# Plain English Summary

#### Word limit: 600

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Most people in the UK do not eat a healthy diet. Eating unhealthily causes illness such as heart disease, diabetes, obesity and certain types of cancer. In fact, eating unhealthily is the second biggest cause of ill health in the UK (smoking is the first). Illness resulting from eating unhealthily is unfairly distributed: for example, people with less money tend to eat less well and suffer more illness as a result.

Current attempts to improve diets in the UK typically focus on providing people with information about which foods to eat and which to avoid. The problem with this approach is that people with less money (or time, or energy) tend to be less able to act on this advice, leading to bigger differences in diet and illness between those who are well off and those who have few resources. (Some new policies, such as the sugar tax, require less effort from people and might end up being fairer as a result).

This research will find people who eat well, despite circumstances that would normally lead them to eat poorly, such as being in poverty or not living near shops selling healthy food. It takes the approach that these people have something to teach us, and that what we learn from them would be useful to people designing policies to improve diets in the UK. While carrying out the research I will work for 1 day a week in the government department responsible for designing these policies, so my research stands a good chance of being used.

This research will use different methods to answer different questions.

Firstly, I will use statistics to analyse the results of the UK’s National Diet and Nutrition Survey. The aim is to identify people who eat well despite difficult circumstances and work out what things tend to help these people eat healthily (e.g. having someone who cooks in the house).

Secondly, I will go and talk to people who eat well despite difficult circumstances, to understand how they do this. I’ll ask people to write down what they eat and take photos of things related to their diet. I’ll interview them and then accompany them ‘out-and-about’, for example on a shopping trip, or when preparing food with friends.

Thirdly, I will look at the scientific literature describing things people have tried to help people eat better. By doing this in a systematic way, I will identify ways of improving diet that are proven to work and that reduce, rather than increase, the gap between rich and poor people.

Finally, I will attempt to bring all this learning together and, with the help of colleagues at the Design Council, work with people in government to design better policies to improve diets.

I will ask members of the public be part of the annual meetings that help shape and direct the research and to help develop infographics that communicate the findings of the research in interesting and visually appealing ways. I will ask one person to help me present my findings at a national conference. Finally, I will work with people who have taken part in the research (supported by experts in art and design) to produce an end-of-project exhibition.

The findings of my research will be published in academic journals. Infographics will be made available online and publicised through social media and newspapers. The end of project exhibition will help publicise the research and its main findings. Finally, I will work closely with policy makers throughout the project, to understand how they make policy and to find ways of improving that process.

# Scientific Abstract

#### Word limit: 500 words

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### Background

Inadequate nutrition resulting from poor diet is the second biggest modifiable risk factor for disease in the UK, causing about 10% of morbidity and mortality. Despite a raft of diet-related policies in the UK, poor diets remain endemic across all social classes, with a greater burden falling on disadvantaged groups.

Traditional methods to address dietary ill health focus on remedying deficits, i.e. are pathogenic. Salutogenic (supportive of health) approaches offer a fresh method capable of empowering disadvantaged groups and revitalising policy makers. There is little research into ‘discordant’ individuals and groups in the UK (who manage to eat a high-quality diet despite adverse circumstances) and no systematic review of effective, population-level interventions to improve diet. This research programme aims to fill that gap with the ultimate aim of developing policies that would support primary prevention of ill health through population-wide dietary improvements.

### Aim

To generate scientific evidence to inform policies that can achieve equitable improvements in UK diets thus reducing diet-related ill health.

## Plan of Investigation

A mixed-methods programme of research to:

1. Identify ‘discordant’ individuals and groups who eat high quality diets despite adverse circumstances (and variables associated with this discordance) (WP1)
2. Qualitatively investigate the food practices of these ‘discordant’ groups and individuals (WP2)
3. Identify, characterise and describe the effect sizes of the range of effective, equitable, scalable population interventions to improve diet (WP3)
4. An innovative, design-led package, to identify original policy approaches to improve diets by supporting salutogenic dietary behaviours (WP4)

### Methods

#### WP1: Identifying Discordant Individuals

Analysis of pooled, cross-sectional UK National Diet and Nutrition Survey data (2008/9-2013/14) to identify discordant individuals and individual, household and environmental variables associated with this discordance. Food environment and urbanity/rurality scores to be generated using Geographical Information Systems (GIS).

#### WP2: Investigating Discordant (high-quality diet) practices

Qualitative, multiple-methods investigation of a purposive sample of discordant individuals using informal (written and photo) food diaries, semi-structured interviews (with questions partly derived from WP1 and food diaries) and ‘Go-Alongs’ (an interview conducted ‘out-and-about, for example a shopping trip).

#### WP3: Systematic Review of Reviews of Equitable, Population-level Interventions to Improve Diets

An overwhelming volume of primary material and many hundreds of systematic reviews necessitates a systematic review of reviews, based on Cochrane guidelines and PRIMSA checklists. The aim is to identify equitable (low-agency), effective interventions that could improve UK diet and support salutogenic dietary behaviour.

#### WP4: Innovative Policy Responses

A design-led work package to synthesise findings from WPs1-3 and identify novel policy responses to support positive dietary behaviour in the UK (and so improve health).

### Anticipated impact and dissemination

My clinical placement in Public Health England’s Diet and Obesity team for the duration of the fellowship offer an exceptional opportunity to translate research into policy. In addition, an ambitious programme of public engagement will translate research findings into data visualisations and an end-of-project exhibition that will engage the public in efforts to improve how we eat.

