

# Invitation to tender

**Health care demand model**

*16 January 2020*

**Prepared by**

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**Deadline date:** 17:00, Thursday 13 February 2020

**Attached documents include**

- Sample application form
- Sample contract

## **1.0 About the Health Foundation**

- 1.1 The Health Foundation is an independent charity committed to bringing about better health and health care for people in the UK.
- 1.2 Our aim is a healthier population, supported by high quality health care that can be equitably accessed. We learn what works to make people's lives healthier and improve the health care system. From giving grants to those working at the front line to carrying out research and policy analysis, we shine a light on how to make successful change happen.
- 1.3 We make links between the knowledge we gain from working with those delivering health and health care and our research and analysis. Our aspiration is to create a virtuous circle, using what we know works on the ground to inform effective policymaking and vice versa.
- 1.4 We believe good health and health care are key to a flourishing society. Through sharing what we learn, collaborating with others and building people's skills and knowledge, we aim to make a difference and contribute to a healthier population.

## **2.0 The Health Foundation's new research centre**

- 2.1 The Health Foundation's research centre is being set up to improve the quality of strategic decisions about the funding, design and delivery of health and social care system. It will be fully funded by the Health Foundation and will comprise a team within the Foundation; a network of academic partners undertaking long-term research; and commissioned research, partnerships and collaborations around specific issues. This tender is for one of the partnerships.
- 2.2 The research centre will provide rigorous evidence and analysis that looks beyond the short-term, preparing decision-makers to address future challenges. It will seek to improve the future demand for care, the resulting workforce and funding requirements, the potential for productivity improvements, and the impact of innovations in service delivery, including new technology. It will draw on wider Health Foundation work on service innovations, as well as insights and analysis on the future impact of population risk factors and the social determinants of health.
- 2.3 As a key element in achieving this, the centre will seek to build on previous work conducted by the Health Foundation to develop a sophisticated suite of health and social care demand and supply projection models. These models will seek to incorporate evidence on need, costs, healthcare activity and workforce supply and allocation as well as health technology, drugs and changing emphasis on treatment styles. This evidence will include both existing peer reviewed research and analysis of health care data from the centres' in-house research team.
- 2.4 The work described within this tender documentation is one phase of a multi-phase, multi-disciplinary approach to developing integrated health and social care supply and demand models. This tender is to work in partnership with the Health Foundation's research centre to develop a model of demand for healthcare based on the modelling of risk factors and the prevalence of non-communicable diseases

(NCDs). Although the focus of this tender will be on health care need and health service use, our ultimate aim is to build a unified model of health and social care need and service use.

2.5 Alongside this demand modelling work we have commissioned work to model the future supply of nurses. Projections from this model will be compared to the projected requirement for nurses from the demand model.

### 3.0 Details of the work

3.1 Our publication with the IFS, *Securing the Future*, included results from our projection model, which helped inform the five-year funding settlement announced in May 2018. This model projected future healthcare costs and activity, based on population ageing, changing prevalence of NCDs, capital acquisition, and labour costs and productivity. Each of these factors have direct implications for healthcare costs and activity now and in the future, but also feed into a range of other policy decisions, from public health to workforce planning.

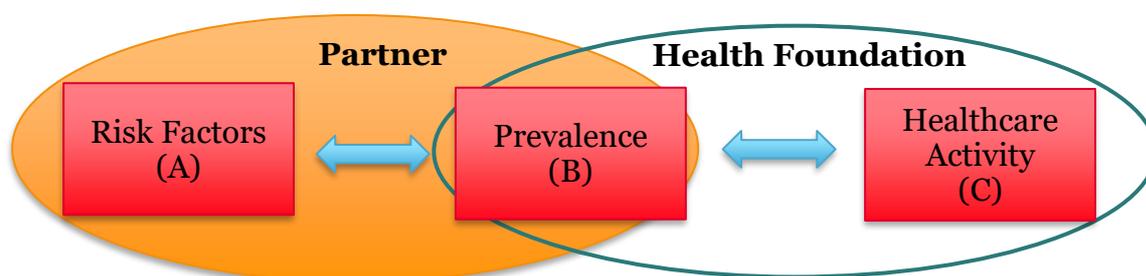
3.2 The research centre will build on this work by focusing on the incidence and prevalence of chronic conditions and other NCDs and the associated healthcare costs, both now and in the future.

