Introduction

Current recommendations are to reduce the average proportion of fat in the population’s diet to 35 per cent of food energy. If this is to be achieved it will need to be balanced by an increased consumption of energy from other sources. The Committee on Medical Aspects of Food and Nutrition Policy (Department of Health, 1994) recommended that this reduction in fat intake should be achieved by increases in consumption of staple starch-rich foods such as bread, potatoes, rice and pasta as well as fruit and vegetables. Previous studies suggest that there is a reciprocal relationship between intakes of fat and sugar, that is those achieving low fat intakes (35 per cent energy or less) do so by consuming a diet relatively high in sugars rather than in complex carbohydrates (Department of Health, 1989; Gibney et al., 1989). An increase in the consumption of starchy foods would require reversal of the dietary trends of at least the past five decades during which time intakes of starch-rich, traditional staples such as potatoes and bread have seen large declines and intake of starchy foods in general has fallen (MAFF, 1991; 1998). During the years 1941-1946 the average consumption of bread was 245g/person/day but this fell to only 107g in 1996. Consumption of potatoes has followed a similar pattern; until the mid-1950s fresh potato consumption exceeded 1.6kg/person/week (MAFF, 1991) and this has fallen to approximately 0.8kg/person/week (MAFF, 1998). Total starch intake in 1990 was 156g and 106g for men and women respectively and provided 24 per cent of daily energy intake; one third of total starch was consumed as bread and potatoes (Gregory et al., 1990). To achieve dietary targets for fat will require major changes to the UK diet and reversal of the decline in the intake of starchy foods.

There may be specific health advantages in consuming larger amounts of starchy foods as distinct from their role as an energy substitute for fats (Cummings and Englyst, 1992). An increased intake of starchy foods may reduce the risk of dental caries, cardiovascular disease, colorectal cancer and diabetes (Cummings and Englyst, 1992; Burn et al., 1992).
A family-based intervention to increase consumption of starchy foods

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1998; Mathers and Daly, 1998) and there may be health benefits in greater intakes of a wide range of micronutrients including iron and folic acid now used extensively in the fortification of breakfast cereals.

Consumer knowledge of the desirability, in terms of health gain, of a reduced fat diet appears to be good, but translation into food habits is poor as per cent energy from fat remains largely unchanged (MAFF, 1998). The majority of consumers may consider that they have already reduced their fat intake despite continuing to consume a diet high in fat (Lloyd et al., 1993). There is evidence of confusion over the fat content of common foods particularly those high in starch (Mela, 1993). For some consumers the term “starchy foods” and “fattening” are synonymous.

Success in meeting the dietary target for reduction in fat intake is likely to depend on an understanding of the influences on food choices. Reported barriers to dietary change include family attitudes to foods, financial constraints and risks associated with trial of new foods (Dobson et al., 1995), unfamiliarity with foods and poor confidence in cooking skills. Reports have indicated the value of “cook and eat” groups and the opportunity for risk-free trial of foods (National Food Alliance, 1994; National Food Alliance, 1996). However, to date evaluation has been limited and has excluded the effect of such approaches on food choices and dietary intake. Evaluation of such interventions is needed both to provide evidence of the effectiveness of methods to promote change and to investigate the process by which consumers are able to achieve change.

In 1997 MAFF funded this 3½-year family-based intervention study to investigate the factors influencing consumption of complex carbohydrate in the form of foods rich in starch and to determine whether, and how, existing barriers could be overcome. The family offers an attractive setting in which to investigate the barriers to change in that it recognises that the home environment contributes 70-75 per cent of all food consumption (MAFF, 1998; Adamson et al., 1996; Loughridge et al., 1989) and that family attitudes and finances are major influences on food choice. It also provides an opportunity to investigate different age and gender groups simultaneously.

**Aim**

The study was designed to identify and determine the factors influencing consumer food choice, to measure the acceptability of foods and diets high in starch and to determine the process of change by which consumers adopt a diet high in complex carbohydrates.

