The Health Education Authority's health and lifestyle survey 1993: who are the low fruit and vegetable consumers?

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Abstract

Study objective—Firstly, to determine the demographic and behavioural characteristics of low fruit and vegetable consumers. Secondly, to investigate whether knowledge and attitudes are barriers to consumption of fruit and vegetables.

Design—Cross sectional survey: an interviewer administered questionnaire was used to assess the demographic, knowledge, attitude, and behavioural characteristics of the respondents.

Setting—England.

Participants—Random sample of 5553 men and women aged between 16 and 74 years. Response rate 70%.

Main results—The main demographic characteristics of the respondents identified as low consumers of fruit and vegetables (less than daily consumption of either fruit or vegetables) were age, sex, and smoking status. The adjusted odds ratios were 2.59 for those aged 16–24 years compared with those aged 45–74 years, 2.17 for men compared with women, and 1.77 for current smokers compared with never smokers. The most important knowledge and attitude statements after adjusting for the demographic variables were disagreeing with the statement “healthy foods are enjoyable” (odds ratio 1.90) and agreeing with the statement “I don’t really care what I eat” (odds ratio 1.76). The impact of knowledge seemed less important than attitudes about a healthy diet in characterising a low fruit and vegetable consumer.

Conclusions—These findings are relevant to future strategies for improving intake of fruit and vegetables, but demonstrate the complexity of interventions required, and the dangers inherent in assuming simplistic relations between psychosocial factors and behaviour.

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endorsed by the COMA report on Nutritional Aspects of the Development of Cancer.⁵ However, a higher level of 400 g to 800 g of fruit and vegetables per day was advocated by The World Cancer Research Fund in 1997.⁶

People who respond to health messages may differ from those who do not in terms of their knowledge about healthy eating, their attitudes towards foods, and their capacity to achieve changes in their eating behaviour.⁷ Access to healthy foods, economic circumstances, food preparation skills, and cultural and social influences all play a part in determining diet.⁸ To increase the effectiveness of health promotion programmes aimed at increasing fruit and vegetable consumption, the characteristics of the groups of the population who do or do not meet the recommended intakes need to be identified. Once the low consumers have been identified there needs to be further understanding of their knowledge of the benefits of and attitudes towards eating more fruit and vegetables.

There is evidence that those who are on a low income, are less educated or have a manual occupation are more likely to have a less healthy diet than those on a higher income, better educated or in non-manual occupations.^{9–11} People who smoke also consume less fruit and vegetables.¹² Research to date has focused on describing behaviour with less attention being paid to the effect that knowledge and attitudes have on behaviour. In the USA a baseline survey before the introduction of the “5 A Day” campaign showed that very few people knew that five portions a day were necessary for health. The survey also reported that psychosocial factors such as liking the taste, and childhood habits were more important determinants of consumption than demographic variables alone.¹³ There is increasing evidence that different approaches to health education targeted at specific sections of the population may be necessary to promote changes in dietary behaviour in different groups.⁸

The aims of this paper are firstly to investigate the profile of low consumers of fruits and vegetables in terms of demographic and behavioural factors; and secondly, to look at the factors limiting achievement of the targets such as knowledge and attitudes. For this purpose we have used data from the Health Education Authority's Health and Lifestyle Survey 1993, a representative sample of the English population. It was not a primary objective of the survey to investigate the profile of

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low fruit and vegetable consumers, thus this is an exploratory analysis.

Methods

The survey instrument and sample procedure were designed by the Health Education Authority who then commissioned a market research agency to conduct the fieldwork between May and September 1993 in England only. The survey methodology and primary results have been published elsewhere.¹⁴ A random probability survey using a nationally representative sample of 386 census enumeration districts (selected at random from all possible districts within a geographical region) within England was conducted. The survey included persons aged between 16 and 74 years of age. The sample was stratified by the eight regional Health Authorities or NHS regions within England.

A letter was sent from the Health Education Authority to each address included in the survey to explain the purpose of the survey and to inform people that an interviewer would call to visit them. The sample addresses were screened by interviewers and those that were identifiable as invalid (non-residential, vacant, demolished, etc) were eliminated from the sample. Addresses were screened for multiple households and if necessary a Kish grid¹⁵ was used to select households and the person within the household to be interviewed.

