Use of dietary supplements, and awareness and knowledge of the recommended fruit and vegetable intakes and consumption of health food store customers in the Cape Town city bowl

Braun M, Venter I
Department of Agricultural and Food Sciences, Cape Peninsula University of Technology: Cape Town Campus
Correspondence to: : Irma Venter, e-mail: Venterl@cput.ac.za
Keywords: supplements; awareness; knowledge; fruit; vegetables; consumption; "5-a-day"

Abstract

Objectives: The objectives of this study were to determine the dietary supplement use and demographic characteristics of customers visiting health food stores in the Cape Town city bowl, and to determine their awareness and knowledge of the recommended fruit and vegetable intake servings and their fruit and vegetable consumption.

Design and setting: A self-administered questionnaire was completed by customers visiting two health food stores in the Cape Town city bowl.

Subjects: Participants were recruited systematically. One hundred and sixteen of the 146 invited customers participated in the survey (79.5%), but the sample consisted of 112 because four questionnaires were not completed fully.

Results: The majority of the sample (81.3%) used supplements, and 79.1% of these were regular users. The demographics of the sample and of the supplement users were mainly female and white, with a higher education, and a younger age. Vitamin (63.2%), mineral (42.5%) and herbal (42.5%) supplements were consumed most. The two main reasons for use were to supplement the diet (68.1%) and to prevent disease (59.3%). A third of the sample (33.0%) was aware of the "5-a-day" concept, while only 21.4% understood the concept. Knowledge of the recommended daily fruit (92.0%) and vegetable (47.3%) intake servings was higher than the awareness of the "5-a-day" concept, although only 65.2% and 14.3% of the respondents consumed the recommended daily servings of fruit and vegetables respectively.

Conclusions: The demographic profile of the supplement users was similar to that reported in other studies. Knowledge of the recommended daily fruit and vegetable intake servings was higher than the consumption behaviour, as fewer servings were consumed than were indicated should be consumed, especially regarding vegetable intake. More respondents who were aware of the "5-a-day" concept were consuming the recommended intake of five fruit and vegetables servings daily.

S Afr J Clin Nutr 2008;21(4):323-330

Introduction

Dietary studies confirm that there is an association between low fruit and vegetable consumption and low micronutrient intakes by adults living in South Africa.[1,2,3,4] The importance of micronutrients in disease prevention is recognised widely.[5] Since the inverse relationship between fruit and vegetable consumption and the risk for chronic diseases was first documented, research on the role of micronutrient supplements in the prevention of chronic disease has intensified. Evidence indicates that micronutrient intake from foods and supplements contributes to disease prevention and treatment.[5] Dietary supplements, some of which provide higher nutrient levels than can be obtained from food,[6] have been shown to contribute to a large proportion of the micronutrient intake of Americans.[7] Supplement users have been characterised as having a positive attitude towards their health. They might therefore intentionally seek to compensate for unhealthy behaviours by taking dietary supplements,[8] which have been seen as "insurance" for the promotion of optimal nutrition and the prevention of illness.[9] Several studies support the "inverse supplement hypothesis" that those most likely to use dietary supplements are also those least likely to need them.[9,10] The reason for this is that supplement users have been found to have higher dietary nutrient intakes than non-users of supplements.[11,12] Little is known about supplement users and their dietary behaviour in South Africa. The major aim of this survey was to determine the dietary supplement use and demographic characteristics of customers visiting health food stores in the Cape Town city bowl. A further aim was to determine their awareness and knowledge of the fruit and vegetable intake recommendations and their fruit and vegetable consumption.

Method

Conducting the survey

For the purpose of this survey, a health food store was described as a store that sells a wide variety of dietary supplements, as well as grocery products and prepared "health" foods, such as whole grains, seeds and nuts, speciality plant oils, organically produced foods, health breads, and muffins. Only three health food stores are located in the Cape Town city bowl. All three stores were approached to request the use of their premises and customers for the survey, but only two store owners/managers approved the request. Participants were recruited during the business hours of the store on all days

of the week over a period of 28 days in 2004. The participant sample was obtained systematically by inviting every third customer to participate voluntarily by anonymously completing the self-administered questionnaire. Every third customer was approached to complete the survey within a reasonable time. Statistical inferences can therefore only be made about the customers of health food stores in the Cape Town city bowl.

Prior to the administration of the survey, a pre-test of the final questionnaire was conducted. This provided an opportunity to examine and reduce potential problems in the administration of the survey. Because only a slight technical change was required in the layout of the questionnaire, in that contingency questions were changed to a box format,[13] the pilot study formed part of the formal survey. A researcher was present when the questionnaires were completed by the respondents. After completion, the questionnaires were returned to the researcher to determine completeness.

Questionnaire

The questionnaire consisted of four parts, namely, i) supplement use, ii) awareness and knowledge of the recommendations for daily fruit and vegetable intake, iii) fruit and vegetable consumption and iv) demographic information and sources of nutrition information. The questions on the use of dietary supplements were adapted from previous studies on graduate students and adults.[14,15] If the subjects used at least one supplement, they were regarded as supplement users. The supplements indicated by the respondents were categorised into the following categories: A – vitamins; B – minerals; C – herbs/botanicals; D – amino acids; E – dietary substances to supplement the diet; F – concentrates, metabolites, constituents, extracts or combinations of A, B, D, and E; and G – combinations with herbs/botanicals. To preclude incorrect categorisation of the dietary supplements, the researchers used the supplement descriptions and/or ingredients indicated in the dietary supplement definition.[16] According to the definition, herbals could also be included in Category F, thus all supplements that contained a herbal as a component in Category F were grouped separately under an additional Category G, which also included Category C. This was done to determine how many respondents were using herbal supplements (Categories C and G), which are being used increasingly.[17] The supplement users were further categorised into three groups, namely exclusive herbal users (Categories C and G), users of exclusively non-herbals (Categories A, B, D, E and F), and those using both herbals and non-herbals (Categories A, B, C, D, E, F and G). This was done to determine which types of supplements were used the most.

