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This document is one of a suite of reports that form the basis of Hull’s Joint Strategic Needs Assessment (JSNA). Each of these JSNA documents and summaries are available for perusal or downloading at www.hullpublichealth.org.

Whilst this document contains a substantial quantity of information, it may not include everything you need. If you require any further information not included within this document, or require further explanation, please contact us and we’ll try to help.

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This report and others are available at www.hullpublichealth.org.
HULL JSNA TOOLKIT: Glossary

Contents

1 SUMMARY .................................................................................................................. 6
2 INTRODUCTION ......................................................................................................... 8
  2.1 Release of This JSNA Toolkit .............................................................................. 8
  2.2 Other Reports ..................................................................................................... 8
  2.3 Terminology, Abbreviations, Statistical Methods and Terms ......................... 9
  2.4 Data Sources ..................................................................................................... 10
  2.5 Deprivation ........................................................................................................ 10
  2.6 Comparator Areas .......................................................................................... 11
  2.7 Public Health Outcomes Framework Indicators ............................................... 12
  2.8 Uses of This Report .......................................................................................... 13
    2.8.1 Health Intelligence and Knowledge for Commissioning of Services ....... 14
    2.8.2 Health Needs Assessment ....................................................................... 14
    2.8.3 Health Equity Audit ................................................................................. 15
    2.8.4 Asset Approach ..................................................................................... 15
3 DATA SOURCES ......................................................................................................... 19
4 SYNTHETIC OR MODELLED ESTIMATES ............................................................... 22
5 LOCAL SURVEYS ....................................................................................................... 24
  5.1 Health and Lifestyle Surveys .......................................................................... 24
    5.1.1 Adult Survey Conducted in 2003 .............................................................. 25
    5.1.2 Adult Survey Conducted in 2007 .............................................................. 25
    5.1.3 Adult Black and Minority Ethnic Survey Conducted in 2007 ............... 26
    5.1.4 Adult Prevalence Survey Conducted in 2009 ....................................... 26
    5.1.5 Adult Survey Conducted in 2011-12 ..................................................... 26
    5.1.6 Adult Black and Minority Ethnic Survey Conducted in 2011-12 .......... 27
    5.1.7 Young People Survey Conducted in 2002 ............................................. 27
    5.1.8 Young People Survey Conducted in 2008-09 ................................... 27
    5.1.9 Young People Survey Conducted in 2012 ............................................ 28
    5.1.10 Veterans’ Survey Conducted in 2009 ................................................... 28
  5.2 Qualitative and Social Marketing Research ...................................................... 30
    5.2.1 Attitudes to Health Focus Groups 2007 ................................................. 30
    5.2.2 Reflector Groups Following 2007 Health and Lifestyle Survey .......... 31
    5.2.3 Reflector Groups Following 2011-12 Health and Lifestyle Survey ........ 32
    5.2.4 Reflector Groups Following 2008-09 Young People Health and Lifestyle Survey .......................................................... 36

Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org
5.2.5 Reflector Groups Following 2012 Young People Health and Lifestyle Survey .......................................................... 38
5.2.6 Social Marketing Research .......................................................... 41
5.3 Social Capital Surveys .................................................................. 41
5.3.1 Survey Conducted in 2004 .......................................................... 41
5.3.2 Survey Conducted in 2009 .......................................................... 41
5.4 Other Surveys ........................................................................... 41
5.5 Patient and Public Involvement Projects ........................................ 42
6 HOSPITAL EPISODE STATISTICS ................................................. 42
7 QUALITY AND OUTCOME FRAMEWORK ..................................... 43
8 GENERAL PRACTICE GROUPINGS ................................................. 45
9 OUTCOME MEASURES, PERFORMANCE TARGETS AND PROGRESS TOWARDS TARGETS ........................................... 52
9.1 Historical Indicators, Outcome Measures and Targets ......................... 52
9.2 Problems Associated With Some Outcome Measures ......................... 52
9.3 Public Health Outcomes Framework ............................................. 52
9.3.1 Introduction ........................................................................... 52
9.3.2 National Profile for Hull and “Tartan Rug” ........................................... 53
9.3.3 Local Analysis ....................................................................... 53
10 DEFINITIONS AND CLASSIFICATIONS ......................................... 58
10.1 Definition of Overweight and Obesity .............................................. 58
10.1.1 Adults ................................................................................ 58
10.1.2 Children ........................................................................... 58
10.2 Definitions Used to Measure Alcohol Consumption .......................... 60
10.3 Definitions Used to Measure Levels of Exercise ............................... 62
10.4 Defining Risk of a Cardiovascular Event Within Ten Years in the Healthy Heart Study .......................................................... 66
10.5 Disease Definitions Using International Classification of Diseases ........ 68
10.6 Surgical Operations and Procedure Codes ...................................... 71
11 HEALTH RELATED DEFINITIONS, METHODS AND TERMS ......... 71
11.1 Asset Approach ....................................................................... 71
11.2 Body Mass Index ..................................................................... 71
11.3 Causality ................................................................................. 71
11.4 General Practice Groupings ....................................................... 72
11.5 Health Equity Audit ................................................................... 72
11.6 Health Needs Assessment .......................................................... 72
11.7 Health Utility Index .................................................................. 72
11.8 Hospital Episode Statistics .......................................................... 72
11.9 Index of Multiple Deprivation ....................................................... 72
11.10 International Classification of Diseases ........................................ 73
11.11 Modelled or Synthetic Estimates ............................................... 73
11.12 Primary Care Practice Groupings ............................................... 73
11.13 Programme Budgeting .............................................................. 73
11.14 Quality and Outcomes Framework ............................................. 74
11.15 Risk factors ........................................................................... 74
11.16 SF-36v2™ ........................................................................................................ 75
11.17 Synthetic or Modelled Estimates .................................................................. 76
11.18 Total Period Fertility or Abortion Rate .......................................................... 76
12 STATISTICAL AND EPIDEMIOLOGICAL METHODS AND TERMS . 77
12.1 What is Statistics? .......................................................................................... 77
12.2 Populations and Samples in Statistics .............................................................. 77
12.3 What is epidemiology? .................................................................................... 78
12.4 Incidence ......................................................................................................... 78
12.5 Prevalence ....................................................................................................... 79
12.6 Population – Residents versus Registered Populations .................................. 79
12.7 Bias .................................................................................................................. 81
12.8 Causality ......................................................................................................... 81
12.9 Confounding, Effect Modification and Interaction .......................................... 83
12.10 Confidence Intervals .................................................................................... 84
12.11 Small Number of Events .............................................................................. 85
12.12 Percentiles, Deciles, Quartiles, Quintiles and Medians ............................... 86
12.13 Standardisation ............................................................................................. 86
12.14 Impact of Changes to European Standard Population on Directly Standardised Rates ........................................................................................................... 87
12.15 Life Expectancy .............................................................................................. 89
12.16 Occurrence Versus Registration of Deaths .................................................... 91
12.17 Moving Average ........................................................................................... 93
12.18 Significance Testing ...................................................................................... 94
12.19 Variation ....................................................................................................... 95
13 CONDUCTING RESEARCH / CRITICAL APPRAISAL .............................. 95
14 APPENDIX ....................................................................................................... 96
14.1 Underlying Data for Figures ......................................................................... 96
15 REFERENCES .................................................................................................... 97
16 INDEX ............................................................................................................... 100
JSNA TOOLKIT:
Glossary

1 SUMMARY

This release incorporates data provided by NHS Hull, Hull City Council and other partners and forms a foundation for the Joint Strategic Needs Assessment (JSNA) which can be found at www.hullpublichealth.org. It is important to examine levels of health and ill-health as well as levels of risk factors and attitudes towards health in different populations for monitoring purposes including the monitoring of health-related targets, examining trends over time, comparison with other geographical areas, examining patterns of health and risk factors within the population of Hull (e.g. comparison of different groups such as those defined by deprivation), assessment and evaluation of programmes designed to improve health, assessing the existing and future need for health-related services following changes in health, ill-health or risk factors so that the Commissioning function can be adequately fulfilled. Further documents such as the health equity audits, reports from the adult and young people health and lifestyle surveys, social capital surveys, child obesity reports and Index of Multiple Deprivation report are available at www.hullpublichealth.org. A local analysis of the Public Health Outcomes Framework is also available at www.hullpublichealth.org.

In order to interpret data correctly, it is necessary to understand the data source and how data has been collected, certain statistical measures, summaries and concepts, etc.

This document covers uses of this report providing information on health needs assessment, health equity audits and the asset approach to commissioning. Data sources and synthetic / modelled estimates are discussed. Details of the local Health and Lifestyle Surveys and the Social Capital Surveys as well as qualitative projects completed locally within public health are discussed. Additional information about Hospital Episode Statistics, Quality and Outcomes Framework GP disease registers and why the prevalence may differ across practices, General Practice groupings, outcome measures, targets and the Public Health Outcomes Framework are explained and/or discussed. Definitions used to measure disease (disease coding), overweight and obesity, exercise levels, alcohol consumption and cardiovascular risk are given. Further information is given in relation to health related aspects such as the assets approach, body mass index, health scores, deprivation, modelling, risk factors, etc are provided. Finally, information is provided on statistical and epidemiological methods and terms such as incidence and prevalence, confounding, effect modification, interaction, confidence intervals, small number of events and variability, percentiles, quartiles, quintiles, standardisation, European Standard Population, life expectancy, moving averages and significance testing. Further information is also given in relation to conducting research and evaluation, and critically appraising papers, journal articles and research completed by others, so that an evidence-based approach can be used.
This document gives some further information statistical and epidemiological topics, and data sources, and can address some of the questions below.

- What is the difference between the registered population and resident population for Hull?
- What is the difference between clinician episodes and admission for inpatient hospital data?
- What are the implications of hospital coding when examining trends over time?
- What is a confidence interval?
- Is there a real difference between these two geographical areas?
- What are confounding factors and have these been considered in the analysis and interpretation?
- What is a p-value?
- Why can synthetic estimates be misleading?
- Why is the prevalence of a specific disease much higher for patients registered with a specific practice than other practices?
2 INTRODUCTION

2.1 Release of This JSNA Toolkit

It is the intention to release the JSNA Toolkit(s) on an on-going basis, with new information added to the document and existing data updated as new information becomes available over time.

This document has been produced for use primarily as an electronic document rather than as a hardcopy. Therefore, certain topics may be duplicated, or there will be references to other sections of the report. It is hoped that the reader can find the information by electronic searching, using the hyperlinks within the document and on the contents page (starting on page 3), and by using the index (starting on page 100).

2.2 Other Reports

This revision of the JSNA Toolkit for Hull is a series of stand alone reports on specific diseases or conditions, people groups, risk factors for disease and other health and wellbeing related issues. Each of these individual reports sum to form the JSNA Toolkit, which informs the production of the JSNA. Each of the JSNA Toolkit documents may be accessed on, and downloaded from, www.hullpublichealth.org. The full list of reports is as follows:

- Executive Summary
- Abbreviations
- Glossary
- Geographical Area
- Demography and Demographics
- Housing, Environment and Social Care
- Deprivation and Associated Measures
- General Health, Disabilities, Caring and Use of Services
- Dental Health
- Inpatient Hospital Admissions
- Life Expectancy
- Mortality
- Overweight and Obesity
- Exercise
- Diet
- Alcohol Consumption
- Drug and Substance Abuse
- Smoking
- Vaccinations and Immunisations
- Screening
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

All Circulatory Disease
Coronary Heart Disease
Stroke
Other Circulatory Diseases
All Cancers
Lung Cancer
Colorectal Cancer
Prostate Cancer
Breast Cancer
Diabetes
Chronic Kidney Disease
All Respiratory Disease
Asthma
Chronic Obstructive Pulmonary Disease
Epilepsy
Hypothyroidism
Palliative Care
Mental Health and Learning Disabilities (includes Social Capital)
Infectious Diseases
Digestive Diseases
Sexual Health
Accidents
Children and Young People
Older People

In order to avoid duplication between the individual reports, references will be made to other reports which may contain further information or explanation.

It is the intention to release the JSNA Toolkit documents on an on-going basis, with new information added to the documents and existing data updated as new information becomes available over time.

2.3 Terminology, Abbreviations, Statistical Methods and Terms

This JSNA Toolkit: Glossary document includes some of the technical information relating to data and statistics. There is also a separate document detailing the abbreviations used within these JSNA Toolkit documents, see the JSNA Toolkit: Abbreviations report. If anything is unclear within these documents or you need further clarification, please contact us.
2.4 **Data Sources**

Where possible, we have used sources of data that are routinely available nationally, either as published material (e.g. the NHS Information Centre Indicator Portal (previously known as the Compendium of Clinical and Health Indicators or Compendium), the Census, labour market website (nomis), Quality and Outcomes Framework (QOF) data, Public Health Outcomes Framework indicators, etc), from Government websites (e.g. Department of Health) or other websites (e.g. those quoted as data sources for Public Health Outcomes Framework). Elsewhere we have used raw data at patient or episode level (e.g. Public Health Mortality Files) to construct local indicators of health. Local information has been provided by colleagues within the NHS Hull Clinical Commissioning Group, the North Yorkshire and Humber Commissioning Support Unit, Hull City Council and other organisations. The prevalence of lifestyle behavioural risk factors comes from local surveys such as the local Health and Lifestyle and Social Capital Surveys, and comparison information from the annual Health Survey for England (Health Survey for England 2008) and the General Household Survey (Economic and Social Data Service 2008). Full information about each of the local surveys conducted is available at www.hullpublichealth.org.

We have provided the most up-to-date data available. Not all the data relate to the same time period. Different sets of data are published at different times of the year and the most recent data may not yet be published, or if the numbers of events are very low for rare diseases, the data for several years are combined to obtain a more reliable picture.

2.5 **Deprivation**

Unemployment, poor housing, lack of qualifications, crime and many other social and environmental factors all indirectly affect the health of the population. Different scales and scores have been produced which attempt to measure deprivation. In general, in relation to national averages, Hull has a higher unemployment rate, more poor housing, residents qualified to a lower level and higher levels of crime. Increased deprivation means that there is poorer health, but this is compounded as poor health also affects other measures such as employment and motivation to improve employment, education and the person’s environment such as housing. In addition, those who live in the most deprived area are more likely to have risk factors for ill health such as smoking, poor diet, lack of exercise, etc. It is also generally more difficult to change lifestyle behaviour if the environment is more stressful resulting from poorer employment prospects and housing, increased debt, relationship problems, etc.

The Index of Multiple Deprivation (IMD) 2010 (Communities and Local Government 2011) score has been produced nationally and is a measure of deprivation derived for each lower layer super output area (LLSOA). There are 166 LLSOAs geographical areas defined within Hull following the 2011 Census (three more than for 2001 Census).
These geographical areas had a minimum population size of 1,000 and a mean population size of 1,500 when they were generated following the 2001 Census. The IMD 2010 index is based on seven domains which are weighted according to their relative importance in relation to the overall score (weights in brackets): (i) income deprivation (22.5%); (ii) employment deprivation (22.5%); (iii) health deprivation and disability (13.5%); (iv) education, skills and training deprivation (13.5%); (v) barriers to housing and services (9.3%); (vi) living environment deprivation (9.3%); and (vii) crime (9.3%). The IMD 2010 score measures deprivation, but is not such a good measure of affluence. As it is applied to a geographical area, it relates to average levels of deprivation within an area. Therefore, there may be some residents of the area who are very much more deprived than the average and some very much better-off relative to the average.

Using the IMD 2010 score, Hull is ranked as the 10th most deprived local authority out of 326 (bottom 4%). The IMD 2010 scores for all of England’s LLSOAs have been divided into five approximately equal-sized groups ranging from the 20% most deprived areas to the 20% least deprived areas. These five groups are referred to as national quintiles. However, as most of Hull’s LLSOAs are within the bottom 20%, local analyses have used Hull’s local quintiles.

Further detailed analysis of the IMD and changes over time is available in a separate IMD report available at www.hullpublichealth.org. The Hull JSNA Toolkit: Deprivation and Associated Measures also includes additional information on deprivation as well as information on unemployment, benefit claimants, crime, etc.

2.6 Comparator Areas

Local analyses of comparator areas have been undertaken. The first analysis in 2007, which was updated in 2009, identified 10 comparator areas which were similar to Hull with regard some key measures such as deprivation, population, ethnicity, housing, etc. None of the comparators areas were very similar to Hull with regard to all the measures examined, which means that differences were evident for some comparator areas. The Office for National Statistics (ONS) grouped local authorities into groups, and Hull was in their Industrial Hinterlands group, but Hull was the least similar to the group average. Furthermore, ONS deemed that North East Lincolnshire was Hull’s nearest comparator, but this was in a different classification group. Local analyses have used the 10 comparators identified plus North East Lincolnshire as comparator areas. A further analysis of comparator areas was undertaken during 2013 following transfer of Public Health Science to Hull City Council. Hull City Council generally uses 15 comparator areas for their analyses. All their areas together with the 11 areas used previously were examined (some were included in both groups). It was felt that there were too many to use all 15 of Hull City Council comparators and a number of the indicators used to
determine similarity were not important from the health or public health point of view. Whilst some of the 11 locally used comparators boundaries of local authority and NHS (i.e. Clinical Commissioning Group) no longer matched, it was decided to continue to use the 11 comparator areas previously used for consistency and comparability.

The comparators are as follows:

1. Middlesbrough**
2. Stoke-on-Trent
3. Sandwell*
4. Salford
5. Wolverhampton
6. Sunderland
7. Plymouth*
8. Derby*
9. Leicester
10. Coventry*
11. North East Lincolnshire

*The boundary of the local authority does not match that of the CCG, so data relating to the Quality Outcomes Framework (see section 7 on page 43) is unavailable.**Middlesbrough local authority and Redcar and Cleveland local authority form NHS South Tees CCG. All comparator QOF data trends use South Tees as a comparator area (historical data for the Middlesbrough Primary Care Trust (PCT) and Redcar and Cleveland PCT have been combined for comparability). Redcar and Cleveland local authority is one of the comparator areas used by Hull City Council so is quite similar to Hull in terms of certain characteristics.

Further information about comparator areas is available in a more detailed report which is available at www.hullpublichealth.org.

2.7 Public Health Outcomes Framework Indicators

A local analysis of the outcome measures published as part of the Public Health Outcomes Framework (PHOF) is available at www.hullpublichealth.org. The JSNA Toolkit reports also include information on the relevant PHOF indicators for the specific topic. Further details of the indicators is available in Table 4, which details which JSNA Toolkit report includes further analysis for each indicator.

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1 Such as taxbase per head of population, percentage of daytime net flow, housing benefit caseload, percentage of households with less than four rooms, percentage of households in purpose-built flats rented from local authority, authorities with coast protection expenditure, etc.
2.8 **Uses of This Report**

This release incorporates data provided by Hull City Council and other partners and forms a foundation for the updated Joint Strategic Needs Assessment (JSNA). This document is not the only JSNA for Hull, but provides more detailed background and reference information for a variety of JSNA documents within Hull. Numerous JSNA documents exist to suit a variety of needs, from a 100 word summary to the main JSNA report (approximately 100 pages). JSNA GP profiles providing summary information for each practice in Hull have been produced. The 72-page JSNA Public Health Profiles provide summary information at ward and area levels. There is also an interactive atlas providing information for all of Hull’s wards. All these reports and information can be found on [www.hullpublichealth.org](http://www.hullpublichealth.org). However, with all documents of this type, new data becomes available all the time, and even in these detailed JSNA Toolkit documents, it is not possible to cover every aspect of health in Hull. Therefore, if you require further information or want to check if the latest data is presented please get in touch with us (see page 2 for contact details).

It is important to examine levels of health and ill-health as well as levels of risk factors and attitudes towards health in different populations for monitoring purposes including the monitoring of health-related targets, examining trends over time, comparison with other geographical areas, examining patterns of health and risk factors within the population of Hull (e.g. comparison of different groups such as those defined by deprivation), assessment and evaluation of programmes designed to improve health, assessing the existing and future need for health-related services following changes in health, ill-health or risk factors so that the Commissioning function can be adequately fulfilled.

It is hoped that readers of this report can assess the levels of health, ill-health or risk factor that they are interested in for their particular ward, Area or Locality and relate this to national figures. In addition, the information provided in this profile can be used as a baseline level of health or ill-health in performing health needs assessments and health equity audits.

The document also includes other information on more qualitative research and social marketing (in relation to specific risk factors see Hull JSNA Toolkit: Smoking, Hull JSNA Toolkit: Alcohol Consumption, Hull JSNA Toolkit: Exercise, Hull JSNA Toolkit: Diet, Hull JSNA Toolkit: Overweight and Obesity; and in relation to the way the research was conducted see Hull JSNA Toolkit: Surveys) and some information from existing public health programmes (in relation to specific risk factors see Hull JSNA Toolkit: Smoking, Hull JSNA Toolkit: Alcohol Consumption, Hull JSNA Toolkit: Exercise, Hull JSNA Toolkit: Diet, Hull JSNA Toolkit: Overweight and Obesity).
2.8.1 Health Intelligence and Knowledge for Commissioning of Services

In order to inform commissioning, information is needed as to the health needs of the local population as well as future changes to the population and need. The information needs to be at population level and measure ‘need’ as it is well recognised that there is an undiagnosed level of disease and medical conditions as some patients do not present with their symptoms. In order to reduce these rates long-term, it is also necessary to commission public health services such as smoking cessation and weight loss programmes. Therefore, obtaining information about the prevalence of health and behavioural risk factors is important. Reducing the inequalities gap is also a priority, and this requires further knowledge about differences in risk factors, treatment rates and mortality rates, etc among different groups.

2.8.2 Health Needs Assessment

Wright et al (Wright, Williams et al. 1998) states: “Assessment of health needs is the systematic method of identifying unmet health and healthcare needs of a population and making changes to meet those unmet needs. It involves an epidemiological and qualitative approach to determining priorities, which incorporates clinical and cost effectiveness and patient’s perspectives. This approach must balance clinical, ethical and economic considerations of needs, that is, what should be done, what can be done and what can be afforded.”

In addition, “Health needs assessment (HNA) should not just be a method of measuring ill-health, as this assumes that something can be done to tackle it. Incorporating the concept of a capacity to benefit introduces the importance of effectiveness of health interventions and attempts to make explicit what benefits are being pursued.”

Therefore, Wright et al (Wright, Williams et al. 1998) states HNA gives the opportunity for:

- Describing the patterns of disease in the local population and the differences from district, regional, or national disease patterns;
- Learning more about the needs and priorities of their patients and the local population;
- Highlighting the areas of unmet need and providing a clear set of objectives to work towards meeting these needs;
- Deciding rationally how to use resources to improve the local population’s health in the most effective and efficient way;
- Influencing policy, interagency collaboration, or research and development priorities.

This report informs the first step for equity audits – describing the patterns of disease in the local population.
2.8.3 Health Equity Audit

There are various definitions of equity and of health equity audits, but essentially a health equity audit identifies how fairly services or other resources are distributed in relation to health 'need' of different groups and areas, and assesses the success of programmes which aim to improve any inequity that is found.

The Government White Paper ‘Choosing Health’ (Department of Health 2004) states that tackling inequalities in health is a key priority and Primary Care Trusts (PCTs) are required to undertake Health Equity Audits regularly to tackle inequalities for specific diseases and medical conditions. The new Health White Paper (Department of Heath 2010) and the Public Health White Paper (Department of Health 2010) also highlight reducing inequalities as a key priority.

This document provides some information on the prevalence of some key diseases and their treatment in relation to deprivation, and so could inform the first step of a health equity audit. Successive steps of initiating interventions and assessing their success are not covered in this report, and would need to be undertaken as additional steps for those undertaking health equity audits.


2.8.4 Asset Approach

Identifying needs based on measures of deprivation, illness and risky behaviour and then developing services to meet or 'fix' those needs has been the traditional approach to reducing health inequalities in the UK. This can work up to an extent but it encourages dependence and allows people to become passive recipients of expensive services rather than active agents in their own and their families’ lives. That this approach is not working well enough is illustrated by the fact that although life expectancy is increasing across England, the rates are not rising to the same extent in the more deprived communities. The Marmot Review in 2010 (Marmot 2010) recommended certain strategies for reducing health inequalities that took a new approach.
Marmot advised health organisations and local authorities to:

- move beyond measuring mortality and to focus instead on ‘being well’ and ‘well-being’
- measure the impact on ‘disability-free life expectancy’
- concentrate on the ‘causes of the causes’ – invest more in the material, social and psychosocial determinants of health
- pay attention to the importance of stress and mental health in shaping physical health and life chances
- put empowerment of individuals and communities and reducing social isolation at the heart of action on health inequalities
- strengthen the role and impact of ill-health prevention.