3.3 The reasons for our focus on chronic disease and other NCDs are twofold:

- First, our existing work suggests that the changing prevalence of chronic conditions is an important driver of activity and cost. However, the methods we have been using to identify and project forward the population with chronic conditions are relatively crude. There is therefore significant scope to improve the quality of our projections.
- Second, the health service can play an important role in helping prevent, manage and treat chronic conditions, and improve quality of life. This has become an increasingly important issue as prevalence of NCDs has grown and we have greater understanding of their impact. Analysis could therefore help to inform strategic decision making related to chronic conditions, for example, about investment in prevention.

3.4 We take as a starting point a simple conceptual model of risk factors, non-communicable diseases, and healthcare activity.

**Figure 1: Simplified model of risk factors, prevalence and healthcare activity for non-communicable diseases**



- 3.5 We acknowledge that the relationship between all the three components (A, B and C) is far more complicated than this model portrays, but we use this as a starting point for ease of exposition. For example, a high prevalence of non-communicable diseases may be unrelated to risk factors (see Appendix A for a more complete description) and risk factors may lead directly to increased healthcare activity (eg obesity in pregnancy may increase the likelihood of caesarean section).
- 3.6 Our existing work has estimated prevalence **(B)** and considered the relationships between prevalence and healthcare activity **(B to C)**. Rates of prevalence and associated costs were then projected forward as an input into the model of projected funding pressures. There was no inclusion of risk factors.
- 3.7 In the first three years of the research centre, we will seek to improve our understanding of, and to model the relationships between, all three components for the population of England.
- 3.8 Our in-house team will focus on estimating and projecting prevalence using survey data and CPRD linked to HES and other NHS administrative health datasets (such as mental health datasets) **(B)**, and the relationship between that prevalence and healthcare activity **(B to C)**. The questions that this work will contribute to include:
- how prevalence of individual chronic conditions and multimorbidity, as measured by different methods, has changed over time.
  - the activity (and costs) involved in treating a person with a given non-communicable disease and how these have changed over time.
  - the relationship between healthcare activity and time since diagnosis and how this has changed over time.
  - how the volume and mix of services needs to change over time to meet future needs.
  - the potential impact of new treatment models, drugs and technology on activity and health outcomes.
- 3.9 **We are seeking a partner to work with us to understand and model the relationships between risk factors, disease progression, mortality and prevalence (A to B)**, though we will also need to model non-communicable disease prevalence in those not exposed to risk factors. This work will result in estimates and projections of prevalence so there will need to be close working between the partner and our in-house team, to bring these together with our estimates and projections.
- 3.10 The issues that we want the model to help us with include:
- current levels of and trends in risk factors, by age, sex and population group (e.g. level of deprivation).
  - what continuation of current levels of risks (such as smoking and obesity), and mortality trends, means for the incidence and prevalence of non-communicable disease over the next 20 years.
  - how incidence and prevalence would change with changes in levels of risk, and interventions to reduce risk factors.
  - the impact of secondary prevention on the progression of NCDs.
  - future patterns and trends in inequalities in NCDs by population group.

