

# Primary care professionals and social marketing of health in neighbourhoods: a case study approach to identify, target and communicate with 'at risk' populations

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**Aim:** In this article the authors illustrate using a case study approach how primary care professionals can use the combination of geodemographic data with hospital episode statistics (HES) to predict the location of people 'at risk' of diabetes mellitus (Type 2 diabetes) in the population of England. This approach facilitates social marketing of those 'at risk'. **Method:** Geodemographic segmentation data for all households was combined with HES for 2001–2002, to predict population groups 'at risk' of Type 2 diabetes. Using a case study approach and quantitative data analysis techniques, a profile of the undiagnosed and 'at risk' population of Slough Primary Care Trust was created at town, ward and street levels. Recent literature on social marketing was applied to predicate a discussion of the theory and practice of social marketing that was most likely to succeed in dealing with the prevention of Type 2 diabetes, via the reduction of obesity and overweight in the population. **Discussion:** The increase in lifestyle-related diseases, such as, Type 2 diabetes that are linked with the rise in overweight and obesity and create large disease management costs for the National Health Service (NHS) are of great concern to primary healthcare professionals and governments throughout the westernized world. Until recently, public and government responses have been very reactive in respect of population groups most in need of lifestyle change. Approaches to the identification of 'sub-populations' most at risk of Type 2 diabetes and targeting of these is of direct relevance to the preventive work of primary care professionals. **Conclusion:** Geodemographic data overlaid onto official NHS and other routinely collected data, can aid the identification and targeting of groups most vulnerable to overweight and obesity, through social marketing approaches including direct mail, telephone canvassing and door-to-door communication channels.

**Key words:** geodemographics; hospital episode statistics; MOSAIC; resources; social marketing; Type 2 diabetes

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## Introduction: Type 2 diabetes, lifestyle and the 'Obesity Time bomb'

Type 2 diabetes and obesity are inextricably linked (Diabetes UK, 2005). Around 1.8 million people

in the UK have been diagnosed with diabetes and 90–95% of these cases are Type 2 diabetics (Diabetes UK, 2005). In the UK and other westernized countries the proportion of overweight and obese adults and children is increasing rapidly. While the trend has been upwards for decades, levels of obesity have increased at an alarming rate through the 1990s and 2000s in particular. In England, successive National Diet and Nutrition surveys in 1987 and 2001, have

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indicated steep rises in levels of overweight and obese people in just a few short years. In 1987, obesity prevalence rates of 8% in men and 12% in women were recorded. By 2001, prevalence increased to 17% of men and 20% of women (Office of National Statistics, 2003). The Health Survey for England in 2002 indicated that 41% of men and 33% of women were overweight and 25% of men and 20% of women were obese (Department of Health, 2003). Diabetes UK estimate that a further one million people in the UK have Type 2 diabetes, but are unaware of this and are undiagnosed.

Obesity is defined through calculation of Body Mass Index (BMI). This is a person's weight in kilograms divided by the square of the person's height in metres. In the UK, people with a BMI between 25 and 30 are categorized as overweight, and those with an index above 30 are categorized as obese (Royal College of Physicians *et al.*, 2004). The rising tide of obesity has recently been described as a health time bomb that needs defusing (Chief Medical Officer, 2002). Increased prevalence of overweight and obese adults is of great concern to governments because of the link with ill-health through diseases, such as Type 2 diabetes, some cancers, coronary heart disease, chronic ill-health, renal failure, osteoarthritis, foot problems and eye problems. Type 2 diabetes has increased in the younger population creating potential resource allocation problems for the public sector. Future disease management is likely to be a very costly process for the National Health Service (NHS) in England if measures are not taken to reduce it soon (Wanless, 2004). As a result, tackling obesity is now regarded as of paramount importance by governments in developed countries, not just in the UK, but worldwide (International Obesity Taskforce, 2002; World Health Organisation, 2004). While the debates about causes and treatments go on, government and public bodies in the UK have united around practical measures to tackle obesity as an urgent public priority and to invite the population to become 'fully engaged' with their own good health. The opportunity cost of not achieving full-engagement was estimated in the first Wanless Report at £20 billion by 2022 (Wanless, 2002).

## Social marketing

Primary healthcare professionals are increasingly interested in 'social marketing' as a way of tackling

health problems that are considered 'preventative' and have an unequal spread in the population. The link between health and social marketing is complex and multi-levelled, but there has been work establishing a theoretical dimension to marketing as a positive force for better health, via the 'social marketing paradigm' (Hastings and Saren, 2003; National Social Marketing Centre for Excellence, 2005). Lefebvre and Flora (1988) (cited in Naidoo and Wills, 2005) propose the key components of social marketing as consumer orientation, identification of key audience through segmentation and analysis, voluntary and mutually beneficial exchange, formative research, clear objective setting, channel analysis, a marketing mix of product, place, promotion and monitoring evaluation. In particular, as these authors point out, marketers are keen to influence consumer behaviour – in this case the need is to influence people to adopt healthier eating and exercise habits to avoid obesity (Lefebvre and Flora, 1988; Naidoo and Wills, 2005).

This article is primarily concerned with the idea of market segmentation or grouping people together. Segmentation based on a range of attributes is central to effective social marketing (Lefebvre and Flora, 1988; Naidoo and Wills, 2005). While the language of public health discourse may not express it in these terms, the idea of 'market segmentation', is now increasingly commonplace in public health policy. In particular, there is a realization that achievement of the Derek Wanless fully engaged scenario depends upon the engagement of 'deprived and marginalized' communities; if it is to be successful. Some sections of the population experience barriers that thwart and prevent attempts to live healthy lifestyles because the circumstances and context of their lives are not conducive to health improvement. The Department of Health White Paper 'Choosing health – Making healthy choices easier' not only recognizes that people need supportive environments within which to change behaviour, but also the need for individually tailored health improvement plans (Department of Health, 2004). 'Choosing Health' recognizes the implementation of personalized 'health guides' that is practical plans for improving individual health that fit into the context of peoples lives (Department of Health, 2004). In addition, it argues for the importance of context in an individual healthy lifestyle acknowledging that this includes a whole host of socio-economic and socio-cultural factors, as well

*Primary Health Care Research and Development* 2007; 8: 22–35

as peoples' own attitudes and beliefs surrounding good health.

