka yang menjalankan kajian dan untuk tujuan kajian
sahaja, dan tidak akan didedahkan kepada sesiapa untuk lain-lain
tujuan).

DATA DEMOGRAFI:

1.   Bilakah tarikh lahir makcik?   _____/_____/_____
                                      hari   bulan   tahun

     (Buktikan dengan kad pengenalan)

2.   Apakah taraf perkahwinan makcik sekarang?

                    _____ berkahwin
                    _____ balu
                    _____ telah bercerai (janda)
                    _____ duduk berasingan
                    _____ bujang (tak pernah kahwin)

3.   Jika masih berkahwin, berapa lamakah makcik telah berkahwin
     dengan suami sekarang? _____ tahun

4.   Jika balu, janda atau duduk berasingan berapa lamakah makcik
     telah menjadi balu, janda, atau duduk berasingan?
     _____ tahun

5.   Berapa ramai anak yang makcik telah lahirkan? _____

6.   Berapakah umur makcik bila melahirkan anak yang sulung?
     _____ tahun

7. Berapakah umur makcik bila melahirkan anak yang bongsu?
    _____ tahun

8. Berapa orang anak-anak makcik yang masih hidup anak lelaki
    dan anak perempuan?

    _____ bilangan anak lelaki yang masih hidup
    _____ bilangan anak perempuan yang masih hidup

(Jika janda, telah bercerai, duduk berasingan atau tak pernah kahwin
terus ke soalan 11)

9. Jika masih berkahwin, adakah suami makcik masih bekerja atau
    pernah bekerja?

    _____ ya, masih bekerja sepenuh masa (>40 jam/minggu)
    _____ ya, masih bekerja separuh masa (<40 jam/minggu)
    _____ ya, pernah bekerja dan telah pencen
    _____ tidak bekerja dan belum pencen
    _____ lain (terangkan) _____

10. Apakah pekerjaan suami makcik sekarang (atau yang terakhir)?

    _____
                (nyatakan jenis pekerjaan)

    _____ profesional, pentadbiran
    _____ teknikal (guru, kerani)
    _____ askar, polis
    _____ peniaga kecil
    _____ petani, pekebun kecil, nelayan, buruh
    _____ lain (terangkan) _____

11. Adakah makcik masih bekerja atau pernah bekerja?

    _____ ya, masih bekerja sepenuh masa
    _____ ya, masih bekerja separuh masa
    _____ ya, pernah bekerja dan telah pencen
    _____ tidak bekerja dan belum pencen
    _____ lain (terangkan) _____

12. Apakah pekerjaan makcik sekarang (atau yang terakhir)?

_____
(nyatakan jenis pekerjaan)

_____ profesional, pentadbiran
_____ teknikal (guru, kerani)
_____ peniaga kecil
_____ petani, pekebun kecil, buruh
_____ suri rumahtangga
_____ lain (terangkan) _____

13. Berapakah anggaran pendapatan sebulan isirumah ini, daripada semua sumber-sumber?

$_____

14. Berapa dan dari manakah sumber pendapatan isirumah ini? (Tandakan semua yang berkenaan)

Jumlah $ Sumber
_____   gaji sendiri dan/atau suami
_____   pemberian ahli keluarga yang tinggal serumah
_____   pemberian ahli keluarga yang tidak tinggal serumah
_____   pencen
_____   bantuan kebajikan
_____   jualan hasil pertanian dan ternakan
_____   lain (terangkan) _____

15. Adakah anak-anak makcik atau ahli keluarga lain selalu memberi makcik duit untuk membantu perbelanjaan seharian atau membayar bil-bil?

_____ ya
_____ tidak
_____ tak tahu

16. Jika ya, siapa selalu memberi makcik duit? _____

berapa kerap? _____

berapa banyak? _____

17. Adakah makcik mempunyai harta-harta berikut?
    (tandakan semua yang berkenaan)

_____	tanah	_____	perakam video
_____	peti sejuk	_____	mesin jahit
_____	radio	_____	seterika letrik
_____	T.V.	_____	kipas letrik
_____	motosikal	_____	mesin pencuci pakaian
_____	basikal	_____	lain (terangkan) _____
_____	kereta		_____

18. Adakah makcik membela binatang ternakan berikut?
    (tandakan semua yang berkenaan dan nyatakan bilangan)

_____	lembu	_____	bilangan
_____	kerbau	_____	
_____	kambing	_____	
_____	ayam	_____	
_____	itek	_____	
_____	lain (terangkan)		
_____		_____	

19. Adakah makcik pernah bersekolah?

    _____ ya
    _____ tidak

    Berapa tahun persekolahan yang makcik telah sempurnakan?

    _____ tahun

20. Bolehkah makcik membaca suratkhabar?

    _____ ya
    _____ tidak

    Jika tidak, mengapa _____

21. Bolehkah makcik menulis surat?

    _____ ya
    _____ tidak

    Jika tidak, mengapa _____

PERUMAHAN DAN KEADAAN SEKITAR:

22. Dari bahan apakah rumah ini diperbuat?

          _____ batu dan atap renting
          _____ kayu dan atap renting
          _____ kayu dan atap zink
          _____ kayu dan atap rembia
          _____ buluh dan atap rembia
          _____ lain (terangkan) _____

23. Adakah rumah ini kepunyaan makcik (atau keluarga) atau disewa?

          _____ disewa oleh makcik atau suami
          _____ disewa oleh ahli keluarga lain
          _____ kepunyaan makcik atau suami
          _____ kepunyaan ahli keluarga lain
          _____ lain (terangkan) _____

24. Berapa lamakah makcik telah tinggal di rumah ini?

          _____ bilangan {hari   (bulatkan satu)
                      {minggu
                      {bulan
                      {tahun

25. Berapa orang biasanya tingal di sini bersama makcik?

          _____ bilangan

26. Siapa yang tinggal di sini bersama makcik?
(tandakan semua yang berkenaan dan catatkan bilangan)

          _____ tiada siapa   _____ menantu lelaki
          _____ suami   _____ cucu
          _____ anak perempuan _____ ibu/bapa
          _____ anak lelaki   _____ abang atau adik
          _____ menantu perempuan _____ saudara lain
          _____ lain (terangkan) _____

27. Dimanakah makcik mengambil air minum untuk isirumah ini?
(tandakan semua yang berkenaan)

          _____ air paip awam (tepi jalan)
          _____ air paip (persendirian)
          _____ perigi
          _____ sungai
          _____ air hujan
          _____ lain (terangkan) _____

28. Apakah jenis tandas yang digunakan oleh isirumah ini?

_____ tandas curah dalam rumah
_____ tandas siam (di luar rumah)
_____ tandas korek
_____ sungai
_____ lain (terangkan) _____

29. Bagaimanakah sampah dari rumah ini dihapuskan?
(tandakan semua yang berkenaan)

_____ ditanam
_____ dibakar
_____ dibuang dalam sungai
_____ cara-cara lain (terangkan) _____

30. Bagaimanakah makcik menilai keadaan kehidupan sekarang
dibandingkan dengan lima tahun yang lepas? Bolehkan makcik
katakan sangat memuaskan, memuaskan, sederhana, tidak
memuaskan atau tak tahu?