## 4.0 Model Specification

- 4.1 The overall model (**A through to C**) will, at a minimum, be able to provide projections of health care need (e.g. prevalence of NCDs and multimorbidity) and activity in England 10-20 years in the future, broken down by region. The model will also need to use costed healthcare activity evidence, provided by the in-house research team, in order to be able to understand the financial impact of policy options.
- 4.2 We do not aim to develop a model from scratch but seek to build on existing models developed by the Health Foundation and models owned and operated by the chosen supplier.
- 4.3 The provider will be responsible for designing, developing and testing the risk to prevalence part of the model (**A to B**), working in partnership with the Health Foundation to integrate the model with the prevalence to activity part (**B to C**) to give an overall integrated model (**A through to C**).
- 4.4 The activity projections from the model will be used to estimate future workforce requirements. These will need to be in a form which enables them to be compared to the outputs from our workforce supply models, being developed separately and in the future. This will allow us to understand any mismatches between workforce demand and supply.
- 4.5 In the first phase of development the model will cover healthcare only; our approach to social care modelling is, partly due to data limitations, still at an early stage and will be developed later with expert input.
- 4.6 While the work of the Health Foundation covers all four devolved nations, the model will focus on need in England. Although we are starting with health demand in England for pragmatic reasons, the model should be capable of being extended to the entire UK in the future. If possible, we would like the model to be useable by local areas once it has been developed.
- 4.7 We anticipate that in-house work using linked administrative data will generate evidence that could be used to improve the provider's model, either during inception or in the future. For example, through new or updated transition probabilities, in relationships between chronic disease and mortality. We also expect that our work will enable the providers to enhance the model, by including more detailed measures of hospital activity and cost. We expect the model provided to be adaptable enough to facilitate these changes, where analytically appropriate.
- 4.8 The outputs of the model – under status quo assumptions – should align with other authoritative sources. For example, through its assumptions about mortality rates the model will produce population projections. These and other parameters in the model should be capable of adjustment so that the model's population projections match ONS's. We would also expect any major differences between the model developed and existing models of risk factors and NCDs to be explainable, in terms of differences in data or methods.

- 4.9 This is a challenging area, and our expectation is that there will need to be trade-offs in the development of the model in order to ensure it is deliverable. Applicants should state the types of trade-offs and assumptions that may need to be made. We encourage applicants to identify types of questions that the model or microsimulations in general are unable to address, alongside the strengths and potential of their proposed model.
- 4.10 In line with the research centre's principles of openness and transparency, when the model is complete and has been peer reviewed, we plan to publish the code together with its inputs enabling the model to be used and results replicated.
- 4.11 The Health Foundation will hold the intellectual property rights to use and modify the model and its outputs (or be given a license to do so). This means that if the supplier has an existing model that could be built on for this work, distinct new models may need to be developed.
- 4.12 We intend to work closely with any providers and would seek to, as part of the tender, have a member of the supplier's team join the Health Foundation team at their offices for part of their allocated time as a research fellow (see section 10.5 for further details). This would allow, provided they agree to the appropriate checks and training, the researcher to engage in analysis of the patient level linked data held in the Health Foundation's Secure Data Environment (SDE). They would be expected to contribute to the evidence generation that will feed into the model.
- 4.13 However, this phase of work does not *require* the supplier to perform analysis of observed patient level health care data. The in-house team at the Health Foundation has access to linked primary and secondary care data and will be producing analysis that will feed into the supplier's model. The supplier for this phase of work will be required to work closely with those managing this work at the Health Foundation. The supplier will need to be responsive and prepared to contribute to the overarching strategy for this work, as well as engage in quality assurance for this analysis.
- 4.14 Over time we would expect to extend the model along a number of different dimensions, and we expect the supplier to bear these in mind throughout this contract. These are expected to include:
- modelling of risk factors associated with, and prevalence of, social care need, for example as measured by people who have 2 or more difficulties with activities of daily living. Chronic conditions such as stroke may lead to a need for social care, but social care need may also arise from other conditions and circumstances, such as arthritis, frailty and living alone. We would expect the supplier to come with ideas about this and to design their approach with this aim in mind.
  - the direct impact of risk factors on health service use e.g. obesity leading to an increased likelihood of a caesarean section.

## 5.0 Methods

- 5.1 Our initial scoping leads us to believe that an approach that focuses on individual-based modelling, is superior to methods which focus on entire cohorts. There are a

number of different methods here in the fields of labour economics, operational research, and elsewhere - including, but not limited to, microsimulation modelling.

- 5.2 Micro-simulation is a form of economic modelling where modelled individuals are passed through the model one-by-one, their results are stored and then the experience of a cohort is obtained by aggregating the individual results.
- 5.3 Micro-simulation models are particularly useful when individuals have a mix of interrelated (and potentially changing) risk factors that influence their experience of a (chronic) disease over time, or where interactions between individuals is important (e.g. infectious disease). Although more complex to create, they may have more general application (than cohort Markov models), being applicable to cohorts with different characteristics (risk factor mix) at the start of the modelled period.<sup>1</sup>
- 5.4 We are flexible on the specific methods that the supplier uses. We are open to a range of different methods and will be led by the expertise of the supplier as to what method fits our requirements best.
- 5.5 As the model will be transferred to our in-house team, our preference is that the model should be written in R to avoid having to learn and purchase new software.