#### Sections 1-9, word limit: 5,000 words

#### Current words: 4,981

# 1. What is the problem being addressed?

Inadequate nutrition resulting from poor diet is the second biggest modifiable risk factor for disease in the UK,1 causing 10% of morbidity and mortality.2 Poor diet is the primary modifiable risk factor for CVD and diabetes and an important risk for cancer and obesity.3-6 Diet-related ill health costs the NHS £6 billion/year.7 Treating (rather than preventing) diet-related ill health is expensive, frequently invasive and often ineffective.7, 8 People from deprived areas and from socio-economically disadvantaged backgrounds have poorer diets and suffer a greater burden of disease.9, 10 There is therefore a financial, human and social-justice case for improved prevention of diet-related disease in the UK.

Attempts to address diet-related health inequalities typically take a ‘deficits’ approach, focussing on factors associated with poor outcomes; this ‘pathogenic’ approach can disempower disadvantaged groups.9, 11, 12 Salutogenic (i.e. supportive of health) approaches, on the other hand, are consistent with WHO health promotion principles and are regaining currency in UK public health practice.13-16 Such asset-based methods can empower groups and individuals, and revitalise policy makers seeking to reduce health inequalities.12

There is a lack of research into ‘discordant’ individuals or groups who manage to eat well, despite adverse individual, household or environmental circumstances. Studying such individuals or groups may offer vital insights for the promotion of healthy diets in the UK. One way of framing such discordance is resilience, i.e. “the capacity to maintain good health in the face of significant adversity”.17 There is a striking lack of qualitative public health research into resilience and only one study (in Australia) that explicitly examines dietary resilience18, 19 There is certainly no systematic exploration of individuals or groups from populations subject to dietary inequalities in the UK today who contrive to eat healthily, with a view to translating these findings into workable policies to support positive, equitable population shifts in diet. This proposal aims to fill this gap.

# 2. Why is this research important in terms of improving the health and/or wellbeing of the public and/or to patients and health and care services?

This study aims to improve primary prevention of diet-related illness through the application of interventions delivered to the whole population, an approach known as the Rose hypothesis.20

Although the UK has a range of both established and newer policies aimed at improving diets, 21-26 the average intake of, for example, fruit and vegetables has not improved since 2008 and inequalities in diet remain entrenched.27, 28 Positive, equitable shifts in the population distribution of healthy diets thus remain elusive, making the current, substantial burden of poor diet and associated obesity and chronic diseases an urgent public health priority, especially for those in disadvantaged circumstances.

If funded, this proposal will provide a sound scientific evidence base for rethinking dietary policy making in the UK. Taking a salutogenic approach, it will identify those factors and behaviours associated with healthy diets in groups who would otherwise be expected to eat poorly (referred to throughout as ‘discordance’). It will identify (via a systematic review of reviews) the effective, affordable, equitable interventions that could achieve population-wide improvements in diet, noting those that support this salutogenic approach. It will also generate novel ideas for policy, rooted in the rigorous science of these work packages.

My proposed clinical placement for the duration of the fellowship is with Public Health England’s Diet and Obesity Team, the body responsible for developing national policy around diet. Through ongoing dialogue and interaction with PHE staff as well as a formal work package to engage policy makers, it is reasonable to expect that improvements to policy could be achieved during the lifetime of the fellowship, thus resulting in benefit to the UK population within 5 years. As the Rose hypothesis suggests, even modest improvements to diet at an individual level will have a significant impact on the UK’s population health.

3. Review of existing evidence

## Identifying and studying individuals and communities with resilient food practices to inform policy

Traditional public health research tends to focus on ‘deficits’, factors whose presence or absence has a deleterious effect on health. This approach has played a vital role in multiple areas, identifying key drivers of poor health and inequalities in their distribution.9, 10, 29 Attempts to turn that understanding into effective policies to improve diets have proved less successful, with the burden of diet-related disease rising worldwide30 and remaining entrenched in the UK.27

An assets-based approach has been suggested as a way of shifting this paradigm and revitalising policy makers.12 The concept of resilience is one way of framing this assets-based approach. Resilience can be defined as, “the capacity to maintain good health in the face of significant adversity”.17 Quantitative approaches have shown that poorer areas tend to have more adverse food environments and that these adverse environments can negatively affect health.31, 32 Very little qualitative research has been done, however, on how individuals and groups enact resilience in the face of adversity, with no studies at all investigating resilience to adverse food environments in the UK.33 This study aims to fill that gap, generating an evidence base rooted in the positive practices of ‘discordant’ individuals and groups who eat well despite adverse circumstances.

## Dietary Interventions

There is a huge body of primary literature concerned with improving diets, and many hundreds of systematic reviews of interventions. There is, however, no systematic review of these reviews, aimed at identifying interventions compatible with primary prevention of ill health through equitable population-level interventions. This review would equip policy makers with a suite of tools for developing policy, particularly when combined with insights into factors promoting good diets in the UK. With this in mind a scoping review of systematic reviews (of interventions to improve diet) has been initiated, which will form the basis for work package (WP) 3.

## Summary

This study aims to address the lack of research into how people manage to eat well in adverse circumstances and the lack of evidence synthesis of the huge dietary literature with a view to identifying equitable interventions for primary prevention of ill health, deliverable to whole populations. The combination of these bodies of evidence will help to determine novel approaches to dietary health policy.

4. What is the research question / aims and objectives?

## Title:

Mixed-methods research to generate evidence for equitable improvements to UK dietary patterns: a salutogenic approach.

## Aim:

To generate scientific evidence to inform policies that can improve dietary patterns in UK in children and adults, and thus reduce the incidence of diet-related diseases as well as inequalities in their distribution.

## Objectives

1. Identify and quantify factors associated with ‘discordant’ individuals and groups who eat high-quality diets despite adverse circumstances in the UK
2. Qualitatively investigate the food practices of these ‘discordant’ groups and individuals
3. Identify, characterise and describe the effect sizes of the range of effective, affordable, equitable, scalable population interventions to improve diet.
4. Develop, with reference to the above findings and a cross-disciplinary panel of experts, innovative policy responses to achieve a positive, equitable population shift in dietary pattern scores.

