

# **Modelling hospital birth activity in the Black Country**

Using collaborative modelling to estimate the scale and nature of future health care activity

# Safe, effective maternity services are built upon a clear understanding of need. We worked with the Black Country STP to provide this

Planning for future demand and need is a core task of any healthcare commissioner or provider of services. Understanding what future demand might look like is not straight forward but it is vital to ensure informed decisions are made relating to expansion or consolidation of capacity.

Maternity and infant health was identified in 2017 as one of four priority areas within the Black County Sustainability and Transformation Plan (STP). A cross organisational work programme was established to review maternity and infant health provision across the STP area.

The Strategy Unit was commissioned to support this workstream by developing a model that would provide estimates of the **volume and nature** of obstetric (birth related) activity that the Clinical Commissioning Groups (CCGs) and hospital trusts within the STP might be expected to deliver in the medium term (over the next five years).

# Projecting future demand is not simple. A sophisticated and collaborative approach to modelling is required

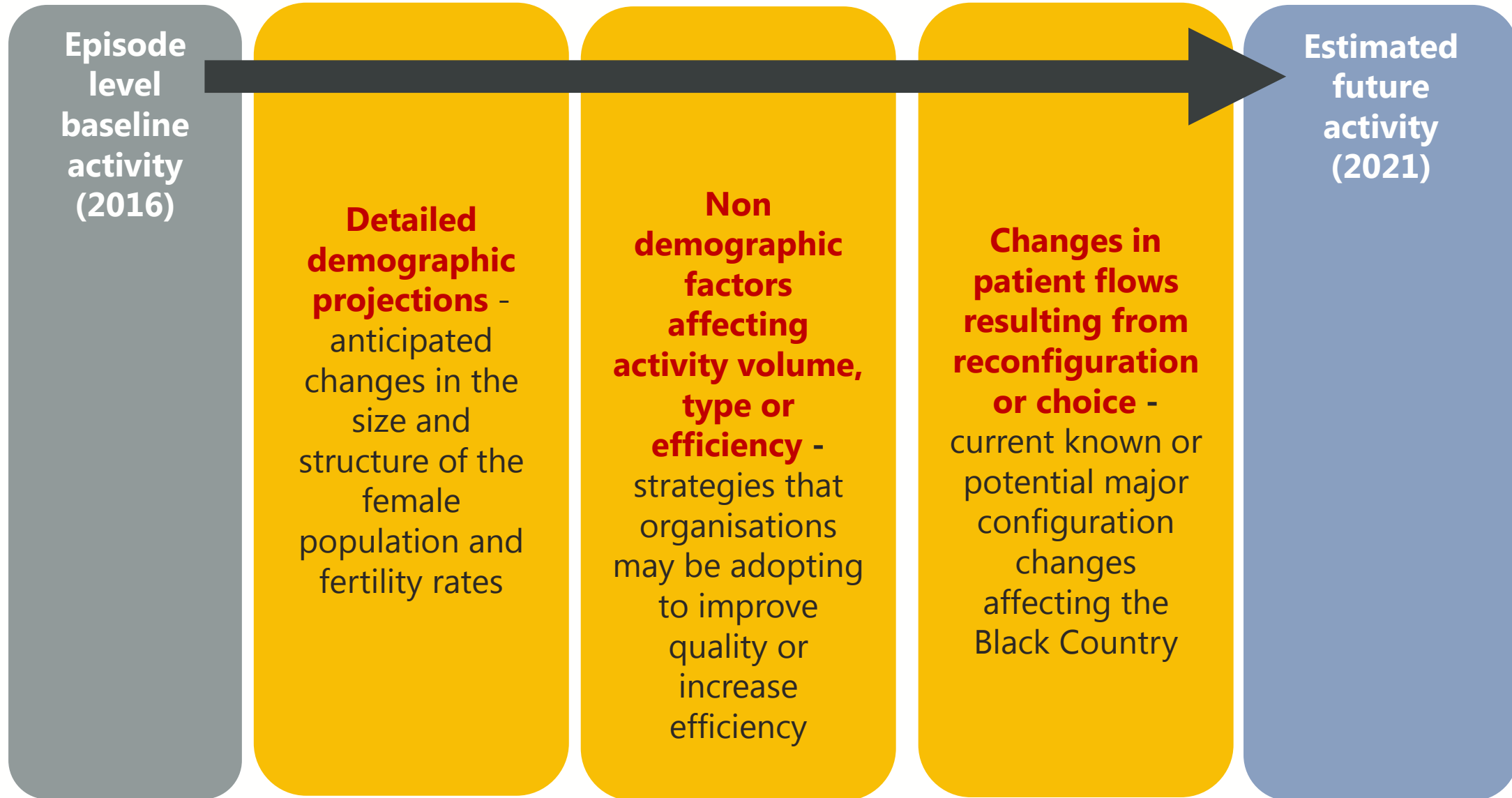
The Strategy Unit has extensive experience in developing activity models across a variety of health and care sectors and previously developed a similar maternity model in 2012 for CCGs and providers across Birmingham and Solihull.