### **Tackling obesity – bringing together public health prevention policy and social marketing**

The emphasis on prevention and health promotion and the close relationship between health and social marketing are central themes of the recent White Paper (Department of Health, 2004). The White Paper may, in a sense, be viewed as a marketing strategy which stimulates demand for health, provides accessible and credible information, guarantees a supply of local services or healthier products and ensures a local environment that makes healthy choice easier (House of Commons Health Committee, 2004). However, there is also recognition that making healthy choices is easier for some people than others and in the case of obesity, we can begin by examining socio-environmental factors and their impact on the obesogenic environment. A complex multi-layered environment is revealed, with four groups of factors contributing to increased obesity levels identified. These are: firstly the presence of 'at risk' groups in terms of medical and socio-economic factors; secondly, the presence of conditions likely to contribute to obesity levels, for example, poverty, social marginalization. Thirdly, the prevalence of risk behaviours, for example, low levels of physical activity, high-energy diets, or poor diets. Finally the presence of psychological or environmental risk factors, for example, lack of social support, exposure to food advertising, poor access to healthy food (Mulvihill and Quigley, 2003).

If, as current health policy identifies, social marketing is an important approach in future behavioural change strategies, then it is vital that market segmentation and targeting are effected as precisely as possible. This may mean segmentation that is achieved using a large number of relevant population characteristics.

The central purpose of this article is to illustrate to an audience of primary care professionals, the worth of 'an approach' to identification and targeting of 'at risk sub-populations' for Type 2 diabetes in a preventative sense. The approach combines a segmentation database of the UK population with health services data, to give direction to public health policy on reduction of Type 2 diabetes in the

*Primary Health Care Research and Development* 2007; **8**: 22–35

diagnosed and undiagnosed population in a targeted and appropriate way. From a health marketing perspective, this gives public policy makers and health professionals a platform for 'understanding well-being' and a practical targeting tool from which a social marketing strategy can be designed. Hence in this article we combine geodemographic data with hospital episode statistics (HES) data recorded in 2001–2002 for Type 2 diabetes (strongly linked to overweight and obesity), to generate detailed geodemographic profiles of population groups at national, city, town, ward and street levels. Our aim is to illustrate a useful approach in an appropriate way for primary care professionals and not to re-explore the previously reported Slough case study (Farr and Evans, 2005).

Geodemographic data can be applied to understand the context in which tailored behavioural interventions could be designed and how and where resources might be targeted to deliver behaviour change with social marketing initiatives. At the present time, geodemographic profiling combined with routine NHS data has not been widely used in a predictive manner to identify 'Type 2 hotspots' at various levels of population aggregation.

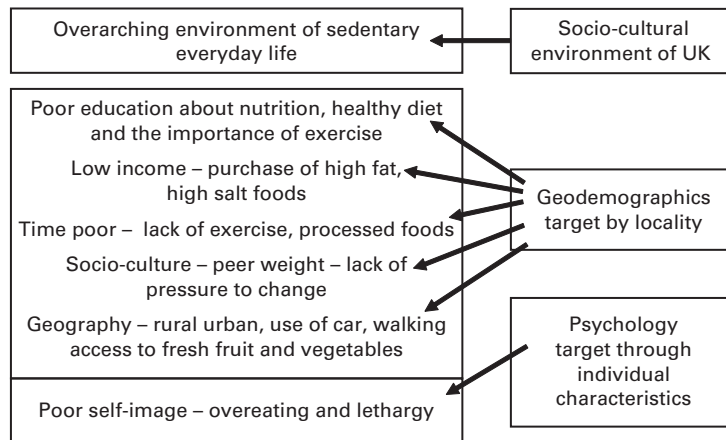
The authors see this work as a first step in demonstrating how existing social marketing and public health policy theory can be deployed in the 'obesity field'. A pre-understanding of the socio-environmental factors underpinning obesity allows us to consider more in-depth models that could underpin the creation of health intervention programmes that may have a chance of success. Figure 1 is tentatively proposed as an explanation of how demographics and 'psychographics' (an individual's psychological and attitudinal make-up) may underpin behaviours linked to Type 2 diabetes and obesity.

### **Research design and methods**

A predictive, secondary data analysis was run using HES of Type 2 diabetes for 2001–2002 with 61 appended geodemographic MOSAIC groups and type codes for all households in England.

### **GB HES for Type 2 diabetes 2001–2002**

This dataset contains entries for 12.8 million overnight hospital admissions to all hospitals in Great Britain (GB) in 2001–2002. Each data record for admissions contains a diagnostic code indicating



**Figure 1** Factors leading to obesity

the health problem that necessitated an overnight stay in hospital. HES also record patient date of birth, ethnicity, Primary Care Trust (PCT) code, general practitioner (GP) code, local authority code and postal code.

### **MOSAIC geodemographic classifications for all GB households**

#### *Geodemographic dataset – MOSAIC UK*

MOSAIC UK is a commercial dataset owned by Experian Ltd. The household version of MOSAIC groups households together into clusters described according to their geographic and demographic characteristics. Household MOSAIC is based on census data, housing and financial data. A total of 400 variables are used to build MOSAIC profiles and some of these are updated annually. These variables have been selected as inputs to the classification on the basis of their volume, quality, consistency and sustainability. In order to be included into the classification data must meet one or more of four criteria. First, that it allows identification and description of consumer segments that are not necessarily distinguished solely by the use of Census data. Second, the data ensures accuracy of the MOSAIC code by either household address or postcode. Third, data is current and lastly it improves discrimination of segments and allows for the identification of a wide range of consumer behaviours. Fifty-four per cent of the data used to build MOSAIC is sourced from the 2001 Census. The remaining 46% is derived

from a consumer segmentation database, which provides coverage of all of the UK's 46 million adult residents and 23 million households using the Electoral Roll, lifestyle survey information, consumer credit activity, post office address file, Shareholder's Register, house price and council tax information and Office of National Statistics local area statistics. MOSAIC classifies consumers by household or by postcode which allows optimization of use of the segmentation depending on application.