_____ sangat memuaskan
_____ memuaskan
_____ sederhana
_____ tidak memuaskan
_____ tak tahu

TARAF KESIHATAN:

31. Bagaimanakah makcik menilai keadaan kesihatan makcik dibandingkan dengan wanita sebaya dengan makcik? Bolehkah makcik katakan sangat memuaskan, memuaskan, sederhana, tidak memuaskan atau tak tahu?

   _____ sangat memuaskan
   _____ memuaskan
   _____ sederhana
   _____ tidak memuaskan
   _____ tak tahu

32. Adakah makcik mengalami masalah kesihatan atau penyakit berikut yang menggangu kehidupan seharian makcik dalam masa satu tahun yang lepas?
   (tandakan semua yang berkenaan)

	ya	tidak	jika ya, adakah telah disahkan oleh doktor	tak tahu
a. penyakit jantung	_____	_____	_____	_____
b. darah tinggi	_____	_____	_____	_____
c. masalah buah pinggang	_____	_____	_____	_____
d. masalah pernafasan (bronkitis, lelah)	_____	_____	_____	_____
e. kurang darah	_____	_____	_____	_____
f. barah	_____	_____	_____	_____
g. kencing manis	_____	_____	_____	_____
h. sengal tulang	_____	_____	_____	_____
i. lain (nyatakan)	_____	_____	_____	_____

_____

33. Berapa kerapkah makcik mengalami masalah-masalah berikut yang
    selalu dialami oleh orang-orang tua sebaya dengan makcik?
    (tandakan semua yang berkenaan)

	sepanjang masa	kadang-kadang	tak pernah
a. susah berjalan	____	____	____
b. susah berdiri	____	____	____
c. susah mendengar	____	____	____
d. susah melihat	____	____	____
e. susah mengunyah	____	____	____
f. masalah rasa	____	____	____
g. masalah bau	____	____	____
h. sembelit	____	____	____
i. cirit birit	____	____	____

34. Dibandingkan dengan satu tahun yang lepas, adakah kesihatan
    makcik sekarang: lebih baik, lebih teruk, lebih kurang sama
    atau tak tahu?

    _____ lebih baik
    _____ lebih teruk
    _____ lebih kurang sama
    _____ tak tahu

35. Pada tahun lepas, adakah kesihatan makcik keseluruhannya
    menyebabkan makcik sangat risau, kadangkala risau, tiada
    risau langsung atau tak tahu?

    _____ sangat risau
    _____ kadangkala risau
    _____ tiada risau langsung
    _____ tak tahu

36. Bilakah terakhir sekali makcik berjumpa doktor atau pegawai
    kesihatan mengenai kesihatan makcik? Bolehkah makcik katakan
    tak pernah, kurang daripada satu tahun, lebih daripada satu
    tahun, atau tak ingat?

    _____ tak pernah
    _____ kurang daripada satu tahun
    _____ lebih daripada satu tahun
    _____ tak ingat

37. Apakah sebabnya makcik berjumpa doktor atau pegawai kesihatan
    kali terakhir sekali?

    _____ pemeriksaan ulangan

    _____ penyakit (terangkan) _____

    _____ kecederaan (terangkan) _____

    _____ pembedahan (terangkan) _____

    _____ lain (terangkan) _____

38. Bilakah terakhir sekali makcik berjumpa bomoh mengenai
    kesihatan makcik? Bolehkah makcik katakan tak pernah, kurang
    daripada satu tahun, lebih daripada satu tahun, atau tak
    ingat?

    _____ tak pernah
    _____ kurang daripada satu tahun
    _____ lebih daripada satu tahun
    _____ tak ingat

39. Apakah sebabnya makcik berjumpa bomoh kali terakhir sekali?

    _____

40 Dalam satu bulan yang lepas pernahkah makcik mengambil ubat-
    ubat yang ditentukan oleh doktor?

    _____ ya
    _____ tidak
    _____ tak tahu

41. Jika ya, untuk keadaan apa? _____

42. Dalam satu bulan yang lepas pernahkah makcik mengambil ubat-ubat yang bukan ditentukan oleh doktor, seperti ubat yang boleh dibeli di kedai?

    _____ ya
    _____ tidak
    _____ tak tahu

43. Jika ya, untuk keadaan apa? _____

44. Dalam satu bulan yang lepas pernahkah makcik mengambil ubat-ubat tradisional?

    _____ ya
    _____ tidak
    _____ tak tahu

45. Jika ya, untuk keadaan apa? _____

46. Pada tahun lepas, berapa kerapkah makcik terlalu sakit/tidak sihat untuk menjalankan pekerjaan harian?

    _____ tiap-tiap hari
    _____ sekurangnya sekali seminggu
    _____ sekurangnya sekali sebulan
    _____ kurang dari sekali sebulan
    _____ tak pernah

47. Adakah makcik mempunyai sesiapa yang akan membantu jika makcik terlalu sakit/tidak sihat untuk menjalankan pekerjaan harian?

    _____ ya
    _____ tidak

Jika ya, siapa? (tandakan semua yang berkenaan)

    _____ suami
    _____ anak perempuan
    _____ anak lelaki
    _____ lain (terangkan) _____

48. Berapa cepatkah salah seorang daripada anak makcik boleh sampai ke sini jika makcik memerlukan mereka?

    _____ anak duduk serumah
    _____ bilangan {minit   (bulatkan satu)
                  {jam
                  {hari

49. Dibandingkan dengan wanita sebaya dengan makcik, adakah makcik
dari segi fizikal (kecergasan), lebih aktif, kurang aktif,
sama aktif atau tak tahu?