# 5. Project Plan

## Overall design

This mixed-methods programme will combine epidemiology, geographical information systems (GIS) techniques, evidence synthesis and qualitative research methods to produce a body of research that is of direct relevance to policy makers working to improve UK diets. It is an ambitious programme of study supported by experienced academics and clinicians that will provide a grounding in a wide range of contemporary public health research skills, thus preparing me for a future career as a clinical academic.

Four work packages (WPs) will address the objectives listed above. This academic work will be complemented by my clinical placement in Public Health England’s (PHE) Diet & Obesity team. My public health (‘clinical’) role during the fellowship offers an outstanding opportunity to develop a detailed understanding of the policy process and to forge relationships with those involved in enacting these policies at a national level. This fellowship application therefore offers a unique opportunity to bridge the gap between evidence and policy.

**WP1:** Analyse National Diet and Nutrition Survey (NDNS) data using statistical and geographical information systems (GIS) techniques to identify factors associated with discordant (i.e. healthy) diets in the UK

**WP2:** Use qualitative methods to identify resilient circumstances and food practices of ‘discordant’ healthy eaters

**WP3:** Undertake a systematic ‘Review of Reviews’ of scalable, equitable, affordable population-level interventions to improve diet, relevant to the UK context

**WP4:** Use a range of techniques to identify potential, innovative policies to improve UK dietary patterns, drawing on the findings from WPs 1-3.

### Work Package 1: Identifying variables associated with being a discordant healthy eater in the NDNS sample

#### Aim

Identify individual, household and environmental factors associated with discordant (healthy) food practices using pooled annual cross-sectional UK National Diet and Nutrition Survey (NDNS) data (currently 2008/9 to 2014/15)

#### Research questions

1. What are the variables associated, on average, with healthy dietary patterns (high Mediterranean Diet (MD score) at the individual, household and environmental level?
2. How do ‘discordant’ individuals with high MD scores in groups who otherwise have poor diet differ from their peers?
3. What are the variables associated with dietary discordance?

#### Study Design

Pooled, cross-sectional data from NDNS.

#### Methods:

##### Analysis

The aim is to determine individual, household and environmental factors associated with high MD score and discordance (defined below). Analyses will be performed using STATA v15 and . ArcGIS Desktop. The MRC Epidemiology Unit (my academic base for the fellowship) hosts the NDNS, facilitating access to data and support from the NDNS scientific team.

###### Step 1: Deriving MD score

Dietary data will be used to derive a MD score, adapting existing methods.34,35-37 In general, points are awarded for consumption above sex-specific medians of healthy foods (e.g. fruit, vegetables, whole grains) and consumption below sex-specific medians for unhealthy foods (e.g. red meat).38 An absolute cut off to define high-quality diet will be defined (e.g. ≥6 out of 8). If this results in too few individuals for analysis, a relative cut off will be defined.

###### Step 2: Defining independent variables

Personal, household and environmental characteristics associated with dietary scores will be specified *a priori*. Food environment and urbanity/rurality scores will be derived using Food Standards Agency (FSA) food premises data (adapting an existing methodology) and the 2011 census Rural Urban classification32,39

###### Step 3: Variables Associated with MD Scores

Simple (i.e. unadjusted) linear regression models will be used to estimate and test the association between each of the pre-specified characteristics and MD score. Independent variables with statistically significant (at the 5% level) associations with MD score will be included in 3 multiple linear regression models for individual, household and environmental variables. All models will use robust standard errors to account for clustering of participants who live at the same address. The final output will be the identification of those personal, household and environmental variables associated with MD score.

###### Step 4: Discordance with respect to specific variables

For each variable identified in step 3, individuals will be defined as either discordant (if their MD score is greater than the pre-specified cut-off) or not discordant (if their MD score is less than or equal to the cut-off). I will use logistic regression (with robust standard errors) to identify factors associated with discordance for each variable.

###### Step 5: Overall discordance

Consultation with CEDAR’s lead statistician suggested assigning individuals a discordance score, with one point awarded for being discordant with respect to each of the variables from steps 3 and 4 (e.g. sex, deprivation, food environment), as a way of identifying variables associated with overall discordance, using linear regression.

#### Sampling strategy:

The NDNS obtains an annual representative sample of the UK population by randomly sampling 3,300 addresses from UK Postcode Address File data. Response rate is 53%27. Children and residents of Wales and Northern Ireland are oversampled, to ensure sufficient numbers for analysis.23 The pooled sample size from years 1-8 (2008/9 to 2012/13) was 12,097 individuals.27, 28, 40

#### Biases & Limitations

Producers of the NDNS reports correct for biases arising from non-response and over sampling using various weighting factors.23 Dietary questionnaires are subject to differential and non-differential error.41 Previous NDNS surveys have identified systematic under-reporting of energy intake, varying by age and sex.42 Nonetheless, the NDNS survey is the most authoritative source of dietary data in the UK.43 Combining data from multiple years may limit the study, as factors determining discordance may change over time. The sample size is relatively sparsely distributed across the UK. Therefore the power to identify spatial clustering of discordance is likely to be limited.

### Work Package 2: Qualitative study of the ‘resilient’ food practices of discordant individuals

#### Aim:

To explore food practices of discordant individuals, households (and potentially groups), who maintain high-quality diets despite adverse circumstances.

#### Study Design

Multiple-method qualitative investigation using food photo diaries, semi-structured interviews and emergent ‘Go-Along’ methods.

#### Research Questions:

For this qualitative work package, dietary discordance will be framed as ‘resilience’ to factors that would otherwise normally lead to poor diet.

1. How can the concept of ‘resilience’ be understood in the context of dietary health inequalities?
2. How can ‘resilient’ food practices be characterised?
3. What are the perceived external and internal structures (or circumstances) that shape ‘resilient’ food practices?
4. How do ‘resilient’ participants exercise agency, via food choices and practices, within these perceived structures?
5. What are the individual, household and group assets that enable resilient food practices and how might they be used to inform policies aimed at reducing diet-related health inequalities in the wider population?