## **6.0 Data access**

- 6.1 The nature of this type of modelling is that it is data intensive. Modelling the needs of the population at an individual level in a way that is consistent with the aims in sections 3.0 and 4.0 will require a basis in microdata. Being able to model this successfully will require data on the current life expectancy, disease prevalence rates and evidence-based assumptions on the probabilities of people moving into different states of health and ill-health. These assumptions would need to come from data analysis and existing evidence.
- 6.2 We expect that the suppliers will, at a minimum, have access to survey datasets available through the UK Data Archive, such as Understanding Society, the English Longitudinal Study for Ageing, and the Health Survey for England. Any requirements to obtain special licenses for additional sensitive survey fields should be identified in the application.
- 6.3 This project will likely involve the storing of sensitive data. We would be looking for any application to make clear any data access requirements as well as their approach to information governance and that they have the correct systems and processes in place to safely store and use the proposed datasets.

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<sup>1</sup> Micro-Simulation [online]. (2016). York; York Health Economics Consortium; 2016.  
<https://www.yhec.co.uk/glossary/micro-simulation/>

## 7.0 Deliverables and milestones

7.1 The contract will last a total of three years; the exact deliverable expected throughout this time will be agreed with the successful supplier once appointed. We expect the work to progress throughout the three years as so:

- a) In year one we would expect the supplier to undertake scoping to deliver an initial analytical plan that details which data the supplier seeks to utilise, the components of the model this data will inform and the analytical methods that the team will seek to utilise throughout the project.
- b) In year two we would expect work to be undertaken to develop the model and deliver a prototype working model ready for testing and processing.

In year three we would expect there to be a period of testing and model finalisation. During this period the model would also be transferred in-house and the research centre would develop policy scenarios (e.g. increased funding in the primary care setting to improve adherence to diabetes treatment) with ongoing support from the supplier to understand the impact on demand.

## 8.0 Outputs

8.1 The primary output would be a quality-assured and documented model, as described above, transferred in-house to the Health Foundation by the end of the contract period.

8.2 We will not require any specific public-facing outputs from the model development. However, the work would need to be rigorous and robust, so we would be open to supporting the publication of journal papers or working papers if this is something the supplier would like to pursue.

8.3 We expect any outputs, **including code**, developed as part of this process, to be made available as open access.

## 9.0 Working with us

9.1 The Health Foundation takes a partnership approach to its work. The work will be managed by the Programme Manager for the research centre with significant content input from a Senior Economist and Research Manager. Senior staff within the Health Foundation will provide strategic and content input.

9.2 Given that the model will eventually be transferred in-house to the Health Foundation, or open sourced, we anticipate a close working relationship with the successful supplier. We have outlined in as much detail as we are able to, the specification for the model but anticipate that there may be changes over time. We are interested in hearing how suppliers propose working closely with us to ensure the model meets our requirements and reflects the evolving work of the centre.

9.3 The research centre has its own governance structure, including an oversight board chaired by Sir Andrew Dilnot. The research centre will look to draw on the expertise from a range of individuals who specialise in this kind of modelling work. Alongside their own thorough quality assurance processes, we expect that the successful

provider will engage with our external advisory boards as appropriate throughout the development of the model, to ensure sufficient assurance of robustness and quality.

- 9.4 We anticipate sending some aspects of this work for peer review, in particular the model protocol / specification. We will work with the successful supplier to agree a process for this and will manage the peer review process on their behalf.