Of the 7887 eligible subjects, 1419 refused to be interviewed (18%); 601 (8%) could not be contacted even after repeated attempts; 314 were not interviewed because they were too ill or had moved away since the original screening. Interviews were conducted with 5553 respondents, 70% of the 7887 eligible subjects.

All respondents completed a face to face interview covering their (and their households) demographic characteristics, smoking, and nutrition. All interviewers were trained before undertaking the interviews and were given a detailed manual for guidance. Data on food consumption was obtained using a short food frequency questionnaire that had been calibrated by comparison with a four day weighed record.¹⁶ The dietary questionnaire covered 32 food items or food groups and measured intake over a usual week. The interview took about three quarters of an hour to complete.

COMBINED FRUIT AND VEGETABLE CONSUMPTION

Respondents reported the number of times a week they consumed fruit (fresh, frozen or canned) and vegetables (excluding potatoes and pulses). Possible answers were less than 1 a week, 1–2 a week, 3–5 a week or, 6 or more a week. These frequencies were then given a score of 0, 1.5, 4, and 6 respectively and an overall figure for consumption of fruit and vegetables was computed. Low fruit and vegetable consumers were defined as those respondents reporting consumption of either fruit or vegetables eight times a week or less. The remainder were defined as higher consumers. It should be noted that those respondents classified as higher consumers may, however, not be consuming the recommended intakes of fruit

and vegetables. The cut off figure of eight was chosen to indicate approximate daily consumption of fruit or vegetables.

DEMOGRAPHIC AND BEHAVIOURAL VARIABLES

The following variables were included; age, sex, education, employment, occupation, smoking status, receipt of benefits (including housing benefit, income support and family credit), region of residence, tenure, room where meals were usually eaten, marital status, and, use of a car. No data were available on physical activity or diets prescribed for medical conditions. Although questions were asked about household income because of a large proportion of missing data this information was not used.

KNOWLEDGE AND ATTITUDE VARIABLES

Questions about knowledge included the health benefits of a healthy diet and whether respondents considered that fruit and vegetables are part of a healthy diet. Attitudes or barriers to healthy eating were classified as agree or disagree with the following statements: "healthy eating is just another fashion"; "it's not easy to eat healthy food if you eat out"; "eating healthy food is expensive"; "healthy foods are enjoyable"; "the tastiest foods are the ones that are bad for you"; "I get confused over what's supposed to be healthy and what isn't"; "experts never agree about what foods are good for you" and "I don't care what I eat".

STATISTICAL ANALYSIS

Data were weighted by a factor that took into account age, sex, region, and household type (using 1991 Census data¹⁶) to the general population. The analysis was carried out in two phases, firstly to characterise the low fruit and vegetable consumers in terms of demographic variables and behaviour, and secondly to analyse the differences in knowledge and attitudes after adjusting for the demographic variables. The χ^2 test was used to test for differences between demographic, knowledge and attitude variables in the univariate analysis.

Two stepwise logistic regression models were used to compare differences between low and higher fruit and vegetable consumers. In the first model demographic and behavioural factors were entered to determine the overall profile of the low fruit and vegetable consumers. Dichotomous variables were computed with the exception of age, where age groups 16–24 and 25–44 were compared with 45–74 year olds; education where those with no formal qualifications or O levels were compared with A levels and higher; and smoking habit where smokers and ex-smokers were compared with never smokers. The odds ratios with 95% confidence intervals are presented for variables with a likelihood ratio test statistic p value of 0.05 or less. The same procedure was carried out for the second phase to determine differences in knowledge and barriers between the groups after adjusting for the behavioural and demographic variables. Data were analysed using SPSS for windows version 7.5. Results are expressed as odds ratios greater