Projects of this type often result in “black box” models, which even if highly sophisticated, can severely limit their value and utility. The model users should understand and have confidence in the model and its outputs, in order to be able to make and justify decisions to ensure sustainable provision for the future.

The Strategy Unit employ a collaborative and pragmatic approach in developing activity models which ensures the methods, inputs, factors and assumptions that drive the model and its outputs are transparent, well understood and agreed by those who will be using it.

The approach provides outputs that are robust and resilient to challenge and-therefore-can be used with confidence when making important planning decisions.

# Our model accounted for multiple factors that affect both the nature and scale of future demand

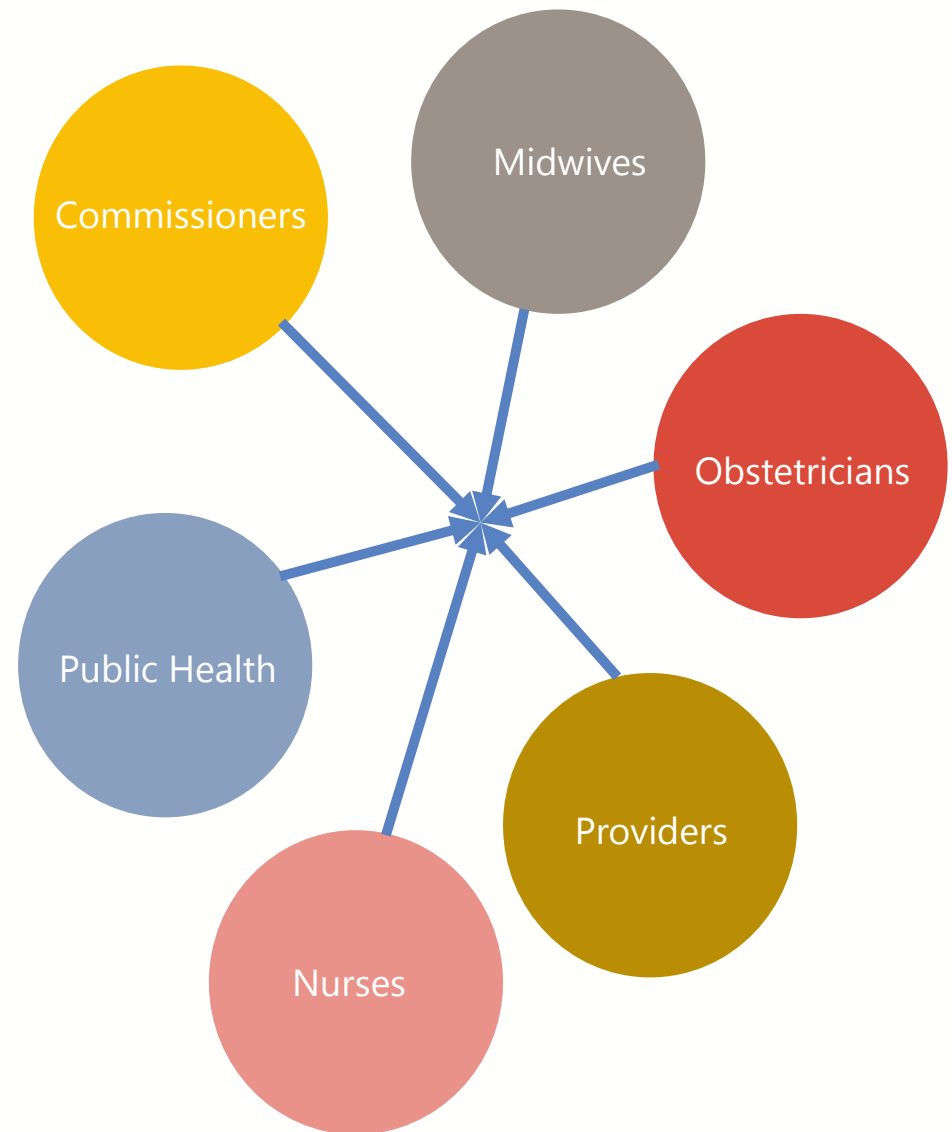