## **10.0 Preferred supplier**

- 10.1 We are seeking a supplier who has worked in this field before and has an in-depth understanding of epidemiology as well as the life-long effects of treated and untreated ill-health. The preferred supplier would also have a solid understanding of the wider determinants of health and the impacts of these on health demand.
- 10.2 It is essential that suppliers bidding for this work have expertise in micro-simulation modelling and already have extensive experience in healthcare demand modelling that can be applied to fit the purpose of this work.
- 10.3 A preferred supplier will have experience working with the health care sector and have a familiarity working for not-for-profit organisations. The preferred supplier will also have experience communicating their findings to a variety of stakeholders including economists, academics and policymakers.
- 10.4 This work is complex and is expected to be iterative; the supplier must be willing to work closely with the Foundation to design and deliver the work. The project team should have advanced expertise in microsimulation in a health context and a first-class publication record – providing intellectual input, guidance and quality assurance.
- 10.5 To aid the collaborative nature of the research, we also expect the project teams should include a **research fellow** – managing the day to day work undertaken as part of the project and providing a knowledge brokerage role between the Health Foundation and the project team. They would work alongside staff within the Health Foundation for a portion of their time. Details of this, including travel costs, will be discussed after selection. They will have expertise in either epidemiology and/or the social determinants of health and familiarity with the data sets that enable insights into these and how they impact health care demand throughout an individual's life.
- 10.6 We would expect the project team to include additional members, which might include junior analysts, project managers, or doctoral researchers. This is at the discretion of the project team but should be outlined in the proposal.

## **11.0 Costs**

- 11.1 £450,000 - £475,000
- 11.2 Responses to this invitation should include accurate pricing, inclusive of expenses and VAT. It is emphasised that assessment of responses to this tender invitation will be on perceived quality of service and demonstrable ability to meet the brief, rather than lowest cost, but value for money is a selection criterion.

## **12.0 Instructions for tender responses**

- 12.1 The Foundation reserves the right to adjust or change the selection criteria at its discretion. The Foundation also reserves the right to accept or reject any and all responses at its discretion, and to negotiate the terms of any subsequent agreement.
- 12.2 This work specification/invitation to tender (ITT) is not an offer to enter into an agreement with the Foundation, it is a request to receive proposals from third parties interested in providing the deliverables outlined. Such proposals will be considered and treated by the Foundation as offers to enter into an agreement. The Foundation may reject all proposals, in whole or in part, and/or enter into negotiations with any other party to provide such services whether it responds to this ITT or not.
- 12.3 The Foundation will not be responsible for any costs incurred by you in responding to this ITT and will not be under any obligation to you with regard to the subject matter of this ITT.
- 12.4 The Foundation is not obliged to disclose anything about the successful bidders, but will endeavour to provide feedback, if possible, to unsuccessful bidders.
- 12.5 Your bid is to remain open for a minimum of 180 days from the proposal response date.
- 12.6 You may, without prejudice to yourself, modify your proposal by written request, provided the request is received by the Foundation prior to the proposal response date. Following withdrawal of your proposal, you may submit a new proposal, provided delivery is affected prior to the established proposal response date.
- 12.7 Please note that any proposals received which fail to meet the specified criteria contained in it will not be considered for this project.

## **13.0 Selection criteria**

- 13.1 Responses will be evaluated by the Foundation using the following criteria, in no particular order:
- Ability to deliver on all required services or outputs
  - The quality and clarity of the proposal, products or services
  - Evidence of proven success of similar projects
  - Responsiveness and flexibility
  - Transparency and accountability
  - Value for money
  - Financial stability and long-term viability of the organisation (Due diligence will be undertaken on all shortlisted organisations)
- 13.2 It is important to the Foundation that the chosen provider is able to demonstrate that the right calibre of staff will be assigned to the project; therefore, the project leader who will be responsible for the project should be present during the panel interviews if you are selected.

## 14.0 Selection process

- 14.1 Please complete the online tender response form on the AIMS system by **Thursday 13 February at 5pm.**

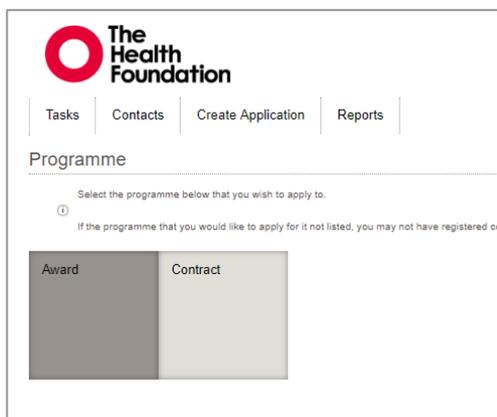
### **AIMS quick start**

Once you have registered with AIMS and activated your profile via the verification email, you can start a tender response. If you are applying on behalf of a team or organisation, register with the organisation via the 'Contacts' tab before doing so.