_____ lebih aktif
_____ kurang aktif
_____ sama aktif
_____ tak tahu

50. Adakah makcik pakai gigi palsu?

_____ ya
_____ tidak (jika tidak terus ke soalan 54)

51. Berapa lamakah makcik telah memakai gigi palsu?

_____ kurang dari satu tahun
_____ diantara satu hingga lima tahun
_____ lebih dari lima tahun

52. Adakah makcik mempunyai

_____ gigi palsu atas sahaja?
_____ gigi palsu bawah sahaja?
_____ gigi palsu atas dan bawah?

53. Adakah gigi palsu makcik elok muatnya?

_____ ya
_____ tidak
_____ tak tahu

AKTIVITI SOSIAL:

54.   Adakah makcik menjadi ahli dalam mana-mana pertubuhan sosial
      atau politik?

            _____ ya (terangkan) _____
            _____ tidak (jika tidak, terus ke soalan 56)

55.   Pada tahun lepas berapa kerapkah makcik menghadiri mesyuarat
      pertubuhan sosial atau politik?

            _____ sekurangnya sekali seminggu
            _____ sekurangnya sekali sebulan
            _____ kurang dari sekali sebulan
            _____ tak pernah

56.   Pada tahun lepas berapa kerapkah makcik menghadiri kenduri
      di kampung ini?

            _____ sekurangnya sekali seminggu
            _____ sekurangnya sekali sebulan
            _____ kurang dari sekali sebulan
            _____ tak pernah

57.   Berapa jauhkah mesjid atau surau dari rumah makcik?

            _____

      Pada tahun lepas berapa kerapkah makcik pergi ke mesjid atau
      surau untuk sembahyang atau aktiviti lain?

            _____ tiap-tiap hari
            _____ sekurangnya sekali seminggu
            _____ sekurangnya sekali sebulan
            _____ kurang dari sekali sebulan
            _____ tak pernah

58.   Pada tahun lepas berapa kerapkah makcik berkumpul dan berbual
      bersama kawan-kawan atau jiran?

            _____ sekurangnya sekali seminggu
            _____ sekurangnya sekali sebulan
            _____ kurang dari sekali sebulan
            _____ tak pernah

59. Memikirkan tentang aktiviti sosial makcik, adakah makcik rasa mencukupi, terlalu banyak, ingin lebih lagi atau tak tahu?

_____ terlalu banyak
_____ mencukupi
_____ ingin lebih lagi
_____ tak tahu

60. Berapa kerapkah makcik berjumpa dengan salah seorang daripada anak makcik?

_____ anak duduk serumah
_____ kurang dari sekali setahun/tak pernah
_____ kali {sehari   (bulatkan satu)
           {seminggu
           {sebulan
           {setahun

61. Adakah makcik mempunyai telefon dalam rumah ini?

_____ ya
_____ tidak (jika tidak, terus ke soalan 63)

62. Berapa kerapkah makcik bercakap melalui telefon dengan salah seorang daripada anak makcik?

_____ kurang dari sekali setahun/tak pernah
_____ kali {sehari   (bulatkan satu)
           {seminggu
           {sebulan
           {setahun

63. Apakah jenis kenderaan yang makcik selalu gunakan?
    (tandakan semua yang berkenaan)

_____ kereta sendiri/suami
_____ kereta anak-anak
_____ motosikal
_____ teksi
_____ kenderaan awam (bas)
_____ berjalan
_____ lain (terangkan) _____

PERSEDIAAN, PERBELANJAAN AND PEMBELIAN MAKANAN:

64. Siapa yang biasanya menyedia dan memasak makanan dalam rumah ini? (tandakan semua yang berkenaan)

_____ sendiri
_____ suami
_____ anak perempuan
_____ lain (terangkan) _____

65. Apakah jenis bahanapi yang digunakan untuk memasak dalam rumah ini? (tandakan semua yang berkenaan)

_____ kayu
_____ arang
_____ minyak api
_____ gas
_____ elektrik

66. Adakah makcik atau isirumah ini mempunyai kebun sayur?

_____ ya
_____ tidak (jika tidak, terus ke soalan 68)

67. Adakah makcik gunakan hasil dari kebun sayur untuk makanan sendiri?

_____ ya
_____ tidak

68. Berapa kerapkah makcik atau isirumah ini mengutip daun, pucuk atau ulam untuk makanan di rumah?

_____ tiap-tiap hari
_____ sekurangnya sekali seminggu
_____ sekurangnya sekali sebulan
_____ kurang dari sekali sebulan
_____ tak pernah

69. Berapakah biasanya isirumah ini berbelanja untuk makanan?

$_____ sebulan

70. Adakah makcik puashati dengan pendapatan yang boleh
dibelanjakan untuk membeli makanan?

_____ sangat memuaskan
_____ memuaskan
_____ tak tahu
_____ tidak memuaskan
_____ sangat tidak memuaskan

71. Siapa biasanya membeli makanan untuk isirumah ini?
(tandakan semua yang berkenaan)

_____ sendiri
_____ suami
_____ anak lelaki
_____ anak perempuan
_____ lain (terangkan) _____

72. Dimanakah paling kerap sekali makcik atau isirumah ini membeli
bahan-bahan runcit seperti beras, minyak masak, tepung, gula,
dan bahan-bahan kering?

_____ kedai runcit di kampung
_____ kedai runcit di pekan yang berhampiran
_____ penjaja
_____ pasar malam/minggu
_____ lain (terangkan) _____

73. Berapa kerapkah biasanya makcik atau isirumah ini membeli
bahan-bahan runcit seperti beras, minyak masak dan lain-lain?

_____ tiap-tiap hari
_____ beberapa kali seminggu
_____ sekali seminggu
_____ sekurangnya sekali sebulan
_____ kurang dari sekali sebulan
_____ lain (terangkan) _____

74. Dimanakah paling kerap sekali makcik atau isirumah ini membeli
bahan-bahan basah seperti ikan, daging, ayam dan
sayur-sayuran?

_____ kedai runcit di kampung
_____ kedai runcit di pekan yang berhampiran
_____ penjaja
_____ pasar malam/minggu
_____ lain (terangkan) _____

75. Berapa kerapkah biasanya makcik atau isirumah ini membeli
    bahan-bahan basah seperti ikan, daging dan lain-lain?

     _____ tiap-tiap hari
     _____ beberapa kali seminggu
     _____ sekali seminggu
     _____ sekurangnya sekali sebulan
     _____ kurang dari sekali sebulan
     _____ lain (terangkan) _____

76. Adakah apa-apa yang menghalang makcik daripada mendapatkan
    makanan yang mencukupi atau jenis makanan yang makcik sukai?

     _____ ya
     _____ tidak
     _____ tak tahu

77. Jika ya, apakah masalah tersebut?
    (tandakan semua yang berkenaan)

     _____ tiada kenderaan
     _____ duit tidak mencukupi untuk membeli makanan
     _____ kedai terlalu jauh
     _____ tiada siapa untuk membantu membeli makanan
     _____ tiada siapa untuk membantu menyediakan makanan
     _____ tiada selera untuk makan
     _____ gigi palsu tidak elok muatnya
     _____ lain (terangkan) _____

POLA DAN PERSEPSI MENGENAI MAKANAN:

78. Berapa hari dalam seminggu makcik makan sajian berikut?
    (bagi tiap-tiap satu, kodkan bilangan hari dalam seminggu
    sebagai 0 - 7, 9 = tak tahu)

    _____ sarapan pagi
    _____ sajian pagi (jam 10 - 11 pagi)
    _____ makanan sampingan pertengahan hari
    _____ makan tengah-hari ·
    _____ makanan sampingan petang (jam 3-4 petang)
    _____ makan malam
    _____ makanan sampingan tengah malam (jam 10-11 malam)

79. Sila nyatakan tiga jenis makanan yang makcik suka dan rasa
    sangat baik untuk kesihatan bagi wanita yang sebaya dengan
    makcik.