### **Procedure**

The MOSAIC data is linked to the HES information using a simple postcode link. To maximize the match-rate the postcodes are forced across eight digits in each file. For example W1 1AA becomes W\_\_1\_1AA. Where postcodes have changed a retrospective file is also held that makes it possible to update old postcodes which may have been entered on the HES file.

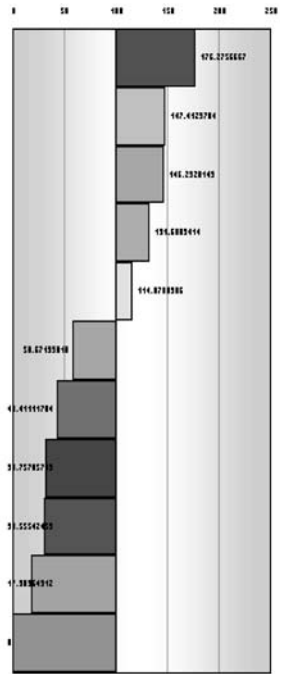
### **Results**

HES for Type 2 diabetes were matched against geodemographic codes for England. In this article we report on these figures aggregated for the UK. Table 1 and Table 2 demonstrate the geodemographic profile of Slough versus the UK average.

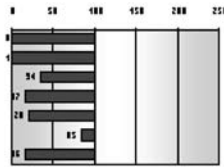






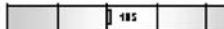



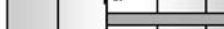












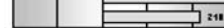
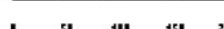
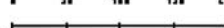





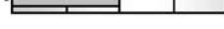

Table 3 demonstrates incidence of diabetes by 'MOSAIC Group' and Table 4 incidence of diabetes

**Table 1** Ranked MOSAIC Groups – Slough PCT and UK profiles

|   | % of population of Slough in each MOSAIC Group | % of population of UK in each MOSAIC Group | Mean average index for Slough versus UK (100 = UK average) |
|---|--|--|--|
| C Families who are successfully established in comfortable, mature homes. Children are growing up and finances are easier.    | 28.66  | 16.26                                      | 176  |
| E Young, single and mostly well educated, these people are cosmopolitan in tastes and liberal in attitudes.                   | 9.51   | 6.45                                       | 147  |
| H People who though not well-educated are practical and enterprising and may well have exercised their right to buy.          | 17.28  | 11.81                                      | 146  |
| B Families with focus on career and home, mostly younger age groups now raising children.                                     | 15.41  | 11.71                                      | 132  |
| D People living in close-knit inner city and manufacturing town communities, responsible workers with unsophisticated tastes. | 18.54  | 16.14                                      | 115  |
| I Elderly people subsisting on meagre incomes in council accommodation.   | 1.67   | 2.85                                       | 59   |
| F People who are struggling to achieve rewards and are mostly reliant on the council for accommodation and benefits.          | 2.30   | 5.30                                       | 43   |
| A People with rewarding careers who live in sought after locations, affording luxuries and premium quality products.          | 3.31   | 10.41                                      | 32   |
| G Families on lower incomes who often live in large council estates where there is little owner-occupation.                   | 2.11   | 6.89                                       | 31   |
| J Independent pensioners living in their own homes who are relatively active in their lifestyles.                             | 1.21   | 6.70                                       | 18   |
| K People living in rural areas where country life has not been influenced by urban consumption patterns.                      | 0.00   | 5.47                                       | 0  |
| Total   | 100  | 100  | 100  |