Questions covering awareness and knowledge of the recommendations for daily fruit and vegetable intake and consumption were included to determine whether there was an association between this awareness and knowledge and the actual consumption. It also allowed for determining whether supplement users and non-users knew what the recommended fruit and vegetable intake servings per day were and whether they consumed these recommended servings. Awareness and knowledge of the recommendations for fruit and vegetable intake were determined using the following three questions:

(i) Have you heard of "5-a-day for better health"?
(ii) How many servings of vegetables should a person consume each day for good health?
(iii) How many servings of fruit should a person consume each day for good health?

These questions had been used with success previously to determine awareness and knowledge of the recommendations regarding fruit and vegetable intake.[18,19] Fruit and vegetable consumption was determined by providing serving descriptions as a reference.[20]

The questionnaire concluded by covering demographic information and the sources of nutrition information.

Clear instructions were provided for the completion of the questionnaire. The questionnaire consisted predominantly of multiple-choice items, except where the respondents had to provide their understanding of the "5-a-day" concept, which required a short answer. Responses such as "none of the above" and "all of the above" were not included, because they often render items less effective.[21] The "don't know or unsure" response was used to eliminate guessing.

Data analysis

The data was entered into Microsoft Excel spreadsheets, where it was cleaned and imported into SYSTAT for analysis. The chi-square test was used to determine whether an association or a difference existed within variables or between data categories. Data was considered significant if the p values were less than 0.05.

Results and discussion

Study sample and demographic characteristics

Of the 146 customers invited to participate at the two health food stores, 116 (79.5%) completed the survey. Thirty of these customers did not give written consent for participation. Four questionnaires could not be used because they were not filled in completely, providing a final sample of 112 respondents. The sample was predominantly female (75.9%), white (84.7%), and English speaking (69.6%), with a tertiary education (80.4%) and aged predominantly between 20 and 39 years (53.6%) (see Table I).

Dietary supplement use

Demographic characteristics of supplement users and non-users of supplements

Most of the respondents were supplement users (81.3%). Supplement users differ from non-users in a number of ways. Supplement users are more likely to be well educated, affluent and health conscious, are less likely to smoke and drink heavily, and are likely to eat more fruit and vegetables.[4] Other studies on the users of dietary supplements also found that the demographic characteristics of supplement users were that they were mainly female,[8,11,12,14,15] white,[11,14,15] with a higher education[11,12,15] and a younger age (20 to 39 years).[8,11,14,15] Similar demographic characteristics were found in this study. The demographic characteristics of the users and non-users of supplements were comparable to those of the sample characteristics (see Table I). In addition to the characteristics of gender, ethnicity, education and age, other studies have confirmed that supplement users are more health conscious than non-users.[4,10] The 81.3% of health food store customers using supplements could thus possibly be assumed to be more health conscious than the non-users of supplements.

Table I: Demographic characteristics of the study population, supplement users and non-users and the supplement user groups

Demographics	Study population (n = 112)	Supplement users* (n = 91)	Non-users of supplements* (n = 21)	Herbal users** (n = 8)	Herbal non-users** (n = 50)	Users of both** (n = 29)
Gender						
Female	75.9% (n = 85)	62.5% (n = 70)	13.4% (n = 15)	8% (n = 7)	42.5% (n = 37)	29.9% (n = 26)
Male	24.1% (n = 27)	18.8% (n = 21)	5.4% (n = 6)	1.1% (n = 1)	14.9% (n = 13)	3.4% (n = 3)
Ethnicity						
White	84.8% (n = 95)	71.4% (n = 80)	13.4% (n = 15)	6.9% (n = 6)	50.6% (n = 44)	31.0% (n = 27)
Coloured	5.4% (n = 6)	3.6% (n = 4)	1.9% (n = 2)	2.3% (n = 2)	1.1% (n = 1)	1.1% (n = 1)
Black	0% (n = 0)	0% (n = 0)	0% (n = 0)	0% (n = 0)	2.3% (n = 2)	0% (n = 0)
Indian	7.1% (n = 8)	3.6% (n = 4)	3.6% (n = 4)	0% (n = 0)	0% (n = 0)	1.1% (n = 1)
Other (residential immigrants)	2.7% (n = 3)	2.7% (n = 3)	0% (n = 0)	0% (n = 0)	3.4% (n = 3)	0% (n = 0)
Age						
20 to 39 years	53.6% (n = 60)	41.1% (n = 46)	12.5% (n = 14)	4.5% (n = 4)	27.6% (n = 24)	19.5% (n = 17)
40 to 65 years	42.9% (n = 48)	37.5% (n = 42)	5.4% (n = 6)	4.5% (n = 4)	27.6% (n = 24)	12.6% (n = 11)
65 years and older	3.6% (n = 4)	2.7% (n = 3)	0.9% (n = 1)	0% (n = 0)	2.3% (n = 2)	1.1% (n = 1)
Highest education level						
Primary	2.7% (n = 3)	2.7% (n = 3)	0% (n = 0)	1.1% (n = 1)	2.3% (n = 2)	0% (n = 0)
Secondary	17% (n = 19)	10.7% (n = 12)	6.3% (n = 7)	1.1% (n = 1)	9.2% (n = 8)	3.4% (n = 3)
Tertiary	80.4% (n = 90)	67.9% (n = 76)	12.5% (n = 14)	6.9% (n = 6)	46% (n = 40)	29.9% (n = 26)
First language						
Afrikaans	21.4% (n = 24)	18.8% (n = 21)	2.7% (n = 3)	1.1% (n = 1)	12.6% (n = 11)	9.2% (n = 8)
English	69.6% (n = 78)	54.5% (n = 61)	15.2% (n = 17)	8% (n = 7)	36.8% (n = 32)	24.1% (n = 21)
Other (French and German)	8.9% (n = 10)	8% (n = 9)	0.9% (n = 1)	0% (n = 0)	8% (n = 7)	0% (n = 0)