In response to this, a different ‘asset based’ approach has recently been increasingly used to empower individuals and communities to tackle inequalities through prioritising well being (Improvement and Development Agency 2010; NHS North West 2011; NHS North West 2011; NHS North West and CPC 2011; Stansfield, Emanuel et al. 2011). The asset approach recognises that as well as having needs and problems, marginalised communities also have social, cultural and material assets. Identifying and mobilising these can help individuals and communities overcome the health challenges they face. Communities are not built on deficiencies but from mobilising the capacity and assets of people and place. Focussing on what a community has increases their power to address their own needs and lever in external support only when necessary. Targeting resources onto ‘needs’ directs funding to professionals and services and not to communities. Instead, an asset based approach can complement a needs based approach by aiming for a better balance between service delivery and community building. **Table 1** shows the differences between a deficit approach and an asset approach:

**Table 1: Prioritisation relative morbidity and mortality impact scores**

<table>
<thead>
<tr>
<th>Deficit approach</th>
<th>Asset approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start with deficiencies and needs in the community</td>
<td>Start with the assets in the community</td>
</tr>
<tr>
<td>Respond to problems</td>
<td>Identify opportunities and strengths</td>
</tr>
<tr>
<td>Provide services to users</td>
<td>Invest in people as citizens</td>
</tr>
<tr>
<td>Emphasise the role of agencies</td>
<td>Emphasise the role of civil society</td>
</tr>
<tr>
<td>Focus on individuals</td>
<td>Focus on communities/ neighbourhoods and the common good</td>
</tr>
<tr>
<td>See people as clients and consumers receiving services</td>
<td>See people as citizens and co-producers with something to offer</td>
</tr>
<tr>
<td>Treat people as passive and done-to</td>
<td>Help people to take control of their lives</td>
</tr>
<tr>
<td>‘Fix people’</td>
<td>Support people to develop their potential</td>
</tr>
<tr>
<td>Implement programmes as the answer</td>
<td>See people as the answer</td>
</tr>
</tbody>
</table>
What is an asset in terms of health? NICE has defined this as “A health asset is any factor or resource which enhances the ability of individuals, communities and populations to maintain and sustain health and well-being. These assets can operate at the level of the individual, family or community as protective and promoting factors to buffer against life’s stresses.”

An asset can be any of the following:

- the practical skills, capacity and knowledge of local residents
- the passions and interests of local residents that give them energy for change
- the networks and connections (‘social capital’) in a community, including friendships and neighbourliness
- the effectiveness of local community and voluntary associations
- the resources of public, private and third sector organisations that are available to support a community
- the physical and economic resources of a place that enhance well-being.

An asset approach is not the same as community engagement or consultation to improve services – although it will improve both. Professional staff and councillors have to be willing to share power; instead of doing things for people they have to help a community to do things for itself. The asset approach does not replace investment in improving services or tackling the structural causes of health inequality. The aim is to achieve a better balance between service delivery and community building. Asset working does not ignore needs but it distinguishes between those that can be met via family and friends; via co-operation between services and communities or only delivered via services. Thus the aim is to embed assets alongside needs in strategic planning. So augmenting a JSNA with a Joint Strategic Assets Assessment (JSAA) will give a fuller picture of local potential as well as gaps.

Assets can be far more powerful than giving out endless ‘health messages’ across populations. Improved knowledge alone does not change behaviours, and there is evidence that people with more chaotic and difficult lives are less likely to change as a result of social marketing messages than middle class groups; so an over-reliance on social marketing could actually widen inequalities. Some of the most powerful influences on behaviour change are family and neighbours, and a collective sense of self esteem, helping people believe that it is possible to take actions to improve health and well-being. If people value themselves, then other behaviours like healthy eating and giving up smoking will follow.

Additionally social networks have a larger impact on the risk of mortality than on the risk of developing disease, that is, it is not so much that social networks stop you from getting ill, but that they help you to recover when you do get ill (Marmot 2010).
So, what does asset working mean for healthy communities’ practitioners?

- Shifting attitudes from a ‘deficit’ way of seeing the world.
- Complementing, not replacing, good service delivery.
- Embed assets in strategic processes (JSAA / JSNA)
- People-centred partnerships take on added importance
- People-centred scrutiny of local services.
- Agreeing a robust foundation for community development and community building in strategic commissioning
- Emphasising co-production, where health outcomes are produced through the combined efforts of citizens and services.

There are various techniques used in putting the asset approach into practice – they all work by discovering and mobilising what people have to offer. These different working methods are often used in combination with each other.

- Asset mapping - Participants make a map or inventory of the resources, skills and talents of individuals, associations and organisations. They discover and collate the links between the different parts of the community and the agencies.
- Asset based community development - The purpose is to build up community groups and voluntary organisations and their informal associations and networks, their collaborative relationships, their shared knowledge and their social capital.
- Appreciative inquiry - A process for valuing and drawing out the strengths and successes in the history of a group, a community or an organisation. Storytelling and World Café are techniques that can be used within this process.
- Participatory appraisal - Local community members are trained to research the views, knowledge and experience of their neighbourhood to inform the assessment of needs and priorities for future plans.
- Open space technology - Participants decide the agenda and what is to be discussed rather than having a fixed agenda or speakers in advance. This allows a diverse group of participants to work on a complex and real issue.

In Hull a number of different activities have taken place or are planned that have a foundation in the asset approach to tackling health inequalities. These include:

- Health Trainers
- Health walks
- Hearty Lives projects to prevent coronary heart disease
- Looking Good, Feeling Good
- Cancer Champions

Community organisations such as the Goodwin Trust have mobilised assets in the residents and locality of the Thornton estate to enhance social capital and community cohesion with Community Health Champions, a food co-op, the Doula project etc.
Such activities could be extended to include initiatives such as ‘timebanking’. An example of this is a community centre in London that runs projects for people with mental health problems, refugees, asylum seekers and homeless people. The centre has established a timebanking scheme by which members exchange skills with each other and earn credits by helping at the centre. They earn time credits that they can exchange with other members, with council services or with local businesses such as cinemas, gyms and theatres.

Whilst it is early days for asset based working in the UK, the planned integration of Public Health services into the responsibility of the Local Authority provides a hugely important opportunity to undertake comprehensive asset mapping and expand this approach to community enablement and ‘whole system change’ across the city. Mapping assets would balance the enormous amount of work that is done to collect data about problems and needs.

3 DATA SOURCES

The data sources for each table and figure included within each report is given within the APPENDIX of each JSNA Toolkit report.

Local and national data is available from the NHS Information Centre Indicator Portal (www.indicators.ic.nhs.uk/webview) which was previously known as the Compendium (of Clinical and Health Indicators). The information provided is quite varied, such as resident population estimates, information from the Quality and Outcomes Framework (GP disease and quality of care registers), age-specific and indirectly and directly standardised mortality rates for the main causes of death, cancer incidence, screening uptake rates, number of births, fertility rates, hospital episode statistics, standardised admission or procedural rates for a limited number of diseases or procedures, etc. The NHS Information Centre Indicator Portal provides information for different geographical areas (national – England, regional, and at local authority and/or CCG level). Some information, particularly mortality rates, is usually provided for males and females separately and combined, and for different age groups. The standardised mortality rates are generally provided for all ages and for those aged under 75 years, with (indirectly) standardised mortality ratios (SMRs) standardised to the English population and the directly standardised mortality rates standardised to the 2013 European Standard Population. This report generally uses the mortality rates from the NHS Information Centre Indicator Portal when presenting information for Hull overall, because these are the nationally recognised figures and it is also useful to have the equivalent comparison information for England, the local region and comparator areas.

2 Note that locally derived estimates for mortality rates and life expectancy differ in relation to the national estimates as different population estimates are used locally, however, the local estimates are produced as the information is available around 4-6 months earlier and local estimates can be produced for different defined groups (such as by deprivation quintile or at ward or area level), and these rates are not produced nationally.
For indicators within the Public Health Outcomes Framework (PHOF), England and the local authority level data can be downloaded at [www.phoutcomes.info](http://www.phoutcomes.info).

The Excel data file also contains a “meta data” worksheet which contains information about the definition of the indicator and the data sources. In some indicators, reference is made to nationally available data which is available at geographical areas smaller than local authorities. For other indicators, it is possible to calculate the indicator at different geographical area using local data (e.g. using hospital records or mortality data).

A number of other datasets and reports are available from the Information Centre ([www.ic.nhs.uk](http://www.ic.nhs.uk)), including vaccination data (Information Centre for Health and Social Care 2011) and Stop Smoking Service data (Information Centre for Health and Social Care 2010).

Information from the 2011 Census is available for different geographical areas from [http://neighbourhood.statistics.gov.uk](http://neighbourhood.statistics.gov.uk) and [www.nomisweb.co.uk/census/2011](http://www.nomisweb.co.uk/census/2011).

Information relating to the Index of Multiple Deprivation 2010 was downloaded from the Communities and Local Government website (Communities and Local Government 2011). ACORN and Health ACORN classifications at postcode and output area level were purchased from CACI ([www.caci.co.uk/insite](http://www.caci.co.uk/insite)). Customer profile types (housing types) were obtained from Hull City Council who derived the profiles.

The prevalence from the Quality and Outcomes Framework (QOF) GP disease registers (see section 7 on page 43 for more information) have been taken from Excel files downloaded from the Information Centre (Information Centre for Health and Social Care 2010).

The GP registration file was available on the Primary Care Information System (PCIS), previously known as Open Exeter (Connecting for Health, 2009). This file includes individual level data on all people registered with GPs within the Hull and East Riding of Yorkshire PCTs (plus a few practices outwith this area). The file includes gender, date of birth, GP information and the postcode of the residence. This has been merged with the NHS postcode lookup file so that other geographical information has been added to this population file (e.g. lower layer super output areas). From this file, an estimate of the resident population can be derived for subpopulations of Hull, such as the number of residents based on ward or deprivation scores (derived from the Index of Multiple Deprivation 2010 score assigned to the lower layer super output area geography which includes the residents’ postcodes, see Hull JSNA Toolkit: Deprivation and Associated Measures and section 2.5 on page 10 for more information about deprivation scores). Breast and cervical cancer screening uptake rates are also available from PCIS at practice level.

The Public Health Mortality Files (PHMF) and the Public Health Birth Files (PHBF) are both available to PCTs and more recently Public Health analysts at the local authority from the Office for National Statistics (most recently via the Primary Care Mortality
Database). These files contain individual records for all deaths and births respectively in Hull. The age, gender and postcode of each individual are included in the file. The PHMF includes the date of death, underlying cause of death and place of death. The PHMF has been used for analyses involving the calculation of the number of deaths from specific causes as well as the calculation of standardised rates when mortality information has been presented for wards and other local geographical areas, or by deprivation quintiles. For these analyses, resident population estimates were derived from the GP registration file mentioned above (Connecting for Health, 2009). In some cases, the estimate for Hull has been presented, but this will not be the same as the figure produced in the NHS Information Centre Indicator Portal due to the differing population estimates. In these circumstances, the figure from the NHS Information Centre Indicator Portal should be used in preference to any locally derived figures. Using the resident population estimate from the GP registration file tends to produce a slightly higher life expectancy estimate and a slightly lower directly standardised mortality rate compared to the NHS Information Centre Indicator Portal, because the local population estimate (from the GP file) is slightly higher than ONS’s estimate.

Patient level data for daycase and inpatient admissions was obtained from local Hospital Episode Statistics (Office for National Statistics 2009; Information Centre for Health and Social Care 2014). Prior to April 2013, the HES dataset was provided by colleagues in the Performance team of NHS Hull. The file included patient’s gender, date of birth, dates of admission and discharge, primary and secondary causes of admission and information on any surgical procedures undertaken as well as the type of admission (daycase, elective or emergency). For more information about Hospital Episode Statistics data, see section 6 on page 42.

Projected population estimates were obtained from the Office for National Statistics (ONS) from www.statistics.gov.uk.

Data from the Stop Smoking Service was downloaded from the Information Centre(Information Centre 2014).

Local information on the prevalence of lifestyle and behavioural risk factors and measures of social capital was obtained from local surveys (see section 5 on page 24). National prevalence information was obtained from the General Lifestyle Survey (previously General Household Survey) (Economic and Social Data Service 2008), the Health Survey for England (Health Survey for England 2008) or Integrated Household Survey (Office for National Statistics 2013). Alternatively, for indicators within the Public Health Outcomes Framework, the data from the PHOF data tool was used (Public Health England 2014) or data from sources quotes from within the “metadata” worksheet within Excel data file downloaded from the PHOF data tool website.
4 SYNTHETIC OR MODELLED ESTIMATES

The Association of Public Health Observatories (APHO) has produced a technical briefing on prevalence modelling (Association of Public Health Observatories 2011). This discusses some of the problems associated with producing a modelled or synthetic estimate. The following was produced independently of the APHO, by the Public Health Sciences Team, but covers a number of the same points:

Research and modelling methodology: The accuracy of any synthetic estimates depends on the quality of the initial research and the modelling itself. If the model is too simple, for example, just containing age and sex as predictors, this means that the resulting estimates will be poor for geographical areas with particularly low or particularly high levels of other factors that influence the estimates, such as deprivation. If the model is complex and contains a high number of predictive factors, it is very possible that the model would be “over-fitted”. This is a statistical term meaning that the model is (artificially) a good model using the initial research, but a much poorer model when applied elsewhere.

Testing: Even if the modelling has been undertaken by qualified statisticians who understand the numerous problems associated with generating models, it needs to be tested and any modelling is still based on initial research. It is very rare for models to be ‘tested’, so generally the accuracy with which the model predicts the true situation is largely unknown.

Validity and generalisability: The quality of the original epidemiological studies could differ substantially, and it is possible that these studies, for any number of reasons, may not be appropriate or of sufficiently high quality to use in modelling. Furthermore, it is possible that a number of different epidemiological studies have been used to generate the model and this has its own complications; combining data from different studies that have used different methodology and definitions, and undertaken at different points in time. It is likely that the initial research was not originally intended to generate such a model, and if different studies have been used it is possible that the factors / variables in the model differ. This means that assumptions need to be made or changes need to be made to the original data to generate a model. For example, it is possible that different measures of deprivation have been used in the original research, but one measure needs to be used in the final model. The time lapse between the original research and the period to which the modelling refers may be long enough to render the model inaccurate under more recent circumstances. It is very possible that the initial research was undertaken in a very specific geographical area, and if this was the case, then there might be very little or no data at the extremes of a highly influential factor, which would result in a very poor model when applied to geographical areas which are substantially different from the geographical area of the initial research. For example, if the original research was undertaken in a geographical area with “average” deprivation and relatively few or no deprived areas, then there would be little or no data from the original research to provide good predictions for more deprived areas. The model would
generate predictions for much more deprived areas, but it is likely that the predictions could be very poor as the model is generating a prediction outside the range of the original data. This is particularly the case for Hull due to its high level of deprivation. Even where the model is constructed from data drawn from a wide range of situations (e.g. high/low deprivation), the linear assumptions made by most models may break down at the extremes, and all too often Hull is at the extreme end of either explanatory or observed variables. This will lead to inappropriate extrapolation and inaccurate and systematically biased estimates.

Lack of transparency in relation to synthetic estimates: Most of the time, the details of the model used to create the synthetic estimates are not available. Therefore, it is difficult to assess the quality of the estimate or the quality of the original research used to derive the model. Furthermore, synthetic estimates are sometimes provided without stating where the estimate comes from or even that it is a modelled / synthetic estimate.

Problems with updating synthetic estimates: Without knowing the details of the model, it is very difficult to assess how and when the model will change in the future (when new data included in the model becomes available). For example, the Index of Multiple Deprivation score was created in 2001 and updated in 2004 and 2007, and if the model included this then it is not likely to change until 2010 or even later (if at all). Some models will use data from the Census, which is updated every ten years with the last Census conducted during 2001. So information from the Census is relatively out of date, and new Census data will not be available until around 2012-2013 once the 2011 Census data is analysed and published.

Examples. Synthetic estimates have been derived by the Public Health Observatories (PHO), and ‘factsheets’ are available for each Primary Care Trust / Local Authority from the Yorkshire and the Humber PHO (YHPHO)\(^3\). Historically the synthetic estimates for smoking prevalence in Hull have been considerably higher than local Health and Lifestyle Survey estimates (almost one third higher). The PHO estimate for 2006-2008 was 32.5% for smoking prevalence which was similar to the local surveys conducted in Hull. However, the estimate prior to this (included in the profiles published during 2009) was 41.9%. \underline{Table 2} gives the synthetic estimates and estimates from the local surveys conducted in Hull, and presenting the information is just illustrative as an example of the potential problems with synthetic estimates particularly when modelling occurs at the extremes (like Hull in terms of deprivation). More recent estimates of prevalence estimates at a local level have generally been obtained from larger national surveys, so synthetic estimates have been produced and presented to a lesser degree recently.

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\(^3\) Health Intelligence Practice Profiles and PCT Level Profiles on [http://www.ypho.org.uk/](http://www.ypho.org.uk/)

\(^4\) All the local surveys in Hull have used quota sampling so are representative of Hull’s population in terms of age, gender and geography (and employment status).
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

### Table 2: Public Health Observatory synthetic lifestyle prevalence estimates for Hull compared to estimates from local health and lifestyle surveys

<table>
<thead>
<tr>
<th>Estimate type</th>
<th>Time period / survey</th>
<th>Prevalence estimate in Hull (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Smoking</td>
</tr>
<tr>
<td>Synthetic</td>
<td>2003-2005 (used in 2009 profiles)</td>
<td>40.9</td>
</tr>
<tr>
<td></td>
<td>2006-2008 (used in 2011 and 2012 profiles)</td>
<td>32.5</td>
</tr>
<tr>
<td>From local surveys</td>
<td>Health &amp; Lifestyle Survey 2007</td>
<td>31.7</td>
</tr>
<tr>
<td></td>
<td>Health &amp; Lifestyle Survey 2009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prevalence Survey 2009</td>
<td>35.1</td>
</tr>
<tr>
<td></td>
<td>Social Capital Survey 2009</td>
<td>32.7</td>
</tr>
</tbody>
</table>

*These ‘terms’ are not defined, so it is difficult to know exactly what is meant by ‘physically active’ or ‘healthy eating’. Locally, ‘healthy eating’ is defined as eating 5-A-DAY, and exercise was defined based on fulfilling the national exercise recommendations. So definitions may not be comparable.
**Not published or not asked in local survey.

### 5 LOCAL SURVEYS

#### 5.1 Health and Lifestyle Surveys

In order to have an impact on reducing inequity in health and preventing disease rather than just treating disease, it is necessary to influence people’s attitudes and behaviours towards health, and in order to accomplish this it is necessary to have knowledge about health-related attitudes and behaviours and people’s perceptions towards their health, as well as the prevalence of risk factors, such as smoking, and prevalence of diseases and medical conditions.

National data are available for some health and lifestyle issues from nationally conducted surveys, but since this covers the whole of England, historically relatively few people within the local area have participate in the survey but more recently the numbers within each local authority are much larger. Information from these national surveys is useful as local results can be compared with national results (usually for England), e.g. prevalence of smoking, prevalence of alcohol consumption or general health status. However, in many cases different questions and response categories, and differences in the survey designs, mean that it is not straightforward to compare the results directly.
A number of local quantitative and qualitative surveys have been conducted and are detailed below. Detailed survey reports from these local surveys can be found at www.hullpublichealth.org.

5.1.1 Adult Survey Conducted in 2003

A local adult Health and Lifestyle Survey conducted in Hull by the Public Health Development Team\(^5\) during 2003 provides more detail at the local level (Public Health Development Team 2005). The aim of the survey was to provide information which could be used in the planning and evaluation of current and future services within the area, particularly those services aimed at improving public health. The survey also provided information to a much wider range of organisations and individuals who have an interest in the health and health-related lifestyle activities of the population. A random sample of people aged between 16 and 84 years who were registered with a General Practitioner (GP) within the Hull and East Riding of Yorkshire were sent a self-completion questionnaire. As this represents a GP practice-based sample, it means that some individuals who live beyond the boundary were included in the sample. However, as postcode of the individual was collected, it was possible to examine only residents of Hull. A self-completed questionnaire was returned by 1,716 Eastern Hull PCT and 1,560 West Hull PCT residents (out of 6,500) giving an overall response rate of 50% which compares favourably to other general population surveys, especially in urban areas.

Local people participating in the Health and Lifestyle Survey were asked questions about specific risk factors, including questions relating to obesity, smoking, exercise and alcohol, and were also asked about their usage of local health services.

5.1.2 Adult Survey Conducted in 2007

Another adult Health and Lifestyle Survey was completed in Hull during early 2007 (Sheikh Iddenden, Porter et al. 2008). This provided more up-to-date information and allows changes over time to be examined. A number of questions remained the same so that comparisons could be made, but it was necessary to add or change some of the existing questions. A different methodology was used (quota sampling), which aimed to provide a final sample of survey responders who were more representative of the overall population of Hull in terms of age, gender, area of residence and employment status. As the questionnaire took approximately 20 minutes to complete, most people when approached on their doorstep by the interviewer preferred to complete it at their leisure. So the majority of the completed questionnaires were self-completed rather than completed by interview. The questionnaires were collected by the interviewer at a mutually agreed time to ensure a higher completion/return rate. A total of 4,086 residents of Hull completed the questionnaire. As this survey resulted in a sample that was broadly similar to Hull’s overall population, an estimate of the number of people from different Black and Minority Ethnic (BME) groups can be obtained. Three specific

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\(^5\) Now Public Health Science section of Hull Teaching Primary Care Trust.
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

reports on obesity and exercise, alcohol and smoking have been written. Reflector groups were also held following the survey (see section 5.2.2 on page 31).

5.1.3 **Adult Black and Minority Ethnic Survey Conducted in 2007**

As well as a Health and Lifestyle Survey which was broadly representative of the Hull population, another adult survey was completed entirely for Black and Minority Ethnic (BME) groups during 2007 (Porter, Sheikh Iddenden et al. 2008). A further survey was completed for Gypsy and Travellers (Sheikh Iddenden, Porter et al. 2008). The surveys used the same questionnaire as the main survey. However, it was not possible to use the same methodology, and potential BME Survey responders were approached through community groups and the Gypsy and Travellers were approached using existing contacts and networks. A total of 1,163 residents of Hull who were from different BME groups, and a further 100 Gypsy and Travellers completed the questionnaire. A BME reflector group was held following the survey (see section 5.2.2 on page 31). A summary of the findings from the BME Survey and the Gypsy and Traveller Survey is given in the Smoking, Alcohol Consumption, Overweight and Obesity, Diet, Exercise and Drugs and Substance Abuse documents of the Hull JSNA Toolkit.

5.1.4 **Adult Prevalence Survey Conducted in 2009**

A smaller ‘Prevalence Survey’ was completed during late 2009. The questionnaire included questions to examine the prevalence of the main risk factors to update the information collected in the 2007 Health and Lifestyle Survey. As well as questions on smoking, exercise, 5-A-DAY, alcohol and height and weight to measure overweight and obesity, the survey included a small number of questions to examine the survey population (general health status, limiting long-term illness or disability, mental health index, age, gender, ethnicity, and employment status). Quota sampling was used with the target to interview 1,750 residents of Hull. Interviewers approached individuals at their homes.

5.1.5 **Adult Survey Conducted in 2011-2012**

A large adult Health and Lifestyle Survey was completed in Hull with fieldwork completed during the period October to February 2012. The target was for the questionnaire to be completed by 12,000 adults (16+ years) living in Hull. The survey involved a similar methodology employed during the 2007 survey involving quota sampling and the questionnaires left with the survey respondent to complete in their own time which were then collected at a later date, although some interviews were also conducted. Many of the questions were the same as the 2007 survey, but there were changes made to the questionnaire. The main changes were the removal of the Health Utility Index measure and the inclusion of questions to derive Healthy Foundations segmentation groups.

A total of 13,553 adults aged 16+ years participated in the survey which was more than the original quota.
5.1.6 Adult Black and Minority Ethnic Survey Conducted in 2011-12

As well as a Health and Lifestyle Survey which was broadly representative of the Hull population, another adult survey was completed entirely for Black and Minority Ethnic (BME) groups during 2011. This survey used the same questionnaire as used for the Health and Lifestyle Survey 2011. In order to attempt to obtain a more representative sample of BME for the survey, at the time of questionnaire completion, survey responders participating in the 2011 main survey were asked (with a very carefully worded script) if there were other people living nearby (± 5 houses) who were from different BME backgrounds/communities. The addresses of these potential households were noted, and once the main survey was completed, these households were approached to obtain the target of 1,000 residents from BME backgrounds. The BME survey was completed after the main survey had been completed as we did not want the main survey to be biased with regard to the BME population, and were assured by the interviewers that knowledge of the BME households would not influence the selection of households for the main survey. This is the main reason why the main survey responders were asked about BME households at the time of the questionnaire completion and why the BME survey was completed after the main survey.