    A. _____

    B. _____

    C. _____

80. Bagi tiap-tiap jenis makanan, sila nyatakan mengapa makcik
    fikirkan makanan tersebut sangat baik untuk kesihatan wanita
    yang sebaya dengan makcik.

    Makanan A. _____

    Makanan B. _____

    Makanan C. _____

81. Sila nyatakan tiga jenis makanan yang makcik tak suka dan rasa
    tidak baik untuk kesihatan bagi wanita yang sebaya dengan
    makcik.

    A. _____

    B. _____

    C. _____

82. Bagi tiap-tiap jenis makanan, sila nyatakan mengapa makcik
fikirkan makanan tersebut tidak baik untuk kesihatan wanita
yang sebaya dengan makcik.

Makanan A. _____

Makanan B. _____

Makanan C. _____

83. Bagaimanakah makcik menilai selera makan makcik, adakah sangat
baik, baik, tidak baik atau tak tahu?

_____ sangat baik
_____ baik
_____ tidak baik
_____ tak tahu

KEKERAPAN MAKANAN:

84. Sekarang saya ingin tahu berapa kerapkah makcik makan makanan
     berikut dalam satu tahun yang lepas? (bila dalam musim dan
     termasuk bahan-bahan dalam masakan atau hidangan)

          1. tiap-tiap hari
          2. sekurangnya selang satu hari
          3. sekurangnya sekali seminggu
          4. sekurangnya dua atau tiga kali sebulan
          5. sekurangnya sekali sebulan
          6. kurang dari sekali sebulan, tetapi beberapa kali
              setahun
          7. sekurangnya sekali setahun
          8. jarang atau tak pernah

Senarai makanan   Kekerapan

                                    1   2   3   4   5   6   7   8

nasi

meehoon

mee kuning

roti

biskut

biskut tawar
Kuih-kuih Melayu - jemput-jemput,
dll dari tepung gandum

ubi kentang

ubi keledek

ubi kayu

kekacang (dal, kacang hijau)

kacang tanah

bahan dari kacang soya (tahu,
tempe, taugeh)

Senarai makanan	Kekerapan							
	1	2	3	4	5	6	7	8
sayur-sayuran hijau (sawi, bayam, kangkung, dll.)								
sayur-sayuran buah (kacang panjang, bende, terung, tomato)								
pisang								
jambu batu								
nangka								
limau manis								
betik								
rambutan								
durian								
ikan bilis								
ikan masin								
kerang dan remis								
ikan segar								
udang								
ikan sardin dalam tin								
telur								
daging lembu								
ayam								
hati lembu atau ayam								
susu segar								
susu tepung								
susu cair								

Senarai makanan   **Kekerapan**

	1	2	3	4	5	6	7	8

susu pekat manis

ais krim (daripada krim susu)

gula pasir

jem

mentega

marjerin

minyak masak

santan kelapa

kopi

teh

horlicks, milo, ovaltine

air minuman bergas seperti, Coke, 7-Up, dll.

NOTA: (sila catatkan masalah atau perkara-perkara yang luarbiasa
      tentang temubual dengan responden)

UKURAN ANTROPOMETRI:

85. berat badan   _____ kg.

86. tinggi berdiri   _____ sm.

87. tinggi duduk   _____ sm.

88. tinggi lutut   _____ sm.

89. lebar lengan   _____ sm.

90. lilitan pinggang   _____ sm.

91. lilitan punggung   _____ sm.

92. nisbah punggung:pinggang   _____ sm.

93. lilitan lengan atas   _____ sm. (kanan)

                                  _____ sm. (kiri)

94. lipatan kulit trisep   _____ mm. (kanan)

                                  _____ mm. (kiri)

95. kekuatan tangan, kg.   (purata)

         kanan   _____   _____   _____   _____

         kiri   _____   _____   _____   _____

96. Adakah makcik kebiasaannya menggunakan tangan kanan atau kiri?

              _____ tangan kanan
              _____ tangan kiri
              _____ menggunakan kedua-dua tangan sama kerap
              _____ tak tahu

APPENDIX B: MODIFIED INFORMED CONSENT FORM

MODIFIED INFORMED CONSENT FORM

Dear   :

Thank you for agreeing to participate in the study. I am a faculty
member at the Department of Human Development Studies, Universiti
Pertanian Malaysia. I am presently on study leave at the Department of
Food and Nutrition, Iowa State University, to pursue my Ph.D. program.
I am conducting this study entitled, "Selected indicators of
nutritional status among rural elderly females in Malaysia" for my
dissertation research.

The main purpose of my study is to examine the nutritional status
indicators of elderly Malay females 55 years and older in selected
rural areas in Malaysia. Four specific objectives are to:

1. examine living conditions, health indices, social
   activities, and other descriptive characteristics of the
   sample and their relationships to the nutritional status
   indicators

2. examine food consumption patterns of the sample using
   food frequency records

3. identify selected perceptions toward food which may
   influence food intake and nutritional status

4. assess selected anthropometric indices of the sample

The source of funding for this study is from Universiti Pertanian
Malaysia and a fellowship from AHEA Foundation. This project has been
approved by the human subjects committee at Iowa State University and
will be carried out under the guidance of Dr. R. Dale Terry.

It will take about 30-45 minutes of your time to answer the questions
in this interview schedule and another 10-15 minutes for me to take the
anthropometric measurements, which include weight; standing, sitting,
and knee heights; arm span; waist, hip, and mid-arm circumferences;
triceps skinfold thickness; and hand grip strength.

Thank you for the time and effort that you are putting in this project.
Individuals will be identified by number only and every effort will be
made to keep all data confidential. Your participation is voluntary
and you are free to withdraw from the project at any time without any
consequences. If you have any questions about the project you can call
me at my office (03) 958-5425 or at my home (03) 825-0075. Finally, a
summary report of the project will be available, upon request, when the
study is completed.

Thank you again for your participation. It is hoped the study will aid in providing useful information to improve the health and welfare of the elderly in Malaysia.