*, ** Not significant at $p < 0.05$

The demographic characteristics of the three supplement user groups – users of exclusively non-herbals, users of both herbals and non-herbals, and users of exclusively herbals – were also similar to those of the sample, namely mainly white, female, having a higher education and English speaking (see Table I). Gunther et al. found that users of herbal/speciality supplements had a higher level of education than those not using any supplements.[17] In this study, it was also found that a larger percentage of the respondents using a herbal-type supplement (21.6% of herbal users and 78.4% of users of both herbals and non-herbals; n = 37) had a tertiary education (86.5%), compared to those with a secondary (10.8%) or primary (2.7%) school education (see Table I).

Regularity of supplement use and reasons for use

An overwhelming majority of the supplement users (79.1%) took supplements regularly. Regular use was equated to daily use, as indicated by the directions for use on the supplement label. Thirty-five per cent of South African dietitians indicated a daily consumption of multivitamins plus minerals.[22] In a survey of dietitians undertaken in Washington State in the 1980s, it was found that nearly 60% used a dietary supplement daily.[23] The percentage of health food store customers who consumed supplements regularly was higher than that found for South African and Washington State dietitians.

The respondents could provide more than one reason for taking supplements. The most popular reason was to supplement their food consumption (68.1%). An emerging aspect in supplement-use behaviour is the use of supplements to ensure an adequate intake of nutrients, either by subjects with restricted diets, intentionally or otherwise, or those who have concerns about farming methods reducing the nutrient quality of their food.[9] The second most popular reason was to prevent disease (59.3%). Taking supplements has been seen as a form of "insurance" to promote optimal nutrition and prevent illness.[9] Besides being used to treat disease, which was indicated by 25.3%, the other reasons (12.1%) included, in descending order, optimal functioning/maintaining health, energy needs, weight loss, muscle building, stress, pregnancy, iron shortage and taking them after using antibiotics. A small number of respondents (5.5%) indicated that they took supplements for no specific reason. In an American study on graduate students, the two main reasons indicated for taking supplements were to prevent disease and to supplement the diet.[15] A study of South African students who used dietary supplements regularly (42%) found that they used supplements mostly for physical health, body conditioning and dietary reasons.[24]

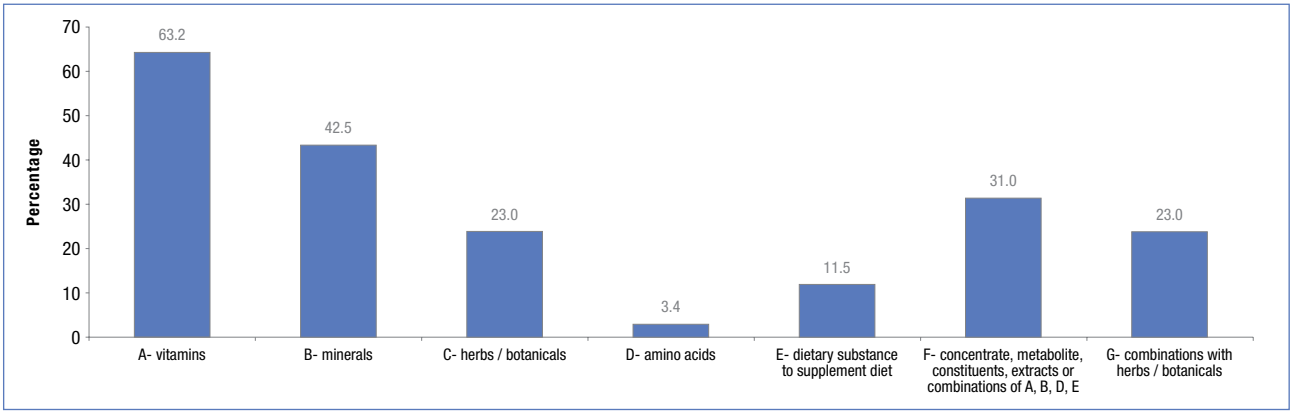
Supplements used

Four of the respondents taking dietary supplements (4.4%) did not specify the type they used, but only indicated the brand name and therefore had to be excluded from the statistical analysis, since these supplements could not be categorised. The respondents indicated all the supplements they consumed. They used a minimum of one (light users)[14] (34.5%) to a maximum of four (heavy users)[14] (65.5%) supplements. This indicates that most respondents use more than one dietary supplement and that about two-thirds of them are heavy users.

The category of dietary supplement used by 87 respondents (95.6%) is indicated in Figure 1. A total of 63.2% of the supplement users consumed vitamin or multivitamin supplements (Figure 1, Category A), while a lower percentage (42.5%) consumed mineral or multimineral supplements (Figure 1, Category B).