**Table 2** Geodemographic breakdown for Slough PCT

|                             | Population of Slough in each MOSAIC Type | % of population of Slough in each MOSAIC Type | Population of UK in each MOSAIC Type | % of Population of UK in each MOSAIC Type | Penalty % | Mean average index for Slough versus UK (100 = UK average) |   |
|-----------------------------|--|---|--------------------------------------|---|-----------|--|---|
| <b>A Symbols of Success</b> |  |   |                                      |   |           |  |   |
| 01 Global Connections       | 0  | 0.00  | 340 206                              | 0.58                                      | 0.00      | 0  |    |
| 02 Cultural Leadership      | 12                                       | 0.01  | 569 707                              | 0.96                                      | 0.00      | 1  |    |
| 03 Corporate Chieftains     | 543                                      | 0.45  | 774 087                              | 1.31                                      | 0.07      | 34   |    |
| 04 Golden Empty Nesters     | 282                                      | 0.23  | 813 753                              | 1.38                                      | 0.03      | 17   |    |
| 05 Provincial Privilege     | 430                                      | 0.35  | 1 041 885                            | 1.76                                      | 0.04      | 20   |    |
| 06 High Technologists       | 2 350                                    | 1.93  | 1 345 396                            | 2.28                                      | 0.17      | 85   |    |
| 07 Semi-Rural Seclusion     | 412                                      | 0.34  | 1 265 420                            | 2.14                                      | 0.03      | 16   |    |
| <b>B Happy Families</b>     |  |   |                                      |   |           |  |   |
| 08 Just Moving In           | 694                                      | 0.57  | 321 678                              | 0.54                                      | 0.22      | 105  |    |
| 09 Fledgling Nurseries      | 4 593                                    | 3.77  | 707 526                              | 1.20                                      | 0.65      | 315  |    |
| 10 Upscale New Owners       | 610                                      | 0.50  | 1 018 040                            | 1.72                                      | 0.06      | 29   |    |
| 11 Families Making Good     | 2 133                                    | 1.75  | 1 511 942                            | 2.56                                      | 0.14      | 68   |    |
| 12 Middle Rung Families     | 4 138                                    | 3.40  | 2 063 265                            | 3.49                                      | 0.20      | 97   |    |
| 13 Burdened Optimists       | 6 610                                    | 5.43  | 1 158 699                            | 1.96                                      | 0.57      | 277  |    |
| 14 In Military Quarters     | 0  | 0.00  | 135 823                              | 0.23                                      | 0.00      | 0  |    |
| <b>C Suburban Comfort</b>   |  |   |                                      |   |           |  |   |
| 15 Close to Retirement      | 1 368                                    | 1.12  | 1 875 500                            | 3.18                                      | 0.07      | 35   |    |
| 16 Conservative Values      | 491                                      | 0.40  | 1 639 657                            | 2.78                                      | 0.03      | 15   |    |
| 17 Small Time Business      | 182                                      | 0.15  | 1 781 396                            | 3.02                                      | 0.01      | 5  |    |
| 18 Sprawling Subtopia       | 5 677                                    | 4.66  | 1 981 458                            | 3.36                                      | 0.29      | 139  |    |
| 19 Original Suburbs         | 1 895                                    | 1.56  | 1 547 875                            | 2.62                                      | 0.12      | 59   |    |
| 20 Asian Enterprise         | 25 303                                   | 20.77   | 776 569                              | 1.31                                      | 3.26      | 1 580  |    |
| <b>D Ties of Community</b>  |  |   |                                      |   |           |  |   |
| 21 Respectable Rows         | 6 069                                    | 4.98  | 1 449 283                            | 2.45                                      | 0.42      | 203  |    |
| 22 Affluent Blue Collar     | 172                                      | 0.14  | 2 000 876                            | 3.39                                      | 0.01      | 4  |    |
| 23 Industrial Grit          | 921                                      | 0.76  | 2 359 262                            | 3.99                                      | 0.04      | 19   |   |
| 24 Coronation Street        | 198                                      | 0.16  | 1 500 575                            | 2.54                                      | 0.01      | 6  |  |
| 25 Town Centre Refuge       | 113                                      | 0.09  | 503 681                              | 0.85                                      | 0.02      | 11   |  |
| 26 South Asian Industry     | 10 827                                   | 8.89  | 725 936                              | 1.23                                      | 1.49      | 723  |  |
| 27 Settled Minorities       | 4 286                                    | 3.52  | 991 695                              | 1.68                                      | 0.43      | 210  |  |
| <b>E Urban Intelligence</b> |  |   |                                      |   |           |  |   |
| 28 Counter Cultural Mix     | 44                                       | 0.04  | 678 424                              | 1.15                                      | 0.01      | 3  |  |
| 29 City Adventurers         | 629                                      | 0.52  | 561 848                              | 0.95                                      | 0.11      | 54   |  |
| 30 New Urban Colonists      | 221                                      | 0.18  | 726 135                              | 1.23                                      | 0.03      | 15   |  |
| 31 Caring Professionals     | 735                                      | 0.60  | 606 229                              | 1.03                                      | 0.12      | 59   |  |
| 32 Dinky Developments       | 9 962                                    | 8.18  | 488 323                              | 0.83                                      | 2.04      | 989  |  |
| 33 Town Gown Transition     | 0  | 0.00  | 456 842                              | 0.77                                      | 0.00      | 0  |  |
| 34 University Challenge     | 0  | 0.00  | 294 045                              | 0.50                                      | 0.00      | 0  |  |

Primary Health Care Research and Development 2007; 8: 22-35

Primary care professionals and social marketing of health 27

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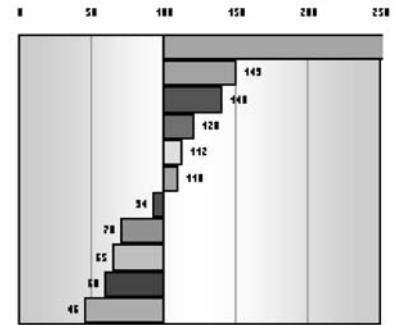