**Methods**

The study is assessing the acceptability and adoption of a diet rich in starch by families over a period of three months and sustained acceptability and adoption of such a diet after six months. For the purposes of this study, a family is defined as a household with any number of adults and at least one child aged less than 16 years. Families, living in enumeration districts (ED) in Newcastle in the middle three quintiles of the Townsend Deprivation Index (Townsend et al., 1988), are identified (facilitated by the Health Authority listings of GP registrations) and approached for recruitment. Our target is to recruit 168 families to go forward to intervention. Change is being measured from diet at baseline (T0) and diet at three months (T1) and at six months (T2). Families found at baseline to be achieving the dietary targets of less than 35 per cent energy from fat and more than 29 per cent energy from starch are not entered into the interventions but are investigated by questionnaire and interview (sub-set) to elicit information on successful dietary strategies and other characteristics of “achievers”. All other families are entered at random (based on ED) into one of three interventions delivered in local community centres by community dietitians.

**Intervention A – health fair**

This is a one-off family health event focusing on the health benefits of starchy foods. It is designed to be interactive and provides plans for personal change, recipes and food samples to eat and to trial at home.

**Intervention B – cook and eat groups**

A series of four cooking groups for adults (plus a separate single session for children) is offered. The groups focus on skills and experience in an informal setting, providing
personal plans for change, recipe files and food samples to eat and to take home.

Intervention C – intensive intervention
Families are invited to participate in all intervention A and B events and are also given individualised advice (initial visit) based on T₀ food diaries. Personalised targets for change are negotiated, targets are monitored during the intervention (mid-way contact) and are reviewed at the end of the intervention (final visit).

Data collection
Data collection methods include both quantitative and qualitative methods at T₀, T₁ and T₂. Dietary data are collected by three-day food diary followed by an interview during which portion sizes are ascribed facilitated by a food portion atlas (Nelson et al., 1997). Heights and weight are measured at the interview along with waist and hip measurements in adults only. Urine collections (24 hours with PABA validation) are made on one day during food diary recording and fasting blood samples (adults only) are collected at T₀, T₁ and T₂. Questionnaires, designed for adults and young people for self-completion at each data collection point, include both qualitative and quantitative questions. These gather contextual, knowledge and attitudinal data on issues considered pertinent in promoting dietary change and focus on shopping habits, decision making, food preparation, attitude and knowledge in relation to food and starch-rich foods, health and dietary change. The questionnaires also collect demographic data. Questions based on the psychological models; stage of change (Prochaska and DiClemente, 1986), self-efficacy (Ajzen and Fishbein, 1980) and theory of planned behaviour (Ajzen, 1985) are included to assess the predictive power of the models in relation to dietary change, specifically an increase in starch-rich foods. Data are also being collected on the acceptability of the interventions. A sub-sample of families is selected at random for in-depth interview (at T₀ and T₁) with the family and with the main food provider. These interviews explore early life influences and the decision-making process for food choice within the family.

Knowledge of starchy foods
In development and testing of questionnaires it became apparent that it would be essential to assess subjects’ understanding of what are “starchy foods” and also the proportion of a meal which needs to be starch-rich foods to meet recommendations (Health Education Authority, 1996a). These data are fundamental to the interpretation of responses to questions about starchy foods. A “Starch Finder” and a “Meal Identifier” were developed to assess this at baseline. The “Starch Finder” includes 30 common foods from which subjects are asked to identify foods they consider rich sources of starch (to avoid possible bias in completing food diaries and questionnaires, subjects are also asked to identify protein-rich foods and foods high in Vitamin C). The “Meal Identifier” uses photographs of a meal with varying proportions of starch as potato (Health Education Authority, 1996b); subjects are invited to select the photograph they believe to contain the appropriate proportion of starchy food.

Sensory evaluation
In a separate, but similar, study population the initial acceptability of foods rich in starch is being assessed using sensory tests in a food laboratory setting. Three common starchy foods (potato, bread, and pasta), each presented in three forms, are assessed by the volunteer family members who are asked to rate different sensory characteristics (e.g. appearance and taste) on visual analogue scales and to circle words from “word scatters” (e.g. tasty, dry and boring) which they associate with particular starchy foods.