#### Methods:

The research questions outlined above require qualitative study, to determine how and why people are resilient in their food practices.

‘Discordant’ individuals from the Fenland Cohort Study, with high quality diets in adverse circumstances, will be identified using methods developed in WP1. A purposive sample of these discordant individuals will be contacted for participation in the study.

Discordant food practices will be investigated using informal food diaries (photo/written), semi-structured interviews and a ‘Go-Along’ whose theme will emerge from the diaries and interviews. Each of these methods is well-established in public health dietary research. 44, 45,46,47 Go-Alongs are a hybrid method combining field observation, interviewing and a pragmatic (i.e. very time-limited) ethnography that have been used to address some of the shortcomings of traditional sit-down interviewing techniques. [ref]

Each participant will be visited twice. The first will be used to obtain informed consent, explain the methods and provide brief training. The follow-up visit will be arranged after 4 consecutive days of diary keeping, including two weekend days (since diets often change at the weekend)48. The results of the food diaries will be discussed and incorporated into a semi-structured interview. Questions will also be informed by the results of WP1, a review of the literature on resilient behaviours and a recent systematic methodological review.49 Researcher and participant will then take part in a ‘Go-Along’, the exact theme of which will emerge from the interview data, e.g. a shopping trip. Semi-structured interviews and Go-Alongs will be audio recorded and professionally transcribed. Notes will also be made immediately after each Go-Along in case transcription is limited by environmental noise.

The data generated will be analysed inductively, with reference where appropriate to mapping data on the local food environment generated in WP1. Strong Structuration Theory (SST) will be used as the theoretical basis for synthesising the diverse data. SST approach recognises the recursive relationship between structure and agency and studies them via the external and internal structures within which agency is enacted.50 For example, the physical food environment would be considered an external structure whereas personal ‘rules’ to maintain a healthy diet would be internal structures. Agency enables an individual to impose this internal structure (healthy food rules) on the external structure (local shops).51

The analytic aim is to generate narratives of practice, experience and perceived cause and effect. External structures are expected to be of particular interest, given the applied, policy-relevant driver for this fellowship proposal, and to avoid perpetuating solutions that rely on individual behaviour (which tend to exacerbate inequalities).52

#### Sampling strategy:

Participants will be purposively sampled to achieve maximum variation with reference to the individual, household and environmental factors identified in WP1 from the Fenland Study, a large cohort of 12,000 adults born between 1950 and 1975, drawn from a broad cross-section of society and with pre-existing ethical permission for re-contact.53,54 The total sample is expected to number approximately 30 individuals. Informed, written consent will be obtained from all participants.

#### Limitations and Biases

Although the Fenland study represents a broad demographic, it will not reflect practices specific to other regions. Nonetheless, given largely homogenous UK food environments (notwithstanding patterning by urbanity/rurality and socio-economic factors) we expect to find data generalizable to the wider UK population.

#### Consent and Ethical Approval

Informed, written consent will be obtained from all participants. Ethical approval will be sought from the Health Research Authority National Research Ethics Service Committee East of England-Cambridge Central.

### Work package 3: Systematic Review

#### Aim:

Identify, characterise and describe the effect sizes of effective, scalable, affordable population-level interventions to improve diet relevant to the UK context, and to relate these findings to factors identified as supporting high quality diets in WP1 and WP2.

#### Study design:

Systematic review of reviews

#### Research question/s:

1. What are the effective interventions for improving diets in high income countries?
2. Which of these interventions could be delivered at population scale?
3. What are their effect sizes and how do these differ by key socio-demographic variables?
4. What data is available on cost-effectiveness and affordability?
5. How can the interventions be categorised in a way that is useful to policy makers?
6. Which of these interventions could promote the ‘salutogenic’ factors associated with high quality diets identified in WPs 1 and 2?

#### Methods:

Different methods for systematic reviews exist.55-57 This study will follow Cochrane methods (which are appropriate for reviews of interventions) and make use of PRIMSA checklists.58 The review will be a systematic ‘Review of Reviews’, an accepted method where there is an overwhelming volume of primary material.59

A scoping review has been completed, identifying papers for screening using a 3-part search strategy developed with support from an information scientist at Cambridge University Medical Library. This search was run in Medline, Cochrane, CINHAL and Scopus databases on 21st February 2018, giving 6,077 hits. After de-duplication, 4,901 papers remained for manual screening. Study inclusion and exclusion criteria have been developed iteratively as part of this scoping review, and will be specified *a priori*.

If this application is successful I will complete the review. A method and templates for data extraction and synthesis will be developed with support from an academic supervisor specialising in systematic reviews. Study classification will be specified *a priori* in terms of agency and high-risk vs population-level approaches and also developed inductively based on my findings (e.g. fiscal policies, e-health etc.). Data on cost-effectiveness will be extracted, where available (although effective population-level interventions are usually highly cost-effective).60 Study selection and data collection will be duplicated by a second investigator as per PRISMA guidelines.56

The anticipated outputs of this review will be:

* a comprehensive list of effective interventions to improve diets at population level
* categorised by agency, modality (derived inductively) and likely cost-effectiveness
* a description of the range of effect sizes, including (where available) variation by key socio-demographic variables such as deprivation, age and sex

#### Biases & Limitations?

A systematic review of review may miss some primary studies. The reviews may be subject to publication bias, which will be assessed using a bias assessment funnel plot.

### Work package 4: Translation of evidence into policy

#### Aim

To generate ideas for innovative policy responses to the research carried in WP1-3 and to engage policy makers in the development of these ideas.

#### Study Design

Mixed methods approach rooted in design principles.