# Well-reasoned, shared assumptions are vital; we worked with a multi-disciplinary expert group to produce them

*Our collaborative modelling approach involves leading a series of facilitated reference group workshops whose membership includes expert clinicians, commissioners and providers.*

*Within the sessions we share and explain the methodology, agree the conceptual model and its components and facilitate the group to agree a range of quantitative modelling assumptions. Detailed supporting data and analyses are provided within the workshops to inform the discussions and ensure that modelling assumptions are reasonable and plausible.*

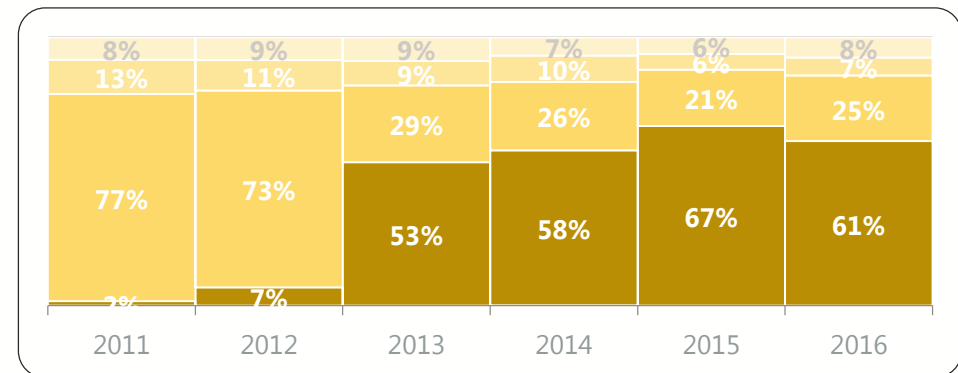
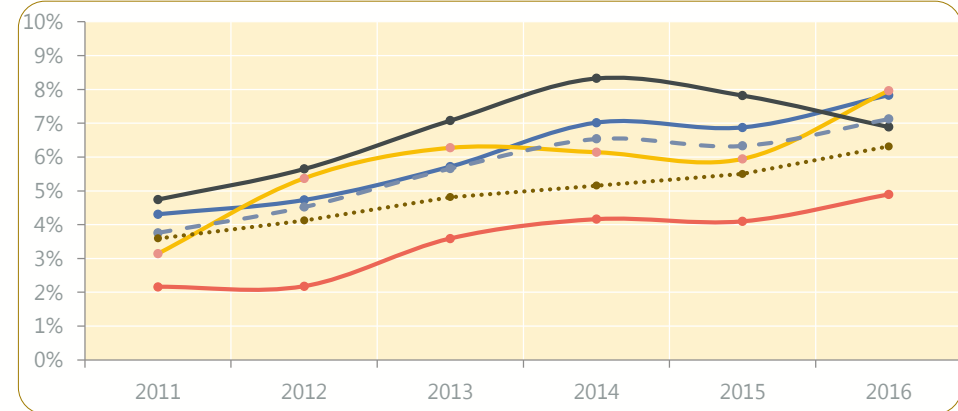
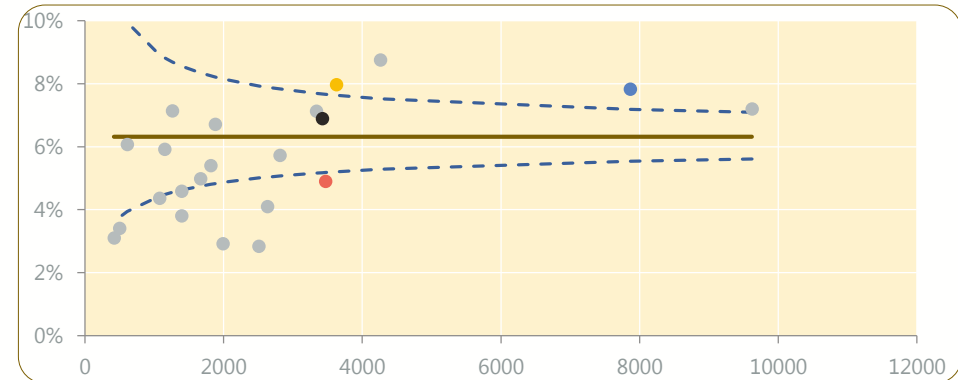
*The outputs of the workshop discussions and the assumptions agreed are translated into modelling parameters that are applied within a quantitative model, developed within a SQL server environment.*