Table 1 Demographic characteristics of low fruit and vegetable consumers

Variable	Category	Number of subjects	Low consumers (%)	* Crude Odds ratio	† Adjusted odds ratio	95% confidence intervals
Age (y)	45–74	2376	36	1.00	1.00	
	25–44	2224	51	1.79	1.75	1.52, 2.02
	16–24	922	62	2.87	2.59	2.11, 3.18
Sex	Female	2782	38	1.00	1.00	
	Male	2740	55	1.95	2.17	1.92, 2.46
Smoking	Never smoked	1839	41	1.00	1.00	
	Ex-smoker	2097	40	0.96NS	1.02	0.87, 1.18
	Current smoker	1520	61	2.21	1.77	1.51, 2.08
Room usually eat meals in	Any except living room in front of television	3958	42	1.00	1.00	
	Living room in front of television	1556	58	1.97	1.66	1.44, 1.90
Region reside in	South	2864	41	1.00	1.00	
	Midlands/North	2657	52	1.55	1.51	1.33, 1.70
Education	A levels or higher	1742	40	1.00	1.00	
	O levels or equivalent	2146	50	1.47	1.40	1.21, 1.63
	No formal qualifications	1603	48	1.38	1.47	1.24, 1.75
Income support	No	5010	45	1.00	1.00	
	Yes	511	64	2.25	1.28	1.01, 1.63
Use of a car	Yes	4280	43	1.00	1.00	
	No	1234	60	1.99	1.23	1.04, 1.47
Tenure	Own/mortgage	4176	42	1.00		
	Rent	1235	62	2.30		
Employment	Working, retired, in fulltime education, or looking after home	5339	46	1.00		
	Unemployed	182	63	2.15		
Housing benefit	No	5227	46	1.00		
	Yes	294	63	2.00		
Occupation	Non-manual	2811	39	1.00		
	Manual	2274	54	1.80		
Marital status	Married or living with partner	3692	42	1.00		
	Single, widowed or divorced	1892	56	1.74		
Family credit	No	5424	46	1.00		
	Yes	98	57	1.53		

* NS, not statistically significant ($p \geq 0.05$). Forward stepwise logistic regression analysis with low consumption of fruit and vegetables (dependent variable), odds ratios are adjusted for other variables in the model. Variables with no values did not meet the entry criteria for the model ($p < 0.05$).

than one for ease of interpretation, however, actual categories were determined before entry into the model.

The research was approved by the appropriate ethics committees and conformed to the principles embodied in the Declaration of Helsinki.

Results

Forty six per cent of respondents were classified as low fruit and vegetable consumers (fruit or vegetables eight or fewer times a week).

Table 1 shows the demographic and behavioural characteristics of the respondents who were classified as low or higher fruit and vegetable consumers. The unadjusted values are shown as per cent of low consumers of fruit and vegetables and as a crude odds ratio. The largest differences in proportion of low consumers were seen for age where 62% of 16–24 year olds were classified as low consumers, compared with only 36% of 45–74 year olds. The low consumers of fruit and vegetables were more likely to rent rather than own their property, to be unemployed, not have use of a car and be a current smoker rather than an ex-smoker or never smoker than higher consumers.

Table 2 Knowledge and attitude characteristics of low fruit and vegetable consumers

Variable	Category	Number of subjects	% Low consumers	*Crude odds ratio	†Adjusted odds ratio	95% confidence intervals
Knowledge	Included vegetables as part of a healthy diet	Yes	4061	44	1.00	
		No	1460	54	1.53	
	Fruit and vegetables reduce chance of CHD	Agree	2644	42	1.00	1.11, 1.53
		Disagree	2877	51	1.45	1.02, 1.35
	Included fruit as part of a healthy diet	Yes	3894	44	1.00	
Attitudes		No	1627	53	1.45	
	Healthy foods are enjoyable	Agree	5070	45	1.00	
		Disagree	382	66	2.41	1.43, 2.51
	I don't really care what I eat	Disagree	4626	42	1.00	
		Agree	895	67	2.77	1.44, 2.16
	I get confused over what's supposed to be healthy	Disagree	3565	42	1.00	
		Agree	1956	54	1.65	1.17, 1.58
	Experts never agree about what foods are good for you	Disagree	3935	46	1.00	
		Agree	1586	47	1.02NS	1.13, 1.58
	Healthy eating is just another fashion	Disagree	4548	44	1.00	
		Agree	974	59	1.89	1.07, 1.56
	The tastiest foods are the ones that are bad for you	Disagree	2143	42	1.00	
		Agree	2798	53	1.56	1.10, 1.47
	Eating healthy food is expensive	Disagree	3374	42	1.00	
		Agree	2147	53	1.53	1.06, 1.42
	It's not easy to eat healthy foods if you eat out	Disagree	1890	49	1.00	
		Agree	3631	45	1.07NS	

* NS, not statistically significant ($p \geq 0.05$). † Forward stepwise logistic regression analysis with low consumption of fruit and vegetables (dependent variable), odds ratios are adjusted for other variables in the model which include the demographic variables included in table 1. Variables with no values did not meet the entry criteria for the model ($p < 0.05$).