**Table 2** (Continued)

|                                 | Population of Slough in each MOSAIC Type | % of population of Slough in each MOSAIC Type | Population of UK in each MOSAIC Type | % of Population of UK in each MOSAIC Type | Penalty % | Mean average index for Slough versus UK (100 = UK average) |  |
|---------------------------------|--|---|--------------------------------------|---|-----------|--|--|
| <b>F Welfare Borderline</b>     |  |   |                                      |   |           |  |  |
| 35 Bedsit Beneficiaries         | 0  | 0.00  | 274 729                              | 0.47                                      | 0.00      | 0  |  |
| 36 Metro Multiculture           | 150                                      | 0.12  | 990 476                              | 1.68                                      | 0.02      | 7  |  |
| 37 Upper Floor Families         | 1960                                     | 1.61  | 855 135                              | 1.45                                      | 0.23      | 111  |  |
| 38 Tower Block Living           | 538                                      | 0.44  | 184 953                              | 0.31                                      | 0.29      | 141  |  |
| 39 Dignified Dependency         | 153                                      | 0.13  | 550 905                              | 0.93                                      | 0.03      | 13   |  |
| 40 Sharing a Staircase          | 0  | 0.00  | 271 770                              | 0.46                                      | 0.00      | 0  |  |
| <b>G Municipal Dependency</b>   |  |   |                                      |   |           |  |  |
| 41 Families on Benefits         | 2246                                     | 1.84  | 838 640                              | 1.42                                      | 0.27      | 130  |  |
| 42 Low Horizons                 | 0  | 0.00  | 1 698 498                            | 2.88                                      | 0.00      | 0  |  |
| 43 Ex-industrial Legacy         | 320                                      | 0.26  | 1 534 025                            | 2.60                                      | 0.02      | 10   |  |
| <b>H Blue Collar Enterprise</b> |  |   |                                      |   |           |  |  |
| 44 Rustbelt Resilience          | 0  | 0.00  | 1 950 354                            | 3.30                                      | 0.00      | 0  |  |
| 45 Older Right to Buy           | 681                                      | 0.56  | 1 501 061                            | 2.54                                      | 0.05      | 22   |  |
| 46 White Van Culture            | 17 872                                   | 14.67   | 1 988 145                            | 3.37                                      | 0.90      | 436  |  |
| 47 New Town Materialism         | 2 497                                    | 2.05  | 1 536 003                            | 2.60                                      | 0.16      | 79   |  |
| <b>I Twilight Subsistence</b>   |  |   |                                      |   |           |  |  |
| 48 Old People in Flats          | 150                                      | 0.12  | 292 729                              | 0.50                                      | 0.05      | 25   |  |
| 49 Low Income Elderly           | 863                                      | 0.71  | 822 995                              | 1.39                                      | 0.10      | 51   |  |
| 50 Cared for Pensioners         | 1 026                                    | 0.84  | 569 032                              | 0.96                                      | 0.18      | 87   |  |
| <b>J Grey Perspectives</b>      |  |   |                                      |   |           |  |  |
| 51 Sepia Memories               | 66                                       | 0.05  | 283 090                              | 0.48                                      | 0.02      | 11   |  |
| 52 Childfree Serenity           | 995                                      | 0.82  | 605 636                              | 1.03                                      | 0.16      | 80   |  |
| 53 High Spending Elders         | 0  | 0.00  | 826 085                              | 1.40                                      | 0.00      | 0  |  |
| 54 Bungalow Retirement          | 0  | 0.00  | 618 551                              | 1.05                                      | 0.00      | 0  |  |
| 55 Small Town Seniors           | 408                                      | 0.33  | 1 486 739                            | 2.52                                      | 0.03      | 13   |  |
| 56 Tourist Attendants           | 0  | 0.00  | 138 570                              | 0.23                                      | 0.00      | 0  |  |
| <b>K Rural Isolation</b>        |  |   |                                      |   |           |  |  |
| 57 Summer Playgrounds           | 0  | 0.00  | 138 216                              | 0.23                                      | 0.00      | 0  |  |
| 58 Greenbelt Guardians          | 0  | 0.00  | 1 058 857                            | 1.79                                      | 0.00      | 0  |  |
| 59 Parochial Villagers          | 0  | 0.00  | 995 000                              | 1.68                                      | 0.00      | 0  |  |
| 60 Pastoral Symphony            | 0  | 0.00  | 794 801                              | 1.35                                      | 0.00      | 0  |  |
| 61 Upland Hill Farmers          | 0  | 0.00  | 241 036                              | 0.41                                      | 0.00      | 0  |  |
| Total                           | 121825                                   | 100   | 59059067                             | 100                                       | 0.21      | 100  |  |

**Table 3** UK Ranked MOSAIC Lifestyle Groups by incidence of diabetes

|                          | Target Incidence of diabetes 2 across each MOSAIC Group in UK | % Incidence of diabetes 2 across each MOSAIC Group in UK | Base Population of UK in each MOSAIC Group | % Population of UK in each MOSAIC Group | Penalty % penetration of diabetes 2 across each MOSAIC Group | Index Mean average deviation score for diabetes in UK MOSAIC Groups (average = 100) |
|--------------------------|---|--|--|---|--|---|
| I Twilight Subsistence   | 63 477  | 8.01   | 1 684 756                                  | 2.85                                    | 3.77   | 281   |
| J Grey Perspectives      | 79 389  | 10.02  | 3 958 671                                  | 6.70                                    | 2.01   | 149   |
| G Municipal Dependency   | 76 503  | 9.65   | 4 071 163                                  | 6.89                                    | 1.88   | 140   |
| F Welfare Borderline     | 50 464  | 6.37   | 3 127 968                                  | 5.30                                    | 1.61   | 120   |
| D Ties of Community      | 143 547   | 18.11  | 9 531 308                                  | 16.14                                   | 1.51   | 112   |
| H Blue Collar Enterprise | 102 748   | 12.96  | 6 975 563                                  | 11.81                                   | 1.47   | 110   |
| C Suburban Comfort       | 120 586   | 15.21  | 9 602 455                                  | 16.26                                   | 1.26   | 94  |
| K Rural Isolation        | 30 458  | 3.84   | 3 227 910                                  | 5.47                                    | 0.94   | 70  |
| E Urban Intelligence     | 33 292  | 4.20   | 3 811 846                                  | 6.45                                    | 0.87   | 65  |
| A Symbols of Success     | 49 425  | 6.24   | 6 150 454                                  | 10.41                                   | 0.80   | 60  |
| B Happy Families         | 42 672  | 5.38   | 6 916 973                                  | 11.71                                   | 0.62   | 46  |
| Total                    | 792 561   | 100  | 59 059 067                                 | 100                                     | 1.34   | 100   |