# Assumptions about non-demographic factors were derived from detailed analysis of historical patterns

*The approach enables the reference group to consider a range of pre specified activity subsets (for example emergency C-sections) and consider the extent to which it is likely there will be changes in volume or length of stay, resulting from factors other than demographics. These factors might include new quality initiatives or strategies, changes in local practice, clinical developments or any other influences that might have an impact on that particular subset of activity. For example it might be that an improved monitoring protocol for high risk women is expected to reduce the level of emergency C-sections required.*

*Reference group members are facilitated to agree specific and quantified assumptions, taking into account supporting comparative and trend data and analyses, their own knowledge and experience, as well as the views and opinions shared within the workshop.*



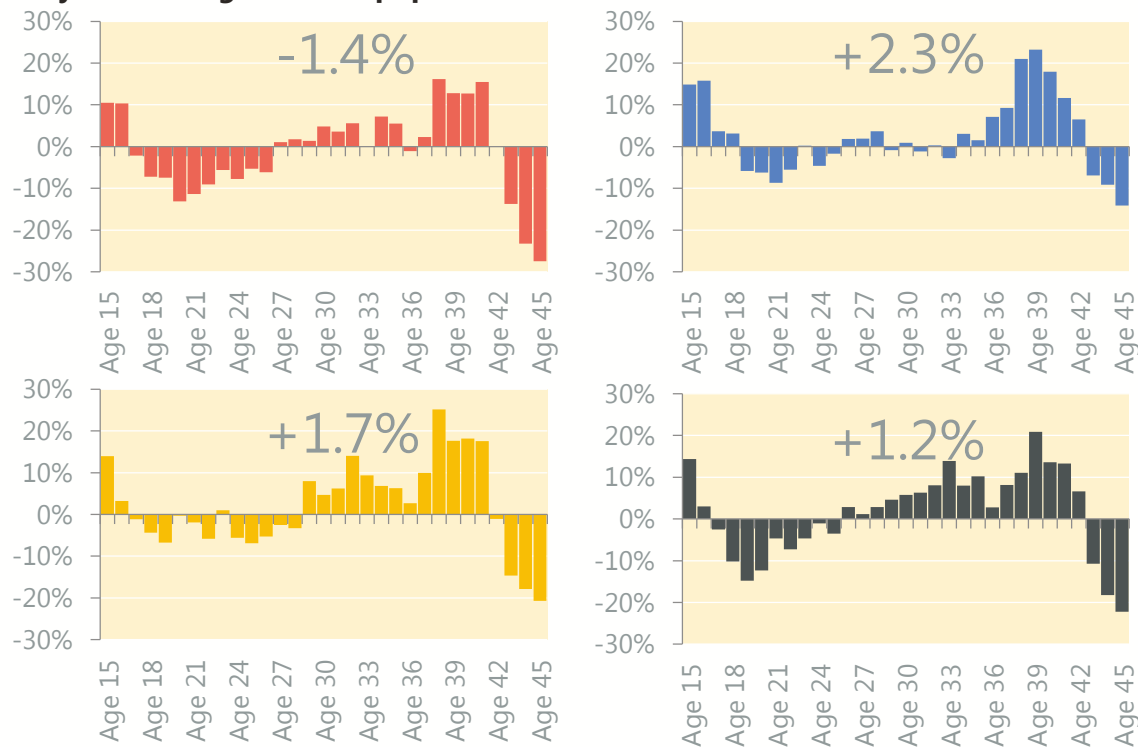
# Analysis of demographic factors revealed clinically significant changes in the nature of expected demand