5.1.7 Young People Survey Conducted in 2002

A Health and Lifestyle Survey (McTighe 2003) was completed among young people aged 11-15 years (school years 7-10). All 36 schools within Hull and East Riding of Yorkshire were asked to take part in the survey, and 21 agreed. In the majority of participating schools, a request was made for two classes of each of the years 7-10 to be surveyed; where schools wished to select only specific age groups this was respected. The sample was therefore not directly random as the schools and pupils taking part were volunteers, few pupils refused to participate. Based on the postcode of the school, a total of 1,432 young people participated in Hull (759 in West Hull PCT and 673 in Eastern Hull PCT).

5.1.8 Young People Survey Conducted in 2008-09

Another Health and Lifestyle Survey was completed among young people aged 11-16 years (school years 7-11) within Hull with fieldwork completed during the period November 2008 to February 2009. Thirteen of the fourteen schools agreed to participate as well as a further three Pupil Referral Units (PRUs). St Mary’s school did not agree to take part, which takes pupils from across the city. As the intake is not geographically focused, it is hoped that there will not be a bias in the survey responders due to the exclusion of this school. All pupils from the PRUs were asked to participate and quota sampling was used for the schools based on the school census conducted in January 2008. Schools were asked to select the number of classes within each school year to survey so that at least as many questionnaires were completed as stated on the quota (minimum). Within the school year, the school chose which classes participated. On the whole, the survey was undertaken during Personal, Social and Health Education classes which are generally not selected in relation to ability and future educational
attainment. Therefore, the classes should represent a mix of pupils based on socio-economic status, etc. In some schools, the quotas for different school years or overall were not achieved, and some schools were approached to ask if they would be willing to complete further questionnaires. The target of 3,000 completed questionnaires was not quite achieved as 2,928 completed questionnaires were obtained. Reflector groups were also held. Two groups were conducted in two schools across all school years, and four further groups were held with those aged 16-18 years (see section 5.2.4 on page 36).

5.1.9 Young People Survey Conducted in 2012

Another Health and Lifestyle Survey was conducted among young people aged 11-16 years (school years 7-11) within Hull with fieldwork undertaken either side of the Easter holidays 2012. Responses were received from 4,074 young people attending 13 of the 14 Hull secondary schools, together with the School Girls Mums, Fountain House and Ashwell Pupil Referral Units, Northcott Special School and Hull Collegiate School. Of these 4,074 pupils, 3,802 questionnaires were completed by young people who lived in Hull (with the others living outside Hull but attending Hull schools). This represents just over one in every four young people in Hull of secondary school age. Participation in the survey was broadly representative of young people in the city, although older pupils were under-represented. While it was not possible to be too prescriptive about the sample size for each school, the market research company that undertook the survey administration were tasked with getting a sample of pupils that was as representative as possible of young people in Hull aged 11-16 years and in full-time education. In a similar way to the 2008-09 survey, the survey was administered in each participating school mainly during Personal, Social and Health Education classes, which are generally not selected in relation to ability and future educational attainment. Therefore, the classes should represent a mix of pupils based on socio-economic status, etc.

5.1.10 Veterans’ Survey Conducted in 2009

The fieldwork for a Veterans’ Health and Lifestyle Survey occurred during Autumn 2009 for Veterans who lived in Hull and had served in the British Armed forces since 1970. As well as a questionnaire, around 20 Veterans completed an in-depth interview. Due to the difficulty in knowing which residents in Hull were Veterans, different organisations who deal with Veterans and other local sources of information were used to approach Veterans directly by post asking the Veterans if they would be willing to participate in the survey. A press release was also issued encouraging Veterans to come forward to participate in the survey. Due to the methodology used to approach Veterans, those who participate in the survey will not necessarily be representative of all Veterans living in Hull who have served in the Armed Forces since 1970 (as Veterans with health problems are likely to volunteer for the survey more readily or be involved with organisations helping Veterans).
From information provided by the 53 Veterans who completed questionnaires between August and October 2009 and had served in and left Armed Services in 1970 or afterwards, a summary of the main findings were:

- Only a half of Veterans (48%) knew about the ‘fast-track’ service.
- Overall, 43% felt they did not have access to all the services they needed and 14% stated that there were reasons why they might not want to engage with local health services mainly as civilians did not understand (although the total numbers not wanting to engage were very small). There were comments about the delays in receiving care, and a hope that action would result rather than this being ‘just another survey’.
- Just under a half stated that they had depression or anxiety and the majority (87%) of these stated that this was related to their service.
- Around one in four stated they suffered from post traumatic stress disorder (PTSD) and all thought this was related to their service.
- One-quarter had problems controlling violence with the majority (83%) of these stating it was related to their service.
- One-third had difficulty obtaining or maintaining a job and the majority (63%) of these stated that this was related to their service.
- One in six stated they smoked too much, drank too much alcohol or ate unhealthily to help deal with stress and the majority of these felt that this was related to their service
- Two-thirds had physical health problems (but this could be associated with age for many), and 79% of these with health problems stated that they felt these problems were related to their time in the Armed Services.
- Overall, of the 51 Veterans answering these questions, 10 (20%) stated that they did not have any of the above health or lifestyle issues and 11 (22%) stated that they had “physical health problems” but none of the other health or lifestyle issues (depression or anxiety, PTSD, problems controlling violence, difficulty obtaining or maintaining a job, or smoking or drinking too much, eating unhealthily or taking drugs).
- Similar percentages attributed depression or anxiety, PTSD, problems controlling violence, difficulty obtaining or maintaining a job, to other people that they knew who were former members of the Armed Services.
- A much higher percentage attributed smoking or drinking too much, eating unhealthily or taking drugs, to other people they knew who were former members of the Armed Services.
- All were registered with a GP and many had used local health services within the last year; 94% had seen a GP, 62% a practice nurse, 23% a community psychiatric nurse, 26% had attended physiotherapy, 38% had attended counselling, 31% had attended a psychologist appointment, 71% had attended a dental appointment, 19% had been to A&E, 53% had had an outpatient appointment, 39% a daycase appointment and 19% had been an inpatient.
- Veterans were asked if they had sought help or advice from a professional within the last year (or more than a year ago) with regard to the various health and lifestyle issues above. Within the last year, 61% had sought help or advice for
physical health problems, 36% for depression or anxiety, 33% for PTSD, 23% for problems controlling violence, 13% for employment problems, 23% for problems with family relationships and few had sought help or advice for lifestyle issues.

- 53 completed questionnaires for post-1970 Veterans with wide age range (23 to 88) with mean age of 54 years, serving between 1-38 years (mean 16 years).
- Compared to similarly-aged local Health and Lifestyle Survey responders, there was much poorer physical and mental health for Veterans, but similar prevalence for 5-A-DAY and alcohol although 17% of Veterans stated that a relative or friend, or a doctor or other health professional has been concerned about their drinking or suggested they cut down. Fewer Veterans smoked and a higher percentage of Veterans exercised to national guidelines compared to the Health and Lifestyle Survey responders.

The final report is available at www.hullpublichealth.org which includes findings and learning points from the in-depth interviews.

5.2 Qualitative and Social Marketing Research

5.2.1 Attitudes to Health Focus Groups 2007

Twelve focus groups were held in Hull during 2007 to ask about opinions and attitudes to health which included a theme on diet and nutrition. Eleven groups were held with residents of Hull aged 40-60 years (8 mixed sex, 1 all female group, 1 all male group and one Black and Minority Ethnic (BME) group). A reflector group was also held involving community volunteers. Various other interviews, follow-up and discussion groups were also held.

Focus group participants were able to identify a range of preventable diseases and conditions that they believed were attributable to lifestyle and behaviours which were consistent with those identified by community professionals. The main factors identified by the groups which affected health were: smoking; alcohol; stress; poor environment; employment; unemployment; lack of money; poor diet; lack of exercise; lack of knowledge; lack of support and illegal drug use. The main personal situations and behaviours believed to constitute a risk to health included: where individuals lived and worked; alcohol intake and excessive drinking; smoking and inhaling the smoke of others; eating a poor diet and over-eating; failing to take exercise; long-working hours; taking illegal drugs and social isolation. In terms of attitudes to diet and poor nutrition, though participants in all groups identified good nutrition as an important factor in remaining healthy and fit in middle age, discussion revealed a huge variance in attitude and behaviour. There was a broad recognition of healthy and unhealthy food groups and an anxiety that related to an increasing lack of knowledge about food purchase and basic cookery skills, which have been lost because of the availability of processed foods, change in family lifestyle and lack of education in school. Blame for the post-war change and deterioration in diet was levelled at the supermarkets, food manufacturers, advertising, low incomes and low availability of good food shops in some areas.
5.2.2 Reflector Groups Following 2007 Health and Lifestyle Survey

The findings from the 2007 Health and Lifestyle Survey for some subject areas demonstrated that there were reasons for public health concern in respect of a number of health and lifestyle topic areas. The objectives of the reflector groups following the quantitative survey were to gain additional insight into the varying attitudes, opinions and feelings of a number of target groups and improve understanding of the statistical differences identified between men and women, old and young, those living in different areas of the city, and between different ethnic groups for the main health and lifestyle topics of concern, namely, smoking; alcohol consumption; diet; overweight and obesity; and exercise.

The groups were recruited by telephone and on a face-to-face basis with a target of 12 attendees for each group. The groups recruited were: (i) all male – mixed age and living in the most deprived areas of Hull (18–64 years); (ii) all male – mixed age and living in the most deprived areas of Hull (18–64 years); (iii) male and female – mixed age and living in the least deprived areas of Hull (18–64 years); (iv) male and female aged 18–24 years; (v) male and female aged 60+ years; and (vi) male and female ethnic minority/immigrant 6 (18–64 years). The full report (Oldroyd et al. 2008) is available at www.hullpublichealth.org.

The key findings noted in the main report were:

- “Smoking rates were high in all groups with a variety of explanations given for the higher frequency of smoking among men and women in Hull and mixed levels of success for those who had tried to quit. Psychological and economic pressures were cited most frequently as reasons for continued smoking and these were often related to unemployment and social deprivation. Good levels of health service support were recognised by most people but some men said that there was insufficient guidance in the area and there was a shared belief that high impact advertising was an effective way of driving messages home. Though smoking while pregnant was considered to be unacceptable by most people the majority did not regard the health impacts of smoking particularly seriously.

- There was broad understanding of the components of healthy and unhealthy diets and agreement that the cost of a healthy diet barred some people from eating the right food. The poor access to fresh fruit and vegetables in some areas, and the availability and the convenience of junk food were major factors, particularly for young people who were also most likely to ignore messages about consumption of good food. A lack of knowledge about shopping and cooking was

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6 As the survey found Africans and Asians tended to have the worst health as a relatively high proportion were asylum seekers, failed asylum seekers or refugees, the Black and Minority Ethnic (BME) reflector group focused on these BME groups.
identified as a serious issue for young families and there were suggestions from several people about how healthy eating education and advertising could be improved and made more effective. Only in the young people’s group was there an obvious lack of knowledge and disinterest about the long-term effects of eating badly and the health implications of a persistently bad diet were well understood by most participants.

- On the whole, women were more likely to be taking regular exercise and conform to national exercise guidelines than men. Though many walked regularly, most were unenthusiastic about exercise and targets were considered to be unrealistic. Things that prevented people from exercising were related to finance, which prevented many from taking gym memberships; insufficient local facilities that caused queuing and discouragement; and reduced access to public spaces, where family and retirement leisure and activity had been curtailed by the abuse of parks and open spaces.

- Opinions about weight were mixed and there was little consensus in either male or female groups about at what stage a clothing size was associated with obesity. Most people did not regard obesity as a big problem though some young people were making an effort to prevent obesity in their children.

- Perceptions about health risks associated with alcohol were mixed with young people disregarding the seriousness of their drinking habits. Though most over 25s thought that alcohol was more harmful than tobacco the anti-smoking ban had convinced younger people that smoking was more harmful and less socially acceptable. Health and social risks were well recognised across the other groups but the social impact of binge drinking was trivialised by the younger group. Binge drinking was accepted as a social norm by most people despite an understanding of its negative impacts, which included danger to the individual and the community. The BME group expressed the highest levels of fear about alcohol-induced bad behaviour.”

5.2.3 Reflector Groups Following 2011-12 Health and Lifestyle Survey

Ten reflector groups were run in January to March 2014, to discuss some of the findings from the 2011-12 Health and Lifestyle Survey. Five of the groups were chosen based on attitudinal/ motivational factors, as defined by Healthy Foundations segments, which are explored more fully both in the full reflector groups report and the main survey report, both of which are available at www.hullpublichealth.org. Three of the groups were chosen based on life stage – 16-34 years, 35-54 years and 55+ years. The remaining two groups were chosen based on the relative level of deprivation in the areas where participants lived, using the Index of Multiple Deprivation 2010 local quintiles as a guide (see Hull JSNA Toolkit: Deprivation and Associated Measures for further details). A brief summary of the findings of this research is provided below, extracted from the Executive Summary of the full report.
“There are some commonalities across all of the different groups which were included in this research, which point to a number of potential interventions for consideration by Hull City Council. These are wide-ranging and connect together through the determinants of health model, so include aspects such as worklessness, transport and travel, and access to food. Chapter 5 of this report explains these in more detail, and below the key points are given in summary form.

The concept of a healthy lifestyle to most in the groups related to the key public health messages, in particular, there is a general understanding of the role of diet, exercise, smoking, and alcohol in health. Each aspect was not perceived separately, but rather within a holistic view of their lifestyle, with many ‘compensating’ for their different behaviours in these different aspects, balancing healthy and unhealthy choices. As an example, some smokers did not wish to give up smoking because they thought they would put on weight. Services need to reflect this by being more connected and better co-ordinated ('joined up') to tackle the wider aspects of lifestyle choices and the impacts of the wider determinants of health.

Income is crucial in determining and controlling residents’ lifestyles, and unemployment, alongside a low wage economy has an important impact on lifestyle in Hull, with the minimum wage having a high impact on those who are less affluent to afford a healthy lifestyle, and healthy food. Supporting and working with employers and conducting further research on the barriers to paying above the minimum wage would lead to a greater understanding of how this might be improved. Encouraging higher pay through commissioned services would need to be balanced with lower emphasis on price. Promoting better work-life balance, by responding to the Faculty of Public Health four day week call, and promoting flexible working with employers could improve the Hull economy by creating jobs and enhancing mental wellbeing. It would also support the development of ‘Big Society’ in Hull, by linking in with the needs of the voluntary and community sector and the City of Culture.

There were opposing views on whether Hull is a good place to lead a healthy lifestyle. Many felt that the perceptions and the aspirations of Hull residents about themselves and their city was led by negative press about the City, with a ‘self-fulfilling prophecy’ that lifestyles should be poor in Hull. Ways in which positive messages can be transmitted about Hull, for example using a positive social norms approach (7/10 don’t smoke) could be connected to the positive aspects, again using the City of Culture and other prime events such as the Freedom Festival and East Park events.

In relation to physical activity in particular, but also to the culture of worklessness in the City and the ability for residents to find and access work, there was an indication that some Hull residents were reluctant or would not go outside the City for work, but also were not prepared to travel even around the local area. Some residents need to be encouraged to commute for the purpose of work, and this needs to be promoted. However, this needs to be supported by reductions in the
cost and improvements in the services provided by different forms of public transport. This would also support travel to healthy lifestyle activities provided across the City and the ability for residents to use ‘active travel’ to reach their destinations for work and leisure.

Connected to public transport issues, were those for cyclists in a city which was ‘made for it’. Cycle tracks were not perceived as safe or sufficient and there is a need to extend and develop the cycle network in the City and across the region. This needs to address the coherence, directness, attractiveness, safety and comfort of the cycle network. This would support active travel for work and leisure, and for physical activity, as well as improving safety for cyclists. Local networks should be encouraged to support cycling initiatives around the City.

In relation to diet, there was concern, and ‘disgust’ about the sizeable number of takeaways in the City from many. However, some found that takeaway meals formed a major part of their diet and often gave in to the ‘temptation’ of takeaways. Others found takeaway food a cheap way to feed their families, even if only occasionally. Some schoolchildren were known to leave the school site to go to the takeaway for lunch. As such the takeaways provided a service which is welcomed by many. There is a need for a multi-faceted and holistic approach which works across a number of aspects of food and diet, including alcohol. A clear food strategy which works with takeaway businesses to offer healthy choices and uses regulation where necessary is recommended. Supporting healthy choices through the ‘just eat’ app could be considered. A review of all of the food provided in council run venues is recommended alongside marketing activities to support residents to choose healthy food in these venues. It is suggested that the Council ensure that all of the food provided in council-run venues, through commissioned services, and in community-led organisations provide and encourage healthy choices.

Supermarkets and the food industry were felt to discourage a healthy diet in a number of ways, including promotions and temptations, but also the expense of buying a healthy diet. It is suggested that the Hull Local Plan to 2030 includes a sustainable local food strategy, and supports and encourages local food initiatives such as extending the availability and use of allotments; land sharing in gardens; developing local food co-operatives and vegetable box schemes; and growing local food in a range of venues. Because income was also a crucial factor in driving residents’ dietary choices, supporting and encouraging the supply availability of low priced, healthy food would support residents to be able to make healthy choices.

There was awareness of the different facilities which were available to exercise, perhaps particularly in the older age groups but there were many barriers to utilising the different forms of exercise, including time, access to facilities, and the pressures of work. In some areas, Hull was seen to have a great deal of green space, such as parks and fields, which were seen as having value for exercise, but in others there were limited opportunities, which is recognised in the Hull local Plan to 2030. Residents had particular concerns about green spaces being lost to
housing developments, which need to be addressed in the Local Plan. The amenities available not just in parks but also in other community assets such as community centres, outdoor and indoor gyms, running and walking routes need to be promoted with residents using geo-demographic targeted social marketing. Models such as the Integrated Wellness Model developed by Sunderland City Council which utilise community assets to promote health and wellbeing, could be used as a framework – this model has a central hub which Health Central could simply provide.

It is also clear that residents felt that events such as the Freedom Festival and East Park events should be better promoted, as they enhanced mental wellbeing in the City. Supporting and extending these events could therefore form a valuable public health initiative.

In relation to smoking it was clear that there were some entrenched smokers, who had made multiple quitting attempts and displayed cognitive dissonance, for example denying the link between smoking and cancer. For some, however, there was also a clear connection with other lifestyle choices, such as alcohol and weight management. Whilst there is a clear demand for the smoking cessation services provided, there is a need for further research to identify the way in which these services can meet the needs of smokers who are entrenched, de-motivated and dissonant.

There is a clear, and possibly growing issue with alcohol in the City. Some admitted that they drank more than the government guidelines, most drank at home and there was a clear trend towards drinking wine rather than beer, not just in women but also in men. The absence of the ‘pub’ in people’s lives was generally considered to have a negative impact on companionship and mental wellbeing, and on the mechanisms for controlling alcohol consumption by peer review. Perhaps as a result, the relationship with alcohol had changed for some – alcohol consumption had become the primary goal, rather than the value of the social occasion. There were particular issues which were not specific to Hull, with young people including pre-loading and binge drinking. The likelihood of residents using services to support alcohol reduction is low, and the decommissioning of such services should be considered. Alternatives could include a social marketing campaign which tackles alcohol using a wide lens, and is inclusive of residents young and old, the licensed trade, and the drinks industry. This could include supporting residents to understand more about units, guidelines and calorific values; encouraging the licensed trade to provide well-priced non-alcoholic drinks; encouraging the drinks industry to promote non-alcoholic drinks in the same way as they promote alcoholic drinks; engaging young people in the alcohol agenda; persuading residents to consider other options to ‘relax’.

The need for information to be given to residents is paramount – there were complaints that advice was inconsistent, changing all the time. It is clear that the public find this confusing and that there may be benefits to having a simple guide or directory which clearly explains the evidence base for each aspect of lifestyle.
This may be by using existing resources such as the Change 4 Life materials. Relying on online resources may not be suitable, and there was a call for more leaflets and printed materials, and information being sent to their homes, for example with the Council Tax bill. There were also community notice boards and the digital notice boards on the way into town, and local TV such as Calendar and Look North. Further research on communication preferences would support effective engagement with residents, and campaigns need to be evaluated.

The key conclusion from these focus groups is that there are many facilities and services available in Hull to support people to have a healthy lifestyle – and that some had used the services provided. However, it was clear that there was limited awareness of the services – in some cases, almost none, even in the core target markets. Many people want to change and would access the services if they were aware of them. As such there is strong evidence from this work that there is a need for wide-ranging marketing and publicity - not just to increase awareness, but to drive service use. This needs to be clearly targeted, and evaluated to ensure that the communities who need to become more involved in their health are driven to have real engagement with the opportunities to improve their health and wellbeing.”

5.2.4 Reflector Groups Following 2008-09 Young People Health and Lifestyle Survey

Two reflector groups were conducted in two schools across all school years, and a further four groups were held with those aged 16-18 years following the Young People Health and Lifestyle Survey 2008-09. A report was completed by SMSR who undertook the Survey on behalf of NHS Hull (Jackson and Vann-Plevey 2009), and is available at www.hullpublichealth.org. The findings are summarised as follows:

- “Diet and exercise
  - The majority of young people aged both 11-16 and 16-18 tended to think that they had an unhealthy diet. The ease, convenience and low cost of take-aways and ‘junk food’ tended to factor in their choice of diet. Although parents in both sets of age groups did encourage a healthy diet and prepared healthy meals for their children, many ‘did not like the taste’ of healthy food and preferred to choose convenience over health value.
  - Females also admitted to ‘not eating very much’ to maintain a thinner figure and tended to use celebrities such as Victoria Beckham and Cheryl Cole as role models. It was also felt by the females that males preferred thinner figures on women and so tended to eat as little as possible to impress the opposite sex.
  - In terms of exercise, males were much more likely than females to both enjoy and participate in any form of sport or exercise. A lack of confidence and worry about image in physical education in schools tended to prevent females from taking part, as well as lack of facilities, lack of variation in sporting activities and lack of ‘girls only’ teams. Males tended to enjoy and take part in football and rugby, with many being involved in teams in and around Hull.
Diet and exercise, or lack of it, were not seen as something that should be worried about at a young age, as with alcohol, smoking and taking drugs; young people of all ages tended to think that health was something to worry about 'when you are older' and to 'live life to the full' while at a young age.

The impact of an unhealthy diet, lack of exercise and indulging in drugs, alcohol and smoking on young person’s body and how it can affect them in the future needs to be addressed with the young age groups and awareness raised of how it will affect them and their lifestyles in the future.

- **Smoking**
  - Smoking was something that tended to be started at an early age, with many of the 16-18 participants smoking from the age of 13 or 14; however within the school groups, just two of the participants had tried smoking – but had not continued. Image, stress and influence of peers were the main reasons for starting smoking, with the number of cigarettes smoked increasing with stress.
  - Respondents aged 11-16 tended to be much more negative about smoking with personal experiences being a major factor.

- **Alcohol**
  - All participants had tried alcohol, with the 11-16 year olds most likely to have tried alcohol in the presence of family members, with the older participants of this age group drinking socially at friends' houses once a week. Year 9 (aged 13 or 14 years) was thought to be the year that young persons tended to start drinking alcohol, due to influence of older friends, more socialising outside of school and an increase in confidence that alcohol gives them.
  - Participants of the 16-18 year old groups tended to drink large amounts of alcohol on a regular basis, with vodka and lager being the preferred options due to low cost and speed of which it gets them drunk. Access to alcohol was not an issue as many – even at the age of 14 – could buy alcohol in local shops without having to give ID.