#### Research Questions

1. How can the findings of WP1-3 be best synthesised?
2. What are the factors associated with high quality diets not addressed by interventions identified in WP3?
3. What policy responses not formally evaluated in the scientific literature have been tried elsewhere and might be relevant to the UK context?
4. What are the innovative (untried, possibly not yet even considered) policies that might promote equitable improvements in UK diet by promoting individual, household and environmental resilience factors associated with high quality diets?
5. How might policy makers be best involved in translating the findings of WP1-3 and WP4 into effective, equitable policies to improve diets in the UK?

#### Methods

This work plan seeks to respond creatively but rigorously to the science of WPs 1-3. It is informed by the rationale that enabling population-wide improvements to diet will require innovative policy approaches, and that the design of such policies would be best attempted using innovative methods.

##### Step 1

Synthesise the findings of WPs1-3, identifying factors and behaviours associated with dietary discordance (WPs1 & 2) and mapping these to effective interventions (WP3). The results of this exercise should make a coherent case for the use of effective identified interventions and also highlight potential areas for new policy responses (see figure 2).

##### Step 2

A rapid review of the grey literature and information to identify policies that have been tried elsewhere. The World Cancer Research Fund’s Nourishing Framework (a country-by-country database of dietary interventions in use worldwide) will be a key resource for this step.61

##### Step 3

Complete an online Delphi survey with a wide variety of relevant stakeholders from academia, industry, civil society and the civil service to generate ideas for innovative policies. The foundation for this process will be the synthesis of WPs1-3 (see step 1). The Delphi method is an efficient way of generating consensus and feedback from a group of geographically dispersed experts, based on an iterative, anonymous questionnaire and feedback process.62

##### Step 4

In consultation with the Design Council, I will design and carry out a process to engage and involve policy makers in the results of all four work packages with the aim of enhancing at least one existing policy and developing at least one new policy for improving diet in the UK. Exact methods are unclear at the time of writing, but will draw on the Design Council’s extensive experience of supporting public health professionals in developing effective, novel solutions to population health problems, using user-centred design methods and wide stakeholder involvement. 63, 64

# 6. Dissemination, Outputs and anticipated Impact

How will you inform and engage patients, NHS and the wider population about your work?

Following preliminary discussions with Oliver Francis, CEDAR’s Head of Communications and Knowledge Exchange, I will develop a comprehensive communication and dissemination plan in the first quarter of the fellowship, covering each of the five main stakeholder groups: academics, civil servants involved in policy relating to dietary health, journalists, and the general public.

### PPI

I have designed and costed (using Involve’s online tool) an ambitious, cutting-edge programme of public involvement in the research and dissemination of its findings. Funding from other sources (for example the Wellcome Trust’s Public Engagement Fund) could be sought to mitigate costs, if desired. Exhibition costs are based on advice from a Wellcome Engagement Fellow.

#### Design and management of Research Study (£4,852)

Feedback on this proposal’s development was sought at an early stage from a Trussell Trust manager. She did not request any changes to the proposal but provided insights into possible factors driving dietary discordance (which will be incorporated into semi-structured questionnaires in WP2) and offered to help find foodbank users to contribute further to the research as it unfolds.

Once the project has started, feedback by lay members on all aspects of running and managing the study will be sought through involvement in the Fellowship Advisory Board. These lay members will include the West Norwood and Brixton Trussell Trust Foodbank manager, two West Norwood foodbank users and the Executive Director of the Food Foundation.

#### Co-production of data visualisations based on research findings from each work package (£15,560)

After each work package, an award-winning data visualisation expert (Antonia D’Efilippo: www.valentinadefilippo.co.uk) will facilitate a co-production workshop with up to 6 members of the public (4 workshops in total). The outputs of these workshops will be further developed into data visualisations to engage the public and policy stakeholders.

#### Co-presenting findings at national conference (£500)

The Trussell Trust Foodbank manager will co-present the final findings of the fellowship at an appropriate national conference, to assist with dissemination of findings.

#### End-of-project exhibition (£36,200)

An end-of-project exhibition, shaped by participants in the research, offers a superb opportunity to engage the wider public in the findings of research, through direct attendance and through media coverage. The exhibition will be developed by a curator with experience of translation of research findings into public exhibitions, in consultation with myself, the data visualisation expert and those involved in the research. The aim is to create an engaging body of material that communicates the research findings in a vibrant, accessible way.

How will your outputs enter our health and care system or society as a whole?

Direct translation of this research into policy is an attainable goal, given my placement within PHE’s Diet and Obesity team. Papers published in peer-reviewed journals will enter the scientific literature and be available for use by other researchers. The production of data visualisations and an end-of-project exhibition presents great opportunity for wide engagement of the local population (in person) and the wider population (through various media channels). In addition, I will communicate the findings of my research through the MRC Epidemiology Unit’s communication channels (online, Twitter), writing a short blog post relating to each work package with the intention of publishing in The Guardian, The Conversation and CEDAR’s website.

What further funding or support will be required if this research is successful (e.g. From NIHR, other Government departments, charity or industry)?

No further funding will be required.

What are the possible barriers for further research, development, adoption and implementation?

One of the biggest hurdles to the adoption of effective policies to improve primary prevention of chronic disease through improvements to diets in the UK is the political discourse around libertarianism and personal responsibility, exemplified by the sometimes rabid response by parts of the press to so-called ‘Nanny State’ interventions.65 Arguably, with the introduction of far-reaching policies such as the Soft Drinks Industry Levy, there is increasing awareness and acceptance of the need to shape the environment within which people enact their decisions. The aim for this fellowship is to contribute positively to this debate, in particular by influencing those responsible for policy.

What do you think the impact of your research will be and for whom?

There are few studies estimating the cost-savings from dietary improvements (partly because of difficulties in designing outcome measures amenable to health economic evaluation) but it has been estimated that every 1% reduction in diabetes would save the NHS £66-£74 million/year.66, 67 Improvements to UK diets would reduce the burden of ill health and save money.

