# The nutritional assessment of community and institutionalised elderly in Australia

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Advances in health care have increased life span. In Australia in 1977, 9 per cent of our population or 1 266 660 persons were 65 years or older. Approximately 58 per cent of these elderly persons were female and 42 per cent male. By the year 2007 the aged dependent group, those 65 years and over, is expected to increase from 9.0 per cent to 10.5 per cent.[1] As more Australians live beyond 65 years, the health of this group will assume importance. Nutritional considerations are likely to be relevant.

Nutrient requirements vary little beyond adolescence. In Table 1 the essential nutrients for which there are dietary allowances are shown. These are for an 'average' population in Australia from 35 years to 75 years of age. The energy allowance decreases with age. Life style, psychologic and economic changes or chronic disease in the later years of life may alter dietary habits and, therefore, nutrient intake.

The older person may not be able to eat enough food because of physical problems such as frailty, poor teeth or other physical handicaps. Other factors which can lead to poor nutrition include the cost of food, poor storage facilities and lack of interest in food. Physiological factors include a decrease in salivary flow, reduced taste bud sensitivity and digestive disturbance. In the elderly biliary secretion may be reduced so impairing fat digestion and there is a gradual reduction in digestive enzyme secretion.[3] It is therefore not sufficient to provide a nutritionally adequate diet for the elderly. Optimal nutrition extends beyond this.

Table 2 summarises nutritional disorders which occur amongst the elderly.

Previous nutrition surveys on small groups of elderly Australians have indicated that older people in the community have diets deficient in certain nutrients.[4-6] In the Department of Health and Social Security (D.H.S.S.) survey of 1972, the overall frequency of anaemia was 7.3 per cent.[7] Those who lived alone had a higher incidence of anaemia than those who lived with spouse or relatives.

According to Herbert, folate deficiency is the commonest vitamin deficiency in man.[8] Various studies have shown that low concentrations of serum and red cell folate do occur amongst people over 60 years of age.[7, 9-11] There is an increased prevalence of pernicious anaemia with advancing years[12], although this may not be on a nutritional basis. Both folic acid and vitamin $B_{12}$ deficiencies give rise to neurological disorders.[13-16]

Ascorbic acid stores in many elderly people may be diminished more so in the male than female, but overt manifestations of ascorbic acid deficiency are rare. The institutionalised elderly are vulnerable to a deficiency of this vitamin.[16, 17] This is believed due to cooking methods employed in institutions and to the inadequate supply of fresh fruit and vegetables.

Deficiencies of Vitamin D leading to osteomalacia in the elderly have been reported[18-20] to be multifactorial in origin. It is believed that Vitamin D deficiency contributes to the high incidence of fractures of the neck of the femur in Britain.[21] Protein deficiency is difficult to assess but serum albumin concentrations are recognised as an index of protein status. In the D.H.S.S. Survey of 1972[7] 13 per cent of the subjects studied had serum albumin concentrations of less than 35 g/l. Overweight is a nutritional problem and occurs because of decreased activity with advancing age.

In the present study we assessed the nutritional status of a group of elderly people living independently in the Geelong region and their institutionalised counterparts.

## Methods

The community elderly were sampled by a two stage cluster technique, which we believe provided a sample representative of the elderly in the Geelong region. The procedure is summarised in Table 3. The institutionalised sample was obtained by a random selection of subjects who had been institutionalised for three months or more.

Evaluation of nutritional status was sociological, dietary, anthropometric and clinical. In this communication folate, ascorbic acid, zinc and protein status will be reported.

Both plasma and platelet ascorbic acid concentrations were measured by the method of

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**Table 1. Dietary allowances for use in Australia[2]**

| | | 35–55 years | | 55–75 years | |
|---|---|---|---|---|---|
| | *Unit* | *Male* | *Female* | *Male* | *Female* |
| Energy | M.J. | 10.46 | 7.53 | 8.79 | 6.28 |
| Protein | μg | 70 | 58 | 70 | 58 |
| Calcium | mg | 400–800 | 400–800 | 400–800 | 400–800 |
| Iron | mg | 10 | 12 | 10 | 12 |
| Retinol activity | μg | 750 | 750 | 750 | 750 |
| Thiamin | mg | 1.0 | 0.7 | 0.8 | 0.6 |
| Riboflavin | mg | 1.2 | 0.9 | 1.0 | 0.8 |
| Niacin equiv. | mg | 16 | 12 | 14 | 10 |
| Ascorbic acid | mg | 30 | 30 | 30 | 30 |
| Vitamin $B_{12}$ | μg | 2.0 | 2.0 | 2.0 | 2.0 |
| Folate | μg | 200 | 200 | 200 | 200 |

**Table 2. Nutritional disorders in the elderly**

1. Iron deficiency anaemias
2. Macrocytic anaemias
   Folic acid deficiency
   Vitamin $B_{12}$ deficiency
3. Other specific nutrient deficiencies
   Vitamin D and Ascorbic Acid
   Protein deficiency
4. Underweight
5. Overweight

**Table 3. Two stage cluster technique**

1. Random sample of collector's districts for Geelong Region;
2. From census printout, the number of people 70 years of age and over in collector's districts;
3. Names and addresses of people obtained from 2;
4. Proportionate random sample of people 70 years of age and over.