- **Drugs**
  - Worryingly, access to drugs was seen as incredibly easy, with children in school witnessing drugs being bought within the school grounds. The relative cheapness of them, along with ease of access were thought to be contributing factors in young people trying them. While the majority of participants of the 16-18 year old groups had tried and were currently taking drugs, just one of the 11-16 year olds had in fact tried drugs and was currently still using them.
  - Along with access and low cost, boredom and the influence of older peers – especially with females – were seen as reasons for the use of drugs. Cannabis was the most commonly used drug as it was not seen as harmful and simply used to ‘relax’, however ‘harder’ drugs such as cocaine and Ecstasy were taken by participants on an occasional basis.
  - The glamorisation of drugs in the media, in television shows and films such as ‘Skins’, ‘Shameless’ and ‘Trainspotting’, were seen to be a sign of acceptance that people take drugs and it isn’t ‘that much of a big deal’.
All participants recognised the health risks involved with taking drugs and tended to feel that taking drugs was more harmful to health than alcohol and smoking; however despite this recognition, older participants felt that nothing would influence them to stop taking drugs as 'young people will try things regardless of what they are told'. Younger participants agreed that young people will try drugs, alcohol and smoking even if they are told not to, however felt that graphic, hard hitting, real life education at a young age – for example taking an addict into schools to show children what can happen if you take drugs and how it can ruin lives – would perhaps have an influence and stop young people trying them at a young age.”

5.2.5 Reflector Groups Following 2012 Young People Health and Lifestyle Survey

Five school-based focus groups were conducted by experienced facilitators with an overall objective of providing a better and more insightful understanding of the key issues arising from the questionnaire analysis. In addition in-depth, one on one interviews were undertaken with local stakeholders to young people’s health and lifestyle in the city. The key objective of these interviews was to better understand the challenges facing organisations and young people how these key stakeholders felt these challenges could be overcome; in addition the interviews provided the opportunity to identify any issues as well as reflect on the findings from the survey. The focus groups were held with different year groups from five schools across the city, and each one lasted approximately 45–50 minutes. Eight pupils were selected by the school at random to attend each group; it was emphasised that the pupils selected should be representative of the year group. A report was completed by SMSR who undertook the Survey on behalf of NHS Hull (SMSR 2013), and is available at www.hullpublichealth.org. The findings are summarised as follows:

- **Diet**
  - There was significant disparity between the healthy diets that were reported by the young people and the perception which key stakeholders had of the diet of young people. Within the focus groups, young people showed high levels of understanding as to what comprised a healthy diet and felt it was something which they themselves followed in their day to day life however, it became apparent that there was confusion and a lack of understanding over what constituted a ‘take-away’ food, with many not categorising McDonalds as a take-away product (one group even classed this as a healthy option). Perhaps this is where the biggest challenge lies in terms of breaking this perception, as although attendees felt they were eating healthy there were very strong indications these were misinformed comments and actually could apply to their parents; this needs further exploration from a parents’ perspective.
  - In both focus groups and stakeholder interviews parents were identified as the main influence on a young person’s diet (although some young people did admit that their parents were unaware of the unhealthy foods they were consuming) and are therefore key to changing this aspect of a young
person’s health. Stakeholders consistently identified a correlation between poor diet and deprivation, particularly with the current economic climate and financial restrictions within households. In addition, and perhaps more significant, was a recognition that both parents and schools have altered their perceptions of obesity because it is such common place; this acceptance was a key barrier in taking action and a considerable challenge for all moving forward.

- **Alcohol**
  - Both interviewees and focus group participants did not mention alcohol as a prominent health issue among young people however, stakeholders tended to view excessive alcohol consumption (and in particular the consequences that followed) as more of an issue than the young people themselves. Consuming alcohol away from parental supervision became more common among older participants although many said it was the parents who would still purchase the alcohol on their behalf; it was also common for parents to be aware of the young person consuming alcohol but unaware of the amount which was consumed.
  - Advertising was a key influencer on young people’s perceptions of alcoholic beverages and brands with humorous or memorable adverts were more likely to be deemed to be ‘cool’ among this demographic. This image was a driver when selecting alcohol and most young people had either tried or consumed products for this reason.

- **Smoking**
  - Young people held a very negative perception of people who smoked and were acutely aware of the dangers and risks which were associated with smoking. Overall interviewees considered smoking among young people to be of lesser importance and of lower concern when addressing health and lifestyle issues among young people, particularly as the perception of smoking within wider society had resulted in a reduction in the prevalence of smoking among young people. Many felt it was actually uncool and there were examples of pupils being out casted for smoking, which represents a flip in attitude in the last ten years and perhaps a good blueprint for an alcohol strategy.
  - A potential concern is the availability of cigarettes as despite being non-smokers all focus group participants were aware of how they could obtain cigarettes should they want them and it seems this has not changed much on the last four years despite numerous legislative changes. Young people again cited parents as an influence and a driver of attitudes towards this aspect of health and lifestyle whether through the effects of second hand smoke or due to cigarettes within the home increasing their availability.

- **Emotional Health and Wellbeing**
  - Stakeholders identified emotional health and wellbeing as a big problem and therefore a key priority moving forward. It was seen to be a hidden issue and something which is often neglected or not acknowledged which, along with the personal nature of the subject, perhaps explains why focus group participants were less forthcoming when discussing their emotions.
Despite the hesitance to discuss this topic openly in front of their peers, focus groups participants did identify an extremely high amount of pressure placed on young people (particularly in regards to academic and athletic achievements) which led to stress, anger and sadness. They naturally seemed happiest when with friends and family and social interaction was identified as being very important in generating better emotional health.

- **Exercise**
  - Stakeholders considered inactivity and an unwillingness to participate in activities to be an issue among some young people (particularly females) however, schools and local schemes were cited as being increasingly proactive in developing activities which were designed to be more appealing to those who would usually be reluctant to take part, the challenge however still lies in increasing participation.
  - Although interviewees identified a large number of sport and exercise facilities, concerns were expressed regarding the suitability and location of some activities and therefore the limitations on the demographic that the facilities / activities would appeal to.

- **Communication**
  - Positively, the successful communication of health messages and information within schools was described by both stakeholders and young people as one of the most effective ways of educating and informing young people on health and lifestyle issues and initiatives. Young people indicated a preference for receiving factual information and in particular said that hearing first-hand accounts of negative effects would be a successful deterrent from an unhealthy diet / lifestyle.
  - Concern was raised among stakeholders as to the type of information which was accessed away from the school setting. As in 2008, young people saw celebrities as role models which although beneficial when they are used in the promotion of healthy lifestyles, can create problems (particularly among females) when young people aspire to recreate the image or behaviour of celebrities.

- **Challenges**
  - Similar to the previous consultation, young people demonstrated an arrogance and feeling of indestructibility, perhaps based on their age; many gave a sense of being too young to be affected and that it was later in life where the health problems occurred. This perception was reiterated among interviewees and therefore a significant challenge for organisations is to make young people accept the personal and sometimes immediate risks of their actions.
  - In addition, organisation representatives faced more generalised challenges such as, promotion and awareness of the schemes and services and changing cultural attitudes. The biggest challenge faced my many was identified as funding and the uncertainty and restrictions many organisations faced made it difficult to ensure a full and effective service is offered.
Interviewees also identified some organisational improvements and felt that moving forward it is important that any schemes and initiatives are efficiently co-ordinated and managed, which as well as developing internal relationships will ensure parents and young people have a clear understanding of the opportunities which are available. This integration of services will ensure outcomes from past initiatives are reflected upon and where appropriate cross-service working can flourish.”

5.2.6 Social Marketing Research

A number of other research projects have examined attitudes towards risk factors and diseases for the purposes of informing local social marketing projects, and these are mentioned within the specific Hull JSNA Toolkit documents, e.g. Chronic Obstructive Pulmonary Disease, Breastfeeding.

5.3 Social Capital Surveys

5.3.1 Survey Conducted in 2004

In Hull, a survey was undertaken during 2004 to assess the levels of Social Capital (features of social organisation such as trust, norms and reciprocity that can improve the efficiency of society by coordinating action) and potential associations between this and health (Hunter, Lee et al. 2005). The survey included questions on health-related behaviour and attitudes, and perceptions of health. A total of 4,002 people aged 16 years and over were interviewed for the survey (quota sampling was used so that the participants were representative of the overall population of Hull in relation to gender, age, employment status and area of residence). People were approached by knocking on their doors and asking if they would be willing to take part in the survey.

5.3.2 Survey Conducted in 2009

Another Social Capital Survey was completed during 2009. The survey included most of the questions from the questionnaire used in 2004, but also additional questions relating to knowledge of alcohol units and perceived impact of changes to lifestyle on health status to assess whether people were taking on board and using national guidelines and messages relating to health and lifestyle. The survey involved the same methodology as the 2004 survey, and there were a total of 4,057 survey responders.

5.4 Other Surveys

Following a successful pilot survey in 2006, between 2006 and 2009 at six-monthly intervals, information was collected, through a specifically-designed questionnaire, on physical activity levels, obesity and diet for members of community managed programmes led by community groups which had an element on physical activity. The
key aims were to assess physical activity levels and mental health status of the participants, and examine trends over time. There were 621 completed questionnaires from 360 individuals who participated in the survey over the four survey rounds (see Hull JSNA Toolkit: Exercise for more information).

During 2004, there was a survey examining 5-A-DAY which involved a mapping exercise of availability of fresh fruit and vegetables (Public Health Development Team 2005). This survey was completed in the most deprived areas of Hull so the findings were not representative, but provided some useful insight into availability of fruit and vegetables locally, problems with trying to and reasons for not eating 5-A-DAY, etc.

5.5 Patient and Public Involvement Projects

Further details of the two main projects have been undertaken by the Patient and Public Involvement directorate are given within the JSNA Toolkit Release 4 report.

6 HOSPITAL EPISODE STATISTICS

Hospital Episode Statistics (HES) refers to the data generated during a stay in hospital. Inpatient admission rates provide useful information about the general level of illness and the use of hospital services within geographical areas. Patients admitted to a bed for elective surgery, but discharged the same day are classed as daycases, and these are included within inpatients in this document, unless otherwise stated. However, it is very important to note that admission rates depend on how willing people are to make use of medical services, the location and accessibility of services, as well as differences in referral patterns and practices within primary and secondary care. These factors may differ between geographical areas, and may explain different levels of hospital activity rather than differences in the prevalence of disease. For example, in general, people who live in more deprived areas are less likely to visit their GP than people with similar levels of symptoms who live in more affluent areas. Referral rates can vary dramatically among different GPs which can influence admission rates. Therefore, findings should be interpreted cautiously with regard to assessing the general level of illness. Nevertheless, analysis of inpatient admission rates will give an indication of the usage of hospital services by patients or residents of different geographical areas.

When a patient is admitted to hospital a “clinician episode” is generated. If the patient is transferred to the care of another clinician during their hospital stay, another clinician episode is generated. Thus, there could be one or many clinician episodes during a patient’s hospital stay. It is not necessarily the case that the primary and secondary diagnoses codes remain the same. A patient could be admitted for cancer treatment with this as the primary diagnosis, but they may develop respiratory problems during their stay and be transferred under the care of another clinician (generating another clinician episode) and their primary diagnosis may change. Therefore, when examining hospital episode statistics with a specific primary or secondary diagnosis, or assessing
the number of procedures or operations that have occurred, different results will be obtained depending on which clinician episode is examined. If all clinician episodes are examined then this will mean that all relevant diagnoses or procedures are included, but reporting on the number of clinician episodes is not as useful as reporting on the number of hospital stays/admissions or the number of patients.

The majority of admissions generate a single clinician episode, but a small number of admission can generate a number of clinician episodes. There were 266,244 clinician episodes for Hull residents over the three year period 2008/2009 to 2010/2011, and 224,590 (84%) were first clinician episodes, 29,886 (11%) were second clinician episodes, and 7,489 (2.8%) were third clinician episodes. The maximum number of clinician episodes during one patient’s hospital stay was 20.

These 266,244 clinician episodes were the result of 225,169 hospital admissions for Hull residents over the three year period, and a total of 98,221 patients were admitted to hospital during the three year period. Therefore, these patients were admitted on average 2.3 times over the three year period.

For specific disease the number of admissions and the number of patients admitted over the three year period could differ substantially. Therefore, when examining the data at ward or practice level, it is possible that one or two patients could inflate the numbers substantially. However, it was thought best to present the data in terms of the total number of admissions over a period of time rather than the total number of patients admitted, as admissions will reflect service usage. A small number of tables present diagnoses out of all clinician episodes.

7 QUALITY AND OUTCOME FRAMEWORK

As part of the General Medical Services contract implemented in April 2004, the Quality Outcomes and Framework (QOF) was set out as a means for practices to measure achievement against a set of clinical and other indicators that reflected the quality of care provided to their patients. GP practices have been submitting QOF data since this time via the Quality Management and Analysis System (QMAS), the national system established to support the calculation of GP practice payments according to the achievements against QOF.

Within each of the Hull JSNA Toolkit disease-specific reports the diagnosed prevalence of the relevant disease is given from the Quality Outcomes and Framework (QOF), where available. The Excel data tables can be downloaded from the Information Centre (Information Centre for Health and Social Care 2010). Patients can be on more than one disease register. Further information is available relating to the quality of care received by patients on the specific disease registers. For instance, the number of people on the diabetes register who have had retinal screening during the previous 15 months, or the number of people on the coronary heart disease register in whom the last blood pressure reading (measured in the last 15 months) was 150/90 or less, etc.
However, within this report it is not possible to examine these additional indicators. Some key indicators have been examined in more detail at practice level for some of the equity audits available at www.hullpublichealth.org.

In general, one would expect that Hull would have a higher prevalence of these conditions relative to England as a whole and other less deprived areas, as the prevalence of the risk factors is generally higher in Hull. However, this is not necessarily the case, patients in more deprived areas may be less likely to present with symptoms or their concerns and may as a result be more likely to be undiagnosed. Furthermore, if mortality rates are particularly high for a particular disease compared to another geographical area perhaps because patients present with their symptoms later or because patients have other risk factors and/or co-morbidities which influence their mortality, then it is possible that the prevalence of disease is lower in a deprived area compared to a more affluent geographical area.

Note that the prevalence is not adjusted in any way for the patient population – for example, practices with a relatively high percentage of elderly patients, patients in nursing homes and patients who live in more deprived areas (who will have a higher prevalence of risk factors such as smoking and poor diet and may be less likely to present if they develop symptoms). However, as well as differences among the practices which will be due to the patient population, there will also be differences in the prevalence due to differences in how well the practices diagnose and record cases of each disease and medical condition. A more detailed document has been produced which discusses these and other issues (available on request). However, in summary the following factors can influence the prevalence of diagnosed disease on the practice registers:

- Differences in age and gender structure among practices;
- Differences in deprivation among practices (influenced by poor housing, unemployment and lower paid jobs, increased stress, higher prevalence of risk factors for poor health such as smoking, obesity, poor diet, lack of exercise, etc);
- Differences in patient profiles among practices, such as practices predominately serving student populations, a high proportion of nursing or care homes, or high risk groups such as the homeless, drug addicts and asylum seekers, or other choices made by the patient based on ethnicity or ease of travelling to the practice which can influence the structure of the practice population;
- Differences in resources and skills base among practices with larger practices, in general, being able to produce more accurate and complete disease registers;
- Different GPs specialising in different diseases and medical conditions, so registers in those practices may be more accurate and complete compared to other practices as patients with those specific diseases as patients within those practices have been targeted by the GP(s) over a long period of time;
- Differences in the knowledge and attitudes to health among the patients will affect the completeness of the register, with patients who tend to be more knowledgeable about their health more likely to consult their GP about a particular problem and therefore more likely to be subsequently placed on a
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

disease register compared to patients who accept poor health at a younger age due to their family history and low expectations of health;

- Differences in list size errors among practices can influence the disease prevalence as practices with an inflated list size will have a higher true prevalence of the condition compared to their calculated prevalence (based on the incorrect list size).

Therefore, when comparing the prevalence and achievement figures among practices, it is important to consider potential biases and circumstances for those particular practices. The mean age and deprivation scores of registered patients is given in **Table 3**, and QOF prevalence information presented by practices have used General Practice Groupings which categorise practices into four groups based on the mean age and deprivation scores of their registered patients.

### 8 GENERAL PRACTICE GROUPINGs

The general practices in Hull differ with regard to their registered population in terms of deprivation and age of patients. Whilst general practices can be compared, it is better and easier to try to compare like-with-like. As a result, the general practices in Hull have been grouped according to the average deprivation score of their patients and the average age of their patients with some practices grouped together for practical reasons, e.g. the practices share the same practice manager.

The Index of Multiple Deprivation 2010 has been used to measure deprivation (see Hull JSNA Toolkit: Deprivation and Associated Measures and **section 2.5 on page 10** for more information). Nationally, a deprivation score has been assigned to each of the lower layer super output areas (LLSOAs) within Hull. On average, 1,500 residents live in each LLSOA in Hull. There were 163 LLSOAs in Hull when they were derived following the 2001 Census, but they have been revised following the 2011 Census and there are now 166 LLSOAs in Hull (some were merged and some were split depending on population changes). A deprivation score has been determined for each registered patient based on their postcode (and which of the 166 LLSOA they live within). There is an assumption that the average deprivation score for the LLSOA is representative for each registered patient and this might not be the case (the patients registered at a specific practice may be more deprived than the average for their area – see Hull JSNA Toolkit: Deprivation and Associated Measures for more information). For the practices which needed to be in the same group, the mean age and deprivation score of their

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7 Theoretically it is possible to group practices using more characteristics than deprivation and age, however, as the number of characteristics increase, in practice, it becomes much more difficult to group the practices into similar groups.

8 The Clinical Commissioning Group (CCG) asked if practices could be grouped into four different groups with certain practices included in the same group as the practice manager was the same, and they did not want to produce different 'peer group' reports if their practices were in two or more peer groups.
combined practice population was used rather than the patients registered to each practice separately.

The groups were originally defined using the IMD 2007 using the population as at April 2010 to calculate the mean IMD score and mean age of the patients and practices were grouped into eight different groups (in JSNA Toolkit Release 4). However, the local CCG preferred a four peer comparison groups as well as a small number of groups of practices assigned to the same group.

Table 3 gives the mean age of the patients registered with each practice (as at October 2012). The deprivation scores are given in Table 3, and should be used as a guide to the level of deprivation within each practice.

Figure 1 also gives the mean deprivation score and mean age of the registered patients for each practice or group/set of practices (as at October 2012). Table 3 gives the assigned groups for each practice based on the deprivation score and mean age of their registered patients or their combined registered populations.

Both Table 3 and Figure 1 include 46 individual or sets of practices including five practices which closed prior to 2012 but are assigned a group based on information within the population file relating to the year prior to their closure (B81676 which closed during 2004/05, B81668 which closed during 2006/07, B81001 and B81646 which both closed in 2010, and B81662 which closed in 2011). These practices are included where QOF GP disease registers prevalence data is presented as trends over time. These practices are marked on the figure as a cross in Figure 1 (although only four practice data points can easily be seen the practice in group C has a similar mean age and deprivation scores as other practices and the point can only just be seen in Table 3).

It can be seen in Table 3 (see table footnotes), that a number of practices would have been assigned to a different group if the group assignment had been based on individual practice details rather than the combined practice details. Of the four Haxby practices assigned to group A, Haxby Orchard Park would have been assigned to group D based on its deprivation score alone. Therefore, this practice has quite different patient characteristics compared to the other practices in group A. Of the seven Bransholme practices assigned to group B, Dr Gopal’s practice and Northpoint would have been assigned to group D based on their individual mean deprivation scores. However, their mean deprivation scores are quite similar to the other practices in the Bransholme group and only slightly higher (more deprived). The mean IMD score for the Bransholme practices as a whole is 40.97 and is relatively close to the cut-off value of 42. Of the two Assura practices that were assigned to group B, the Story Street Practice and Walk In Centre would have been assigned to group D based on its deprivation score alone. Therefore, this practice has quite different patient characteristics compared to the other practices in group B. Of the five St Andrew’s practices assigned to group B, one would have been assigned to group A, one to group C and two to group D. The characteristics of these practices are quite different from each other, and for some of the individual practices quite different to the characteristics of the patients in group B. Of the three City Healthcare Partnership (CHCP) practices assigned to group D, one would have
been assigned to group A based on its deprivation score alone. Therefore, this practice has quite different patient characteristics compared to the other practices in group D. **Figure 2** shows the mean IMD scores and mean ages of all the individual practices and the data points are colour coded to illustrate the group they have been assigned (for example, the CHCP practice Y01200 is coloured in purple to denote that it was assigned to group D, but its low mean IMD (19.91) and mean age (40.05) places it within the cut-off area of group A. The five practices that closed prior to 2012 are not shown in **Figure 2**.

A map illustrating the location of general practices in Hull is given in Hull JSNA Toolkit: Geographical Area.

**Figure 1**: Mean deprivation score and mean age of registered patients for each general practice or group/set of practices as at October 2012 and grouping of practices
Figure 2: Mean deprivation score and mean age of registered patients for each general practice as at October 2012 and grouping of practices
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

**Table 3: General practice groupings based on deprivation score and mean age of registered patients as at October 2012**

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<th>Group</th>
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Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

<table>
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<th>Code</th>
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<th>Mean age</th>
<th>Group</th>
<th>List size (Oct 13)</th>
<th>Group (if applicable)</th>
<th>Group mean IMD</th>
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</tr>
</tbody>
</table>

*These five practices have closed (mean IMD and mean age based on patient data for most recent practice registration details prior to closure)*

1. Would have been in group A if practice assigned to groups based on individual characteristics rather than group characteristics (based on same cut-off values for age and IMD).
2. Would have been in group B if practice assigned to groups based on individual characteristics rather than group characteristics (based on same cut-off values for age and IMD).
3. Would have been in group C if practice assigned to groups based on individual characteristics rather than group characteristics (based on same cut-off values for age and IMD).
4. Would have been in group D if practice assigned to groups based on individual characteristics rather than group characteristics (based on same cut-off values for age and IMD).
9 OUTCOME MEASURES, PERFORMANCE TARGETS AND PROGRESS TOWARDS TARGETS

9.1 Historical Indicators, Outcome Measures and Targets

Further information about historical outcome measures and targets, and progress towards historical targets is given in the JSNA Toolkit Release 4.

9.2 Problems Associated With Some Outcome Measures

Further information about some of the problems associated with specific measures, such as using life expectancy and the all age all cause mortality rate as outcome measures are given in Hull JSNA Toolkit: Mortality report.

9.3 Public Health Outcomes Framework

9.3.1 Introduction

The current key indicators for public health are those specified in the Public Health Outcomes Framework (PHOF) which was published in January 2012 (Department of Health 2012; Department of Health 2012).

From the Introduction to the Public Health Outcomes Framework 2013 to 2016 document produced in January 2012, “The responsibility to improve and protect our health lies with us all – government, local communities and with ourselves as individuals. There are many factors that influence public health over the course of a lifetime. They all need to be understood and acted upon. Integrating public health into local government will allow that to happen – services will be planned and delivered in the context of the broader social determinants of health, like poverty, education, housing, employment, crime and pollution. The NHS, social care, the voluntary sector and communities will all work together to make this happen. The new Public Health Outcomes Framework (PHOF) that has been published is in three parts. Part 1 introduces the overarching vision for public health, the outcomes we want to achieve and the indicators that will help us understand how well we are improving and protecting health. Part 2 specifies all the technical details we can currently supply for each public health indicator and indicates where we will conduct further work to fully specify all indicators. Part 3 consists of the impact assessment and equalities impact assessment.”

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The vision for the PHOF is “to improve and protect the nation’s health and wellbeing, and improve the health of the poorest fastest”. There are two overarching outcomes to “increase healthy life expectancy and to reduce differences in life expectancy and healthy life expectancy between communities.” There are also four domains:

- **Domain 1 – Improving the wider determinants of health**
  - Objective: improvements against wider factors that affect health and wellbeing, and health inequalities.

- **Domain 2 – Health improvement**
  - Objective: people are helped to life healthier lifestyles, make healthy choices and reduce health inequalities

- **Domain 3 – Health protection**
  - Objective: the population’s health is protected from major incidents and other threats, while reducing health inequalities

- **Domain 4 – Healthcare public health and preventing premature mortality**
  - Objective: reduced numbers of people living with preventable ill health and people dying prematurely, while reducing the gap between communities.

A small number of the PHOF outcomes are still under development, but where data is available it has been published nationally on www.phoutcomes.info. A number of the indicators also have sub-indicators, and data has been published males and females separately in addition to main indicator for some of the indicators. There are approximately 150 indicators or sub-indicators. A list of the main indicators is available in Table 4 in section 9.3.3. Specific details of all the indicators and sub-indicators are given in the local analysis of the PHOF indicators at www.hullpublichealth.org as well as in Hull’s JSNA Toolkit documents specified in Table 4.

9.3.2 National Profile for Hull and “Tartan Rug”

Nationally, profiles for each local authority have been produced and can be downloaded from www.phoutcomes.info. These are referred to as ‘tartan rugs’ as each indicator is colour coded for the local authority depending on whether its value is statistically significantly higher or lower than England’s value. Pale blue is used where the local authority’s value is significantly higher than England’s, amber where there is no significant difference, and dark blue where the local authority’s value is significantly lower than England’s.