# 7. Project Management

I will apply the PRINCE II project management principles I have used for numerous projects, producing a detailed project plan to include clear deliverables, dependencies, contingency plans, risk management, and realistic timeframes.

Weekly meetings with my primary supervisor will be used to shape the research. We will assess progress against key milestones, risks and any mitigating actions on a monthly basis. Progress and actions will be recorded and countersigned on the Cambridge PhD student research log (CamSIS). Meetings with second and third supervisors will be organised around the requirements of specific work plans, with weekly contact when the work plan is in progress. These meetings will be supplemented by bi-annual joint supervisory meetings with my academic supervisory team.

I will have monthly clinical supervision from my clinical supervisor, Dr Alison Tedstone, Chief Nutritionist at PHE. To maintain my Public Health CPD and professional development, I will also have quarterly public health clinical supervision from my public health mentor, Dr Tazeem Bhatia, Consultant in Public Health, PHE.

I will convene a Fellowship advisory group annually during the award. Members will include all academic and clinical supervisors as well as external advisors, including The Norwood Foodbank manager and the Food Foundation Executive Director.

The MRC Epidemiology business manager will provide me with quarterly expenditure updates, which I will monitor against my allocation, with advice from my primary supervisor.

# 8. Ethics

## NHS REC Consent

Use of the Health Research Authority (HRA) tool suggests consent is not required from the NHS Research Ethics Committee for WPs1, 3 & 4. 68

## Data storage

All data from WP2 will be stored and analysed within the MRC Epidemiology unit’s […](ISO27001 certified, conforms to NHS Information Governance Toolkit).

## Ethical permission

No ethical permission is required for WPs1, 3 & 4. I will seek ethical approval for WP2 from the Health Research Authority National Research Ethics Service Committee East of England-Cambridge Central.69 Informed consent will be obtained from all study participants in WP2.

Qualitative work (WP2) and PPI Workshops:

Informed consent will be obtained using full pre-study materials developed with my advisory team. Interviewees and PPI participants will have sufficient time for questions before participation. Interviews will be recorded with an encrypted digital voice recorder with biometric fingerprint recognition. Transcription of interviews and workshop notes will use anonymised identifiers. Interviewees and workshop participants will be free to withdraw at any time.

# 9. Success Criteria

## Measurements of Success

* improvement of existing dietary policy
* initiation of new dietary policy
* academic papers published, citations and Altmetrics
* data visualisations co-produced with public
* counts of views of engagement activities (online, social media)
* media activity in relation to project outputs, e.g. newspaper articles, radio interviews
* Successful completion of all work packages and training programme.

## Risk Management

| **Risk** | **Rating** | **Mitigation** |
| --- | --- | --- |
| **Likelihood (1-5)** | **Severity (1-5)** | **Score (1-25)** |
| Work programme too ambitious | 2 | 4 | 8 | Formal monitoring against project plan on a monthly basis with reduction in scope or number of work plans as needed.  |
| Insufficient participants agree to take part in qualitative research | 2 | 5 | 10 | Invites to participate through official Fenland channels. If recruitment impossible, another cohort will be used. |

# Research Experience

#### Word Limit: 1,000 words.

#### Current words: 984

After working in the NHS for almost a decade in various roles I self-funded a part-time MSc in public health at the London School of Hygiene and Tropical Medicine. During my first year of study I applied for and was awarded a place on the public health training scheme, completing my MSc as part of training.

I have become increasingly interested in working in public health diet and nutrition, seeking out relevant projects wherever possible (see below), gaining experience of a range of research techniques (analysis of large datasets, use of geographical information systems (GIS), evidence review, basic qualitative research methods). I am applying for this fellowship to develop my research skills and understanding of the evidence, in order to become an effective public health consultant working in this area. With this in mind I arranged a placement at the Centre for Diet and Activity Research (CEDAR) in Cambridge, with the explicit aim of developing a proposal for the NIHR/HEE Clinical Doctoral Research Fellowship.

While my research output at this stage is modest (a blog published in Lancet Global Health, a paper submitted to BMJ Open and various conference posters and presentations) I believe that I have repeatedly demonstrated an aptitude for academic work, both formally (through a high GPA in my MSc) and through many pieces of work carried out during my ‘clinical’ work as a public health trainee.

### Research experience

Academic placement at the Centre for Diet and Activity Research (CEDAR), Cambridge University and the London School of Hygiene and Tropical Medicine (LSHTM) as part of public health training, to develop NIHR/HEE CDRF PhD proposal (supervised by Prof Martin White)

Original research for LSHTM MSc dissertation: Assessing neighbourhood accessibility to a healthy diet in inner London: a cross-sectional study using food price data and geographic information systems (supervised by Prof Steve Cummins)

### Publications

Lancet Global Health Blog: Evaluation in innovation – death threats and the importance of independence (http://globalhealth.thelancet.com/bloggers/robert-marr) (published September 2017)

Innovation and Public Health in Emergencies: A Pilot Study of an Electronic Medical Record for Emergencies (EMR-E) in a Nutritional Programme in Bokoro, Chad (Submitted to BMJ Open April 2018)

### Conferences: Presentations and Posters

Evaluation of the Electronic Medical Record for Emergencies (EMR-E): Oral presentation, MSF Scientific Days, 2016

Public Health Advocacy within the European Public Health Alliance (co-presenter): Workshop, Annual London Public Health Registrar Conference, 2016

Implementing an Electronic Medical Record for Emergencies: Workshop, Annual London Public Health Registrar Conference, 2016

Investigating High PID Rates, workshop, Annual London Public Health Registrar Conference, 2015

The Art of Transformation at Great Ormond Street Hospital’, oral presentation at IHI International Conference, Berlin, 2009.