There are three key demographic factors that will impact on the number of births:

- **Changes in the total number of women in the population of child bearing age**
- **Changes in age specific fertility rates (births per 1,000 women)**
- **Changes in the age profile of women of child bearing age (e.g. relative growth in the number of women with the highest fertility rates)**

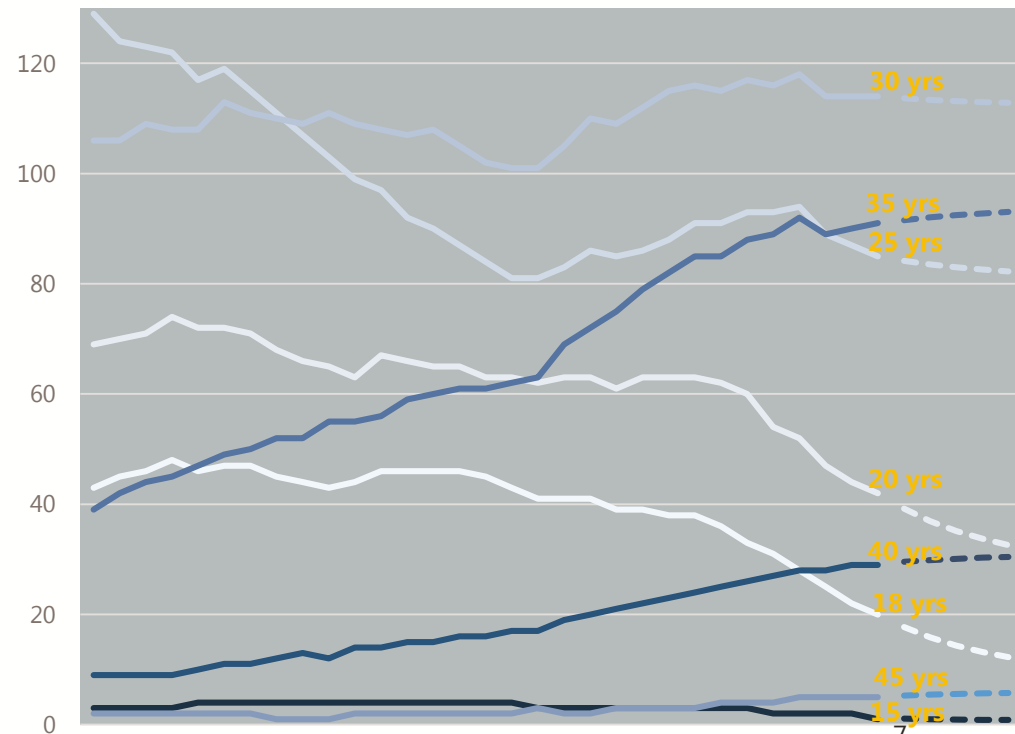
Our model takes account of each of the above factors such that the combined effects of growth in the population of women over 30 and projected increases in fertility rates for older women (and the opposite for women under 30) are accounted for within the model.