9.3.3 Local Analysis

A local analysis of indicators within the PHOF has been undertaken. The following documents have been produced:

- Each indicator summarised on single page of a document
- Each indicator summarised on single row on a single table
- Performance card summarising key local PHOF outcome measures
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

The first set of documents (one document for overarching outcome measures and one document for each of the four domains, plus other documents grouping some of the outcome measures, e.g. a document covering all indicators for Children and Young People) give a detailed description of the indicator, and information about the indicator such as data source, time periods of baseline and latest data, and other relevant information about the indicator data. There are also up to five graphs for each indicator depending on how much data is available for the specific indicator. These five graphs are: (1) the latest figures for Hull and its comparator geographical areas; (2) trends over time for Hull; (3) comparison trends over time for Hull relative to England (together with regression lines if appropriate); (4) differences among the five local deprivation quintiles/fifths (based on the Index of Multiple Deprivation 2010) over time; and (5) latest data for the 23 wards in Hull. Six key points summarises Hull’s baseline and latest values of the indicator, the change in the inequalities gap between Hull and England, and between the most and least deprived local deprivation quintiles, and differences across the wards. There is also a section which gives the ranking (out of 12 comparators), the ‘tartan’ rug colour and whether the trends and national and local inequalities gaps have improved over time or not. A significant lower indicator might denote a worse situation for some indicators whereas for other indicators a significantly higher indicator might denote a worse situation. Therefore, for the local ‘tartan rug’, whether the value of Hull’s indicator is ‘worse’, ‘identical’ or ‘better’ than England has also been noted. Although the ‘tartan rug’ colour may differ for one or two indicators within this report from those published nationally as within this document they are based on overlapping or non-overlapping 95% confidence intervals, and the ‘tartan rug’ colours might be determined differently for those published nationally.

The summary table document summarises each indicator in a single line of a table. For each indicator, the following information is given: latest values for Hull and England, the ranking of Hull for the latest value of the indicator in relation to 11 other geographical areas which are comparable to Hull, the ‘tartan rug’ colour for the indicator for Hull, if the indicator has improved or not in Hull over time, and whether the difference in the indicator (national (England v Hull) and local (most v least deprived quintile/fifth of areas of Hull) inequalities gap) has narrowed or widened over time.

Within these two sets of local documents, the comparator areas used for Hull are Coventry, Derby City, Leicester City, Middlesbrough, North East Lincolnshire, Plymouth, Salford, Sandwell, Stoke-on-Trent, Sunderland and Wolverhampton.

These documents are all available on our website www.hullpublichealth.org.

Information relating to each specific outcome measure has also been included within the JSNA Toolkit documents. **Table 4** details which JSNA Toolkit documents gives more information for each of the PHOF indicators.
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

Table 4: List of which JSNA Toolkit documents include information on each of the Public Health Outcomes Framework indicators

<table>
<thead>
<tr>
<th>Domain and indicator</th>
<th>Hull JSNA Toolkit:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators corresponding to overarching outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>0.1 Healthy life expectancy</td>
<td>Life Expectancy</td>
</tr>
<tr>
<td>0.2 Differences in life expectancy and healthy life expectancy between communities</td>
<td>Life Expectancy</td>
</tr>
<tr>
<td><strong>Domain 1: Improving the wider determinants of health</strong></td>
<td></td>
</tr>
<tr>
<td>1.01 Children in poverty</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.02 School readiness</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.03 Pupil absence</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.04 First-time entrants to the youth justice system</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.05 16-18 year olds not in education, employment or training (NEETS)</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.06 People with mental illness or disability in settled accommodation</td>
<td>Mental Health</td>
</tr>
<tr>
<td>1.07 People in prison who have a mental illness or significant mental illness*</td>
<td>Mental Health</td>
</tr>
<tr>
<td>1.08 Employment for those with a long-term health condition including those with a learning difficulty / disability or mental illness</td>
<td>Mental Health</td>
</tr>
<tr>
<td>1.09 Sickness absence rate</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.10 Killed or seriously injured casualties on England’s roads</td>
<td>Accidents</td>
</tr>
<tr>
<td>1.11 Domestic abuse</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.12 Violent crime (including sexual violence)</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.13 Re-offending</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.14 The percentage of the population affected by noise</td>
<td>Housing, Environment and Social Care</td>
</tr>
<tr>
<td>1.15 Statutory homelessness</td>
<td>Housing, Environment and Social Care</td>
</tr>
<tr>
<td>1.16 Utilisation of green spaces for exercise / health reasons</td>
<td>Housing, Environment and Social Care</td>
</tr>
<tr>
<td>1.17 Fuel poverty</td>
<td>Deprivation and Associated Measures</td>
</tr>
<tr>
<td>1.18 Social connectedness</td>
<td>(B)</td>
</tr>
<tr>
<td>1.19 Older people’s perception of community safety</td>
<td>Mental Health</td>
</tr>
<tr>
<td><strong>Domain 2. Health improvement</strong></td>
<td></td>
</tr>
<tr>
<td>2.01 Low birth weight of term babies</td>
<td>Children and Young People</td>
</tr>
<tr>
<td>2.02 Breastfeeding</td>
<td>Children and Young People</td>
</tr>
<tr>
<td>2.03 Smoking status at time of delivery</td>
<td>Smoking</td>
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## Domain and indicator

<table>
<thead>
<tr>
<th>Hull JSNA Toolkit:</th>
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</thead>
<tbody>
<tr>
<td><strong>2.04</strong> Under 18 conceptions</td>
</tr>
<tr>
<td><strong>2.05</strong> Child development at 2-2.5 years*</td>
</tr>
<tr>
<td><strong>2.06</strong> Excess weight in 4-5 and 10-11 year olds</td>
</tr>
<tr>
<td><strong>2.07</strong> Hospital admissions caused by unintentional and deliberate injuries in children</td>
</tr>
<tr>
<td><strong>2.08</strong> Emotional wellbeing of looked-after children</td>
</tr>
<tr>
<td><strong>2.09</strong> Smoking prevalence – 15 year olds*</td>
</tr>
<tr>
<td><strong>2.10</strong> Hospital admissions as a result of self-harm*</td>
</tr>
<tr>
<td><strong>2.11</strong> Diet*</td>
</tr>
<tr>
<td><strong>2.12</strong> Excess weight in adults</td>
</tr>
<tr>
<td><strong>2.13</strong> Proportion of physically active and inactive adults</td>
</tr>
<tr>
<td><strong>2.14</strong> Smoking prevalence – adult (over 18s)</td>
</tr>
<tr>
<td><strong>2.15</strong> Successful completion of drug treatment</td>
</tr>
<tr>
<td><strong>2.16</strong> People entering prison with substance dependence issues who are previously not known to community treatment*</td>
</tr>
<tr>
<td><strong>2.17</strong> Recorded diabetes</td>
</tr>
<tr>
<td><strong>2.18</strong> Alcohol-related admissions to hospital</td>
</tr>
<tr>
<td><strong>2.19</strong> Cancer diagnosed at stage 1 and 2</td>
</tr>
<tr>
<td><strong>2.20</strong> Cancer screening coverage</td>
</tr>
<tr>
<td><strong>2.21</strong> Access to non-cancer screening programmes</td>
</tr>
<tr>
<td><strong>2.22</strong> Take up of the NHS Health Check Programme – by those eligible</td>
</tr>
<tr>
<td><strong>2.23</strong> Self-reported wellbeing</td>
</tr>
<tr>
<td><strong>2.24</strong> Falls and injuries in the over 65s</td>
</tr>
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</table>

### Domain 3. Health protection

<table>
<thead>
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<th>Hull JSNA Toolkit:</th>
</tr>
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<tbody>
<tr>
<td><strong>3.01</strong> Air pollution</td>
</tr>
<tr>
<td><strong>3.02</strong> Chlamydia diagnoses (15-24 year olds)</td>
</tr>
<tr>
<td><strong>3.03</strong> Population vaccination coverage</td>
</tr>
<tr>
<td><strong>3.04</strong> People presenting with HIV at a late state of infection</td>
</tr>
<tr>
<td><strong>3.05</strong> Treatment completion for tuberculosis</td>
</tr>
<tr>
<td><strong>3.06</strong> Public sector organisations with board-approved sustainable development management plans</td>
</tr>
<tr>
<td><strong>3.07</strong> Comprehensive, agreed inter-agency plans for responding to public health incidents*</td>
</tr>
</tbody>
</table>

### Domain 4. Healthcare public health and preventing premature mortality

<table>
<thead>
<tr>
<th>Hull JSNA Toolkit:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.01</strong> Infant mortality</td>
</tr>
<tr>
<td><strong>4.02</strong> Tooth decay in children aged 5 years</td>
</tr>
<tr>
<td><strong>4.03</strong> Mortality from causes considered preventable</td>
</tr>
<tr>
<td><strong>4.04</strong> Mortality from all cardiovascular disease</td>
</tr>
<tr>
<td><strong>4.05</strong> Mortality from cancer</td>
</tr>
<tr>
<td><strong>4.06</strong> Mortality from liver disease</td>
</tr>
<tr>
<td><strong>4.07</strong> Mortality from respiratory disease</td>
</tr>
<tr>
<td><strong>4.08</strong> Mortality from communicable diseases</td>
</tr>
<tr>
<td><strong>4.09</strong> Excess under 75 mortality in adults with serious mental health*</td>
</tr>
<tr>
<td><strong>4.10</strong> Suicide</td>
</tr>
<tr>
<td><strong>4.11</strong> Emergency re-admissions within 30 days of discharge from</td>
</tr>
</tbody>
</table>
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

<table>
<thead>
<tr>
<th>Domain and indicator</th>
<th>Hull JSNA Toolkit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>hospital</td>
<td>Admissions</td>
</tr>
<tr>
<td>4.12 Preventable sight loss</td>
<td>General Health, Disabilities, Caring and Use of Services</td>
</tr>
<tr>
<td>4.13 Health-related quality of life for older people*</td>
<td>(A)</td>
</tr>
<tr>
<td>4.14 Hip fractures in over 65s</td>
<td>Older People</td>
</tr>
<tr>
<td>4.15 Excess winter deaths</td>
<td>Mortality</td>
</tr>
<tr>
<td>4.16 Dementia and its impacts</td>
<td>Mental Health</td>
</tr>
</tbody>
</table>

*No national data published. The indicator is mentioned within the JSNA Toolkit stated, but no data is generally available.

(A) The indicator definition and data source both need further development. No data is available for this indicator.

(B) The indicator definition and data source both need further development. No data is available for this indicator. Information on social capital is given within Hull JSNA Toolkit: Mental Health which includes some measures relating to social networks, social support, trust of local establishments and neighbours, opinions on their neighbourhoods, etc, with further information in the Social Capital Survey 2009 available on www.hullpublichealth.org. However, it is not known if ‘social connectedness’ indicator will be similar to any of these measures or not.
10 DEFINITIONS AND CLASSIFICATIONS

10.1 Definition of Overweight and Obesity

10.1.1 Adults

Height and weight were collected as part of the local Health and Lifestyle Surveys. However, it is well known that self-reported height tends to be overestimated and self-reported weight tends to be underestimated compared to measured height and weight.

A survey of 4,808 British men and women aged 35-76 which compared self-reported and measured height and weight (Spencer, Appleby et al. 2002), found that height was overestimated by on average 1.23cm for men and 0.60cm for women, but the extent of the overestimation was greater in older men and women, shorter men and heavier women. They also found that weight was underestimated by on average 1.85kg for men and 1.40kg for women and the extent of the underestimation was greater in heavier men and women, but did not vary with age or height (although other studies in the other parts of the world have found that the elderly particularly underestimate their weight (Jalkanen, Tuomilehto et al. 1987; Kuczmarski, Kuczmarski et al. 2001)). These differences were added or subtracted to the self-reported height and weight to try to obtain a more realistic estimate of actual height and weight. For more details, including the effects on the prevalence, are available in the Obesity and Exercise report resulting from the Health and Lifestyle Survey 2007 at www.hullpublichealth.org.

Definitions of underweight, desirable or healthy weight, overweight and obesity are defined on the basis of the body mass index (BMI) which is a measure of the weight to height ratio. It was calculated by taking the adjusted weight (in kilograms) and dividing it by the square of adjusted height (in metres). In adults, the cut-off values for BMI vary for defining underweight and desirable weight, with some defining underweight as having a BMI of less than 18.5 whereas others define underweight as having a BMI of less than 20. For the purposes of the analysis below the local data uses underweight defined as having a BMI of less than 20. In practice, differences in the definitions of underweight are not of particular concern within this report as the focus is on presenting information on overweight and obesity. Desirable weight is defined as having a BMI more than (18.5 or) 20 but less than 25, overweight as having a BMI of 25 or more but less than 30, and obesity is defined as having a BMI of 30 or more. Within this latter category, morbidly obese is defined as having a BMI of 40 or more.

10.1.2 Children

There is little consensus on the “best” definition of childhood obesity in terms of BMI owing to the marked changes of BMI profile in populations of children across time and countries as well as over age. However, BMI remains the measure of choice in assessing obesity in children. Differing definitions have been used to define overweight and obesity in children. Analysis of the measurement data in Hull over the years has also used differing definitions as no standard or nationally recognised definitions existed.
However, the National Child Measurement Programme (see JSNA Toolkit: Overweight and Obesity report) has used age-specific z-scores from the 1990 reference curves (Cole, Freeman et al. 1995) for boys and girls separately. Locally, these z-scores were calculated using the ‘LMS Growth’ add-in macro for Excel (Harlow Healthcare 2011), which uses the 1990 reference curves. Age-specific centiles can then be calculated for BMI, and BMI classifications are based on these centiles. Underweight was defined as a BMI ≤ 2nd centile, healthy weight as a BMI > 2nd centile but < 85th centile, overweight as a BMI ≥ 85th centile but < 95th centile, and obese as a BMI ≥ 95th centile (Association of Public Health Observatories and Information Centre for Health and Social Care 2011).

Previous methods for classification used in Hull have involved approximations to the definitions of overweight and obese children used by the Department of Health to produce Local Delivery Plan (LDP) target figures for the childhood obesity indicator10 (HM Treasury 2004). A technically superior definition was later used in Hull’s earlier local childhood obesity reports (Chinn and Rona 2004) which was based on the adult cut-off values and modelling these cut-off values to comparable BMI values at younger ages. However, as the NCMP adopted use of the 1990 reference curves and using centiles to define underweight, overweight and obesity, this same methodology has been used in Hull.

As the specific cut-off values differ depending on the age of the child, it is difficult to give a true picture of the distribution of BMI values, and the cut-off values in relation to these distributions. However, Figure 3 presents the approximate cut-off values by gender and age (by ¼ years) for Year R children aged 4–5 years and Year 6 children aged 10–11 years.

It can be seen that, for Year R children, the BMI thresholds are lower for girls compared to boys when defining underweight, but that the reverse is true when defining overweight and obesity. The thresholds to define underweight vary between 12.9 and 13.6 depending on the age and gender of the child, so any Year R child with a BMI less than 12.9 will be classified as underweight, children with a BMI of 13.7 or more will not be classified as underweight, and children with a BMI within the range 12.9 to 13.6 may be classified as underweight depending on their gender and exact age. The approximate thresholds to define overweight are 17.0–17.3 for Year R children, and the approximately thresholds to define obesity are 18.0–18.1 for boys and 18.3–18.7 for girls. Thus any Year R child with a BMI of 18.7 or more will be classified as obese.

For Year 6 children, the thresholds to define underweight children are virtually identical for boys and girls, with an overall range of 13.5 to 14.4, so any Year 6 child with a BMI 13.5 or lower will be defined as underweight and any Year 6 child with a BMI greater than 14.4 will not be classified as obese. The cut-off values to define overweight and obesity are more distinct between boys and girls, with girls having the highest thresholds. The range for the thresholds to define overweight in Year 6 boys are 18.6 to 19.9 compared to 19.5 to 21.0 for girls, and the thresholds for obesity are 20.4 to 21.0 for Year 6 boys and 21.5 to 23.2 for Year 6 girls. Thus Year 6 boys with a BMI of 21.0

10 Public Service Agreement: PSA10a.
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

or more will be defined as obese and boys with a BMI of 20.4 or lower will not be defined as obese, and Year 6 girls with a BMI of 23.3 or more will be defined as obese.

*Figure 3: BMI cut-off values used to define underweight, overweight and obese Year R and Year 6 boys and girls*

### 10.2 Definitions Used to Measure Alcohol Consumption

The local Health and Lifestyle Surveys collected information on the total number of drinks consumed over the previous week by category of drink, e.g. the number of pints of ordinary-strength and strong beer, lager, cider and stout, number of glasses of wine, number of pub measures of spirits, etc. The questionnaires used in the local surveys can be found at [www.hullpublichealth.org](http://www.hullpublichealth.org). From this information the estimated number of alcohol units were derived. *Table 5* gives the number of alcohol units for each type of drink from the 2011-12 Health and Lifestyle Survey. From this, the total number of alcohol units drunk during the previous week was calculated.
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org).

Table 5: Calculating alcohol units consumed during the previous week based on types of drinks consumed

<table>
<thead>
<tr>
<th>Type of drink</th>
<th>Measure</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary beer, lager or cider</td>
<td>Pint/500ml bottle or can</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Standard 440ml can</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Small 330ml can/bottle</td>
<td>1.1</td>
</tr>
<tr>
<td>Strong beer, lager or cider</td>
<td>Pint/500ml bottle or can</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Standard 440ml can</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Small 330ml can/bottle</td>
<td>2.3</td>
</tr>
<tr>
<td>Wine</td>
<td>Glass (pub measure)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Large glass</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Bottle</td>
<td>9</td>
</tr>
<tr>
<td>Sherry/fortified wine/shots</td>
<td>Glass (pub measure)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Glass (home measure)</td>
<td>1.4</td>
</tr>
<tr>
<td>Alcopops</td>
<td>Bottle</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Survey responders were also asked how frequently they drank 8 or more units (for men) or 6 or more units (for women) with examples of what constituted an alcoholic unit. It is recommended that men do not exceed 4 units daily and that women do not exceed 3 units daily. Therefore, this question asks about the frequency of consuming twice the daily recommended limit and this is generally the definition used for binge drinking (although the General Lifestyle Survey uses “exceeding 8 units” for men and “exceeding 6 units” for women, i.e. drinking exactly 8 and 6 units respectively is not classified as binge drinking). Table 6 gives the definitions used to define excessive alcohol consumption and binge drinking in the local Health and Lifestyle Surveys. Further information can also be found in the Alcohol report resulting from analysis of the 2007 Health and Lifestyle Survey data which is available at [www.hullpublichealth.org](http://www.hullpublichealth.org).
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

### Table 6: Definitions of excessive alcohol consumption and binge drinking

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Question</th>
<th>Response/Calculation</th>
<th>Risk factor present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol (weekly)</td>
<td>Number of alcohol drinks in last seven days for different types of drinks for different types, e.g. ordinary and strong beer, lager or cider, wine, sherry, spirits, alcopops, etc</td>
<td>Calculated number of weekly alcohol units based on number of pints/glasses of alcohol stated with some assumptions about number of units per pint/glass (Porter et al. 2008b).</td>
<td>Male: &gt;21 units Female: &gt;14 units (more than the recommended weekly amount)</td>
</tr>
<tr>
<td>Alcohol (binge drinking)</td>
<td>How often do you drink 8/6 or more units of alcohol on a single day? (asked separately for men/women with unit examples given)</td>
<td>'Everyday', '4-6 days a week', '1-3 days a week', '1-3 days a month', 'less than once a month', or 'never'.</td>
<td>'1-3 days a week' or more frequently</td>
</tr>
<tr>
<td>Problem drinking</td>
<td></td>
<td>Excessive alcohol consumption and/or binge drinking</td>
<td></td>
</tr>
</tbody>
</table>

There are no national recommendations relating to young people for alcohol. It is illegal to sell alcohol to anyone under the age of 18 years, and whilst it is not illegal to drink alcohol under this age, young people clearly should not be drinking very much alcohol at all. However, as there are no recommended alcohol units for young people, the alcohol unit limits for adults were applied to young people to estimate excessive alcohol consumption for the Young People Health and Lifestyle Survey 2008-09. The effects of exceeding the alcohol limits for adults is clearly much worse for young people aged 11-16 years.

### 10.3 Definitions Used to Measure Levels of Exercise

It was recommended that adults undertake 30 minutes or more of vigorous or moderate exercise at least five times per week, and these have been used to define ‘sufficient exercise’ prior to 2011 when the guidelines changed (see below). The 2007 and 2011-12 Health and Lifestyle Surveys and the 2009 Prevalence Survey asked about the frequency of vigorous, moderate and light exercise, and from this information it was possible to assess if individuals were undertaking exercise to the recommended guidelines ([Table 7](#)). As an assumption was made regarding the number of times per week for the 2007 and 2011-12 surveys when a survey responder ticked the 3-4 or 1-2 times per week, the questionnaire was changed for the 2009 survey to ask survey responders the specific number of times per week. However, there is the possibility that the question could have been interpreted differently which could influence comparability.
Table 7: Definitions of exercise levels

<table>
<thead>
<tr>
<th>Survey</th>
<th>Question</th>
<th>Response/Calculation</th>
<th>Risk factor present</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007, 2011-12</td>
<td>In a usual week, how many times do you undertake exercise lasting 30 minutes or more? Separately for vigorous, moderate and light exercise with examples.</td>
<td>5+ times per week, 3-4 times per week, 1-2 times per week or never. Values of 3.5 and 1.5 were assigned to the middle categories respectively and the total number of 30 minute weekly sessions of vigorous or moderate exercise was calculated.</td>
<td>Less than 5 times weekly, but this was divided into three different categories (&lt;5, light exercise only and never exercises).</td>
</tr>
<tr>
<td>2009</td>
<td>In a usual week, how many times do you undertake exercise lasting 30 minutes or more? Separately for vigorous, moderate and light exercise with examples.</td>
<td>Box to specify number of times per week. Combined responses from moderate and vigorous exercise.</td>
<td>Less than 5 times weekly, but this was divided into three different categories (&lt;5, light exercise only and never exercises).</td>
</tr>
</tbody>
</table>

It is recommended that children and young people are physically active for at least an hour daily. The Young People Health and Lifestyle Survey 2008-09 asked the young people to specify how many hours they had undertaken sports and physical activities in the previous week during or outside school (“as well as sports and activities include walking, cycling, gardening, active housework and any activity vigorous enough to make you breathless”). From this information, the number undertaking seven or more hours the previous week were classified as fulfilling the national exercise recommendation as on average their daily exercise levels exceeded one hour.

The national exercise guidelines changed in 2011, with all age groups encouraged to be active. Babies should be encouraged to be active from birth. Before a baby can crawl, they should be encouraged to be physically active by reaching and grasping, pulling and pushing, moving their head, body and limbs during daily routines, and during supervised floor play, including tummy time. Children who can walk on their own should be physically active every day for at least 180 minutes (3 hours). This should be spread throughout the day, indoors or outside. The 180 minutes can include light activity such as standing up, moving around, rolling and playing, as well as more energetic activity like skipping, hopping, running and jumping. Active play, such as using a climbing frame, riding a bike, playing in water, chasing games and ball games, is the best way for this age group to be physically active. Children under 5 should not be inactive for long periods of time, unless they are sleeping.
Children and young people aged 5-18 years need to do:

- At least 60 minutes (1 hour) of physical activity every day, which should be a mix of moderate-intensity aerobic activity, such as fast walking, and vigorous-intensity aerobic activity, such as running.
- On three days a week, these activities should involve muscle-strengthening activities, such as push-ups, and bone-strengthening activities, such as running.

Many vigorous-intensity aerobic activities can help meet the weekly muscle- and bone-strengthening requirements, such as running, skipping, gymnastics, martial arts and football. Children and young people should minimise the time spent being inactive and minimise the time spent travelling by car when they could walk or cycle instead. Moderate-intensity aerobic activity would include walking to school, playing in the playground, skateboarding, rollerblading, walking the dog, riding a bike on level ground or with few hills, pushing a lawn mower, etc. Vigorous-intensity aerobic activity would include playing chase, energetic dancing, aerobics, running, gymnastics, playing football, martial arts such as karate, riding a bike fast or on hills, etc. Muscle-strengthening activities include those that require them to lift their own body weight or to work against a resistance, such as climbing a rope, tug of war, rope climbing, sit-ups, push-ups, swinging on playground equipment or bars, gymnastics, resistance exercises with exercise bands, weight machines or hand-held weights, rock climbing, etc. Bone-strengthening activities are those that have an impact on the bones. They help bone growth and strength, such as hopscotch, hopping, skipping and jumping, skipping rope, running, sports such as gymnastics, football, volleyball and tennis, etc.