The adjusted odds ratio shows the effect when all the variables are entered into the logistic regression model. The most important determinants of being a low fruit and vegetable consumers were being aged between 16–24 years compared with 45–74 years, male compared with female and a current smoker compared with an ex or never smoker. Other important determinants were eating meals in front of the television and living in the North or Midlands. To a smaller extent, lack of education, in receipt of income support and no use of a car predicted low fruit and vegetable consumption. Occupation group, marital status, tenure, employment and other benefits did not help discriminate between low and higher fruit and vegetable consumers once the other factors had been taken into account.

Table 2 presents the differences in knowledge and attitudes between low and higher fruit and vegetable consumers. The unadjusted analysis showed that of those who agreed that fruit and vegetables can reduce your chance of getting heart disease only 42% were low consumers. Two thirds of those who disagreed that healthy food was enjoyable were low consumers compared with 45% of those who agreed. Two thirds of those who agreed that they didn't care what they ate were low consumers compared with 42% who disagreed with the statement. Those that agreed rather than disagreed with the statements "eating healthy food is expensive", "the tastiest foods are bad for you", "healthy food is just another fashion", and "I get confused about healthy eating" were more likely to be low consumers.

The adjusted odds ratio predicts the knowledge and attitudes of the low consumers' group taking into account the demographic and behavioural differences between the groups. The regression analysis showed that when all factors were taken into account the attitude statements were more important than the knowledge statements in discriminating between low and higher consumers of fruit and vegetables. The most important attitude statement in the regression analysis for being a low fruit consumer was disagreeing with the statement that healthy foods were enjoyable. Other important barriers were; "I don't care what I eat", where low consumers were more likely to agree than higher consumers; and "I get confused over what's supposed to be healthy" where low consumers were more likely to agree than higher consumers. Other less important barriers were agreeing "healthy eating is just another fashion" and "experts never agree".

To test the robustness of the data the final logistic regression models were re-run with different cut offs for low fruit and vegetable consumers. When a cut off of 10 was used adjusted odds ratios for disagreeing with the statements "healthy foods are enjoyable", "I get confused over what's supposed to be healthy" and agreeing with the statement "I don't care what I eat" were 1.56, 1.41 and 1.58 respectively. When a cut off of 5.5 was used the corresponding adjusted odds ratios were 1.68, 1.64, 2.04.

KEY POINTS

- Low consumers of fruit and vegetables are more likely to be young, male or current smokers than higher consumers.
- Attitudes about healthy diets were more important than knowledge about a healthy diet.
- Important attitude statements were not liking healthy foods and no concern of what is eaten.

Discussion

This paper reports differences in knowledge, attitudes and behaviours between low and higher fruit and vegetable consumers using the Health Education Authority's Health and Lifestyle Survey for 1993. This study shows that the low consumers of fruit and vegetables were younger, more likely to be male and to smoke than higher consumers. After taking into account differences in demographic characteristics the lower consumers were more likely to disagree with the statement "healthy foods are enjoyable" and more likely to agree with the statement "I don't really care what I eat".

There are some limitations to this study. Firstly, although the response rate was high it is possible that some people with less healthy lifestyles did not complete the questionnaire. Comparison of the data from the Health and Lifestyle Survey with the 1991 census showed a similar age and region of the country profile. However, the survey showed a higher proportion of women compared with men (58% women for survey and 52% for the census). This could reflect a higher response rate from women. Thus if respondents with less healthy lifestyles were less likely to respond to the survey this may lead to an underestimate of the size of the odds ratios.

Secondly, the assessment of fruit and vegetable consumption is rather crude despite using a validated questionnaire.¹⁶ Precise estimates of number of portions per day were not possible. Therefore it is not possible to calculate the actual consumption of fruit and vegetables of the two groups. In general, people tend to over estimate their consumption of fruit and vegetables when completing food frequency questionnaires compared with weighed records¹⁸. It is quite likely that the actual cut off between the two groups is less than eight times a week. By using an interviewer administered questionnaire respondents may have answered questions the way they felt the interviewer would want them to answer. To test the robustness of the results the final model incorporating demographic, knowledge, and attitude variables was re-run with cut off of 10 and 5.5 in both cases healthy foods are enjoyable, I don't care what I eat and I get confused over what's supposed to be healthy were all important in determining who the low consumers were. Although we cannot be precise over the absolute value of the cut off the comparison of low and higher consumers is stable over a number of cut off values.