Then click on 'Create Application' and select to apply on behalf of the organisation you have just registered with.

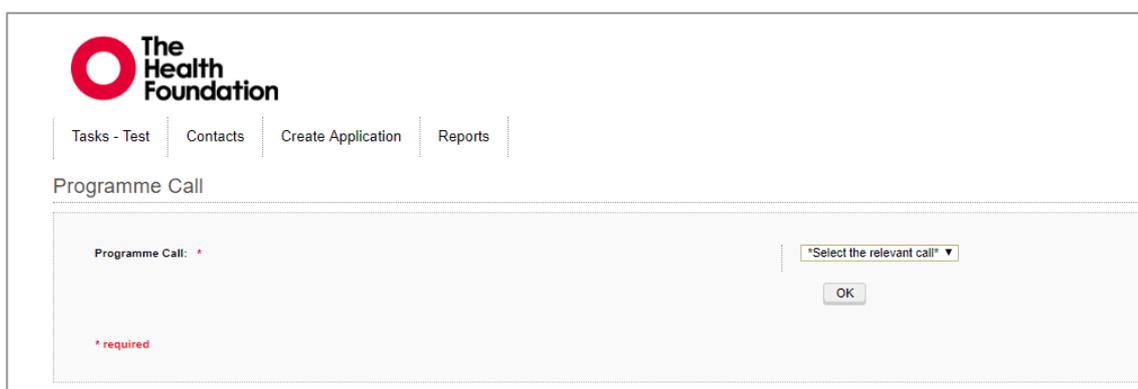
### **Open tender instructions**

Select the 'Contract' programme, as shown below.



The screenshot shows the AIMS system interface for The Health Foundation. At the top, there is a navigation menu with 'Tasks', 'Contacts', 'Create Application', and 'Reports'. Below this is the 'Programme' section, which includes a dropdown menu. The dropdown menu is open, showing two options: 'Award' and 'Contract'. The 'Contract' option is highlighted in a darker grey color, indicating it is the selected option.

On the next screen, click into the drop-down menu and select the **Health care demand model** in the drop down for 'Programme call', as shown below.



The screenshot shows the AIMS system interface for The Health Foundation. At the top, there is a navigation menu with 'Tasks - Test', 'Contacts', 'Create Application', and 'Reports'. Below this is the 'Programme Call' section, which includes a dropdown menu. The dropdown menu is open, showing a list of options. The 'Health care demand model' option is highlighted in a darker grey color, indicating it is the selected option. Below the dropdown menu, there is an 'OK' button.

- 14.2 A response to your application will be made by **Wednesday 4 March**
- 14.3 Interviews will be held on **Wednesday 11 March**
- 14.4 Final decision will be communicated by **Friday 13 March**

14.5 Start date to be agreed following the final decision [and would be as soon as practicable]. We are aiming to hold an inception meeting with the successful supplier in late March.

#### **15.0 Confidentiality**

15.1 By reading/responding to this document you accept that your organisation and staff will treat the information contained as confidential and will not disclose to any third party without prior written permission being obtained from the Foundation.

15.2 Providers may be requested to complete a non-disclosure agreement.

#### **16.0 Conflicts of interest**

16.1 The Foundation's conflicts of interest policy describes how it will deal with any conflicts which arise as a result of the work which the charity undertakes. All external applicants intending to submit tenders to the Foundation should familiarise themselves with the contents of the conflicts of interest policy as part of the tendering process and declare any interests that are relevant to the nature of the work they are bidding for. The policy can be found and downloaded from the Foundation's website at the following location: <http://www.health.org.uk/about-us/>