Sincerely,

(Zaitun Yassin)

APPENDIX C: STATISTICAL RELATIONSHIPS AMONG DEMOGRAPHIC VARIABLES

TABLE 27. Distribution of respondents who were married or widowed or divorced by selected demographic variables (n=317)

Demographic variable	Marital status			
	Married (n=144)		Widowed or divorced (n=173)	
	No.	%	No.	%
Age group (years)[a]				
55 - 59	77	24.3	35	11.0
60 - 65	37	11.7	54	17.0
66 - 74	26	8.2	48	15.1
75 and over	4	1.3	36	11.4
Income (Malaysian $)[b]				
M$50 - M$200	22	6.9	59	18.6
M$201 - M$499	71	22.4	69	21.8
M$500 - M$700	27	8.5	31	9.8
M$701 or more	24	7.6	14	4.4
Possession score[c]				
0 - 5	29	9.2	66	20.8
6 - 8	56	17.8	50	15.9
9 - 15	59	18.8	57	18.2

[a] $x^2 = 48.82$, df=3, p<0.001.

[b] $x^2 = 17.33$, df=3, p<0.001.

[c] $x^2 = 12.23$, df=3, p<0.01.

TABLE 28. Distribution of respondents' educational and literacy levels
by selected demographic variables (n=317)

Demographic variable	Have attended school (n=116)		Able to read (n=88)		Able to write (n=67)	
	no.	%	no.	%	no.	%
Age group (years)						
55 - 59	64	20.2	42	13.2	35	11.0
60 - 65	34	10.7	30	9.5	21	6.6
66 - 74	17	5.4	15	4.7	11	3.5
75 and over	1	0.3	1	0.3	0	0
Income (Malaysian $)						
M$50 - M$200	17	5.4	13	4.1	10	3.2
M$201 - M$499	55	17.4	38	12.0	27	8.5
M$500 - M$700	26	8.2	20	6.3	16	5.0
M$701 or more	18	5.7	17	5.4	14	4.4
Possession score						
0 - 5	15	4.8	12	3.8	8	2.5
6 - 8	49	15.6	34	10.8	24	7.6
9 - 15	52	16.6	42	13.4	35	11.1

TABLE 29. Distribution of respondents by employment status and age group (n=317)

Age group (years)[a]	Presently working part-time (n=70)		Not working or retired (n=247)	
	No.	%	No.	%
55 - 59	36	11.4	76	24.0
60 - 65	19	6.0	72	22.7
66 - 74	12	3.8	62	19.6
75 and over	3	0.9	37	11.7

[a] x^2=13.09, df=3, p<0.01.

APPENDIX D: STATISTICAL RELATIONSHIPS BETWEEN LIVING CONDITIONS AND
DEMOGRAPHIC VARIABLES

TABLE 30. Correlation coefficients of selected demographic and living
conditions variables

Variable	Age	Income	Possession score
Rating of present living conditions	-0.17**	0.27***	0.30***
No. of years living in the same house	0.26***	-0.08	-0.07
No. of people living in the same household	-0.11*	0.43***	0.43***
No. of respondent's children living in the same household	-0.30***	0.27***	0.35***

*p<0.05.

**p<0.01.

***p<0.001.

TABLE 31. Distribution of respondents by household size and marital status

Marital status[a]	Household size					
	1 person (n=38)		2 - 4 persons (n=157)		5 or more persons (n=122)	
	no.	%	no.	%	no.	%
Married	0	0.0	81	25.6	63	19.9
Widowed or divorced	38	12.0	76	24.0	59	18.6

[a] $x^2 = 35.94$, df=2, p<0.001.

TABLE 32. Distribution of respondents by number of children living in
the household and selected demographic variables

	No. of children living in household					
	None (n=111)		1 (n=119)		2 or more (n=87)	
Variable	no.	%	no.	%	no.	%
Education (years)[a]						
0	77	24.3	82	25.9	43	13.6
1 - 2	11	3.5	13	4.1	18	5.7
3 - 4	19	6.0	9	2.8	7	2.2
5 or more	4	1.3	15	4.7	19	6.0
Marital status[b]						
Married	49	15.5	46	14.5	49	15.5
Widowed or divorced	62	19.6	73	23.0	38	12.0

[a] x^2=28.22, df=6, p<0.001.

[b] x^2=6.44, df=2, p<0.05.

APPENDIX E: STATISTICAL RELATIONSHIPS BETWEEN HEALTH AND DEMOGRAPHIC VARIABLES

TABLE 33. Correlations between selected health characteristics and demographic variables

Variable	Age	Education	Possession score	Amount of worry due to health	Health score	Complaints score	Frequency of being sick
Perceived state of health	-0.13*	-0.14	0.12*	-0.32***	-0.29***	-0.48***	-0.29***
Rating of health compared to a year earlier	0.07	0.32***	-0.10	-0.23***	0.10	-0.24***	-0.16**
Rating of physical activity	0.06	-0.17	0.15*	-0.38***	-0.30***	-0.38***	-0.46***
Health score	-0.06	-0.03	0.03	0.41***	1.00	0.25***	0.33***
Complaints score	0.46***	-0.16	-0.19**	0.42***	0.25***	1.00	0.34**

*$p<0.05$.

**$p<0.01$.

***$p<0.001$.

TABLE 34. Distribution of respondents by perceived health status and
selected health variables

	Perceived health status							
	Excellent		Good		Fair		Poor	
Variable	no.	%	no.	%	no.	%	no.	%
High blood pressure[a]								
Yes	2	0.7	11	3.6	28	9.2	8	2.6
No	1	0.3	90	29.4	124	40.5	42	13.7
Respiratory problems[b]								
Yes	0	0.0	8	2.6	28	9.2	15	4.9
No	3	1.0	93	30.5	123	40.3	35	11.5
Arthritis[c]								
Yes	2	0.7	51	16.7	106	34.8	40	13.1
No	1	0.3	50	16.4	44	14.4	11	3.6

[a]x^2=8.35, df=3, p<0.05.

[b]x^2=12.91, df=3, p<0.01.

[c]x^2=15.54, df=3, p<0.01.

TABLE 35. Distribution of respondents by use of prescribed medicine within last month and selected health variables

| | Use of prescribed medicine | | | |
| | Yes | | No | |
Variable	No.	%	No.	%
Perceived health status[a]				
excellent	2	0.6	1	0.3
good	23	.7.5	79	25.6
fair	74	24.0	78	25.3
poor	28	9.1	23	7.5
Health score[b]				
0	16	5.4	60	20.4
1	50	17.0	81	27.6
2 - 4	58	19.7	29	9.9
Complaint score[c]				
9 - 11	38	12.3	98	31.7
12 - 13	46	14.9	48	15.5
14 - 22	41	13.3	38	12.3

[a] $x^2 = 22.91$, df=3, p<0.001.

[b] $x^2 = 36.16$, df=2, p<0.001.

[c] $x^2 = 15.94$, df=2, p<0.001.