‘Using the Consultant Contract to Deliver a Highly Reliable Service', poster presentation, IHI International Conference, Berlin, 2009

‘Advanced Access at the Royal Free’, poster presentation, IHI International Conference, Paris 2008

### Teaching, Mentoring and Buddying

Seminar lead for Principles and Practices of Public Health (LSHTM, 2018)

Co-design and delivery of seminar for Social Determinants of Health - Public Health in Clinical Practice MBBS module (Year 5 medical students at Royal Free Hospital) (2015)

Co-design and delivery of Ebola Emergency Planning Training for colleagues, South London Health Protection Team (2015)

Mentoring of junior (ST2) public health registrar (2018)

Buddying of 4 junior public health registrars (2014-18)

### Clinical Experience Relevant to Academic Work

#### Centre for Diet & Activity Research/London School of Hygiene and Tropical Medicine

Scoping ‘Review of Reviews’ for systematic review of dietary interventions. Preparation of NIHR/HEE CDRF application. Teaching on Principals and Practices of Public Health at LSHTM.

#### Lambeth Local Authority: data analysis

Analysis of south east London diabetic eye screening dataset (80,000 patients) for health equity audit, identifying inequities in screening invite, attendance and onward referral to ophthalmology. Important findings included: women less likely to attend screening than men (OR 0.94 95% CI 0.90-0.99 p=0.013); patients in most deprived quintile less likely to attend than least dperived baseline (OR 0.31 95% CI 0.28 to 0.35 p< 0.0001).

#### Medecins Sans Frontieres (MSF): complex evaluation

Comprehensive evaluation of MSF’s electronic medical record for emergencies (EMR-E), carried out in ‘the field’ in Chad. Methods: audits, tests for speed and accuracy, direct observation, semi-structured interviews with staff, Delphi questionnaire with technical staff. Results: 9 (36%) of audit criteria met; no significant differences in the time taken to answer questions (EMR-E 1.67 vs paper 1.89 minutes; p=0.36, n=24) or the percentage of correct answers (EMR-E 89.5% vs paper 94%; p=0.29, n=24); thematic analysis of observation notes showed difficulties with stability of hardware and software and logistical pressures; staff very positive about EMR-E despite technical shortcomings, high training needs; innovative offline capabilities using USB install and backup but significant (€500,000) further development costs. Conclusion: recommend discontinuation of project to senior management (recommendation accepted). Evaluation written up for publication (pending).

#### European Public Health Alliance: rapid evidence review

Rapid review of evidence linking consumption of highly processed foods (according to Monteiro classifaction) and various health outcomes including chronic disease and obesity. Review found good quality cross-sectional evidence of association but no large cohort/RCT data at that time.

#### Health Protection, South London Health Protection Team: Investigation of high Pelvic Inflammatory Disease (PID) rates as reported in PHE Fingertips Profiles

Generation of 12 hypotheses (and associated null hypotheses) for testing after extensive consultation with stakeholders, including: data error, confounding by age/ethnicity, coding error, differential diagnostic criteria, poor sexual health services. Several hypotheses disproved using GUMCAD, SHHAPT and other datasets with assistance from PHE Knowledge and Intelligence Teams, e.g. data and coding errors, confounding. Areas for further investigation agreed with commissioners. Crucially, inadequacies in sexual health provision shown to be a plausible explanation.

#### Lewisham Local Authority: investigation of access to healthy food (MSc dissertation)

In response to a lack of information about food poverty in Lewisham, I designed and carried out a GIS study mapping areas of deprivation without access to healthy foods. The method was subsequently used by Greenwich Local Authority to identify their own areas with poor food access.

# Training Programme

#### Word limit: 1,000 words

#### Current words: 802

My training as a public health registrar has provided a basic level of academic skill and knowledge and equipped me with tools and techniques for self-directed learning. My aim, from this fellowship, is to further develop these skills to the point of being a skilled practitioner capable of independently carrying out complex quantitative and qualitative data analysis and evidence synthesis.

The work plans in this fellowship proposal cover a wide range of academic skills: statistical analysis of large datasets; use of geographic information systems (GIS); evidence selection, appraisal and synthesis (systematic review); qualitative research methods and analysis, creative tools and techniques to develop novel policy responses.

For each skill I have identified the following: an academic supervisor with appropriate experience, theory-based taught courses to deepen my theoretical grounding in the subject; practical courses to develop skills and techniques (for example the highly-regarded courses run by the Nuffield Department of Primary Healthcare Sciences providing practical training in qualitative methods).

These will be supplemented by self-directed learning using formal and informal sources such as Massive Open Online Courses (MOOC’s), Google searches and relevant books. Peer-to-peer learning will be provided by departmental meetings, lectures and seminars at the Centre for Diet and Activity Research (CEDAR) and membership of the British Sociological Association (BSA) Food Study Group.

The university of Cambridge runs a large programme of general training to support research projects (such as project management, budgeting, academic writing, presentation skills) as well as technical and theoretical courses covering various topics. Learning needs are assessed at induction. Costs are covered by the university composition fee and are available at no extra charge to post graduate students. These courses are typically short, and introductory: where I anticipate additional training I have identified courses by other institutions.

Conference attendance and participation will provide an opportunity for broader development (sometimes across disciplines). Finally, an overseas research visit to the only other university I am aware of looking at resilient food behaviours from both quantitative and qualitative perspectives (Deakin University in Melbourne, Australia: The Resilience for Eating and Activity Despite Inequality (READI) study) will provide an intensive, hands-on learning opportunity.

Finally, through collaborations with a data visualisation expert, exhibition curator and the Design Council (WP4) I will expand my understanding of the application of creative and design tools and techniques to solving policy questions and engaging the public. This fellowship offers an unusual opportunity to develop a completely different skillset by working alongside professionals from creative disciplines.