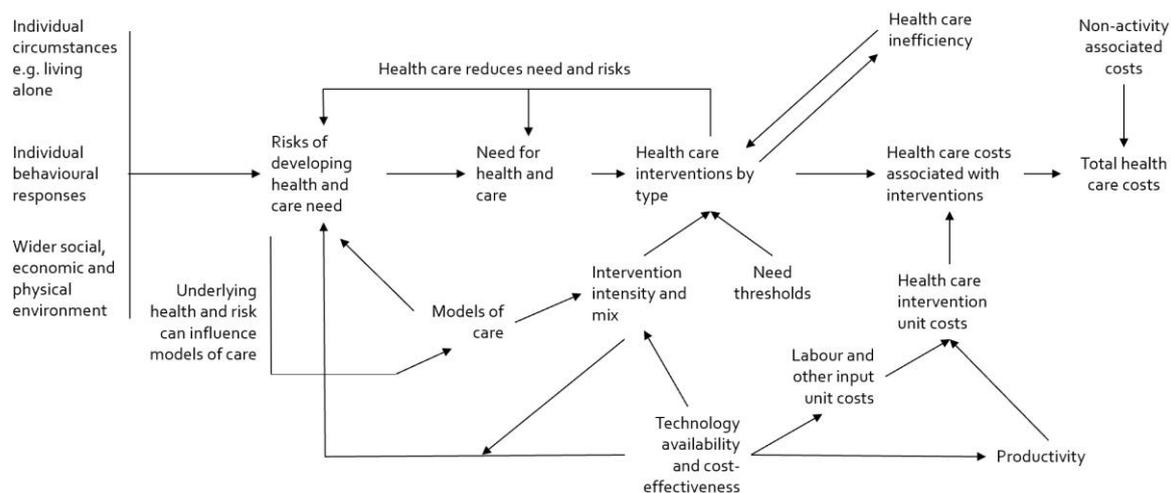
#### **17.0 Contract arrangements**

17.1 The Health Foundation's standard contract for delivery of services is attached. Any queries about the contract terms should be detailed in your application.

## Appendix A

The work will build upon existing modelling developed by the Health Foundation and additional commissioned work. A simplified conceptual model has been developed (figure 1) to map the drivers of observed healthcare activity data. These drivers flow from population risk factors and demographic factors through to systemic policy, health technology, productivity and models of care. The model attempts to account for the cyclicity of the equilibrium of health care need and how that need is met by the healthcare system.

Figure 1: health care supply and demand conceptual model

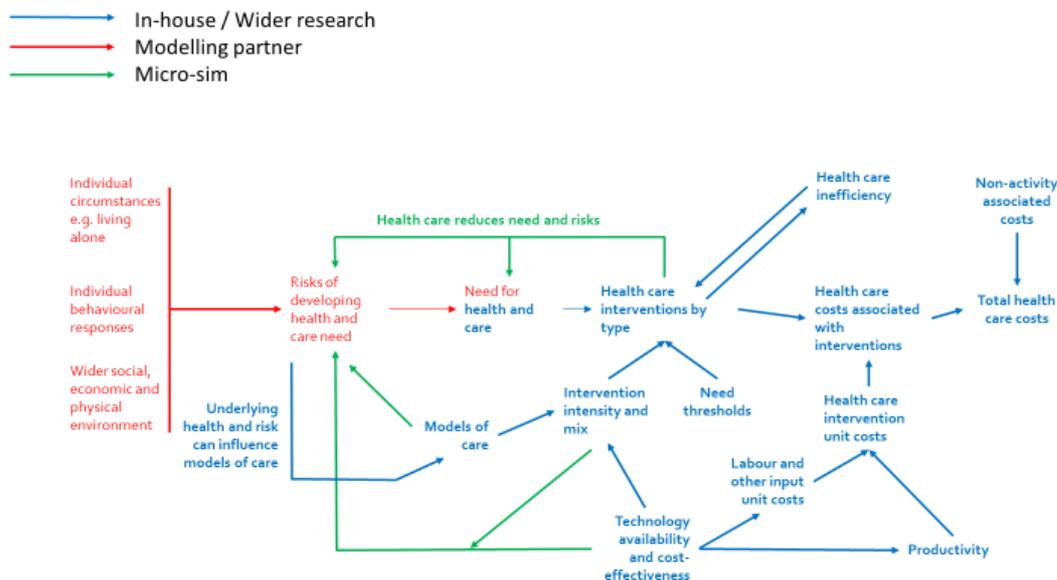


The in-house research of the Health Foundation has focussed on the health care activity and costs, using patient level administrative data to analyse trends in activity and to project those trends into the future. This research is represented towards the right-hand side of figure 1 (blue in figure 2 – in conjunction with the wider research of the centre). In the aim of producing a more sophisticated model of health care trends in activity and cost, our research will seek to expand our research to model the impact of risk factors that lead to multi-morbidity and more complex health care needs.