Coincidently, 23.0% of the supplement users consumed herbs/botanicals and supplement combinations with herbs/botanicals respectively (Figure 1, Category C and G). Most of the supplement

Figure 1: Dietary supplement category consumption



users in this study (57.5%) did not use herbals as supplements (therefore neither of the supplements in Category C or G). A third of the supplement users (33.3%) used both herbals and non-herbals, while 9.2% exclusively used herbals as supplements. Therefore, 42.5% of the supplement users consumed herb-containing supplements (consisting of the 9.2% of herbal users and the 33.3% of users of both herbals and non-herbals). This fairly high usage could be linked to the increase in use found for the herbal supplements.[17]

The herbs/botanicals consumed are listed in Table II. Several supplements that were consumed by the respondents in the VITamins and Lifestyle (VITAL) cohort study were also consumed by this sample. These include Gingko biloba (14.4%), garlic (14.1%), ginseng (6.4%), soy supplements/isoflavones (natural oestrogen) (6.4%) and lycopene (carotenoids) (1.0%).[17] Spirulina, one of many forms of blue-green algae, is a source of protein and some vitamins and minerals,[25] and was consumed by 11.5% as a dietary supplement (included in Category E). Preliminary evidence has shown that Spirulina enhances immunity, has a lipid-lowering effect, inhibits oral cancers and promotes intestinal health. Controlled clinical trials are necessary, however, to confirm these health-promoting effects.[25] Previous South African studies found that Spirulina is commonly used as a complementary and alternative medicine or as a non-vitamin and non-mineral supplement.[24,26] Procydin, used by 2.3% of the supplement users and included in Category F, is an antioxidant supplement made from grape seed extract.[27] Grape seed extract is one of the richest sources of a powerful antioxidant called proanthocyanidin, which belongs to the flavonoid group. Proanthocyanidins are especially effective in protecting the body from the harmful effects of free radicals, which have been implicated in many chronic diseases, such as Alzheimer's and Parkinson's disease, cancer and artherosclerosis.[28] No previous studies were found indicating Procydin consumption, as it is a product that is manufactured in South Africa.[27]

Amino acid dietary supplements (Figure 1, Category D) were used by 3.4%, mainly for muscle building. Although 71.3% of the supplement users said that they used dietary supplements to supplement their diet, only 11.5% consumed a dietary substance to supplement their diet (Figure 1, Category E). A third of the supplement users (31.0%) consumed a concentrate, metabolite, constituent, extract or combinations of vitamins, minerals, amino acids and/or dietary substances (Figure 1, Category F).

Awareness and knowledge of recommended fruit and vegetable intake and consumption by study sample

Awareness of concept of "5-a-day for better health"

A third of the respondents (33.0%) had heard of the concept, and 64.9% of these provided the correct meaning – "eating five fruit and vegetables each day". The remaining 35.1% who indicated that they were aware of the concept did not understand it, as they gave the incorrect meaning or could not provide a meaning. Only 21.4% of the 112 respondents therefore correctly understood the concept. The awareness among American high school students (n = 2213) in 1994 was lower (18.5%)[18] than that of this sample. Of the American students who were aware of the concept, 42% knew that it meant "eating five fruit and vegetables a day".[18] Levels of awareness increase with time.[29] It could be assumed that the awareness of the "5-a-day" concept among the American students would have increased from 1994 to 2004. In a South African study that determined the nutrition knowledge of urban black and white South Africans (n = 180), these two groups respectively indicated that experts had advised them to eat 2.5 and 3.0 servings (representing the group means) of fruit and vegetables per day, which is below the recommendation of five servings.[30] In a United Kingdom study of 1 024 adults between the ages of 55 and 64 years, 63% of the women and 28% of the men correctly estimated the recommended intake of at least five servings of fruit and vegetables a day.[31] Not one of these two latter studies, however, determined the awareness of the concept itself, but only questioned the daily recommended number of fruit and vegetable servings thought to be adequate.

Table II: Herbs/botanicals consumed by respondents (n = 37)

Barley green (n = 3; 8.1%)	Ginseng (n = 1; 2.7%)
Barley grass (n = 1; 2.7%)	Green tea tablets (n = 1; 2.7%)
Barley life (n = 3; 8.1%)	Hawthorn berry (n = 1; 2.7%)
Carotenoids (n = 1; 2.7%)	Herbal teas (n = 3; 8.1%)
Cruciferous (n = 1; 2.7%)	Herbal tinctures (n = 1; 2.7%)
Echinacea (n = 1; 2.7%)	Herbal remedies (n = 1; 2.7%)
Flavonoids (n = 1; 2.7%)	Milk thistle (n = 2; 5.4%)
Garlic (n = 2; 5.4%)	Natural oestrogen (n = 1; 2.7%)
Garlic parsley (n = 1; 2.7%)	Natural herbs (n = 1; 2.7%)
Gingko Biloba (n = 1; 2.7%)	Star flower (n = 3; 8.1%)

Knowledge of the recommended daily fruit and vegetable intake servings

A significant association ($p < 0.001$) was found between knowledge of the recommended daily fruit and daily vegetable intake servings. A total of 47.3% of the respondents knew that the number of servings of vegetables to be consumed for good health was three to five and more, while 98.1% of these also knew that consuming two to four and more servings of fruit was adequate. The remaining 1.9% indicated that one serving of fruit was sufficient. Of the respondents, 48.2% indicated that two to four servings of vegetables should be consumed for good health, with 92.6% who also knew that the adequate fruit consumption was two to four servings. The remaining 7.4% indicated that one serving was sufficient. Nearly five per cent of the respondents (4.5%) indicated that one serving of vegetables was sufficient for good health, and 20.0% of these indicated that the adequate fruit servings were two to four and more, while the remaining 80.0% indicated that one serving of fruit was sufficient. In general it appeared that knowledge regarding the recommended vegetable intake servings (three to five and more) (47.3%) in this study was 50% lower than that of the recommended fruit intake serving (two to four and more) (92.0%).