### Data analysis

Advanced Course in Epidemiological Analysis (LSHTM Short courses): 10 days, £2,850.00

Advanced STATA (LSHTM Short courses): 5 days, £1,385.00

### Geographical Information Systems (GIS)

ArcGIS 1 – Enhanced Skills of ArcGIS 10.x for Desktop (ESRI UK): 2 days, £852.00

ArcGIS 2 – Essentials of ArcGIS 10.x for Desktop (ESRI UK): 2 days, £852.00

GIS for Public Health (Small Area Health Statistics Unit): 5 days, £500.00

Understanding small areas: spatial analysis of population and neighbourhood data (National Centre for Research Methods): 1 day, £60.00

Introduction to GIS and Spatial Analysis for Retail Applications (National Centre for Research Methods): 1 day, £70.00

### Qualitative Research - theory

Qualitative Research Methods (Oxford University): 5 days, £1,795.00

Mixed Methods: (Cambridge University): 2 hours, £0.00

Mixed Methods in Healthcare Research (Oxford University): 5 days, £1,795.00

Sociological approaches to health (LSHTM MSc Module): £2,050.00

Critical Approaches to Discourse Analysis (Cambridge University): 1 day, £0.00

### Qualitative research - practice

Introduction to Qualitative Research Methods (Nuffield Department of Primary Healthcare Sciences): 5 days, £1,525.00

Introduction to Qualitative Interviewing (Nuffield Department of Primary Healthcare Sciences): 1day, £403.00

Introduction to NVIVO (Nuffield Department of Primary Healthcare Sciences) 1 day, £405.00

Analysing Qualitative Interviews (Nuffield Department of Primary Healthcare Sciences): 2 days, £650.00

Introduction to Conversation Analysis (Nuffield Department of Primary Healthcare Sciences): 1 day, £405.00

Narratives and story-telling in qualitative research (Social Research Association (foundation): 1 day, £260.00

Ethnographic Methods (Cambridge University): 2 days, £0.00

### Systematic Review

Systematic Reviews and Meta-Analysis (Bristol University Medical School): 5 days, £880.00

### Design-led approaches

Data visualisation workshop (Andy Kirk): 2 days, £800.00

A creative approach to data: hand-drawn data visualisation (Guardian Masterclasses ):1 day, £255.50

Collaboration with the Design Council and data visualisation expert

### Personal Development

Communication Skills Introduction: "Are You Receiving Me?" (Cambridge University): 1 day, £0.00

Communication Skills Advanced: "Was it something I said?" (Cambridge University): 1 day, £0.00

Data protection training (online) Cambridge University: £0.00

Other

Managing the Budget (Cambridge University): 1 day, £0.00

Scientific Writing (Cambridge University): 1 day, £0.00

Public Policy Analysis (Cambridge University): 3 days, £0.00

### Clinical development

[to complete]

### Conferences and Study Groups

To include: the Society for Social Medicine Annual Conference, the International Society of Behavioural Nutrition and Physical Activity Annual conference, Public Health England Annual Conference, Food Foundation Conferences (ad hoc), BSA Food Study Group

### Overseas Visit

Faculty of Health, School of Exercise and Nutritional Science, Deakin University, Melbourne Australia

# Collaborations

Explain what collaborations you intend to establish to support your research and, if applicable, your training and development programme. This may involve short visiting placements (e.g. an Overseas Research Visit), or secondments in new (to the applicant) research environments, e.g. clinical trials units or NIHR Biomedical Research Units / Centres. The NIHR is particularly keen to enhance the cadre of researchers equipped to work at the university/NHS/industry interface, translating ideas into new treatments and products from which patients can benefit. Therefore, where appropriate, you should consider any industry collaborations you may wish to establish during the course of your Fellowship. You should include; the training and development the collaboration will provide; the facilities and expertise you will have access to; and how the collaboration will strengthen links between academia, industry and the NHS.

This fellowship offers a number of opportunities for collaboration. Firstly, my clinical placement with PHE’s Diet and Obesity team presents an outstanding opportunity to develop a detailed understanding of the policy process by working closely with civil servants (and politicians) from a variety of government departments.

Secondly, my planned overseas visit to Deakin University offers an opportunity to learn from fellow academics working on dietary resilience, currently an under-researched topic. Deakin University established the Resilience for Eating and Activity Despite Inequality (READI) cohort of “4,349 women aged 18–46 years and 685 children aged 5–12 years […] from 80 socio-economically disadvantaged urban and rural neighbourhoods of Victoria, Australia.”18 They have published quantitative and qualitative analyses of this cohort in high-impact journals.70-73 Working with researchers who are involved with this study will provide an invaluable opportunity to better understand how to get maximum value from my fellowship and possibly an additional opportunity to publish. I aim to complete this research visit before carrying out my qualitative research, to provide additional training before I start interviewing participants. I am also looking forward to exploring how these colleagues approach translating research into policy, to inform my own practice.

Thirdly, through WP4 and public engagement activities (in particular, the co-production of data visualisations and an end-of-project exhibition) will collaborate with colleagues from the creative disciplines of design and contemporary art. Design methods are increasingly being used to solve the complex problems confronting professionals working in public health. These collaborations will equip me with alternative tools and techniques for working out how to improve the public’s health which should benefit both the work resulting from the fellowship and my future career.

Finally, through my existing involvement with the Food Foundation, I have been introduced to a variety of professionals working within the food industry. These include farmers, food processors, buyers, communications experts and horticulture productivity experts. My aim is to build on these relationships throughout the fellowship, so that work on policy is informed by an understanding of the practicalities of food production, processing and retail. Some of these individuals will be formally involved in WP4 through the Delphi questionnaire. I also hope to build on these relationships during the 4 years of study through site visits, attendance at conferences and other means. This offers an opportunity to develop links between academia, policy makers and industry and to consider how diverse interests might be best aligned when attempting to improve UK diets.

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