To stay healthy, adults aged 19-64 and adults aged 65 or older who are generally fit and have no health conditions that limit their mobility should try to be active daily and should do one of the following:

- At least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity, such as cycling or fast walking every week, and muscle-strengthening activities on two or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms); OR
- 75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic activity, such as running or a game of singles tennis every week, and muscle-strengthening activities on two or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms); OR
- An equivalent mix of moderate- and vigorous-intensity aerobic activity every week (for example, two 30-minute runs plus 30 minutes of fast walking), and muscle-strengthening activities on two or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

One way to do the recommended 150 minutes of weekly physical activity is to do 30 minutes on 5 days a week, which is the same as the previous guidelines.
For adults aged 19-64 years, moderate-intensity aerobic activities include walking fast, water aerobics, riding a bike on level ground or with few hills, doubles tennis, pushing a lawn mower, hiking, skateboarding, rollerblading, volleyball, basketball, etc. Vigorous-intensity aerobic activities include jogging or running, swimming fast, riding a bike fast or on hills, singles tennis, football, rugby, skipping rope, hockey, aerobics, gymnastics, martial arts, etc. Muscle-strengthening exercises are counted in repetitions and sets, with a repetition being one complete movement of an activity, like lifting a weight or doing a sit-up, and a set is a group of repetitions. The aim is to try to do 8 to 12 repetitions in each set for each activity, and trying to do at least one set of each muscle-strengthening activity, ideally undertaking two or three sets. Muscle-strengthening exercises include gym work, lifting weights, working with resistance bands, doing exercises that use your body weight for resistance, such as push-ups and sit-ups, heavy gardening, such as digging and shovelling, yoga, etc. However, muscle-strengthening activities don't count towards the aerobic activity total.

For adults aged 65+ years, moderate-intensity aerobic activities include walking fast, water aerobics, ballroom and line dancing, riding a bike on level ground or with few hills, playing doubles tennis, pushing a lawn mower, canoeing, volleyball, etc. Vigorous-intensity aerobic activities include jogging or running, aerobics, swimming fast, riding a bike fast or on hills, playing singles tennis, playing football, hiking uphill, energetic dancing, martial arts, etc. The same muscle-strengthening exercises are recommended for adults aged 65+ years as for those aged 19-64 years. Older adults at risk of falls, such as people with weak legs, poor balance and some medical conditions, should do exercises to improve balance and co-ordination on at least two days a week. These could include yoga, tai chi and dancing.
10.4 Defining Risk of a Cardiovascular Event Within Ten Years in the Healthy Heart Study

*Table 8* gives the points assigned based on the following six risk factors for men and women to give a total score (summed over the six risk factors) of a cardiovascular event within the next ten years. The total scores in combination with family history were related to 10-year risk as given in *Table 9* (see example below table).

*Table 8: Points for scoring each risk factor*

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Category</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>30-34</td>
<td>-1</td>
<td>-9</td>
</tr>
<tr>
<td></td>
<td>35-39</td>
<td>0</td>
<td>-4</td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>45-49</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>55-59</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>60-64</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>65-69</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>70-74</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>≤4.14</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td>4.15 to 5.17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5.18 to 6.21</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6.22 to 7.24</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>≥7.25</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>High density lipoprotein (HDL) cholesterol (mmol/L)</td>
<td>≤0.90</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>0.91 to 1.16</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1.17 to 1.29</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.20 to 1.55</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>≥1.56</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>Blood pressure (SBP/DBP mmHg)*</td>
<td>&lt;120 / &lt;80</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td>120-129 / 80-84</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>130-139 / 85-89</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>140-159 / 90-99</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>≥160 / ≥100</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Smoker</td>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

*Highest score (risk) given if blood pressure falls within two different categories. For example, if blood pressure is 146/86, it would be in fourth category for systolic blood pressure and third category for diastolic blood pressure, and the highest score (fourth) category with two points would be assigned.*
Table 9: Overall score relating to 10-year risk of a cardiovascular event

<table>
<thead>
<tr>
<th>Total points#</th>
<th>Probability of cardiovascular risk event in next 10 years (based on total points scored for six risk factors) with and without family history (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Without family history</td>
</tr>
<tr>
<td>≤ –2</td>
<td>2</td>
</tr>
<tr>
<td>–1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>13</td>
<td>45</td>
</tr>
<tr>
<td>14</td>
<td>≥ 53</td>
</tr>
<tr>
<td>15</td>
<td>≥ 53</td>
</tr>
<tr>
<td>16</td>
<td>≥ 53</td>
</tr>
<tr>
<td>≥ 17</td>
<td>≥ 53</td>
</tr>
</tbody>
</table>

*Risk is multiplied by 1.5 if there is family history of premature CVD death.

#The total points is the sum of the individual points for each of the six risk factors.

For instance, a man of 52 years with total cholesterol of 7mmol/L, HDL cholesterol of 1.2mmol/L, blood pressure 131/82mmHg, who does not have diabetes but who smokes would have individual scores of 3, 2, 0, 1, 0 and 2 for each of the risk factors respectively, giving a total score of 8, which relates to a 16% chance/probability of a cardiovascular event in the next 10 years provided he does not have family history of premature cardiovascular disease (or 24% chance with family history).
10.5 **Disease Definitions Using International Classification of Diseases**

The International Classification of Disease (ICD) is the international standard method used to diagnose and define disease status. The version currently being used is version 10 (since 2001). The disease definitions are also given in relation to the indicators within the Public Health Outcomes Framework (PHOF), see section 9.3 on page 52 for more information. **Table 10** gives the ICD codes for the different diseases used in this document. Prior to 2001, ICD version 9 was used, but versions 9 and 10 are not easily cross-linked for all diseases and medical conditions. Therefore, for these tables and figures, there have been some adjustments so that trends over time are more comparable so the information being presented is comparing like-with-like. These adjustments have been made by the Office for National Statistics and the details of such adjustments are not given within this report.

**Table 10: International Classification of Diseases: classifications used**

<table>
<thead>
<tr>
<th>Disease or medical condition</th>
<th>ICD 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths considered preventable (PHOF 4.03)</td>
<td>A15-19, B17.1, B18.2, B20-24, B90, C00-16, C18-22, C33-34, C43, C45, C50, C53, E10-14, F10-16, F18-19, G31.2, G62.1, I20-26, I42.6, I71, I80.1-80.3, I80.9, I82.9, J09-11, J40-44, K29.2, K70, K73-74 (excl. K74.3-74.5), K86.0, U50.9, V01-Y34, Y60-69, Y83-84 for under 75s except E10-14 (aged under 50 only) and B20-24, U50.9, V01-Y34, Y60-69, Y83-84 (all ages).</td>
</tr>
<tr>
<td>Alcohol-related (locally defined)</td>
<td>See Table 11</td>
</tr>
<tr>
<td>Alcohol-related (Jones, Bellis et al. 2008)</td>
<td>See Table 12</td>
</tr>
<tr>
<td>Cancer (PHOF 4.05i)</td>
<td>C00 to C97</td>
</tr>
<tr>
<td>Cancer deaths considered preventable (PHOF 4.05ii)</td>
<td>C00-C16, C18-C22, C33-C34, C43, C45, C50, C53 for under 75s</td>
</tr>
<tr>
<td>Bladder cancer</td>
<td>C67</td>
</tr>
<tr>
<td>Brain cancer</td>
<td>C71</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>C50</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>C53</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>C17 to C21*</td>
</tr>
<tr>
<td>Haematological cancers</td>
<td>C81 to C96</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>C64</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>C33 to C34**</td>
</tr>
<tr>
<td>Oesophagus cancer</td>
<td>C15</td>
</tr>
<tr>
<td>Ovary</td>
<td>C56</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>C61</td>
</tr>
<tr>
<td>Pancreatic cancer</td>
<td>C25</td>
</tr>
<tr>
<td>Skin cancer</td>
<td>C43 to C44***</td>
</tr>
<tr>
<td>Stomach</td>
<td>C16</td>
</tr>
<tr>
<td>Uterus</td>
<td>C54****</td>
</tr>
<tr>
<td>Disease or medical condition</td>
<td>ICD 10</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Cardiovascular disease (PHOF 4.04i)</td>
<td>I00 to I99</td>
</tr>
<tr>
<td>Cardiovascular deaths considered preventable</td>
<td>I20-I26, I42.6, I71, I80.1-I80.3, I80.9, I82.9 for under 75s</td>
</tr>
<tr>
<td>(PHOF 4.04ii)</td>
<td></td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>I20 to I25</td>
</tr>
<tr>
<td>Stroke</td>
<td>I60 to I69†</td>
</tr>
<tr>
<td>Communicable disease (PHOF 4.08)</td>
<td>A00-B99, J09-J18 (all ages)</td>
</tr>
<tr>
<td>Dementia</td>
<td>F00 to F03</td>
</tr>
<tr>
<td>Diabetes</td>
<td>E10 to E14</td>
</tr>
<tr>
<td>Fractured neck of the femur (PHOF 1.14)</td>
<td>S72.0, S72.1, S72.2</td>
</tr>
<tr>
<td>Injuries among children – unintentional and deliberate</td>
<td>S00-T79 and/or V01-Y36</td>
</tr>
<tr>
<td>(PHOF 2.07)</td>
<td></td>
</tr>
<tr>
<td>Injuries due to falls (PHOF 2.24)</td>
<td>Primary diagnosis codes S00-T98 and secondary cause W00-W19</td>
</tr>
<tr>
<td>Injury, poisoning and certain other consequences of</td>
<td>S00-T98</td>
</tr>
<tr>
<td>external causes</td>
<td></td>
</tr>
<tr>
<td>Liver disease (PHOF 4.06i)</td>
<td>B15-B19, C22, I81, I85, K70-K77, T86.4</td>
</tr>
<tr>
<td>Liver disease deaths considered preventable</td>
<td>B17.1, B18.2, C22, K70, K73-K74 (excluding K74.3-K74.5) for under 75s</td>
</tr>
<tr>
<td>(PHOF 4.06ii)</td>
<td></td>
</tr>
<tr>
<td>Chronic liver disease including cirrhosis</td>
<td>K70, K73 to K74</td>
</tr>
<tr>
<td>Mental/behavioural disorders (drugs)</td>
<td>F10-F19</td>
</tr>
<tr>
<td>Intentional self-harm</td>
<td>X60 to X84</td>
</tr>
<tr>
<td>Respiratory disease (PHOF 4.07i)</td>
<td>J00-J99</td>
</tr>
<tr>
<td>Respiratory disease deaths considered preventable</td>
<td>J09-J11, J40-J44 for under 75s</td>
</tr>
<tr>
<td>Preventable (PHOF 4.07ii)</td>
<td></td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>J40 to J44</td>
</tr>
<tr>
<td>Suicide or event of undetermined intent</td>
<td>X60 to X84 and Y10 to Y34 excl Y33.9</td>
</tr>
<tr>
<td>Suicide (PHOF 4.10)</td>
<td>X60-X84 (all ages), Y10-Y34 (ages 15+ only)</td>
</tr>
<tr>
<td>Violent crime – hospital admissions (PHOF 1.12i)</td>
<td>X85-Y09</td>
</tr>
</tbody>
</table>

*Also defined as C18-C20 if otherwise stated in specific table/figure.
**Also defined as just C34 if otherwise stated in specific table/figure.
***Melanoma of the skin only is defined as C43 and is stated in specific table/figure.
****Also defined as C54 and C55 if otherwise stated in specific table/figure.
†Although the ICD10 coding for stroke differs in the NHS Information Centre Indicator Portal depending on if mortality or hospital admission data are being analysed.
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

*Table 11* gives the locally defined descriptions for the alcohol-related medical conditions and diseases, and *Table 12* gives the descriptions used by the North West Public Health Observatory in their alcohol profiles (Jones, Bellis et al. 2008).

*Table 11: Alcohol-related medical conditions and diseases (locally defined)*

<table>
<thead>
<tr>
<th>ICD 10 coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F10</td>
<td>Mental and behavioural disorders due to use of alcohol</td>
</tr>
<tr>
<td>G62.1</td>
<td>Alcoholic polyneuropathy</td>
</tr>
<tr>
<td>I42.6</td>
<td>Alcoholic cardiomyopathy</td>
</tr>
<tr>
<td>K29.2</td>
<td>Alcoholic gastritis</td>
</tr>
<tr>
<td>K70</td>
<td>Alcoholic liver disease</td>
</tr>
<tr>
<td>K86.0</td>
<td>Alcohol-induced chronic pancreatitis</td>
</tr>
<tr>
<td>O35.4</td>
<td>Maternal care for (suspected) damage to fetus from alcohol</td>
</tr>
<tr>
<td>P04.3</td>
<td>Fetus and newborn affected by maternal use of alcohol</td>
</tr>
<tr>
<td>Q86.0</td>
<td>Fetal alcohol syndrome</td>
</tr>
<tr>
<td>T51</td>
<td>Toxic effect of alcohol</td>
</tr>
<tr>
<td>X45</td>
<td>Accidental poisoning by and exposure to alcohol</td>
</tr>
<tr>
<td>X65</td>
<td>Intentional self-poisoning by and exposure to alcohol</td>
</tr>
<tr>
<td>Y15</td>
<td>Poisoning by and exposure to alcohol, undetermined intent</td>
</tr>
<tr>
<td>Z50.2</td>
<td>Alcohol rehabilitation</td>
</tr>
<tr>
<td>Z71.4</td>
<td>Alcohol abuse counselling and surveillance</td>
</tr>
<tr>
<td>Z72.1</td>
<td>Problems related to lifestyle – alcohol use</td>
</tr>
</tbody>
</table>

*Table 12: Alcohol-related medical conditions and diseases used within North West Public Health Observatory alcohol profiles*

<table>
<thead>
<tr>
<th>ICD 10 coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E24.4</td>
<td>Alcohol-induced pseudo-Cushing’s syndrome</td>
</tr>
<tr>
<td>F10</td>
<td>Mental and behavioural disorders due to use of alcohol</td>
</tr>
<tr>
<td>G31.2</td>
<td>Degeneration of nervous system due to use of alcohol</td>
</tr>
<tr>
<td>G62.1</td>
<td>Alcoholic polyneuropathy</td>
</tr>
<tr>
<td>I42.6</td>
<td>Alcoholic cardiomyopathy</td>
</tr>
<tr>
<td>K29.2</td>
<td>Alcoholic gastritis</td>
</tr>
<tr>
<td>K70</td>
<td>Alcoholic liver disease</td>
</tr>
<tr>
<td>K86.0</td>
<td>Alcohol-induced chronic pancreatitis</td>
</tr>
<tr>
<td>T51.0</td>
<td>Ethanol poisoning</td>
</tr>
<tr>
<td>T51.1</td>
<td>Methanol poisoning</td>
</tr>
<tr>
<td>T51.9</td>
<td>Toxic effect of alcohol, unspecified</td>
</tr>
<tr>
<td>X45</td>
<td>Accidental poisoning by and exposure to alcohol</td>
</tr>
<tr>
<td>Z72.1</td>
<td>Problems related to lifestyle – alcohol use</td>
</tr>
</tbody>
</table>
10.6 Surgical Operations and Procedure Codes

The Office of Population Censuses and Surveys (OPCS) Classification of Surgical Operations and Procedures was used to classify medical procedures that were undertaken. *Table 13* provides a list of the surgical codes that were used to define the procedures presented in this profile.

*Table 13: Classification of Surgical Operations and Procedures: classifications used*

<table>
<thead>
<tr>
<th>Surgical operation or procedure</th>
<th>Coding used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiography (cardiac)</td>
<td>K63, K65</td>
</tr>
<tr>
<td>Coronary artery bypass graft</td>
<td>K40, K41, K44, K45</td>
</tr>
<tr>
<td>Hip replacement</td>
<td>W37, W38, W39, W46, W47, W48</td>
</tr>
<tr>
<td>Percutaneous coronary intervention</td>
<td>K49</td>
</tr>
</tbody>
</table>

11 HEALTH RELATED DEFINITIONS, METHODS AND TERMS

11.1 Asset Approach

For information on this topic see *section 2.8.4* on *page 15*.

11.2 Body Mass Index

Definitions of underweight, desirable weight, overweight and obesity are defined on the basis of the body mass index (BMI) which is a measure of the weight to height ratio. It is calculated by taking the weight (in kilograms) and dividing it by the square of height (in metres).

It is well-recognised that people tend to over-estimate their true height and under-estimate their true weight when it is self-reported rather than measured. To attempt to compensate for this, height and weight from the local Health and Lifestyle Surveys were adjusted prior to calculating the BMI.

Details of the classifications are given in *section 10.1* on *page 58*.

11.3 Causality

Information on this topic is given within *section 12.8* on *page 81*. 
11.4 **General Practice Groupings**

Information on this topic is given within *section 8* on *page 45*.

11.5 **Health Equity Audit**

Information on this topic is given within *section 2.8.3* on *page 15*.

11.6 **Health Needs Assessment**

Information on this topic is given within *section 2.8.2* on *page 14*.

11.7 **Health Utility Index**

The Health Utility Index (HUI) (Furlong et al. 2001; Horsman et al. 2003) is a set of questions to measure physical and mental health status which was used in the local Health and Lifestyle Survey 2007. The HUI is a scored health status measure reporting health-related quality of life on single attributes (vision, hearing, speech, ambulation/mobility, pain, dexterity, self-care, emotion and cognition) as well as a multi-attribute score derived from a combination of these attributes. Details of the single attribute classification scores range from 1 to 5 (speech, emotion and pain) or 1 to 6 (vision, hearing, ambulation, dexterity and cognition) with a score of 1 denoting the best health status. The multi-attribute score ranges from –0.36 to 1 with 0 denoting death, 1 denoting the best health status and negative scores denoting very poor health scores. To calculate the multi-attribute score, each single attribute needed to be used. Where an individual had only 1 or 2 single attribute scores missing (i.e. had not answered the relevant questions), these were randomly imputed, in order that the multi-attribute score could be produced (although when the single attribute scores were analysed, these imputed scores were treated as missing).

11.8 **Hospital Episode Statistics**

Further information is given within *section 6* on *page 42*.

11.9 **Index of Multiple Deprivation**

The Index of Multiple Deprivation (IMD) 2010 (Communities and Local Government 2011) score is a measure of deprivation derived for lower layer Super Output Area (LLSOA). These geographical areas had a minimum population size of 1,000 and a mean population size of 1,500 when they were generated following the 2001 Census.
Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)

The IMD 2010 index is based on seven domains which are weighted according to their relative importance in relation to the overall score (weights in brackets): (i) income deprivation (22.5%); (ii) employment deprivation (22.5%); (iii) health deprivation and disability (13.5%); (iv) education, skills and training deprivation (13.5%); (v) barriers to housing and services (9.3%); (vi) living environment deprivation (9.3%); and (vii) crime (9.3%). The IMD 2010 score measures deprivation, but is not such a good measure of affluence. As it is applied to a geographical area, it relates to average levels of deprivation within an area. Therefore, there may be some residents of the area who are very much more deprived or very much better-off relative to the average.

Further information is available in section 2.5 on page 10, with more detailed information within the JSNA Toolkit: Deprivation and Associated Measures report. A separate document which gives further detailed information on the separate domains of the IMD and changes over time is also available on [www.hullpublichealth.org](http://www.hullpublichealth.org).

11.10 International Classification of Diseases

Further information is available in section 10.5 on page 68.

11.11 Modelled or Synthetic Estimates

Further information is available in section 4 on page 22.

11.12 Primary Care Practice Groupings

Further information is given within section 8 on page 45.

11.13 Programme Budgeting

Programme Budgeting is a well-established technique for assessing investment in health programmes rather than services. It can provide an overall view of how Hull PCT/CCG expenditure (from Department of Health Programme Budgeting information) and health outcomes compare with other PCTs/CCGs in England, and to identify programmes that may require further investigation. The two quadrant charts used in this section highlight better/worse outcomes for spend across individual programmes relative to the England average.

The Yorkshire and Humber Public Health Observatory (YHPHO) led the Programme Budgeting and Marginal Analysis (PBMA) pilot project in Hull Teaching Primary Care Trust with diabetes (for persons aged over 16 years) chosen as the area of care.
The aim of the pilot was to test the model of PBMA at the micro level (within the diabetes programme budget of Hull PCT) as proposed in a seven stage process suggested by Ruta et al (Ruta, Mitton et al. 2005).

The resource envelope for the PBMA project was assumed to be neutral so that any service growth would have to be funded from taking resources from elsewhere in diabetes care. In Hull, the programme budget was broken into finance, activity and outcomes.

Further details of this pilot are given within the JSNA Toolkit: Diabetes document.

11.14 Quality and Outcomes Framework

Further information is given within section 7 on page 43.

11.15 Risk factors

“1. An aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic that, on the basis of scientific evidence, is known to be associated with meaningful health-related condition(s). 2. An attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. Not necessarily a causal factor: it may be a risk marker. 3. A determinant that can be modified by intervention, thereby reducing the probability of occurrence of disease or other outcomes. It may be referred to as a modifiable risk factor, and logically must be a cause of the disease.

The term risk factor became popular after its frequent use by T.R. Dawber and others in papers from the Framingham study. The pursuit of risk factors has motivated the search for causes of chronic disease over the past half-century. Ambiguities in risk and in risk-related concepts, uncertainties inherent to the concept, and differences in legitimate meanings across cultures (even if within the same society) must be kept in mind in order to prevent medicalisation of life and iatrogenesis (i.e. adverse effects of preventive, diagnostic, therapeutic, surgical and other medical, sanitary and health procedures, interventions, or programs).” (Porta 2008)

“In epidemiology, a risk factor is a variable associated with an increased risk of disease or infection. Sometimes, determinant is also used, being a variable associated with either increased or decreased risks.

Risk factors or determinants are correlational (associated) and not necessarily causal, because correlation does not prove causation (see other document on website for more on causation). For example, being young cannot be said to cause measles, but young people have a higher rate of measles because they are less likely to have developed immunity during a previous epidemic. Statistical methods are frequently used to assess
the strength of an association and to provide causal evidence (for example in the study of the link between smoking and lung cancer). Statistical analysis along with the biological sciences can establish that risk factors are causal. Some prefer the term risk factor to mean causal determinants of increased rates of disease, and for unproven links to be called possible risks, associations, etc.

The probability of an outcome usually depends on an interplay between multiple associated variables. When performing epidemiological studies to evaluate one or more determinants for a specific outcome, the other determinants may act as confounding factors, and need to be controlled for, e.g. by stratification. The potentially confounding determinants varies with what outcome is studied, but the following general confounders are common to most epidemiological associations, and are the determinants most commonly controlled for in epidemiological studies: age, gender and ethnicity. Other possible confounders include: social status/income, geographical location, genetic predisposition, occupation, smoking status, diet, level of physical activity, alcohol consumption, and other social determinants of health, etc." (Wikipedia 2013)

11.16 **SF-36v2™**

The SF-36v2™ questionnaire is a frequently used questionnaire to assess various components of health. As well as a ‘health transition’ question which compares current health with health one year ago, eight different health scores are created from the responses to the 36 questions which measure various aspects of health as follows:

- **Physical functioning:** Extent to which health limits physical activities such as self-care, walking, climbing stairs, bending, lifting, and moderate and vigorous exercises.
- **Role–physical:** Extent to which physical health interferes with work or other daily activities, including accomplishing less than wanted, limitations in the kind of activities, or difficulty in performing activities.
- **Bodily pain:** Intensity of pain and effect of pain on normal work, both inside and outside the home.
- **General health:** Personal evaluation of health, including current health, health outlook, and resistance to illness.
- **Vitality:** Feeling energetic and full of life versus feeling tired and worn out.
- **Social functioning:** Extent to which physical health or emotional problems interfere with normal social activities.
- **Role–emotional:** Extent to which emotional problems interfere with work or other daily activities, including decreased time spent on activities, accomplishing less, and not working as carefully as usual.
- **Mental health:** General mental health, including depression, anxiety, behavioural-emotional control, general positive affect.

These scores range from zero representing the worst health to 100 representing the best health.
Variations of this questionnaire are also available, such as the SF-8™ which includes eight questions, but as a result is less detailed and specific.

11.17 Synthetic or Modelled Estimates

Further information is available in section 4 on page 22.