In a previous South African study, 45.0% of urban black women were able to correctly identify the recommended number of servings of fruit a day (two to four servings).[32] Thirty-seven per cent also correctly identified that three to five vegetable servings is the daily recommendation, while 47% thought that one vegetable serving per day was the optimal recommendation. In this study, only 4.5% of the respondents thought that one vegetable serving per day was the recommended intake. The knowledge of the recommended fruit and vegetable consumption found in this study was higher than that of the urban black South African women, namely 92.0% and 45% for fruit and 47.3% and 37% for vegetables respectively.[32] Taken as a whole, it can be assumed that the health store customers in this study were more informed about the recommended number of fruit and vegetable servings than the average urban black woman. This assumption can be supported by the finding that this sample consisted mainly of supplement users (81.3%), who are considered to be more health conscious than non-users of supplements.[10]

Fruit and vegetable consumption

A significant association ($p < 0.001$) was found between the fruit and vegetable consumption of the respondents, as indicated in Table III. Those respondents who consumed inadequate (zero to one) fruit and vegetable servings (18.8%) were more than those respondents who consumed adequate fruit (two to four) and vegetable (three to five and more) (14.3%) servings daily. The respondents who consumed two to four servings of vegetables and adequate servings of fruit daily (38.4%) could adhere to the recommendations of the "5-a-day" concept if they consumed a daily minimum of five fruit and vegetables. If those respondents consuming adequate fruit and vegetable servings (14.3%) and those that could be consuming five fruit and vegetable servings (38.4%) daily were added, 52.7% of the respondents were consuming the recommended five servings of fruit and vegetable each day. Thus half of the sample could be adhering to the recommendations. The South African Food Based Dietary Guidelines encourage South Africans to "eat plenty of vegetables and fruits every day". Consumption of at least five portions (400 g) of fruit and vegetables each day has become established as a manageable, minimum recommendation by numerous international and national health promotion agencies, producers and retailers.[33]

Table III: Fruit and vegetable consumption of sample*

Fruit consumption**	Vegetable consumption**					
	3 to 5 and more servings		2 to 4 servings		0 to 1 serving	
	N	%	N	%	N	%
2 to 4 servings	16	14.3	43	38.4	14	12.5
0 to 1 serving	0	0	18	16.1	21	18.8
Total	**16**	**14.3**	**61**	**54.5**	**35**	**31.3**

* N = 112
** Significant at $p < 0.001$

In a previous study conducted on the adult population of South Africa (n = 2000), 28% of the respondents reported that they consumed the recommended four portions of fruit and vegetables daily.[3] At the time the study was conducted, the recommendations for fruit and vegetable consumption were four servings.[3] About 17% clearly consumed an inadequate amount of fruit and vegetables, as reflected by low frequencies and few portions per week.[3] In this study, 18.8% of the respondents were consuming inadequate servings of fruit and vegetables daily, a fact that is in close correspondence with the above-mentioned study.

Awareness of the concept of "5-a-day for better health" of the sample compared with their fruit and vegetable consumption

A significant association ($p < 0.05$) was found between awareness of the "5-a-day" concept and the vegetable consumption of the respondents (see Table IV). More respondents who were aware of the concept (21.6%) than those who were unaware of the concept (10.6%) consumed the adequate daily servings (three to five and more) of vegetables. Furthermore, the respondents had greater awareness of the concept (33.0%) than actual consumption of the adequate daily vegetable servings (14.3%).

Table IV: Awareness by the sample of the "5-a-day for better health" concept compared with their fruit and vegetable consumption

	Aware of concept*		Unaware of concept*	
Vegetable consumption*	N	%	N	%
0 to 1	3	2.7	32	28.6
2 to 4	26	23.2	35	31.3
3 to 5 and more	8	7.1	8	7.1
Total	**37**	**33.0**	**75**	**67.0**
Fruit consumption**	Aware of concept**		Unaware of concept**	
0 to 1	6	5.4	33	29.5
2 to 4 and more	31	27.7	42	37.5
Total	**37**	**33.0**	**75**	**67.0**

*, ** Significant at $p < 0.05$

A significant association ($p < 0.05$) was also found between awareness of the concept and the fruit consumption of the respondents (see Table IV). More respondents who were aware of the concept (83.8%) consumed the two to four daily fruit servings than those who were unaware of the concept (56.0%). Overall, those respondents who were aware of the concept consumed more fruit and vegetables than those who were unaware of the concept.

Knowledge of the recommended daily fruit and vegetable intake servings of the sample compared with their consumption

A significant association ($p < 0.001$) was found between actual vegetable consumption and knowledge of the recommended number of vegetable servings. A total of 47.3% of the respondents knew that three to five and more servings should be consumed daily for good health, while 13.4% consumed these servings. A quarter of the respondents (25.0%) consumed two to four servings of vegetables and 8.9% consumed zero to one serving, which is inadequate. Furthermore, 48.2% of the respondents thought that two to four servings should be consumed daily for good health, while 0.9% consumed adequate servings (three to five and more), 29.5% consumed two to four servings and 17.9% consumed zero to one serving. Five per cent of the respondents (4.5%) indicated that one serving was sufficient for good health and consumed this number. More respondents knew that the recommended vegetable intake was three to five and more servings compared to those who actually consumed this number of servings (47.3% and 14.3% respectively).