Attwood *et al.* [22]. Serum and red cell folate were measured by radio-immunoassay techniques and plasma zinc concentrations by atomic absorption spectrophotometry. The serum albumin concentrations were measured on a Centrifichem autoanalyser using the bromocresol green method.

## Results and discussion

The number of subjects for each age group are summarised in Table 4. The institutionalised subjects were older than their community counterparts.

The results of the biochemical measurements of serum and red cell folate, plasma ascorbic acid, serum albumin and plasma zinc concentrations are illustrated in Figures 1–5. The concentrations of these nutrients for the institutionalised subjects are significantly lower than for the community based subjects. In the community, the mean serum folate level was 6.8 ± 0.4 ng/ml whereas, for the institutionalised subjects it was 4.1 ± 0.3 ng/ml ($P$ 0.001). (Fig. 1 p. 175). The mean red cell folate community value was 553 ± 64 ng/ml and the institutionalised 374 ± 31 ng/ml ($P<0.01$). (Fig. 2 p.175). For red cell and serum folate concentrations, the males had a higher value than the females.

Plasma ascorbic acid concentration in the community elderly was 11.9 ± 0.9 μg/ml whilst in the institutionalised 6.8 ± 0.6 μg/ml ($P<0.001$) (Fig. 3 p.175). In both groups the male ascorbic acid values were significantly lower than the female value ($P<0.05$).

Sixty-three per cent of the institutionalised elderly had serum albumin concentrations of less than 35 g/l. Mean serum albumin for the institutionalised elderly was 34.4 ± 0.5 g/l and for their community counterparts 42.0 ± 1.5 g/l ($P<0.001$) (Fig. 4 p.175). There was no significant difference in albumin concentrations between male and female.

Plasma zinc concentration in the community elderly was 0.90 ± 0.02 μg/ml and the institutionalised 0.74 ± 0.12 ($P<0.01$) (Fig. 5 p.175).

**Table 4. Number of subjects in age groups**

| | *70–74* | *75–79* | *>80* | *Total* |
|---|---|---|---|---|
| | | *Institutionalised* | | |
| Male | 7 | 6 | 26 | |
| Female | 7 | 16 | 33 | |
| Total | 14 | 22 | 59 | 95 |
| | | *Community* | | |
| Male | 5 | 5 | 2 | |
| Female | 10 | 5 | 1 | |
| Total | 15 | 10 | 3 | 28 |

*Figure 1. Serum folate concentrations (mean ± SEM) for community and institutionalised elderly subjects. 'n' is the number of subjects. Significance of difference between community and institutionalised elderly (Student's t test) is indicated.*

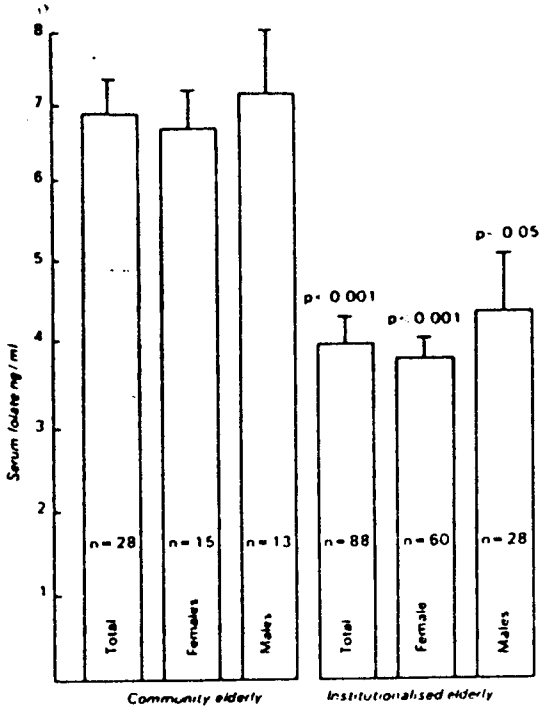



*Figure 2. Red cell folate concentrations (mean ± SEM) for community and institutionalised elderly. See Legend for Figure 1.*