11.18 Total Period Fertility or Abortion Rate

Since there are differences in the number of births amongst women of different ages, one measure of fertility is the number of births per 1,000 women for a specific age-group. For example, 203 births per 1,000 women aged 25-29 years. However, this results in a different fertility estimate for each age group, and the overall fertility rate among different geographical areas cannot be easily compared. This is particularly the case, if there is a difference in the age women tend to have their children among different geographical areas or countries. The total period fertility rate (TPFR) is a convenient summary measure of the fertility. It is an hypothetical estimate of completed fertility. It indicates how many births a woman would have by the end of her reproductive life, if, for all of her childbearing years, she was to experience the age-specific birth rates for a given year (e.g. current fertility rates as at 2012). It takes into account the differences in the fertility rates within different reproductive age groups, and enables comparisons to be made between different geographical areas and between different time periods, because it is not affected by the age distribution of the women in the reproductive age-groups. The total period abortion rate (TPAR) is a similar measure of abortions rather than births over all age groups. These rates are not predictions of fertility as the measures use the current rates, and the same issues apply as discussed earlier in relation to life expectancy mentioned above, although for these measures the estimate is more likely to be close to the true figure as the current age-specific rates are applied to a narrower age group (15-44) compared to life expectancy (where rates will be applied from 0-85+ years).
12  **STATISTICAL AND EPIDEMIOLOGICAL METHODS AND TERMS**

Knowledge of these statistical methods is essential for many tables and figures in order to interpret the information correctly.

There is also a statistical presentation on [www.hullpublichealth.org](http://www.hullpublichealth.org) which covers the following topics (with detailed ‘notes’ pages):

- What is statistics?
- Variability
- Confidence intervals
- Problems of small numbers
- Standardisation
- Causality
- Questions to ask (when examining/interpreting data/statistics)

This document also gives examples of variability in relation to numbers surveyed and the implication on the width of confidence intervals.

Another document on [www.hullpublichealth.org](http://www.hullpublichealth.org) provides more detailed information on standardisation, including worked examples of both indirect and direct standardisation.

Also see **section 13** on **page 95** which gives further information about issues involved when conducting research and/or critically appraising papers and journal articles.

**12.1  What is Statistics?**

Statistics is the “Science of collecting, summarising, presenting and interpreting data, and of using them to estimate the magnitude of associations and test hypotheses. Not only does it provide a way of organising information on a wider and more formal basis, it takes into account intrinsic variation inherent in most biological processes.” (Kirkwood and Sterne 2003).

**12.2  Populations and Samples in Statistics**

The word population has a slightly different meaning in statistics than in general. The population of interest will differ depending on the focus of the query. In statistics, population refers to any specific (unknown) population to which you are attempting to describe. A population in statistics can be a population of adults, a population of patients with a specific medical condition, a population of trees, a population of insects, a population of traffic passing a certain point within a certain time period, etc.
As you cannot examine all the population, a sample of the population is collected and the data from this sample analysed. It is then hoped that the sample you have obtained is representative of your underlying population so you can generalise the findings from your sample that of your population.

The population could be adult males living in Hull and you are hoping to measure their heights. You cannot measure all adult men living in Hull, so you measure the heights in a sample of adult males who live in Hull, and hope that your sample is representative of the adult males living in Hull. If it is then you can calculate the mean height of men in your sample, and can then generalise your findings to the population, and produce a good estimate of the mean height of men living in Hull.

12.3 **What is epidemiology?**

“The study of the occurrence and distribution of health-related states or events in specified populations, including the study of the determinants influencing such states, and the application of this knowledge to control the health problems. Study includes surveillance, observation, hypothesis testing, analytic research, and experiments. Distribution refers to analysis by time, place, and classes or subgroups of persons affected in a population or in a society. Determinants are all the physical, biological, social, cultural, economic and behavioural factors that influence health. Health-related states and events include diseases, causes of death, behaviours, reactions to preventative programs, and provision and use of health services. Specified populations are those with common identifiable characteristics. Application to control... makes explicit the aim of epidemiology – to promote, protect and restore health. The primary ‘knowledge object’ of epidemiology as a scientific discipline are causes of health-related events in populations. In the past 70 years, the definition has broadened from concern with communicable disease epidemics to take in all processes and phenomena related to health in populations.” (Porta 2008)

“Epidemiology is the study (or the science of the study) of the patterns, causes, and effects of health and disease conditions in defined populations. It is the cornerstone of public health, and informs policy decisions and evidence-based medicine by identifying risk factors for disease and targets for preventative medicine. Epidemiologists help with study design, collection and statistical analysis of data, and interpretation and dissemination of results.” (Wikipedia 2013)

12.4 **Incidence**

“The number of instances of illness commencing, or of persons falling ill, during a given period in a specified population. More generally, the number of new health-related events in a defined population within a specified period of time. It may be measured as a frequency count, a rate, or a proportion.
The incidence rate is the rate at which new events occur in a population. The numerator is the number of new events that occur in a defined period or other physical span. The denominator is the population at risk of experiencing the event during this period, sometimes expressed as person-time; it may instead be in other units, such as passenger-miles. The incidence rate most often used in public health practice is calculated from the formula: $10^n$ multiplied by the number of new events in specified period divided by average number of persons exposed to risk during this period. Strictly speaking, this ratio is neither a rate nor a proportion but is instead the rate multiplied by the length of the specified period. If the period is a year, the ratio is nonetheless often called the annual incidence rate. The average size of the population is often the estimated population size at the mid-period. The ratio divided by the length of the period is an estimate of the person-time incidence rate (i.e. the rate per 10n person-years). If the ratio is small, as with many chronic diseases, it is also a good estimate of the cumulative incidence over the period (e.g. a year). If the number of new cases during a specified period is divided by the sum of the person-time units at risk for all persons during that period, the result is the person-time incidence rate.” (Porta 2008)

The $10^n$ is simply a multiplier. For instance, $10^1$ is 10, $10^2$ is 100, etc. Incidence rates are frequently denoted as per 100,000 person-years, but this multiplier will depend on how common or rare the medical condition or disease is.

### 12.5 Prevalence

The prevalence is “a measure of disease occurrence: the total number of individuals who have an attribute or disease at a particular time (it may be a particular period) divided by the population at risk of having the attribute or disease at that time or midway through the period. When used without qualification, the term usually refers to the situation at a specified point in time (point prevalence). A measure of occurrence or disease frequency, often used to refer to the proportion of individuals in a population who have a disease or condition. It is a proportion, not a rate.” (Porta 2008)

### 12.6 Population – Residents versus Registered Populations

There are two populations that are frequently used within the JSNA Toolkit documents. The resident population of Hull is simply the residents of Hull, or equivalently those who live within the Hull geographical boundary. The primary population of interest for the local authority will be the resident population. The registered population is the patient population or the patients who are registered with GP practices within the Hull boundary. The primary population of interest for the NHS Hull Clinical Commissioning Group (CCG) will be the registered population. Around 10% of patients registered with Hull GP practices live in East Riding of Yorkshire, but particular GP practices have much higher proportions of East Riding of Yorkshire residents. Further information is given within the Hull JSNA Toolkit: Demography and Demographics report.
The exact numbers of people living in Hull is not known, and there are two main ways in which the population of a particular geographical area can be estimated. One is from the registered population file and another is from the Census and subsequent estimates produced by the Office for National Statistics.

The number of people registered with GPs in Hull is known, but it is possible that some people registered with Hull GPs have moved away and no longer live in the area. This is particular the case for young males who do not regularly go to their GP, and sometimes can take a while to re-register with a local GP once the move. The converse is true; it is also possible that the resident population of Hull will include some individuals who are not registered with a local GP practices.

Whilst it is a requirement to complete the Censuses which have previously occurred every 10 years, not everyone does so, and it is a snapshot of the population at that particular time. As particular groups are known to not complete the Census form (again particularly the young and particularly men), the Office for National Statistics (ONS) has to 'adjust' their Census estimates to take into account an estimate of those who did not complete the Census form. As the Census is an estimate of the population at a specific point in time, as time progresses, the estimate(s) becomes less accurate. ONS produce mid-year estimates of the resident population annually, using information from the latest Census aging people by one year, adding in births and subtracting deaths, and including a modelling component to estimate migration (both internal and international). Some of the migration element uses information from the GP registration file to estimate migration by assessing changes in GP registration data.

Most of the local analyses within the JSNA use the information from the GP registration file as this has been the only file from which sufficient information is available at different geographical levels (such as at ward level or at lower layer super output area level which is the geographical level at which deprivation is measured – see section 2.5 on page 10 and the JSNA Toolkit: Geographical Area and JSNA: Toolkit: Deprivation and Associated Measures reports), and it is information was also available at these geographical levels by single year (or five year age bands) of age and gender (which is necessary for standardisation). Due to restrictions on data access following the major NHS re-organisation in April 2013, access to this dataset is currently no longer possible. The latest file is for the population as at October 2012. Aggregated data is available for later time periods (April 2014), but for this aggregated data cannot always be used for analyses purposes. However, ONS have also recently produced estimates of the resident population at lower layer super output area geographical level for single years of age. So it may be possible to use these estimates that have recently become available.

Statistics that have been produced nationally generally use the resident population, but in some cases the population will be the registered population, such as information from the Quality and Outcomes Framework GP registers and quality of care indicators which is practice-based (see section 7 on page 43).
12.7 **Bias**

“A fundamental aspect of statistics is to avoid bias in the sample(s) of observations. Biases can be introduced at each stage of the research process. Systematic errors are potentially serious and can lead to bias and invalid conclusions. An example of a systematic error is where a nurse always measures blood pressure lower than colleagues. Random errors give rise to reduced precision but not in general to validity. Random errors can occur through data collection through questionnaire or equipment faults, observer error, responder mistakes, during data processing through coding, copying, data entry, programming and calculating errors. There are three main types of bias: selection bias; confounding bias and information bias.” (Kirkwood and Sterne 2003)

“Selection bias occurs when the selected subjects (for the sample) differ in some systematic way from those not selected. This could be through high survey non-response, loss to follow-up of inappropriate choice of sampling frame (a list from which your sample is drawn) or sample. It can also occur through inappropriate choice of comparison groups, and this is particularly the case for case-control studies and the choice of the control sample. Confounding bias occurs when researchers have failed to take into account an unknown or unrecorded factor that is associated with both the two factors being examined in the research. Age, gender, deprivation and socio-economic status are some common confounders. Confounders are discussed further in section 12.9 on page 83. If information is collected about confounders, then statistical analyses can be adjusted to take into account the recorded confounders. However, if information is not collected on all confounders then serious biases can occur, and incorrect conclusions can be reached. Information bias occurs due to systematically incorrect measurements or responses, or misclassifications of disease or exposure status which can result from questionnaire faults (culturally inappropriate questions, ambiguous wording, too many questions, etc), observer errors (misunderstanding of procedures, misinterpretation, interviewer bias, etc), responder errors (misunderstanding, faulty recall, wanting to give the ‘right’ answer, embarrassment, suspicion, etc) and instrument errors (faulty calibration, incorrect dilution, inaccurate diagnostic tests, etc).” (Kirkwood and Sterne 2003)

12.8 **Causality**

Just because an association has been found to exist between two factors does not necessarily imply there is causality. Firstly, it is useful to assess if the relationship is valid? There are three main questions to address related to chance, bias and confounding. Firstly, has the relationship occurred by chance? If your p-value is small, you have more evidence that the relationship exists. However, you could have just been unlucky with your research. If your p-value is one in a million then you will reject the null hypothesis of no difference. However, you may have just been unlucky with your sampling. Out of the million “samples” you could have genuinely chosen which were
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

within your population of interest (the population to which you want to generalise your findings to) you could have just been unlucky to pick out one as extreme as the one you did, and the null hypothesis (of no difference) could actually be correct. If your p-value is statistically significant but only just below the significance testing level (generally deemed to be p<0.05, i.e. 5%), then you are more likely to just be unlucky with your sample. Further information on significance testing and p-values are given in section 12.18 on page 94. Secondly, has the relationship occurred through bias? Is your sample reliable and representative? Is the response rate too low? Have only certain people responded to your survey? Further information on bias is given in section 12.7 on page 81. Thirdly, are the results due to confounding, i.e. due to some other factor that you have not considered? Further information on confounding is given in section 12.9 on page 83.

After assessing chance, bias and confounding, there are various other things to consider in relation to starting to make the case for causality as follows:

- Temporality – The exposure must precede the disease or at least happen simultaneously. This is crucial. For instance, ex-smokers often have a higher mortality rate than current smokers following surgery. Does this mean that quitting smoking is bad? No, it just means that their exposure occurred before they quit. They smoked a high number of cigarettes prior to the surgery, and their health was at risk and/or were told that they could not have the surgery without quitting. Whereas the current smokers did not smoke as many cigarettes, and they were less likely to quit prior to surgery. Therefore, the current less heavy smokers were more healthy than the ex heavy smokers so the mortality rate for the current smokers was lower than the ex-smokers.
- Strength of the relationships is important. If the odds of the disease was double that of one group compared to the other there is less evidence if the odds of disease was 100 times that of one group compared to another.
- Plausibility - It helps if there is a proper scientific reason why the exposure might cause the disease.
- Experimental evidence – It helps if there is evidence that intervention has some effect. Stopping the exposure should stop the disease completely or partially.
- Biological gradient – The causality argument is helped if more exposure results in more disease, for example, heavy smokers are more likely to get lung cancer.
- Consistency – It helps the causality argument if you have consistency in that others have found a similar relationship.
- Specificity – It also helps the causality argument if the exposure is associated with a specific disease as opposed to a wide range of disease.
- Coherence – If there is coherence in that results are consistent with the natural history of the disease, for example, lung cancer rates are higher in countries where more people smoke.
- Analogy – It also helps the causality argument if there is other evidence, scientific mechanisms that can be examined as further evidence.

So just because you find a relationship does not necessarily mean that it is causal!
12.9 Confounding, Effect Modification and Interaction

Confounding occurs when another factor (or factors) influences the association of interest. This occurs when this other factor is associated with both the risk factor of interest and the outcome of interest. For example, if examining the association between alcohol consumption and lung cancer mortality, it might be that an association is found. However, smoking is a confounder. There is an association between smoking and alcohol consumption as people who tend to smoke also tend to drink more alcohol. There is also an association between smoking and lung cancer mortality, therefore, it is possible that there is no real association between alcohol consumption and lung cancer mortality and smoking is acting as a confounder. Failure to take into account or consider smoking when examining this association can lead to biased results – known as confounding bias.

Age, gender and deprivation are frequently related to the prevalence of behavioural risk factors, and poor health and mortality are also associated with age, gender and deprivation. Therefore, any of these factors can act as confounders when examining the relationship between risk factors and poor health.

It is also possible that one factor modifies the effect of one factor on another (effect modification). For example, it could be that there is a strong association between two factors at younger ages, but at older ages the association could disappear. Age is modifying the association between the two factors of interest.

Interaction between two different factors can also occur which influence the relationship with another factor. For example, there could be twice the risk of developing a disease for a smoker compared to a non-smoker, and twice the risk of developing the same disease if the person is overweight compared to someone who is within the ‘desirable’ weight category, but for an overweight smoker the risk of developing the disease may be ten times greater than a person who is a non-smoker and not overweight.

Therefore, examining the relationship between two factors is not straightforward. In some cases, a relationship can seem to occur when there is no real relationship present and it is just influenced by a confounding variable. In other cases, a relationship may not seem to be present, but it is being masked by a confounder. Therefore, it is important when assessing the relationship or association between two factors, to consider potential confounding factors. In particular, as mentioned, age, gender and different measures of deprivation are frequent confounders in relation to risk factors and poor health.

This is the reason that a number of the tables and figures present information grouped in some way, for instance the practice groupings classify practices based on the age and deprivation levels of their patients. Thus, the information being presented, whether it be prevalence or hospital admission rates for a particular disease, can be compared within a grouping so similar practices are being compared. Other tables and figures present
age-standardised rates, e.g. inpatient admissions or mortality rates, which standardises the rates to a 'standard' population structure, and as the standard population has a fixed age-gender structure, the rates can be compared taking into account the differences between age and gender.

12.10 Confidence Intervals

A confidence interval (CI), calculated using statistical methods, gives a range of likely values for the parameter of interest. Since one cannot generally survey all people for all years within all geographical areas of interest, it is common practice to obtain necessary data from a sample of the population. However, different samples will result in different estimates for the measure of interest due to natural variation of measurement data (assuming all other influences remain constant). Therefore, it is useful to have a range of values for the measure of interest (e.g. percentage or mean, difference between two means or measure of risk, etc) rather than a single value to get an idea of the range of likely values. The usual CI calculated is the 95% CI, in which we are 95% confident that the interval obtained (from the sample) will contain the true underlying measure of interest (of your population of interest). Having a range of values in which the population statistic/measure lies is much more useful than having a single value. The interval also takes into consideration the number of people on which the estimate is based, so that if there are many people surveyed the interval tends to be narrower (and therefore more useful). The 95% CI for a difference in a percentage or mean between two groups that does not include the value zero (i.e. the percentage or mean is not the same for both groups) will have a p-value less than 0.0511 (see section 12.18 on page 94 on significance testing). If the CI is wide then this suggests uncertainty regarding the underlying statistic.

For example, if the standardised mortality ratio is 140 then it implies there is an increase of 40% in the mortality rate locally compared to that in the standard population (which may be national population). This raises immediate concern. However, if the 95% CI ranges from 50 to 230 then it implies that the true underlying ratio lies between 50 and 230, i.e. half the mortality locally compared to nationally through to more than twice the mortality rate locally compared to that observed nationally. Since this is a wide range, we are less confident in saying that there is an increased mortality rate locally as it could very easily have occurred by natural variation of measurements rather than representing an underlying increase. Whereas if the 95% CI ranged from 132 to 148 then we would be more confident in stating there was a higher mortality rate locally as the lower estimate of the SMR is still more than 30% higher than the mortality rate nationally.

Interpreting confidence intervals is an essential to interpreting statistical and epidemiological data. Interpretation also needs to be considered in relation to clinical significance.

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11 In rare cases this is not the case depending on the way in which the statistical test is undertaken and the assumptions made, however, if it is not true then the p-value will be close to 0.05.
When dealing with small numbers of events (see section 12.11 on page 85), it is very important to consider the implications of this and present and assess the width of CIs to determine how much confidence there is in the estimate presented. If there is too much variability or the numbers are too small, and the confidence intervals are wide, then it is not possible to present any conclusions, and it is possible that findings could be misleading with incorrect assumptions being drawn.

Further information is also given within the presentation mentioned in section 12 on page 77.

12.11 Small Number of Events

When comparing the mortality rates for specific relatively rare cancers, for example, skin cancer, differences in the mortality rates can occur which appear to be large, but are actually only based on a very small number of deaths.

For example, if there are two geographical areas both with populations of 1,200 people and one death in area A giving a standardised mortality rate (see section 12.13 on page 86) of 83 per 100,000 persons and two deaths in the area B giving a mortality rate of 167 per 100,000 persons, then the number of deaths and the mortality rate is twice as high in area B compared to area A. However, if the mortality rates only are compared the difference looks dramatic, but it is misleading as the differences in the total number of deaths is very small, in fact, there is only one extra death in area B. Even if these two areas had exactly the same underlying mortality rate, one would not expect that exactly the same number of deaths to occur every single year in each area; there will be some natural variation over time and between the two areas. So it is reasonable to expect the number of deaths to vary over time in the two areas, and be zero, one or two in these areas for most years. Presenting confidence intervals (CIs) (see section 12.10 on page 84 for more on confidence intervals) are useful in virtually all cases, but CIs are even more useful when there is a problem with small numbers. In this example, one would find that the CIs are wide, and this would indicate that the numbers are too small to provide a good estimate of the underlying statistic. In the above case the 95% confidence intervals are 1 to 464 deaths per 100,000 persons for area A and 19 to 602 deaths per 100,000 persons for area B. This represents a very wide confidence interval, and means that the estimate is not useful (it is likely that one would have guessed that the estimate fell between 1 and 464 deaths per 100,000 persons in area A before any analysis of the data was completed). There is also considerable overlap between the two sets of confidence intervals suggesting that there is no significant difference in the mortality rate between area A and area B (see section 12.18 on page 94 for more on significance testing).

Therefore, even if a mortality rate appears to be substantially higher in one area compared to another, the number of deaths should be considered (and the width of the 95% confidence interval if presented). If the numbers of deaths are relatively small, then the results should be interpreted very cautiously.
12.12 Percentiles, Deciles, Quartiles, Quintiles and Medians

Percentiles divide a distribution of ordered numerical values into groups. The 10th percentile is the value of a numerical variable for which 10% of the values fall below. For example, if from a survey of employees at a particular company the 10th percentile for annual income is £10,000, then this would mean that 10% of the employees for this particular company were earning £10,000 or less (and 90% were earning £10,000 or more). Deciles, quintiles and quartiles are alternative names for specific percentiles. Deciles divide the observations into 10 groups as illustrated in the example above which presents one of these (10%). The quartiles divide the sample or observations into five groups whereas the quintiles divide the observations into four groups. The Index of Multiple Deprivation is frequently divided into quintiles usually based on the national distribution of all the IMD scores across the entire lower layer super output areas (LLSOAs; geographical areas – with a mean of 1,500 residents – on which the IMD scores are calculated). As Hull is much more deprived than England, the IMD scores are often divided into local quintiles for Hull. Thus, the most deprived quintile of areas represents the 20% most deprived areas. The quartiles divide the observations into four groups, and the cut-offs are generally referred to as the lower quartile, median and upper quartile. Thus 25% of all the observations have a value equal to the lower quartile or less, 25% between the lower quartile and the median, etc, and half of the observations have a value of the median or less (or the median or more). The median is frequently used to illustrate the ‘typical’ or ‘middle’ value if the observations have a skewed distribution where there are a small number of observations that have a particularly high value. The mean (arithmetic average) is not the best measure of the ‘typical’ value if the distributions have a skewed distribution as it is influenced by this, whereas the median is not. Income is a good example of a variable that has a skewed distribution. Reporting the mean income does not give a representative figure of the typical income as a small number of individuals will earn substantial incomes which will artificially inflate the mean or average income. So the median income would be a better representation of the typical income. However, in some cases, mean income is a more useful if the total cost is required or needed to be known, as it is possible to calculate the total cost (say total salaries paid) by using the mean and multiplying by the number of people.

12.13 Standardisation

The prevalence of ill-health, risk factors and disease and mortality within a particular population will depend on the age and gender structure of that population (as well as many other factors such as deprivation).

In terms of the provision of resources in relation to the prevalence of ill-health, disease and risk factors in the population, it is most helpful to report on the prevalence without taking into account the age and gender distribution of the population. This is because it is necessary to treat and have the provision to treat the existing population, regardless of the age and gender structure. However, if one wishes to assess whether one
population has an excess rate of disease or if there is a difference in the prevalence of disease among different levels of deprivation, it is necessary to take the age and gender structure into consideration. Otherwise any differences found may be simply due to differences in the age and gender structure of the different populations, and not due to the factor of interest, e.g. deprivation. The age and gender structure can be taken into consideration by using standardisation. Two different methods are used to standardise: direct or indirect standardisation.

Direct standardisation involves applying the age/gender specific rates of disease / prevalence of a risk factor observed in the study (e.g. Hull) population to a ‘standard’ population. For direct standardisation, the ‘standard’ population is generally the 2013 European Standard Population. The resulting directly standardised (mortality) rate (DSR) is frequently given as the number of deaths per 10,000 or 100,000 population.

Indirect standardisation involves applying the age/gender specific rates of disease / prevalence of a risk factor observed in the ‘standard’ population to the study (e.g. Hull) population. For indirect standardisation, the ‘standard’ population is generally England (latest mortality rates). This results in a standardised mortality (or morbidity) ratio with 100 denoting the same mortality (or morbidity) rate as England after adjusting for the differences in the age/gender structure of the local study population and a value of more than 100 denoting increased mortality relative to England (e.g. an SMR of 150 denotes a mortality rate 50% higher than England after adjusting for the age/gender structure of the local population).

Further information, including examples of how to calculate standardised rates, are given in a separate document on www.hullpublichealth.org.