A significant association ($p < 0.001$) was also found between the actual fruit consumption and knowledge of the recommended daily fruit intake servings. Ninety-two per cent of the respondents knew that the recommended daily servings of fruit were two to four and more, of whom 65.2% consumed these servings, while 26.8% consumed zero to one serving, which is inadequate. Eight per cent of the respondents thought that one serving was sufficient for good health and consumed this inadequate amount. In general, knowledge of the recommended fruit intake was higher than the actual servings consumed by the respondents. Ninety-two per cent of the respondents knew that the recommended fruit servings are two to four and more daily, while only 65.2% consumed these servings.

Despite the significant associations found between knowledge of the recommended daily fruit and vegetable intake servings and the actual consumption, there was a tendency amongst the sample to consume less fruit and vegetables than what they knew should be consumed. A total of 46.4% of the respondents knew the recommendations for both an adequate fruit and vegetable intake, while only 14.3% consumed these servings. Just fewer than 27% of the respondents (26.8%) knew that they should consume two to four and more servings of fruit daily, but they were not consuming these servings. Thirty-four percent of the respondents knew that they should consume three to five and more servings of vegetables daily, but were not consuming these servings. Thus knowledge of the recommended intake serving of the respondents did not correspond with their consumption behaviour.

Knowledge of the recommended daily fruit and vegetable intake servings of the supplement group and their consumption of fruit and vegetables

Supplement users versus non-users

No significant differences were found between the supplement users and non-users regarding their awareness of the "5-a-day" concept, their knowledge of the recommended fruit and vegetable intake servings and their fruit and vegetable consumption.

Supplement user groups

No significant differences were found between the three supplement user groups – the users of exclusively non-herbals, the users of both herbals and non-herbals and those using exclusively herbals – regarding their awareness of the "5-a-day" concept and their knowledge of the recommended vegetable servings, as well as their fruit and vegetable consumption. A significant difference ($p < 0.05$) was found for their knowledge of the recommended number of fruit servings (Table V). Fifty-four per cent of the non-herbal supplement users knew that they should consume two to four and more servings of fruit daily. Only 31.0% of the users of both herbals and non-herbals and 8.0% of the herbal users were aware of the recommendation, indicating that the non-herbal supplement users had the highest knowledge of the recommendation.

Table V: Knowledge of the recommended daily fruit intake servings of the supplement user groups

Knowledge of the recommended daily fruit servings*	Supplement user groups*					
	Non-herbal		Herbal and non-herbal		Herbal	
	N	%	N	%	N	%
2 to 4 servings	47	54.0	27	31.0	7	8.0
0 to 1 serving	3	3.4	2	2.3	1	1.1
Total	**50**	**57.4**	**29**	**33.3**	**8**	**9.2**

* Significant at $p < 0.05$

Herbal supplement users

As most users of herbal supplements (89.7%) (eight users of exclusively herbals and 29 users of both herbals and non-herbals) had a tertiary education, it could be assumed that they would be aware of the "5-a-day" concept and know the recommended daily fruit and vegetable servings. However, this was not the case. Only 27.0% of the herbal supplement users were aware of the "5-a-day" concept and only 40.5% knew that consuming three to five and more servings of vegetables was adequate. However, a high percentage of the herbal supplement users (91.9%) knew that two to four and more servings of fruit should be consumed.

A greater percentage of the herbal supplement users were consuming two to four servings (51.4%) than zero to one or the recommended three to five and more servings (35.1% and 13.5% respectively) of vegetables daily. A total of 59.5% of the herbal supplement users consumed two to four and more servings of fruit, while 40.5% consumed zero to one serving. A cohort study found that adults consuming low-fat diets or five or more daily servings of fruit and vegetables were more likely to use herbal and speciality supplements.[17] In this study, 13.5% and 59.5% of the herbal supplement users respectively consumed three to five and more vegetable servings and two to four and more fruit servings. Thus the herbal supplement users did not consume significantly more fruit and vegetables, as was found in the cohort study.[17] No significant differences were found between the three supplement user groups regarding their fruit and vegetable consumption.

Sources of nutrition information

A total of 79.5% of the respondents indicated that they got their information from lay books and articles in magazines. This was followed by family and friends (61.6%) and printed material (such as brochures) (60.7%) as sources. Fifty-five per cent of the respondents (55.4%) indicated that food and dietary supplement advertisements were a source of nutrition information. Approximately half of the respondents also indicated that health food store personnel (51.8%)

and health personnel (medical and health professionals) (50.0%) were sources. A previous study (n = 394) found some discrepancy between the sources of nutrition information and the reported degree of trust placed in the various sources. Only about half of the respondents (48.5%) in that study, as was found in this study, had received nutrition information from a health professional, yet it was trusted "a lot" as information source by the respondents (91.1%) in that study.[32]