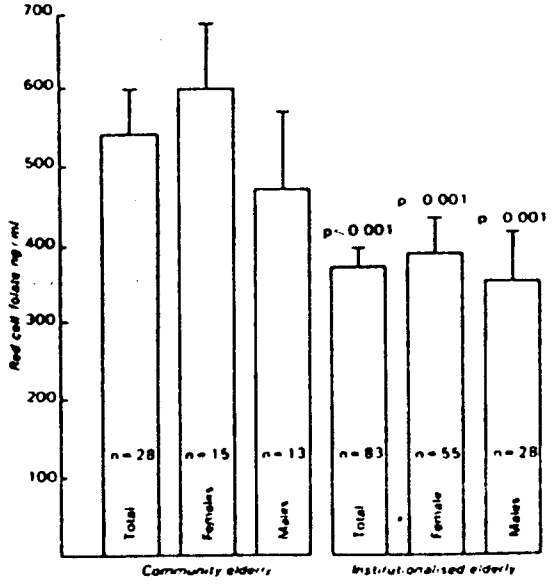



*Figure 3. Plasma ascorbic acid concentrations (mean ± SEM) for community and institutionalised elderly. See Legend for Figure 1.*

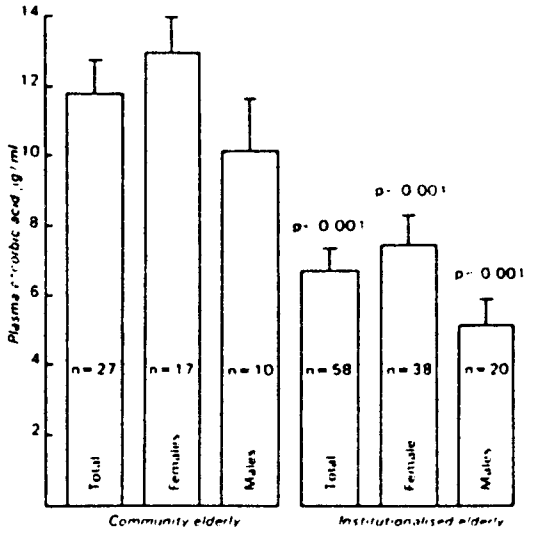



*Figure 4. Serum albumin concentrations (mean ± SEM) for community and institutionalised elderly. See Legend for Figure 1.*

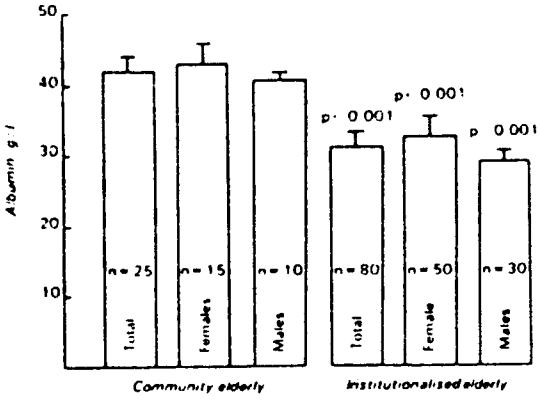
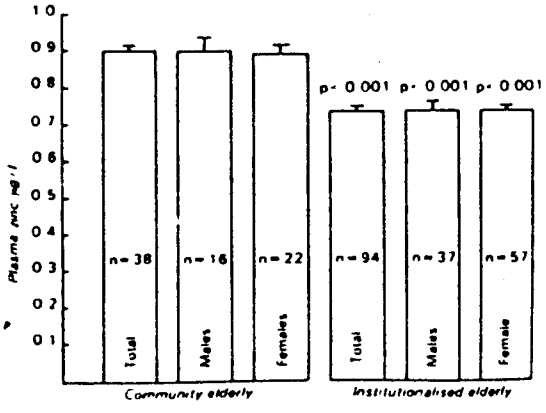



*Figure 5. Plasma zinc concentrations (mean ± SEM) for community and institutionalised elderly. See Legend for Figure 1.*



The folate and ascorbic acid status of these elderly groups agree with reports from other workers.[9-11,16] The low albumin concentrations in the institutionalised may indicate protein deficiency.[23] The zinc status of the institutionalised is inferior to that of the community elderly.

The present study demonstrates that elderly people who live independently in the community are in a good state of folate, ascorbic acid, zinc and protein nutrition. The nutritional status of the institutionalised elderly with respect to these nutrients is poor. Underlying disease may be contributory to these nutrient deficiencies.[24] However, the poor nutritional status of the institutionalised may be due to inadequate nutrient intake, which may in turn relate to catering techniques.

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