**Table 4** UK incidence of diabetes by ranked MOSAIC types

| Ranked MOSAIC Types            | Target Incidence of diabetes 2 across each MOSAIC Type in UK | % Incidence of diabetes 2 across each MOSAIC Type in UK | Base Population of UK in each MOSAIC Type | % Population of UK in each MOSAIC Type | Penalty % penetration of diabetes 2 across each MOSAIC Type | Index Mean average deviation score for diabetes in UK MOSAIC Types (average = 100) |
|--------------------------------|--|---|---|--|---|--|
| <b>50</b> Cared for Pensioners | 32 984   | 4.16  | 569 032                                   | 0.96                                   | 5.80  | 432  |
| <b>48</b> Old People in Flats  | 15 013   | 1.89  | 292 729                                   | 0.50                                   | 5.13  | 382  |
| <b>51</b> Sepia Memories       | 11 198   | 1.41  | 283 090                                   | 0.48                                   | 3.96  | 295  |
| <b>26</b> South Asian Industry | 21 322   | 2.69  | 725 936                                   | 1.23                                   | 2.94  | 219  |
| <b>54</b> Bungalow Retirement  | 15 910   | 2.01  | 618 551                                   | 1.05                                   | 2.57  | 192  |
| <b>39</b> Dignified Dependency | 13 950   | 1.76  | 550 905                                   | 0.93                                   | 2.53  | 189  |
| <b>43</b> Ex-industrial Legacy | 35 468   | 4.48  | 1 534 025                                 | 2.60                                   | 2.31  | 172  |
| <b>49</b> Low Income Elderly   | 15 480   | 1.95  | 822 995                                   | 1.39                                   | 1.88  | 140  |
| <b>20</b> Asian Enterprise     | 14 570   | 1.84  | 776 569                                   | 1.31                                   | 1.88  | 140  |
| <b>37</b> Upper Floor Families | 15 584   | 1.97  | 855 135                                   | 1.45                                   | 1.82  | 136  |
| <b>25</b> Town Centre Refuge   | 9 100  | 1.15  | 503 681                                   | 0.85                                   | 1.81  | 135  |
| <b>38</b> Tower Block Living   | 3 309  | 0.42  | 184 953                                   | 0.31                                   | 1.79  | 133  |
| <b>42</b> Low Horizons         | 30 127   | 3.80  | 1 698 498                                 | 2.88                                   | 1.77  | 132  |
| <b>55</b> Small Town Seniors   | 26 171   | 3.30  | 1 486 739                                 | 2.52                                   | 1.76  | 131  |
| <b>45</b> Older Right to Buy   | 26 114   | 3.29  | 1 501 061                                 | 2.54                                   | 1.74  | 130  |
| <b>56</b> Tourist Attendants   | 2 410  | 0.30  | 138 570                                   | 0.23                                   | 1.74  | 130  |
| <b>24</b> Coronation Street    | 25 955   | 3.27  | 1 500 575                                 | 2.54                                   | 1.73  | 129  |
| <b>52</b> Childfree Serenity   | 10 088   | 1.27  | 605 636                                   | 1.03                                   | 1.67  | 124  |
| <b>53</b> High Spending Elders | 13 612   | 1.72  | 826 085                                   | 1.40                                   | 1.65  | 123  |
| <b>16</b> Conservative Values  | 26 504   | 3.34  | 1 639 657                                 | 2.78                                   | 1.62  | 120  |
| <b>46</b> White Van Culture    | 30 551   | 3.85  | 1 988 145                                 | 3.37                                   | 1.54  | 115  |
| <b>36</b> Metro Multiculture   | 14 947   | 1.89  | 990 476                                   | 1.68                                   | 1.51  | 112  |
| <b>27</b> Settled Minorities   | 13 621   | 1.72  | 991 695                                   | 1.68                                   | 1.37  | 102  |
| <b>47</b> New Town Materialism | 20 946   | 2.64  | 1 536 003                                 | 2.60                                   | 1.36  | 102  |
| <b>23</b> Industrial Grit      | 31 854   | 4.02  | 2 359 262                                 | 3.99                                   | 1.35  | 101  |

by 'MOSAIC Type'. Table 3 and Table 4 reveal what are perhaps the most important results of this analysis. Those 'groups' and 'types' that have the highest Type 2 counts are the ones with the highest indices. An index of 100 indicates the UK average penetration of the disease. The Groups with the highest penetrations of Type 2 diabetes (over 100) are, in order, 'Twilight Subsistence', 'Grey Perspectives', 'Municipal Dependency', 'Welfare Borderline', 'Ties of Community', 'Blue Collar Enterprise'. People who live in areas characterized as 'Twilight Subsistence' have a high-average age, and a lower than average income. They may not be well educated, and will typically have lower social class backgrounds. These people may not be particularly mobile and are likely to have low aspirations with the remainder of their lives. 'Grey Perspectives', though of similar advanced years, will be better off and better educated than the 'Twilight Subsistence' group, and it is interesting to note the dramatic drop in diabetes that occurs. While age is the key underlying factor of the top two groups, the next two, 'Municipal Dependency' and 'Welfare Borderline' groups comprise people who have very low average incomes and low horizons in life. They exhibit predominantly working class cultures that will strongly influence attitudes to diet and exercise, and will be less well educated than UK averages. The concern with these groups lies particularly with their modest average age, indicating poor weight control in early stages in life.

'Ties of community' and 'Blue Collar Enterprise' are also working class-based cultural groups with distinct sub-cultures, but once more likely to be characterized by strong socially driven attitudes to diet and exercise that will need hard work to break down. However these groups have indices that are only just above the national average.

At the bottom of the chart 'Rural Isolation', 'Urban Intelligence', 'Symbols of Success' and finally 'Happy Families' all have incidences of Type 2 diabetes that are much lower than the national average, perhaps suggesting that less resources will need to be deployed in these population clusters.

Table 4, highlights the same data as Table 3, this time split into 'MOSAIC Types', which are smaller clusters with more 'extreme' underlying demographics. As can be seen, the indices can be much higher or lower than for Groups, with an index of 432 indicating an incidence of diabetes of 4.32 times the national average. This has important implications for the extra return on investment that may be expected for tightly targeted activities. Finally, it is interesting to note the high indices attached to predominantly Asian geographic types, suggesting the adverse impact Asian-based diets have had on prevalence of Type 2 diabetes.