We therefore present, in figure 2, the areas of the conceptual system where we hope to work with a modelling partner to develop our research to cover both population risk factors and model the complex feedback loops and interrelated aspects of the health system.

We have split the expected research areas of the modelling partner into those elements which pertain to epidemiological and population health research (in red) and the areas which require complex person level modelling techniques such as microsimulation (in green).

Figure 2: health care demand elements of conceptual model



These elements are considered to support us to understand the latent demand in relation to healthcare and the factors that drive an individual's latent health need. By exploring these elements, the work conducted a part of this phase will support the development of a final integrated model in three ways:

- Offer insight as to the epidemiological factors that lead to a need for health care services and how these factors manifest and interact, in addition to their impact.
- Offer insight into the impact of the wider determinants of health and how these impact an individuals' health and ongoing healthcare needs across their lifetime.
- Provide insight into the ways that healthcare services can exacerbate existing health need or create new health need and how this impacts the long-term health of individuals.
- How continued unmet need affects the future health and treatment of patients.

Examples of the types of knowledge that is required to build this model includes:

- Does early diagnosis of morbidity increase or decrease health care needs in the longer term (e.g. cancer/COPD)?
- How do changes in behaviours such as smoking, inactivity, addiction, poor nutrition and unhealthy sexual behaviour impact the long-term care needs of these individuals?
- How do changes in models of care impact the levels of met and un-met need of the public?
- How does a failure to prevent morbidity impact on future care needs (e.g. ongoing care for those who have the flu due to non-vaccination)?
- If new treatments for terminal illnesses were to emerge, how would this change future care needs (e.g. a treatment for dementia)?

## Appendix B

## Definitions

### Healthcare demand

Healthcare demand is the amount of health care required to improve and individual's health as much as possible, conditional on age, current medical technology, chronic illness and one's lifetime behaviours. For instance, an 80-year-old experiencing frailty cannot expect to hold the same level of "health" as a 25-year-old athlete. Their demand for healthcare is therefore different; both are restricted by the limits of medical science. This totality of need is called 'latent demand'. Latent demand consists of three separate forms of demand: observed, unmet and avoidable.

- a) **Observed demand:** As researchers we never observe the latent demand for healthcare, we observe the meeting of this demand through the health care system. How this demand is met depends on multiple factors related to the supply of health care, including staff, resources, commissioning decisions and medical science to name a few. When this demand is met, we observe health care activity and the associated costs, this varies from a stomach flu, resulting in a visit to a primary care practitioner, to palliative care in an intensive care unit as a result of chronic fatal liver disease.
- b) **Unmet demand:** Unmet health care needs are determined as the difference between the services judged necessary and the services actually received; this stems from barriers related to accessibility (related to cost and proximity), availability (related to the timely provision of health services) and acceptability (related to personal attitudes and circumstances). Examples may include undiagnosed mental health issues due to a lack of patient recognition of their illness, poor dental care due to fear of the dentist, or an unaddressed mobility issue due to an inability to access healthcare services.
- c) **Avoidable demand:** In addition to unavoidable health care costs, including treatment of the common cold or hip fractures, some of this latent demand is avoidable from a public health perspective as it is results from exposure to risk factors, such as air pollution, diet and smoking. Considering the underlying demand for health as a derived demand in a decision to invest (or not) in good health can help us to understand the importance of public health policy. For our purposes in understanding the underlying drivers of demand for healthcare we will describe latent demand and need for health care in this way.

### Social determinants of health

When we talk about the 'social determinants of health', sometimes also called the wider determinants of health, we are referring to the social, cultural, political, economic, commercial and environmental factors that shape the conditions in which people are born, grow, live, work and age. Examples include housing, employment and social connections.