Some information regarding physical activity and those following prescribed diets as well as

complete data on income would have helped give a more complete picture of the low consumers.

We have assumed a higher fruit and vegetable intake is an indicator of a healthy diet. This is justified from the published literature that shows that diets high in fruits and vegetables are correlated with healthy dietary habits.^{19 20}

The results confirm the findings of other studies that have shown that being young or male are important determinants of low fruit and vegetable consumption.^{19 21 22} Similarly other studies have also shown a lower fruit and vegetable intake in the north compared with the south of England. However, these results show that education is a more important discriminator between low and higher consumers than occupation. The relation between fruit and vegetable consumption and smoking habit has been reported previously, smokers consume less fruit and vegetable than non-smokers.¹²

The comparison of attitude statements between the groups showed that for low consumers the perception that healthy foods were not enjoyable was most important. Perhaps related to this attitude is not caring what you eat, significantly more low consumers expressed this view. For each of the group of statements relating to confusion about what is healthy, healthy eating being just a fashion, and experts never agreeing, the low consumers were all more likely to agree, indicating a lack of clarity in the health information received about healthy eating.

In contrast with other studies the perception that eating healthily is more expensive seemed to be a less important barrier in this study. The small difference between low and higher fruit and vegetable consumers in healthy food is expensive is surprising as other studies have shown cost of fruit and vegetables to be an important barrier.^{22 23} We have not used any indicators of income in the analysis, as although data on income were collected, 20% of respondents refused to complete the question. Despite this lack of information low consumers probably have a lower income as they are more likely to be unemployed, receiving benefits, younger and less qualified than the higher fruit and vegetable consumers. While price is an important factor, it may be an oversimplification to assume that it is universally so. Studies of nutrition in low income families have shown that some families on a low income are able to purchase and prepare nourishing meals, relying on basic ingredients including fruits and vegetables, while others on similar incomes find this more difficult, suggesting that other factors must be involved.⁸

These results concur with those found in the US survey where only a third of the population believed that price affected decisions to eat fruit and vegetables. In the US study the lowest consumers were similarly male, young adults and persons with low income and education.¹³ The most important factors for identifying low consumers of fruit and vegetables were knowledge of the number of portions necessary for health, liking the taste and whether they have

been in the habit of eating fruit and vegetables since childhood. Their recommendations included emphasising the number of portions in educational campaigns. In contrast, our results show that many low consumers are aware that they eat too little, and so knowledge alone is clearly not sufficient.

An important finding is the increased chance of being a low fruit and vegetable consumer if meals are eaten in front of the television in the living room compared with other rooms. This may reflect a larger reliance on convenience foods easily cooked in the microwave, and a reduction of eating meals with the family. Vegetables are perhaps more easily eaten if cooked for the whole family rather than being cooked at different times for each member of the family. Eating meals with other people may affect the types and amounts of food eaten. De Castro²⁴ reported that the presence of other people increases the amount eaten in meals by extending the time spent at the meal. The influence of other people on dietary behaviour is seen by the regression analysis on factors affecting purchases that showed that the food choices of partners were important factors in food choices, particularly so for the lower consumers.

These findings are relevant to future strategies for improving intake of fruit and vegetables, but demonstrate the complexity of interventions required, and the dangers inherent in assuming simplistic relations between psychosocial factors and behaviour. There is a clear need for continued education about the health benefits of fruit and vegetables, and the quantities that should be consumed. Clarity and specificity of information is important, particularly for those contemplating making changes, and those who feel they have changed, but are still perhaps eating less than desirable amounts. The evidence from studies assessing Stage of Change and fruit and vegetable intake shows that the high proportion of the population are precontemplative, that is not thinking or caring about the issue, has been borne out by the attitudes of the low consumer group in this sample.²⁵ Awareness raising strategies should be targeted appropriately to young men, and to smokers, emphasising not only the health benefits, but that eating fruit and vegetables can be enjoyable.

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