Table 5 illustrates how the combination of datasets MOSAIC and HES, can allow one to drill down to postcode sectors to highlight 'hotspots' for Type 2 diabetes prevalence. In this case study for Slough

**Table 5** Demonstration of geodemographics as a targeting system: Slough PCT – Zone Ranking

| Postal sector                     | D43 Settled but poor older people in low-rise social housing, often found in declining industrial areas | %      | Slough  | %     | Penalty | Index |
|-----------------------------------|---|--------|---------|-------|---------|-------|
| SL 2 1 Long Readings Lane, Slough | 143   | 57.43  | 12,484  | 11.1  | 1.145   | 515   |
| SL 3 8 Sutton, Slough             | 106   | 42.57  | 14 624  | 13.1  | 0.725   | 326   |
| SL 1 1 Upton, Slough              | 0   | 0.00   | 4340    | 3.9   | 0.000   | 0     |
| SL 1 2 Chalvey, Slough            | 0   | 0.00   | 12 002  | 10.7  | 0.000   | 0     |
| SL 1 3 Salt Hill, Slough          | 0   | 0.00   | 12 319  | 11.0  | 0.000   | 0     |
| SL 1 4 Manor Park, Slough         | 0   | 0.00   | 890     | 0.8   | 0.000   | 0     |
| SL 1 5 Dorney, Slough             | 0   | 0.00   | 10 343  | 9.2   | 0.000   | 0     |
| SL 1 6 Blumfield Cr, Slough       | 0   | 0.00   | 6142    | 5.5   | 0.000   | 0     |
| SL 1 9 Wood Lane, Slough          | 0   | 0.00   | 2630    | 2.3   | 0.000   | 0     |
| SL 2 2 Lynch Hill, Slough         | 0   | 0.00   | 7429    | 6.6   | 0.000   | 0     |
| SL 2 5 Petersfield Road, Slough   | 0   | 0.00   | 13 677  | 12.2  | 0.000   | 0     |
| SL 3 0 Colnbrook, Slough          | 0   | 0.00   | 3533    | 3.2   | 0.000   | 0     |
| SL 3 7 Slough, Slough             | 0   | 0.00   | 11 573  | 10.3  | 0.000   | 0     |
| Total                             | 249   | 100.00 | 111 986 | 100.0 | 0.222   | 100   |

PCT area down to a street level which is powerful information on which to base resource allocation and targeting decisions at a policy level.

The combination of datasets method is very useful to all PCTs in terms of identification of at risk groups and targeting of resources and effort. Table 6 illustrates 'hotspots' and low-spots' at PCT area level. This can aid primary care professionals to recognize the need to target or not target scarce

resources at Type 2 diabetes prevention vis-a-vis other competing uses of scarce resources.

## Discussion

### Limitations of the approach

Our analysis has highlighted age, weight, ethnicity and poverty, as the key variables impacting on

**Table 6** Predicted prevalence of Type 2 diabetes by PCT

| Ranking               | PCT   | Estimated number of people with diabetes | Total population |
|-----------------------|---|--|------------------|
| 231                   | Staffordshire Moorlands 5HR                     | 4421                                     | 116 076          |
| 232                   | Mansfield District 5AM                          | 4403                                     | 96 162           |
| 233                   | South Liverpool 5HC                             | 4386                                     | 99 091           |
| 234                   | Chiltern and South Bucks 5G4                    | 4381                                     | 166 544          |
| 235                   | Exeter 5FR                                      | 4377                                     | 130 402          |
| 236                   | Hartlepool 5D9                                  | 4372                                     | 88 004           |
| 237                   | Sedgefield 5KE                                  | 4360                                     | 89 734           |
| 238                   | Doncaster East 5EK                              | 4351                                     | 109 222          |
| 239                   | Broadland 5JL                                   | 4348                                     | 121 016          |
| 240                   | Ashfield 5FA                                    | 4338                                     | 90 723           |
| 241                   | Slough 5DM                                      | 4325                                     | 121 337          |
| 242                   | North Peterborough 5AF                          | 4292                                     | 99 651           |
| 243                   | Witham, Braintree and Halstead TAG              | 4268                                     | 125 892          |
| 244                   | Basildon 5GR                                    | 4251                                     | 101 853          |
| 245                   | South Wiltshire 5DJ                             | 4236                                     | 119 457          |
| 246                   | West Wiltshire 5DH                              | 4233                                     | 121 969          |
| 247                   | Langbaugh 5KN                                   | 4228                                     | 97 144           |
| 248                   | Hambleton and Richmondshire 5KH                 | 4226                                     | 117 767          |
| 249                   | Derwentside 5KA                                 | 4193                                     | 89 331           |
| 250                   | Cherwell Vale 5DV                               | 4188                                     | 129 011          |
| 251                   | Oldbury and Smethwick 5MG                       | 4174                                     | 89 147           |
| <b>Top 10 PCTs</b>    |   |  |                  |
| 319                   | Newbury and Community 5DK                       | 3415                                     | 89 151           |
| 320                   | Fylde 5HE                                       | 3166                                     | 71 100           |
| 321                   | Maldon and South Chelmsford 5GL                 | 3145                                     | 83 887           |
| 322                   | North East Oxfordshire 5DT                      | 2930                                     | 67 189           |
| 323                   | Eden Valley 5D5                                 | 2559                                     | 68 703           |
| 324                   | Royston, Buntingford and Bishop's Stortford 5GK | 2541                                     | 64 047           |
| 325                   | Uttlesford 5GN                                  | 2454                                     | 68 980           |
| 326                   | Western Isles 15                                | 1138                                     | 25 940           |
| 327                   | Shetland 14                                     | 911                                      | 21 910           |
| 328                   | Orkney 13                                       | 729                                      | 19 111           |
| <b>Bottom 10 PCTs</b> |   |  |                  |
| 1                     | Bro Taf QW2                                     | 34 916                                   | 709 662          |
| 2                     | Lothian 05                                      | 33 647                                   | 783 081          |
| 3                     | Greater Glasgow 09                              | 32 237                                   | 866 755          |
| 4                     | Eastern (NI) 9501                               | 31 782                                   | 662 066          |
| 5                     | North Wales QW4                                 | 31 177                                   | 668 067          |
| 6                     | Gwent QW1                                       | 29 574                                   | 559 650          |
| 7                     | Lanarkshire 10                                  | 28 929                                   | 552 164          |
| 8                     | Morgannwg QW5                                   | 24 887                                   | 488 626          |
| 9                     | Grampian 02                                     | 23 706                                   | 521 377          |
| 10                    | Dyfed Powys QW3                                 | 21 113                                   | 496 391          |

Type 2 diabetes. In this analysis it is important not to overclaim diabetes as a surrogate for obesity. This is true amongst younger age groups, but for over 65s diabetes may occur more frequently regardless of the obesity of individuals. Of more interest therefore is the rather stark segmentation that emerges according to class, with 'lower social class' groups much more prone to obesity than 'middle classes'. Perhaps the most important finding, is the exhibit that segmentation systems based on demographics and geography seem to offer precise targeting opportunities and hence a powerful way for focusing scarce health resources. Another qualification that might limit the power of combining geodemographic and HES data, is that individual attitudes and beliefs concerning health status are captured indirectly rather than directly using this approach.