A total of 45.5% of the respondents indicated radio talks and TV programmes as sources, while 87.5% had received nutrition information from at least one media source (TV, radio and magazines), with magazines being the major source. Ninety per cent of the black urban South African woman in the cross-sectional descriptive study also had received nutrition information from at least one media source [TV (73%), radio (72%), magazines (66%) and newspapers (40%)].[31] These respondents placed the majority of their trust in TV (68%) and radio (65%), whereas the written media were regarded as less trustworthy (45%). The media encourages consumers to use dietary supplements and cannot be ignored in efforts to improve public understanding of nutritional issues.[15] Unfortunately, the quality of much of the media information available to the public is a cause for some concern.[14]

A total of 38.4% of the respondents had received their nutrition information from formal books, 25.0% from public lectures and 10.7% from formal lectures. These three sources were not assessed in the South African study on black urban women, although 33% preferred the source of nutrition information to be talks, discussions or workshops in community halls/centres or clinics/health centres.[32]

Conclusions and recommendations

Health food stores predominantly sell dietary supplements, grocery products and other prepared foods associated with healthy eating. Studies have found that many of the lifestyle characteristics of supplement users are health related, such as not smoking, being physically active, having an optimal body weight and consuming alcohol in moderation.[8,11] The majority of the customers visiting the health food stores in the Cape Town city bowl were supplement users and could thus be considered health conscious. The demographic characteristics of the supplement users, namely female, white, with a higher education and a younger age (20 to 39 years), resemble the supplement user profile identified in other studies. An overwhelming majority regularly used supplements, with intake ranging from one to four products. Most users were heavy supplement users, taking four products. The most frequently used were vitamins, followed by minerals and herb-containing supplements. Many of the herbal supplements, however, lack scientific support for the claims made regarding their efficacy.[25] Dietary supplements were used predominantly to supplement the diet and for disease prevention, which are reasons also indicated in other studies.

The consumption behaviour of the respondents did not correspond with their knowledge of the recommended fruit and vegetable intake, as fewer fruit and vegetable servings were consumed than what the respondents indicated should be consumed. Most users indicated their reason for consuming dietary supplements as supplementing their food consumption, and were possibly intentionally compensating for their behaviour.[8] Although no significant differences were found between the supplement users and non-users regarding their awareness of the "5-a-day" concept, knowledge of the recommended fruit and vegetable intake servings and their fruit and vegetable consumption, supplement users seemed to be more aware and consumed more fruit and vegetables than non-users of supplements, which could also support the "inverse supplement hypothesis". An association was found between awareness of the "5-a-day" concept and fruit and vegetable consumption. More respondents aware of the "5-a-day" concept consumed the recommended five fruit and vegetable servings. Thus awareness needs to be raised, as South Africans are not aware that they should eat five servings of fruit and vegetables each day for good health.[30]

No significant differences were found between the different supplement user groups regarding their awareness of the concept and knowledge of the recommended vegetable intake servings and their fruit and vegetable consumption. It seemed, however, that the users of non-herbal supplements generally had superior knowledge than the users of both herbals and non-herbals and the users of exclusively herbals. Also, more non-herbal supplement users seemed to be consuming adequate fruit and vegetable servings than the users of both herbals and non-herbals and those who used only herbals. It is as a result recommended that future supplement studies, in the light of the popularity of herbal supplements, consider why the users of herbal supplements, may be less likely to consume adequate fruit and vegetable servings.

The public media were the most frequently indicated source of nutrition information among the health food store customers. Although this is not the most reliable source of information,[14] the media are the most informative sources for South Africans regarding nutrition.[32] The media could be used to raise awareness of the recommended fruit and vegetable intake servings and, with time and effort, possibly help to increase fruit and vegetable consumption as awareness and knowledge increase. It is important to make people aware of their low consumption of fruit and vegetables as the first step to promoting higher consumption.[33]

To our knowledge, the present study is the first investigation in South Africa into the use of dietary supplements by customers of health food stores and of their demographics and aspects of their dietary behaviour. Other studies conducted in South Africa looked at the supplement use of dietitians[22] and university students[24] and at alternative and complementary medicines.[26] To our knowledge, the determination of the awareness and understanding of the "5-a-day" concept was the first investigation thereof in South Africa. Generalisation of the results is limited, however, as we only focused on individuals visiting health food stores. A broader survey covering the general public is recommended in this regard.

Acknowledgements

The Cape Peninsula University of Technology is acknowledged for financial assistance, as is Mr JC Lombard, who undertook the statistical analysis of the data. The health food store owners/managers and their customers are also thanked for making the survey possible.

References

1. Langenhoven ML, Steyn K, Van Eck M, Gouws E. Nutrient intake in the coloured population of the Cape Peninsula. Ecol Food Nutr 1988;22:97–106.
2. Bourne LT, Langenhoven ML, Steyn K, Jooste PL, Laubscher JA, Van Der Vyver E. Nutrient intake in the urban African population of the Cape Peninsula, South Africa. The Brisk Study. Centr Afr J Med 1993;39:238–46.