12.14 Impact of Changes to European Standard Population on Directly Standardised Rates

Age standardised rates allow comparison between populations which may contain different proportions of people of different ages. The European Standard Population (ESP) is a widely used artificial population structure for the calculation of directly age standardised rates. The replacement of the ESP first used in 1976 with an updated version published in 2013 resulted in an increase of all-cause mortality rates for England and Wales by 85%, with similar increases seen for Hull. Figures using the 1976 and 2013 ESPs are therefore not comparable. Information about this change in methods can be found on the ONS website at: http://www.ons.gov.uk/ons/about-ons/get-involved/consultations/consultations/implementation-of-the-2013-european-standard-population/index.html. A comparison of directly standardised mortality rates for Hull derived using the 1976 and 2013 European Standard Populations, for a selection of causes of death, is shown in Table 14 for all age DSRs and Table 15 for under 75 DSRs.
Table 14: All age directly age-standardised mortality rates per 100,000 Hull residents 2010-12 using the 1976 and 2013 European Standard Populations, selected causes of death

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Gender</th>
<th>All age directly age-standardised mortality rates per 100,000 Hull residents, using the 1976 and 2013 European Standard Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ESP 1976</td>
</tr>
<tr>
<td>All causes</td>
<td>Men</td>
<td>747.2</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>552.7</td>
</tr>
<tr>
<td>CHD</td>
<td>Men</td>
<td>116.7</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>54.5</td>
</tr>
<tr>
<td>Stroke</td>
<td>Men</td>
<td>46.5</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>35.4</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>Men</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>55.6</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>Men</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>14.8</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Men</td>
<td>24.6</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>21.5</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Men</td>
<td>51.7</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>45.4</td>
</tr>
<tr>
<td>COPD</td>
<td>Men</td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>25.7</td>
</tr>
<tr>
<td>Dementia</td>
<td>Men</td>
<td>14.9</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>6.5</td>
</tr>
</tbody>
</table>
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

Table 15: Under 75 directly age-standardised mortality rates per 100,000 Hull residents 2010-12 using the 1976 and 2013 European Standard Populations, selected causes of death

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Gender</th>
<th>Under 75 directly age-standardised mortality rates per 100,000 Hull residents, using the 1976 and 2013 European Standard Populations</th>
<th>ESP 1976</th>
<th>ESP 2013</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>Men</td>
<td>408.6</td>
<td>549.1</td>
<td>+34.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>280.6</td>
<td>375.0</td>
<td>+33.6</td>
<td></td>
</tr>
<tr>
<td>CHD</td>
<td>Men</td>
<td>66.3</td>
<td>91.2</td>
<td>+37.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>21.3</td>
<td>30.8</td>
<td>+44.6</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>Men</td>
<td>17.7</td>
<td>25.5</td>
<td>+44.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>10.8</td>
<td>15.5</td>
<td>+43.5</td>
<td></td>
</tr>
<tr>
<td>Lung cancer</td>
<td>Men</td>
<td>44.7</td>
<td>66.0</td>
<td>+47.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>42.9</td>
<td>59.8</td>
<td>+39.4</td>
<td></td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>Men</td>
<td>15.5</td>
<td>21.8</td>
<td>+40.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>8.8</td>
<td>12.4</td>
<td>+40.9</td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Women</td>
<td>18.7</td>
<td>24.0</td>
<td>+28.3</td>
<td></td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Men</td>
<td>7.7</td>
<td>11.7</td>
<td>+51.9</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>Men</td>
<td>24.8</td>
<td>38.0</td>
<td>+53.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>21.1</td>
<td>31.7</td>
<td>+50.2</td>
<td></td>
</tr>
<tr>
<td>Dementia</td>
<td>Men</td>
<td>2.3</td>
<td>3.6</td>
<td>+56.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>0.9</td>
<td>1.6</td>
<td>+77.8</td>
<td></td>
</tr>
<tr>
<td>Alcohol related deaths</td>
<td>Men</td>
<td>15.3</td>
<td>17.5</td>
<td>+14.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>6.8</td>
<td>7.3</td>
<td>+7.4</td>
<td></td>
</tr>
</tbody>
</table>

12.15  **Life Expectancy**

Life expectancy at birth is a commonly used method of assessing health, improvements in health over time, and differences in health between different groups (defined on the basis of geography, deprivation, social class, smoking status, etc). A common misconception is that life expectancy at birth measures the expected or average duration of life of a newborn; it does not. It is a measure of life expectancy assuming that the current age-specific mortality rates continue throughout an entire lifetime. This is an unrealistic assumption as mortality rates are likely to change over time. The current mortality rates at each age group are used in the calculation of life expectancy at birth for a newborn infant, but the mortality rates will not be the same as the mortality rates in future (for example, in 50 years’ time when that person is 50 years of age). Advances in healthcare, changes in political and social circumstances, changes in the prevalence of risk factors and changes in diseases and medical conditions (such as acquired immunodeficiency syndrome (AIDS), bird ‘flu, diseases resistant to antibiotics,
etc) and many other factors which influence health and life expectancy cannot be anticipated, so it is not possible to predict mortality rates for each age group in the future. Therefore, life expectancy at birth (despite its name) is more generally a measure of current health rather than an expectation of life (i.e. predicting how long an infant will live).

Life expectancy at birth is frequently used, but it is possible to calculate life expectancy at any age. For example, life expectancy at age 65 years could be calculated. This will tend to be closer to the true or actual duration of life than life expectancy at birth would be for a newborn. This is because trends in mortality rates will tend to be reasonably gradual, so that the current rates of mortality (on which life expectancy calculation is based) might be a reasonable prediction of mortality rates in the next 20 years or so (but not of the next 80 years or so, which is the assumption required for life expectancy at birth).

Healthy life expectancy can also be estimated. This is a modelled estimate of the average number of years a person would expect to live in good health based on current mortality rates and prevalence of self-reported good health. See section 4 on page 22 for more about modelled data and synthetic estimates. Good health is based on the response to the question "How is your health in general; would you say it was very good, good, fair, bad or very bad?". The responses “very good” and “good” being categorised as “good health”. As this also based on current age-specific mortality rates, it cannot be used as a prediction of the healthy life expectancy of a newborn.

Life expectancy at birth is calculated for an arbitrary 100,000 males or females and is the average of how long they will live based on current age-specific mortality rates (in the calculations for Hull the mortality rate was obtained directly from local mortality and population data files).

**Example calculation**

Life expectancy calculations commence with an arbitrary 100,000 population at birth for an area. The mortality rate at that age / age group is applied to the population (eg a mortality rate of 5 deaths per 1,000 live births at one year would equate to 500 deaths in our arbitrary 100,000 population at one year – therefore 500 would die in their first year of life).

This would leave 99,500 aged one year who contribute in total 99,500 years to the life expectancy total (i.e. 99,500 people alive for 1 year = 99,500 x 1).

Applying the mortality rate to these 99,500 people in subsequent years (eg 40 deaths per 100,000 in second year) would mean, on average, 40 would die within their second year of life. Their contribution for this year would be approximately half a year (20 years in total) and the 99,460 who survive their second year would contribute a whole year –

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12 Many of the infants who die within their first year of life die within the first seven days of life, therefore, most will contribute only a short period of time.
Therefore 99,480 years would be contributed in total in the second year (i.e. 99,460 people alive in year 2 + 20 years of total life for the 40 who died in year 2 = 99,480).

In most cases the calculation is undertaken for grouped ages (5-year age bands, e.g. 0, 1-4, 5-9, 10-14, 15-19, ..., 85+). The ‘contributions’ at each age group are summed and divided by 100,000 (the starting number of individuals) to obtain the average life expectancy at birth over these arbitrary 100,000 individuals.

12.16 Occurrence Versus Registration of Deaths

Deaths and mortality rates produced by the NHS Information Centre Indicator Portal are based on year of registration of the death rather than year of death. The Public Health Mortality File (PHMF) obtained from the Office for National Statistics (ONS) by Public Health Sciences prior to 2007, for each calendar year, was based on the year in which the death occurred. That is, the 2006 PHMF included deaths which occurred during 2006. This information was used in Release 1 of the Public Health Profiles for Hull. ONS no longer produces this information based on year of death, but on year of registration of the death. Public Health Sciences preferred using the ‘occurrence’ file based on year of death as this was not influenced by delays in registering the death. However, as this file is no longer available, Public Health Sciences has since analysed the ‘registration’ file based on year of registration of the death. This change will affect the comparability of information between Release 1 (which used the ‘occurrence’ file) subsequent releases and updates (which use the ‘registration’ file). The historic files (for deaths registered during 1996 to 2006) were obtained from ONS so that analyses in this profile and future analyses could be based on year of registration of the death. The information produced will be more consistent with the nationally produced information on the NHS Information Centre Indicator Portal. However, it could be biased if there are delays in the registration process for some reason. It is extremely unlikely that there would be delays for most deaths, but there could be delays in deaths which involve a Coroner’s Inquest if there is a delay in the inquests, perhaps due to staffing problems at the Coroner’s office.

Deaths should be registered within five days of the death. However, delays can occur if the death needs to be investigated by the local coroner. In these cases, which involve unexplained or suspicious deaths including suicides, the registration date of the death can be several months after the date of the death, as it is necessary to have an official cause of death prior to registering a death. As most deaths are registered within a week, for the majority of deaths, the year of the death and the year of the registration of the death will be within the same calendar year. The deaths which occur within the last few days of one calendar year could well be registered during the next calendar year. So the ‘registration’ file, in relation to the ‘occurrence’ file, will include ‘extra’ deaths which occurred during December of the previous year which were registered at the beginning of January, and ‘exclude’ deaths which occurred during December which were registered in January in the next year’s registration file. Furthermore, the registration file will include deaths from the previous year(s) which were subject to registration delays predominantly those which involved Coroner’s Inquests. For
example, the majority of suicide and undetermined injury deaths are registered within nine months of the actual date of the death, but for some deaths the delay could be longer. Therefore, by analysing deaths based on year of registration, particular causes of death will be influenced to a greater extent; deaths which involved a Coroner’s Inquest. Table 16 shows the difference between year of death and year of registration. For example, a small number of the total deaths registered during the year 2010 occurred during 2008 and 63 occurred during 2009 (* = less than 3 deaths).

Table 16: Difference between year of death and year of registration: all deaths

<table>
<thead>
<tr>
<th>Year of death</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>76</td>
<td>4</td>
<td>*</td>
<td>0</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>2,487</td>
<td>69</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>2,555</td>
<td>89</td>
<td>6</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>2,636</td>
<td>90</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>2,440</td>
<td>108</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>2,450</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>2006</td>
<td>2,513</td>
<td>65</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>2,246</td>
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</tbody>
</table>

As mentioned, the cause of death will influence the difference between the date of death and the date of the registration of the death, with suicide and undetermined injury deaths having a longer delay as a Coroner’s Inquest will be required. Other causes of death will also result in delays, but Table 17 gives the delay for just suicide and undetermined injury, so it is possible to get an idea of the effect of the difference in registration delay. Asterisks replace the actual number of deaths if the number is three or fewer, and cannot be reported due to confidentiality reasons. It can be seen that the delay is quite variable. The reason for this is not known. It could be associated with the end of the year, particularly if early Winter or Christmas resulted in more unexplained deaths which could well be the case, as it is more likely that these deaths will be registered the following calendar year. It is possible that there could be staffing issues within the Coroner’s office which could delay inquest and subsequent delay in registration. There will also be random variation in the number and complexity of the deaths which could delay registration compared to a year which has fewer deaths or where causes of death are more straightforward to determine.
Table 17: Difference between year of death and year of registration: suicide and undetermined injury deaths

<table>
<thead>
<tr>
<th>Year of death</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>1999</td>
<td>*</td>
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<td>0</td>
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<tr>
<td>2010</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

12.17 Moving Average

A moving average is an average or mean value over a number of years, with the years 'moving' over time. A three-year moving average is very common (where the value presented is the mean value over three years). A moving average is very useful in summarising data where the number of events are small on an annual basis and there are potentially large fluctuations in the rate of events. Calculating the moving average smooths out the fluctuations and makes interpretation easier so that the overall trend can be better seen. For instance, if we had the mortality rate for each of the eleven years from 1994 to 2004 and the annual number of deaths is small resulting in large fluctuations over the years, then it would be better to calculate and present nine three-year moving averages rather than the mortality rates for the individual years. The first three-year moving average mortality rate would be the mean or average mortality rate for the years 1994, 1995 and 1996. The second three-year moving average value would be the mean mortality rate for 1995, 1996 and 1997, and so on, with the final three-year moving average being the mean mortality rate for the years 2002, 2003 and 2004.

Nevertheless, this does not guarantee a smooth 'trend' line. For women in Hull, there was a particularly high number of deaths in 1998 and a particularly low number in 2001. As these were three years apart, this dramatically influenced the life expectancy trend in Hull for women over time (there was also a slight increase in 2004). Life expectancy increased dramatically between 1998-2000 and 1999-2001 as the high mortality rate year (1998) was removed and the low mortality rate (2001) was added.
12.18 Significance Testing

It is often useful to compare a particular summary parameter (for instance, mean, median, measure of risk) among different groups. Since there is natural variation associated with virtually all measurements and since we generally only have a sample and have not measured the entire population\(^{13}\), it is necessary to distinguish between differences which are close enough together to be explained by chance and differences which are ‘unlikely’ to be explained by chance. Such a comparison can be undertaken using a statistical test which takes into the account chance variation. When undertaking a statistical test, we assume that there is no difference in the summary measure among the groups and then calculate the probability of obtaining the difference we observe in our sample (i.e. in the data we have). If the calculated probability, or so-called p-value, is small then this means that there is a small chance of obtaining such a result under the assumption that there is no difference. Therefore, if the probability is small enough (generally, less than one in twenty or less than 0.05) then we assume that the original assumption must be incorrect and that there really is a difference. Since this is based on probabilities and assumptions, just because a small p-value is observed, it does not necessarily mean that the original assumption of no difference between the groups is untrue. However, clearly the smaller the p-value, the more likely it is that the original assumption is untrue. Similarly, just because you obtain a large p-value and therefore have no evidence to reject the original assumption, it does not mean that it is actually true, it could be that there is simply insufficient evidence to show otherwise (for example, a small number of people or small number of people with a particular event). If a small p-value is obtained (p<0.05) then the difference is deemed ‘statistically significant’. However, this does not necessarily mean that the result is important clinically. It is possible that 50% of those living in one area report poor health compared to another area whose residents report 45%. If the number of people involved in the survey was sufficiently large, it is possible to obtain a statistically significant difference between these areas. However, from a medical point of view it may be considered not very important and the fact that both areas report high levels of poor health may be more important.

One such statistical test or significance test is the $\chi^2$ test which compares the percentages between different groups (with the original assumption that the percentages are the same for all groups). The $\chi^2$ test for trend compares the percentages across different groups with ordered categories, such as deprivation, and assesses whether there is an increasing or decreasing trend in the percentages across the ordered categories. McNemar’s test can be used to compare paired percentages. Paired data occurs when responses from the same individual are compared; paired analyses generally occur when the aim is to compare changes over time (this method has been used in the evaluation of Community Physical Activity Survey in the JSNA Toolkit Release 4 report).

\(^{13}\) Even when data from a population is known, for example, the total number of deaths within a specific geographical area over a specific period of time, there will still be year-on-year random variation and variability in the number of deaths, so significance testing can be undertaken. There will be random factors which will influence the number of deaths such as the weather, accidents, ‘flu epidemics, etc.
Another test is the t-test which compares the mean or average of a parameter between two different groups, such as between men and women. A paired test is used when the groups being compared are related to each other, for example, when changes are being compared among the same people over time (these methods have been used in the paired analysis of the child obesity data in the JSNA Toolkit Release 4 report).

12.19 Variation

Assessing the degree of variation is fundamental to statistics, and a real example of variation of the height of children has been discussed in the presentation which gives a brief introduction to statistics, variation, confidence intervals, and the problem of small numbers (see section 12 on page 77 for more on this presentation).

13 CONDUCTING RESEARCH / CRITICAL APPRAISAL

Conducted research and evaluating (the success of) projects is complex and not necessarily straightforward. Further advice can be sought from the Public Health Sciences team about conducted research and evaluation.

Public Health Sciences participated in a teaching component on critical appraisal in a course organised by the CCG and the University of Hull on critical appraisal. A copy of the slides are available at www.hullpublichealth.org which include some information on survey design which is necessary to interpret and critically appraise journal articles and research conducted by others, but also provides details of issues that need to be considered when conducted research. The presentation includes information on the types of surveys, randomisation, blinding, controls, confounding, bias, confidence intervals, p-values, etc.
**APPENDIX**

### 14.1 Underlying Data for Figures

**Practice groupings**

The underlying data for **Figure 1** and **Figure 2** is given in **Table 3**.

**Defining overweight and obesity in children**

There is quite a lot of data presented in **Figure 3**, so it is not given here. The z-scores (used to calculate overweight and obesity) are calculated using the ‘LMS Growth’ add-in macro for Excel (Harlow Healthcare 2011), which uses the 1990 reference curves. Age-specific centiles can then be calculated for BMI, and BMI classifications are based on these centiles. Underweight was defined as a BMI ≤ 2\textsuperscript{nd} centile, healthy weight as a BMI > 2\textsuperscript{nd} centile but < 85\textsuperscript{th} centile, overweight as a BMI ≥ 85\textsuperscript{th} centile but < 95\textsuperscript{th} centile, and obese as a BMI ≥ 95\textsuperscript{th} centile (Association of Public Health Observatories and Information Centre for Health and Social Care 2011). Further information is available on request.
15 REFERENCES


Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org


Further information, including the Interactive Hull Atlas, is available at [www.hullpublichealth.org](http://www.hullpublichealth.org)


### Index

10-year risk of cardiovascular event... 66
Abbreviations................................. 9
Abortion rate................................. 76
Alcohol........................................... 60, 70
Allocation of resources...................... 73
Appendix......................................... 96
Appraisal of research......................... 95
Asset approach................................. 15
Association...................................... 81
Attitudes to health
  findings........................................ 30
Behavioural risk factors...................... 74
Benchmarking
  general practices........................... 45
Bias............................................... 81
Blinding......................................... 95
BME
  health and lifestyle survey.............. 24
Body mass index.............................. 58, 71
Case control study............................ 95
Causality....................................... 81
CCG............................................. 14
Census.......................................... 79
Changes to mortality rates.................. 87
Clinical commissioning group.............. 14
Clinical significance....................... 84, 94
Commissioning of services............... 14
Comparator areas............................. 11
  more information........................ 96
Conducting surveys.......................... 95
Confidence intervals....................... 84
Confounding................................... 83
Contents page.................................. 3
Controls........................................ 95
Critical appraisal............................ 95
Data sources.................................. 10, 19
Data underlying figures.................... 96
Daycases...... See Inpatient admissions
Deaths
  occurrence versus registration......... 91
Deciles......................................... 86
Definitions..................................... 58
  10-year risk of cardiovascular event 66
  alcohol...................................... 60, 70
  cause of death.............................. 68
  exercise...................................... 62
  ICD........................................... 68
  obesity...................................... 58, 71
  surgical codes............................ 71
  Delay in registering deaths............. 91
  Deprivation.................................. 10
  IMD........................................... 10
  Index of multiple deprivation......... 10
  Design
    research................................... 95
  Direct standardisation................... 86, 87
  Directly standardised mortality rate...
    ........................................... See DSR
  Disease registers......................... See QOF
  DSR.......................................... 86, 87
  Effect modification....................... 83
  Epidemiology............................... 77, 78
  Equity audit................................ 15
  ESP........................................... 87
  European Standard Population.......... 87
  Evaluation.................................. 95
  Evidence based research.................. 95
  Exercise..................................... 62
  Explanation of terminology.............. 71, 77
  Explanation of terms..................... 58
  Fertility rate.............................. 76
  Figures
    underlying data.......................... 96
  General practice
    benchmarking.............................. 45
    groupings.................................. 45
  Generalising findings................... 77
  Gold standard research.................. 95
  GP disease registers..................... See QOF
  Grouping of general practices.......... 45
  Gypsy and Travellers
    health and lifestyle survey............ 24
  Health and lifestyle surveys.......... 24
  Health and Wellbeing Boards........... 14
  Health equity audit....................... See Equity audit
  Health intelligence...................... 14
  Health needs assessment................. 14
  Health scores.............................. 72, 75
Further information, including the Interactive Hull Atlas, is available at www.hullpublichealth.org

Health terminology ........................................... 71
Health utility index ........................................ 72
Healthy life expectancy ................................... 89
Hospital episode statistics .............................. 42
ICD ............................................................. 68
IMD .............................................................. 72
differences in mortality .................................... See Deprivation
prevalence ....................................................... See Deprivation
risk factors ..................................................... See Deprivation
lower layer super output level ....................... 10
national ranks ............................................... 10
quintiles ......................................................... 10
Incidence ......................................................... 78
Index of multiple deprivation ........................ See IMD
Indicators ......................................................... 12, 52
Indirect standardisation .................................. 86
Inpatient admissions ..................................... 42
Intelligence ....................................................... 14
Interaction ........................................................ 83
International classification of diseases .......... 68
Introduction ....................................................... 8
JSNA ............................................................. 14
JSNA Toolkit ..................................................... 8
Knowledge ....................................................... 14
Life expectancy ................................................. 89
Lifestyle risk factors ......................................... 74
LLSOAs .......................................................... 10
Local surveys .................................................. 24
Marginal analysis ............................................. 73
Marmot ............................................................ 15
Measures of health .......................................... 72, 75
Median .............................................................. 86
Modelled estimates .......................................... 22
Modelling ........................................................ 95
Mortality changes due to European Standard
Population ....................................................... 87
occurrence versus registration ..................... 91
Moving average ................................................. 93
New cases of disease ....................................... 78
Obesity ............................................................ 58, 71
ONS population estimates .......................... 79
Outcome measures .......................................... 12, 52
Overweight ......................................................... See Obesity
Patient population .......................................... 79
PBMA .............................................................. 73
Percentiles ......................................................... 86
Performance targets ........................................ 52
PHOF ........................................................... 12, 52
local analysis ................................................... 53
national profile ............................................... 53
tartan rug ........................................................ 53
Population ......................................................... 77, 79
Prevalence ......................................................... 79
Prevalence registers ...................................... See QOF
Procedure codes and surgical operations .......... 71
Programme budgeting ..................................... 73
Public Health Outcomes Framework ............
................................................................. See PHOF
P-values ............................................................ 94
QMAS ............................................................. 43
QOF ............................................................... 43, Also see Prevalence
problems with comparing GPs ...................... 43
Qualitative research .......................................... 30
findings ........................................................... 30
Quality and outcomes framework ...............
................................................................. See QOF
Quartiles ........................................................... 86
Questionnaire measures of health
HUI scores ....................................................... 72
Questionnaire design ......................................... 95
Quintiles ............................................................ 86
Randomisation .................................................. 95
Randomised controlled trial ......................... 95
RCT ................................................................. 95
References ......................................................... 97
Reflector groups findings ................................... 30
Registered population ..................................... 79
Registration of deaths ..................................... 91
Research .......................................................... 95
design ............................................................. 95
Resident population ........................................ 79
Resources and allocation .................................. 73
Risk factors ....................................................... 74
Risk of cardiovascular event ......................... 66
Sample ............................................................. 77
SF36 ............................................................... 75
SF8 ................................................................. 75
Short Form ......................................................... 75
Significance ......................................................... 84, 94
Significance testing .......................................................... 94
Small numbers ................................................................. 85
   problem explained .......................................................... 85
SMR ................................................................. 86
Social capital
   local surveys ................................................................. 41
Social marketing ............................................................... 30
Social marketing research .................................................. 41
Standardisation ............................................................... 86, 87
   change in European Standard Population ......................... 87
Standardised mortality ratio .............................................. See SMR
Statistics ................................................................. 77
   problem of small numbers explained .................................. 85
Summary ................................................................. 6
Surgical operations and procedure codes ................................ 71
Surveys ................................................................. 95
   5-A-DAY ................................................................. 41
   health and lifestyle surveys ............................................ 24
   local ................................................................. 24
   qualitative research ..................................................... 30
   social capital surveys .................................................. 41
   social marketing research .............................................. 30, 41
   types of surveys .......................................................... 95
   Synthetic estimates ...................................................... 22
   Targets ................................................................. 52
   Tartan rug ................................................................. 53
   Technical information ................................................. 58, 71, 77
   Ten year risk of cardiovascular event .................................. 66
   Testing significance ..................................................... 94
   Three year period data ..................................................... 93
   Toolkit ................................................................. 8
   Total period abortion rate .............................................. 76
   Total period fertility rate ............................................... 76
   TPAR ................................................................. 76
   TPFR ................................................................. 76
   Uncertainty ............................................................. 95
   problem of small numbers explained .................................. 85
   Underlying data for figures ............................................. 96
   Undertaking research ..................................................... 95
   Uses of this report .......................................................... 13
   Variability
      and small numbers ..................................................... 85
   Variation ............................................................. 95
   Veterans
      health and lifestyle survey ............................................ 24
   Young people
      health and lifestyle survey ............................................ 24