Results
Recruitment and compliance
Recruitment into the study is taking place in five phases and all interventions run concurrently in each phase. Families in phases 1 to 3 have completed the intervention and phase 4 subjects are being recruited at the time of writing. To avoid any potential influence of knowledge of outcomes on the delivery of the interventions in later phases, no interim analysis of change has been undertaken. However, baseline data have been analysed from 77 families (254 individuals) in phases 1 and 2. Of these
families, 13 per cent (ten of the 77) were found to meet the dietary targets for both fat and starch intakes, so did not proceed to the interventions. Participation in the interventions and assessments has been good with more than 80 per cent of the families attending at least part of the intervention offered, and only 6 per cent of families completing the intervention but failing to complete the T1 questionnaire.

Attitudes to starchy foods
Subjects (adults and young people aged ten to 15 years) were asked whether they agreed or disagreed with statements commonly associated with starchy foods, e.g. bread, potatoes, pasta and rice. In general, attitudes to starchy foods were positive (Table I). The majority of adult respondents believed that the starchy foods listed represented good value for money, were not difficult to prepare, taste good and are of good nutritional value. Although there was general agreement that these foods were not fattening and that most people should eat more of these foods, 15 per cent and 17 per cent of adults believed these two statements, respectively, not to be true. In addition 19 per cent of adults thought these foods were boring. For young people, 24 per cent considered these foods boring and 21 per cent that they are fattening.

Knowledge of the main food provider
Initial analysis of T0 food diaries, questionnaires and “Starch Finder” has focused on the main food provider (as identified by the family). There was no significant relationship between the knowledge of what is, and what is not, a starchy food of the main food provider and the percentage of energy provided by starch, sugars or fat in the corresponding family’s diet. Subjects were asked to assess the healthiness of their own diet and then to give reasons for their self-assessment. For many, quantity/frequency of consumption of fruit and vegetables was given as an indicator of “healthiness” and none of the responses included the words “starchy foods” or “starch”, although single starch-rich foods were included, e.g. bread and pasta. There was no relationship between perceived “healthiness” of the family diet and the percentage energy contributed by starch, sugars or fats.

Discussion
Understanding of the term “starchy food”
Early analysis of baseline data indicates that the term “starchy foods” is not nearly as well understood by the public as other food groupings such as “fruit and vegetables” and that while there is, in general, a positive attitude to starchy foods these are not commonly associated with “healthiness”. “Starchy foods” are not a homogeneous group of foods with many, such as pies and cakes, being high in fat or sugar as well as starch. It appears that knowledge of what is and is not a starchy food, at least by the main food provider, does not translate to a family diet high in starch and low in fat.

Work in progress
Since analysis of outcomes from the three interventions being tested in this project and of the process of any change will not be undertaken until the end of the interventions, it is too early to report any results from any dietary change achieved by families following the interventions. It is also too soon to

Table I Adult and young person (ten to 16 years) responses to question about starchy foods “Thinking about foods such as bread, potatoes, pasta and rice, please could you say whether in general you agree or disagree with the following statements”

<table>
<thead>
<tr>
<th>Statement</th>
<th>Adults</th>
<th>Young people</th>
</tr>
</thead>
<tbody>
<tr>
<td>These foods are poor value for money</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>These foods taste good</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>These foods have very little nutritional value</td>
<td>11</td>
<td>NA</td>
</tr>
<tr>
<td>These foods are good for you</td>
<td>87</td>
<td>81</td>
</tr>
<tr>
<td>These foods are fattening</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>These foods are boring</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>These foods fill you up</td>
<td>88</td>
<td>74</td>
</tr>
<tr>
<td>These foods should be the main part of all meals</td>
<td>65</td>
<td>NA</td>
</tr>
<tr>
<td>These foods are difficult to cook</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>These foods take a long time to prepare</td>
<td>4</td>
<td>NA</td>
</tr>
<tr>
<td>Most people should eat more of these foods</td>
<td>73</td>
<td>62</td>
</tr>
</tbody>
</table>

Note: NA – these questions were not asked in the young person questionnaire.
identify what further work will be needed before any of the interventions can be transferred to the health promotion arena. However, it is apparent in this early stage that this novel family-based project will provide detailed socio-economic, psycho-social, biological and behavioural information on the factors which allow or prevent individuals or families adopt lower fat, higher starch diets.

References


Health Education Authority (1996a) (in association with the Department of Health and the Ministry of Agriculture, Fisheries and Food), The Balance of Good Health, Health Education Authority, UK.

Health Education Authority (1996b), The Balance of Good Health Information Pack, Health Education Authority, UK.