3. Langenhoven ML, Wolmarans P, Jooste PL, Dhansay MA, Benadé AJS. Food consumption profile of the South African adult population. S Afr J Sci 1995;91:523–8.
4. Block G, Sinha R, Gridley G. Collection of dietary-supplement data and implications for analysis. Am J Clin Nutr 1994;59(suppl):232S–9S.
5. Labadarios D. The role of micronutrient supplementation in chronic disease. S Afr J Clin Nutr 2002;15(suppl):S19.
6. White E, Patterson RE, Kristal AR, Thornquist M, King I, Shattuck AL, Evans I, Satia-Abouta J, Littman AJ, Potter JD. Vitamins and Lifestyle Cohort Study: study design and characteristics of supplement users. Am J Epidemiol 2004;159:83–93.
7. Satia-Abouta J, Patterson RE, King IB, Stratton KL, Shattuck AL, Kristal AR, Potter JD, Thornquist MD, White E. Reliability and validity of self-report of vitamin and mineral supplement use in the Vitamins and Lifestyle Study. Am J Epidemiol 2003;157:944–54.
8. Ishihara J, Sobue T, Yamamoto S, Sasaki S, Tsugane S, for the JPHC Study Group. Demographics, lifestyles, health characteristics, and dietary intake among dietary supplement users in Japan. Intern J Epidemiol 2003;32:546–53.
9. Kirk S, Woodhouse A, Conner M, and the UK Woman's Cohort Steering Group. Beliefs, attitudes and behaviour in relation to supplement use in the UK Woman's Cohort Study (UKWCS). Proc Nutr Soc 1998;57:54A.
10. Kirk SFL, Cade JE, Barrett JH, Conner M. Diet and lifestyle characteristics associated with dietary supplement use in woman. Pub Health Nutr 1999;2:69–73.
11. Slesinski MJ, Subar AF, Kahle LL. Dietary intake of fat, fiber and other nutrients is related to the use of vitamin and mineral supplements in the United States: the 1992 National Health Interview Survey. J Nutr 1996;126:3001–8.
12. Lyle BJ, Mares-Perlman JA, Klein BEK, Greger JL. Supplement users differ from nonusers in demographic, lifestyle, dietary and health characteristics. J Nutr 1998;128:2355–62.
13. Babbie E. Conceptualisation and instrument design. In: Babbie E, ed. Survey research methods. Belmont: Wadsworth; 1990:119–45.
14. Levy AS, Schucker RE. Patterns of nutrient intake among dietary supplement users: attitudinal and behavioural correlates. J Am Med Assoc 1987;87:754–60.
15. Driskell J. Vitamin-mineral supplementation habits and beliefs of male and female graduate students. J Fam Cons Sci 1999;91:99–103.
16. Dietary Supplement Health and Education Act of 1994. 108 Stat. 4325. Public Law 103-417, United States Congress.
17. Gunther S, Patterson RE, Kristal AR, Stratton KL, White E. Demographic and health-related correlates of herbal and speciality supplement use. J Am Diet Assoc 2004;104:27–34.
18. Beech BM, Rice R, Myers I, Johnson C, Nicklas TA. Knowledge, attitudes, and practices related to fruit and vegetable consumption of high school students. J Adol Health 1999;24:244–50.
19. Stables GJ, Subar AF, Patterson BH, Dodd K, Heimendinger J, Van Duyn MS, Nebeling L. Changes in vegetable and fruit consumption and awareness among US adults: results of the 1991 and 1997 5 A Day for Better Health Program surveys. J Am Diet Assoc 2002;102:809–17.
20. Seizer FS, Whitney EN. Nutrition tools – standards and guidelines. In: Seizer FS, Whitney EN, eds. Nutrition: concepts and controversies. Belmont CA: West/Wadsworth, ninth edition; 2003:40–1.
21. Gronlund NE. Writing selection items: multiple choice. In: Gronlund NE, ed. How to make achievement tests and assessments. Needham Heights, MA: Allyn and Bacon, fifth edition; 1993:40–61.
22. Steyn NP, Labadarios D, Nel JH, Robertson H-L. Development and validation of a questionnaire to test knowledge and practices of dieticians regarding dietary supplements. Nutr 2005;21:51–8.
23. Worthington-Roberts B, Breskin M. Supplementation patterns of Washington State dieticians. J Am Diet Assoc 1984;84:795–800.
24. Steele M, Senekal M. Dietary supplement use and associated factors among university students. S Afr J Clin Nutr 2005;18:17–30.
25. Sarubin A. The health professional's guide to popular dietary supplements. Chicago: American Dietetic Association; 2000.
26. Singh V, Raidoo DM, Harries CS. The prevalence, patterns of usage and people's attitude towards complementary and alternative medicine (CAM) among the Indian community in Chatsworth, South Africa. BMC Compl Altern Med 2004;4:1–7.
27. Anon. 2004. Procydin Super Antioxidant by Value Added Life. Available from http://www.procydin.com/ (Accessed 21/02/2005). (Subsequently available from http://www.valueaddedlife.com/index.php?page=shop.product_details&flypage= shop.flypage&product_id=11&category_id=2&manufacturer_id=0&option=com_virtuemart&Itemid=9&vmcchk=1&Itemid=9 Accessed 22/08/2008.)
28. Bagchi D, Bagchi M, Stohs SJ, Das DK, Ray SD, Kuszynski CA, Joshi SS, Pruess HG. Free radicals and grape seed proanthocyanidin extract: importance in human health and disease prevention. Toxicol 2000;148:187–97.
29. International Food Information Council. 2002. Functional foods: attitudinal research. http://www.ific.org/research/funcfoodsres02.cfm?renderforprint=1 (Accessed 13/10/2004).
30. Peltzer K. Nutrition knowledge among a sample of urban black and white South Africans. S Afr J Clin Nutr 2004;17:24–31.
31. Baker AH, Wardle J. Sex differences in fruit and vegetable intake in older adults. Appetite 2003;40:269–75.
32. Charlton KE, Brewit P, Bourne LT. Sources of nutrition information among black urban South African woman, with a focus on messages related to obesity. Publ Health Nutr 2004;7:801–11.
33. Love P, Sayed N. Eat plenty of vegetables and fruits everyday. S Afr J Clin Nutr 2001;14:S24–S32