TABLE 36. Distribution of respondents by availability of help and selected variables

	Availability of help			
	Yes		No	
Variable	No.	%	No.	%
Income (Malaysian $)[a]				
M$50 - M$200	62	19.6	19	6.0
M$201 - M$499	124	39.1	16	5.0
M$500 - M$700	55	17.4	3	0.9
M$701 or more	36	11.4	2	0.6
Household size[b]				
1	26	8.2	12	3.8
2 - 4	132	41.7	25	7.9
5 or more	119	37.5	3	0.9
How soon children can come to provide help[c]				
living in same household	193	62.3	14	4.5
30 minutes or less	39	12.6	9	2.9
8 hours or less	29	9.4	10	3.2
more than 8 hours	11	3.5	5	1.6

[a] $x^2 = 13.59$, df=3, $p < 0.01$.

[b] $x^2 = 27.25$, df=2, $p < 0.001$.

[c] $x^2 = 19.55$, df=3, $p < 0.001$.

APPENDIX F: CORRELATION COEFFICIENTS FOR SELECTED SOCIAL PARTICIPATION VARIABLES

TABLE 37. Correlation coefficients for selected social participation variables

Variable	Age	Attendance at meetings	Attendance at feasts	Attendance at mosque	Socializing with friends or neighbors
Attendance at meetings	0.31^{***}				
Attendance at feasts	0.27^{***}	0.28^{***}			
Attendance at mosque	0.14^{*}	0.26^{***}	0.29^{***}		
Socializing with friends or neighbors	0.04	0.18^{*}	0.12^{*}	0.19^{**}	
Rating of adequacy of social activity	0.05	0.12	0.09	0.17^{**}	0.13

*$p<0.05$.

**$p<0.01$.

***$p<0.001$.

APPENDIX G: FREQUENCY OF FOOD INTAKE

TABLE 38. Responses to food frequency scale

Food item or group	Percent							
	Daily	Every other day	At least once a week	At least 2 - 3 times a month	At least once a month	Less than monthly	At least once a year	Seldom or never
Rice	98.4	1.6	–	–	–	–	–	–
Rice noodles	0.6	4.4	46.5	16.8	14.6	5.1	1.9	10.1
Wheat flour noodles	0.3	1.6	26.5	19.6	18.9	6.9	2.2	24.0
White bread	12.7	27.9	29.8	9.8	7.9	2.2	1.3	8.3
Cookies	5.1	5.4	14.7	8.0	8.6	6.1	3.5	48.6
Crackers	16.1	25.0	25.3	8.9	6.3	1.3	1.9	15.2
Variety pudding and fritters	22.4	33.8	29.3	7.3	3.2	0.9	0.3	2.8
Potatoes	5.0	9.1	38.2	23.3	12.0	3.8	1.3	7.3
Sweet potatoes	0.3	0.3	12.0	17.4	21.8	15.5	3.8	29.0
Tapioca	0.3	0.6	6.6	13.6	21.5	24.0	6.3	27.1
Legumes	0.3	1.3	11.1	19.7	38.2	11.5	4.5	13.4
Peanuts	1.0	6.7	22.0	15.0	16.3	11.8	6.4	20.8
Soy products	4.7	13.6	58.7	7.6	8.2	0.9	0.9	5.4
Green leafy vegetables	28.7	42.0	17.4	4.4	0.9	1.3	–	5.4
Non-leafy vegetables	5.7	38.8	32.8	6.3	4.7	1.9	0.6	9.1
Bananas	18.6	16.4	33.1	13.6	6.9	1.6	0.9	8.8
Guava	0.6	0.6	2.5	4.4	6.9	7.9	2.5	74.4

Table 38. continued

Food item or group	Daily	Every other day	At least once a week	At least 2 - 3 times a month	At least once a month	Less than monthly	At least once a year	Seldom or never
Jackfruit	1.3	0.9	1.9	4.1	11.4	30.0	8.5	42.0
Oranges	1.9	4.1	44.4	16.8	15.2	4.1	1.6	11.7
Papaya	1.6	1.9	12.0	13.9	21.8	15.2	3.2	30.4
Rambutan	71.9	14.8	6.0	2.5	0.6	-	0.9	3.2
Durian	64.7	17.4	9.5	2.2	0.3	0.9	1.6	3.5
Dried anchovies	81.0	11.7	5.1	0.6	-	0.3	-	1.3
Dried salted fish	10.1	9.5	27.4	11.7	11.4	7.9	2.5	19.6
Cockles and clams	0.6	2.2	21.9	13.0	17.8	7.6	1.6	35.2
Fresh fish	74.1	18.0	6.3	0.9	-	-	-	0.6
Shrimp	1.6	5.7	41.8	11.4	12.3	4.7	0.6	21.8
Canned sardines	-	1.3	7.6	11.1	19.0	14.6	2.5	43.8
Eggs	38.3	23.1	22.5	3.5	3.2	2.2	0.6	6.6
Beef	-	1.9	32.0	17.7	21.5	11.4	5.4	10.1
Chicken	0.3	2.9	30.5	22.2	24.4	6.0	1.3	12.4
Beef or chicken liver	-	1.3	17.1	14.2	26.6	12.3	5.7	22.8
Pasteurized milk	1.0	0.3	-	0.6	0.6	1.6	1.0	94.9
Dried powdered milk	13.7	2.9	2.2	1.6	1.6	1.3	0.3	76.5
Evaporated milk	7.6	6.7	5.1	4.5	1.9	3.8	1.9	68.5

Table 38. continued

Food item or group	Daily	Every other day	At least once a week	At least 2 - 3 times a month	At least once a month	Less than monthly	At least once a year	Seldom or never
				Percent				
Condensed milk	46.2	7.6	5.4	2.2	1.9	0.3	0.6	35.8
Ice-cream	–	0.3	2.2	1.3	4.8	6.3	6.0	79.0
Granulated sugar	84.2	6.6	4.4	1.6	0.3	0.9	–	1.9
Jam	0.6	2.2	12.4	7.6	9.2	14.6	8.6	44.6
Butter	0.9	0.9	8.8	4.7	8.2	18.0	16.7	41.6
Margarine	2.2	0.9	10.7	6.0	7.6	19.9	17.4	35.3
Cooking oil	94.3	4.1	0.9	0.3	–	–	–	0.3
Coconut milk	53.6	34.4	9.8	1.9	–	0.3	–	–
Coffee	40.3	16.5	5.4	3.2	2.2	1.3	1.3	29.8
Tea	43.6	17.2	4.8	0.6	1.9	1.0	1.0	29.9
Horlicks, milo, ovaltine	18.0	5.7	7.6	5.4	3.5	4.4	1.6	53.8
Aerated drinks	0.6	–	1.9	1.9	2.2	8.6	8.0	76.8

APPENDIX H: CORRELATIONS BETWEEN SELECTED FOOD INTAKE FREQUENCIES AND
DEMOGRAPHIC VARIABLES

TABLE 39. Correlations between selected food intake frequencies and demographic variables