Interestingly, while there are instances of psychological unhappiness being linked to overeating, the World Health Organisation (WHO) suggest that by and large overeating is not the key issue leading to obesity, as we eat less on average in terms of calorific value, today, than we did 50 years ago. The central issue is lack of physical exercise, within the context of westernized lives being made more and more sedentary with respect to how we live our everyday lives. A typical westernized life now involves a lack of in-built exercise to such a profound extent that most physical activity involves 'artificial' intervention in daily routines. If this line of argument is accepted, and it is by the WHO, then the current obsession with dieting is tackling the problem from the wrong end (WHO, 2004). The role of social marketing is to work out how to design and implement behavioural intervention programmes that have the best chance of success in increasing physical activity. However, these interventions would also need to be tailored appropriately to their audience if they are to be successful in motivating and sustaining people in increased physical activity and again household MOSAIC would be a useful tool to facilitate appropriate approaches tailored to the specific sub-populations.

### Communications channels

The approach identified in this article is not complete without some discussion of the communications channels which use of MOSAIC profiles open up, as these are as crucial to success of targeting. The best media will be those which facilitate

a direct approach that can use the segmentation to best advantage. New media such as Email or mobile have yet to be well linked with geodemographics, so the best traditional channels include telephone canvassing, door-to-door and direct mail. Door-to-door is particularly well suited to geodemographics, as door-to-door media is itself geographically based (Tapp, 2005).

One of the Wanless Report's main themes is to encourage deprived or marginalized communities to improve their own health. MOSAIC analysis clearly shows how important deprived communities are at the front line of the obesity issue in the UK. Primary care professionals therefore could have a role in using these communication channels to support and empower deprived and marginalized communities to improve their own health. For those 'at risk' of Type 2 diabetes our behavioural intervention model for reducing obesity suggests these communication channels are used to mount a two-pronged initiative that 'targets' both diet (a little) and physical activity (mostly). As far as primary care professionals are concerned door-to-door canvassing in the form of 'brief intervention' might be both supportive and cautionary in advising overweight or obese people in terms of sudden increased physical activity and improved diet. If more information is required, direct mail, with its extra physical space, may be better suited.

### Future work

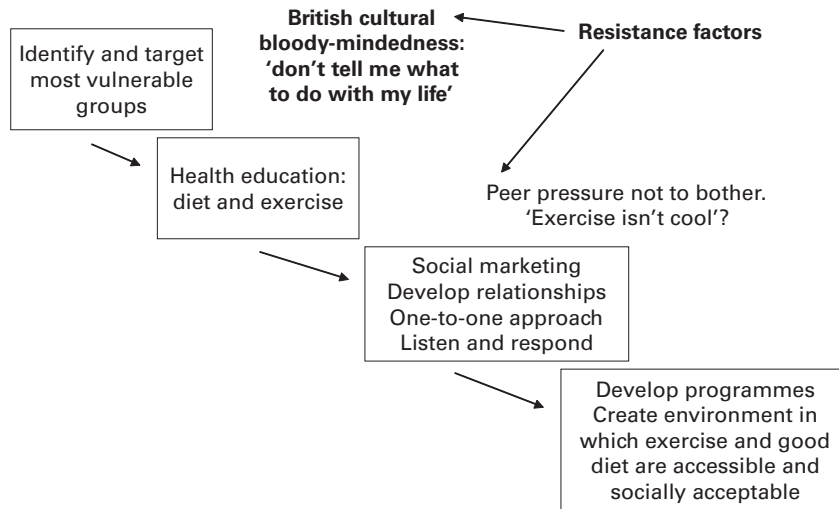
Figure 2 is offered as a way of structuring the causal linkages, and may be a start point for future research.

It is vital that the public are involved in the implementation of a social marketing strategy to reduce obesity. Social marketers emphasize that 'listening to the consumer' or 'consumer involvement' are all important in terms of initiating sustained behaviour changes in consumers (Lefebvre and Flora, 1988; Naidoo and Wills, 2005). This stance is in keeping with the current view of public health professionals; that they are engaged in partnership with users of services and that they should enable 'user involvement' in the delivery of public healthcare.

### Conclusion

This article has reported on a case study approach in which HES for Type 2 diabetes were combined

*Primary Health Care Research and Development* 2007; 8: 22–35



**Figure 2** A behavioural intervention model for reducing obesity

with household MOSAIC to identify neighbourhood, wards and streets for targeted interventions in health prevention of Type 2 diabetes in the area covered by Slough PCT. The theoretical and practical benefits of the combination of NHS data and geodemographic profiling seem to be considerable in terms of identification, targeting and use of communication channels for ‘getting health messages across’ in an appropriate and tailored way. Primary healthcare professionals could use the approach outlined in this article to devise tailored behavioural interventions including social marketing to various segments of the population at country, city, towns, ward, neighbourhood and street level. Changing one’s life to overcome overweight and obesity is very difficult. There are clearly big social, cultural and psychological barriers to reducing obesity. The first premise of social marketing is that these barriers must be understood before attempting behaviour change. From a practical standpoint, tools such as MOSAIC can be combined with routine datasets to allow precise targeting of particularly vulnerable groups. This means scarce resources can be precisely deployed to areas of most need. MOSAIC can in turn aid public health professionals and social marketers to understand the geodemographic factors that influence lifestyles that lead to obesity; helping in efficient resource allocation and the design of appropriate programmes and

*Primary Health Care Research and Development* 2007; **8**: 22–35

interventions that are sent through appropriate communication channels.

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