Food item or group	Age	Income	Possession score	Education	Household size	Health score
Rice flour noodles	-0.10	0.16**	0.19**	0.09	0.08	0.01
Wheat flour noodles	-0.12*	0.17**	0.20***	0.05	0.01	-0.05
White bread	-0.17**	0.19**	0.16**	-0.08	0.20***	0.05
Variety pudding and fritters	-0.19**	0.06·	0.09	-0.07	0.14*	-0.13*
Potatoes	-0.11*	0.25***	0.21***	0.10	0.21***	-0.06
Sweet potatoes	-0.17**	0.12*	0.14*	0.09	-0.02	-0.12*
Tapioca	0.02	0.02	-0.01	-0.04	-0.03	-0.12*
Legumes	-0.10	0.14*	0.15*	0.05	0.15**	-0.16**
Peanuts	-0.19**	0.17**	0.19**	-0.02	0.08	-0.09
Soy products	-0.16**	0.16**	0.15**	0.17	0.12*	-0.04
Green leafy vegetables	-0.23***	0.14*	0.07	0.13	0.05	-0.05
Non-leafy vegetables	-0.16**	0.16**	0.07	-0.09	0.08	-0.13*
Bananas	-0.11*	-0.04	0.03	0.10	-0.03	-0.18**
Guava	-0.23***	0.15**	0.24***	-0.06	0.03	0.01

*p<0.05.

**p<0.01.

***p<0.001.

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Table 39. continued

Food item or group	Age	Income	Possession score	Education	Household size	Health score
Jackfruit	-0.03	0.00	-0.01	0.01	-0.10	-0.15*
Oranges	-0.08	0.21***	0.19**	-0.13	0.07	0.01
Rambutan	0.00	0.03	0.06	-0.02	0.07	-0.18**
Durian	-0.06	0.03	0.01	0.06	-0.03	-0.17**
Dried anchovies	-0.16**	0.10	0.09	0.09	0.08	-0.01
Dried salted fish	0.01	0.10	0.03	0.17	0.12*	-0.20***
Cockles and clams	-0.17**	0.16**	0.16**	0.10	0.07	-0.04
Fresh fish	-0.18**	0.15**	0.18**	-0.00	0.14*	0.03
Shrimp	-0.19**	0.26***	0.26***	0.08	0.19**	-0.11
Canned sardines	-0.14*	0.05	0.07	-0.03	-0.05	-0.12*
Eggs	-0.23***	0.12*	0.09	0.05	0.05	-0.19**
Beef	-0.14*	0.24***	0.26***	0.11	0.10	-0.07
Chicken	-0.24***	0.14*	0.21***	0.19*	0.06	-0.09
Beef or chicken liver	-0.12*	0.08	0.14*	0.21*	0.08	-0.11
Dried powdered milk	-0.08	0.11	0.11*	-0.03	-0.03	0.01
Ice-cream	-0.13*	0.03	0.14*	0.02	-0.03	0.02
Granulated sugar	-0.05	0.00	0.05	0.05	0.07	-0.14*

Table 39. continued

Food item or group	Age	Income	Possession score	Education	Household size	Health score
Jam	-0.19**	0.24***	0.22***	0.23*	0.07	-0.04
Butter	-0.09	0.20***	0.19**	0.09	0.02	-0.07
Margarine	-0.17**	0.26***	0.27***	0.32***	0.07	-0.05
Cooking oil	-0.10	0.12*	0.14*	0.09	0.12*	-0.02
Coconut milk	-0.17**	0.21***	0.28***	0.16	0.25***	-0.10
Tea	-0.16**	0.12*	0.07	-0.12	0.00	-0.03
Horlicks, milo, ovaltine	-0.05	0.12*	0.11	0.28**	0.06	0.03

APPENDIX I: CORRELATIONS BETWEEN AGE AND ANTHROPOMETRIC VARIABLES

TABLE 40. Correlation matrix of age, standing height, and indicators of stature of elderly respondents (n=305)

Variable	Age	Standing height	Sitting height	Arm span	Knee height
Standing height	-0.37***				
Sitting height	-0.42***	0.69***			
Arm span	-0.12*	0.71***	0.45***		
Knee height	-0.08	0.51***	0.02	0.53***	
Stature computed from knee height	-0.46***	0.59***	0.18**	0.52***	0.92***

*p<0.05.

**p<0.01.

***p<0.001.

TABLE 41. Correlation coefficients for age and indicators of adiposity of elderly respondents (n=305)

Variable	Age	Body weight	BMI
Body weight	-0.38***		
Body mass index	-0.31***	0.95***	
Waist circumference	-0.21***	0.89***	0.92***
Hip circumference	-0.31***	0.94***	0.92***
Waist-hip ratio	0.03	0.43***	0.51***
Arm circumference, right	-0.41***	0.90***	0.89***
Arm circumference, left	-0.39***	0.91***	0.92***
Arm muscle circumference	-0.30***	0.82***	0.83***
Arm muscle area	-0.28***	0.81***	0.83***
Triceps skinfold, right	-0.41***	0.83***	0.82***
Triceps skinfold, left	-0.41***	0.80***	0.79***
Arm fat area	-0.38***	0.92***	0.92***

*** $p < 0.001$.

APPENDIX J: PERCENTILE DISTRIBUTIONS OF ANTHROPOMETRIC VARIABLES

TABLE 42. Percentiles of body weight by age group (n=305)

Age group (years)	No. of respondents	Percentiles in kilograms						
		5	10	25	50	75	90	95
55 - 59	110	36.6	39.2	46.5	55.3	62.0	69.5	73.2
60 - 69	123	32.2	36.5	41.5	46.5	57.0	69.0	76.3
70 and over	72	30.0	22.3	36.5	42.0	47.0	55.5	61.4
Total	305	32.7	36.0	41.0	47.5	57.3	67.7	72.5

TABLE 43. Percentiles of body-mass index by age group (n=305)

Age group (years)	No. of respondents	Percentiles in kilograms/meter^2						
		5	10	25	50	75	90	95
55 - 59	110	17.1	18.0	20.9	24.4	28.0	30.3	32.8
60 - 69	123	16.2	17.2	19.2	22.1	26.0	29.6	32.8
70 and over	72	14.9	16.5	18.1	19.8	22.3	26.0	28.0
Total	305	16.1	17.1	19.0	22.4	26.2	29.9	31.8

TABLE 44. Percentiles of standing height by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	140.6	142.9	145.9	149.1	152.7	155.6	157.5
60 - 69	123	138.7	139.9	142.7	147.3	150.9	154.0	156.0
70 and over	72	134.7	137.3	140.1	145.0	148.9	151.2	152.3
Total	305	138.2	139.8	143.4	147.5	150.9	154.2	156.7

TABLE 45. Percentiles of sitting height by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	71.3	72.1	74.1	76.2	78.8	80.6	81.8
60 - 69	123	68.0	70.2	72.3	75.3	77.5	79.3	80.4
70 and over	72	63.3	66.0	69.1	72.9	75.9	77.6	78.3
Total	305	67.1	69.2	72.3	75.1	77.6	79.6	80.7

TABLE 46. Percentiles of knee height by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	42.3	42.9	44.9	45.8	47.3	48.2	49.8
60 - 69	123	42.4	43.2	44.1	45.8	47.4	48.2	49.2
70 and over	72	42.0	42.5	43.7	45.7	46.8	47.8	48.3
Total	305	42.3	42.9	44.2	45.8	47.1	48.1	49.4

TABLE 47. Percentiles of arm span by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	141.4	144.5	148.5	153.3	156.6	160.5	163.5
60 - 69	123	142.0	144.5	147.4	152.0	155.9	159.2	162.9
70 and over	72	139.8	142.7	147.7	150.5	155.1	158.5	160.6
Total	305	141.8	144.3	148.0	152.2	156.0	159.6	162.9

TABLE 48.   Percentiles of right arm circumference by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	21.4	22.8	26.4	29.2	30.9	32.9	34.4
60 - 69	123	20.4	21.6	23.9	26.7	29.7	32.9	34.4
70 and over	72	18.5	19.1	21.4	23.9	26.3	28.9	30.9
Total	305	19.9	21.3	23.7	26.7	29.9	32.2	33.9

TABLE 49.   Percentiles of left arm circumference by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	20.7	22.2	26.0	28.8	30.5	33.2	33.9
60 - 69	123	20.2	21.4	23.3	26.2	28.8	32.8	35.3
70 and over	72	17.8	18.8	21.4	23.6	25.9	27.4	30.6
Total	305	19.5	20.7	23.2	26.4	29.6	32.1	33.6

TABLE 50. Percentiles of right triceps skinfold by age group (n=305)

Age group (years)	No. of respondents	Percentiles in millimeters						
		5	10	25	50	75	90	95
55 - 59	110	6.1	9.0	14.3	20.3	24.5	28.2	31.1
60 - 69	123	6.3	7.4	11.3	15.8	20.3	24.9	30.7
70 and over	72	3.8	5.7	7.3	12.2	15.3	18.3	22.9
Total	305	5.5	6.5	10.5	15.8	21.5	26.3	29.2

TABLE 51. Percentiles of left triceps skinfold by age group (n=305)

Age group (years)	No. of respondents	Percentiles in millimeters						
		5	10	25	50	75	90	95
55 - 59	110	7.4	9.5	16.3	21.3	25.3	29.2	31.0
60 - 69	123	6.7	8.4	12.3	16.8	21.3	27.2	30.1
70 and over	72	4.0	6.3	8.1	13.3	16.5	20.4	25.5
Total	305	6.3	7.5	12.3	17.3	22.3	27.1	29.8

TABLE 52. Percentiles of arm muscle circumference by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 – 59	110	17.6	18.8	20.2	21.8	22.8	25.2	26.2
60 – 69	123	16.9	18.0	19.4	20.8	22.5	24.7	25.7
70 and over	72	16.4	16.7	18.2	19.2	21.0	22.4	23.9
Total	305	16.8	17.9	19.2	20.8	22.4	24.5	25.7

TABLE 53. Percentiles of mid-arm muscle area by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters^2						
		5	10	25	50	75	90	95
55 – 59	110	24.7	28.1	32.4	37.8	41.2	50.7	54.4
60 – 69	123	22.8	25.8	30.0	34.6	40.4	48.5	52.4
70 and over	72	21.5	22.2	26.5	29.4	35.3	39.8	45.3
Total	305	22.4	25.6	29.2	34.3	40.0	47.8	52.4

TABLE 54. Percentiles of mid-arm fat area by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters^2						
		5	10	25	50	75	90	95
55 - 59	110	7.3	9.8	19.0	27.4	33.3	40.4	43.0
60 - 69	123	6.3	8.8	13.7	19.2	27.3	35.8	43.6
70 and over	72	3.5	5.3	7.8	14.3	18.8	25.1	30.8
Total	305	5.7	7.5	12.4	20.2	29.4	36.3	41.0

TABLE 55. Percentiles of waist-hip ratio by age group (n=305)

Age group (years)	No. of respondents	Percentiles						
		5	10	25	50	75	90	95
55 - 59	110	0.72	0.74	0.77	0.83	0.87	0.92	0.95
60 - 69	123	0.71	0.74	0.77	0.81	0.86	0.92	0.95
70 and over	72	0.73	0.74	0.77	0.81	0.88	0.92	0.97
Total	305	0.73	0.74	0.77	0.81	0.86	0.92	0.95

TABLE 56. Percentiles of waist circumference by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	56.5	58.5	67.1	75.4	83.8	90.9	94.6
60 - 69	123	56.0	58.2	62.9	70.3	80.5	90.4	94.6
70 and over	72	56.0	57.9	61.8	65.5	72.9	85.4	91.6
Total	305	56.5	58.3	63.9	70.9	80.9	89.9	93.2

TABLE 57. Percentiles of hip circumference by age group (n=305)

Age group (years)	No. of respondents	Percentiles in centimeters						
		5	10	25	50	75	90	95
55 - 59	110	76.4	78.9	84.2	91.0	97.5	102.9	107.0
60 - 69	123	73.6	76.6	81.0	85.7	93.9	105.9	108.7
70 and over	72	73.0	74.8	79.0	81.5	87.4	93.8	103.4
Total	305	74.5	76.4	80.9	86.7	94.6	102.2	107.7

TABLE 58. Percentiles of right hand grip strength by age group (n=280)

Age group (years)	No. of respondents	Percentiles in kilograms						
		5	10	25	50	75	90	95
55 - 59	100	9.0	10.7	14.2	17.6	20.3	22.5	24.5
60 - 69	116	6.8	8.9	10.5	14.0	18.4	22.2	24.3
70 and over	64	6.5	7.7	9.8	13.0	16.4	18.9	21.5
Total	280	7.0	9.0	11.0	15.7	18.8	21.7	24.1

TABLE 59. Percentiles of left hand grip strength by age group (n=280)

Age group (years)	No. of respondents	Percentiles in kilograms						
		5	10	25	50	75	90	95
55 - 59	100	7.7	8.6	11.4	15.1	18.0	21.2	22.1
60 - 69	116	4.7	5.8	7.9	12.4	16.5	19.1	21.8
70 and over	64	3.5	5.4	7.3	10.1	14.2	16.1	19.9
Total	280	5.3	6.3	9.2	12.9	16.5	19.3	21.7