**Projected changes female population size and structure 2016-2021**



Source: ONS subnational population projections

**Trends and projections in fertility rates for a selection of ages**

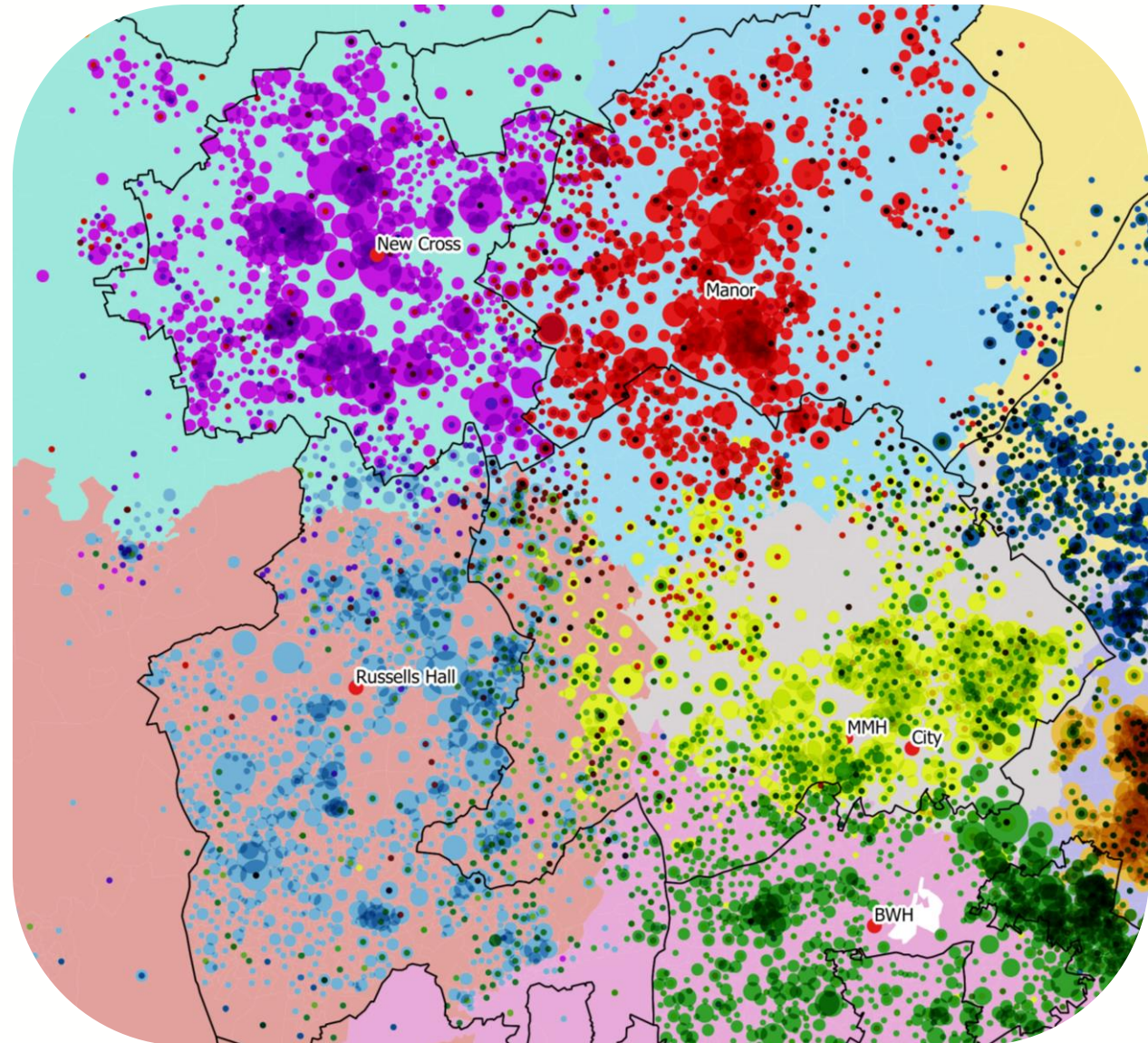


# We also modelled likely patient choices given potential changes of service location

Two key scenarios were modelled within the analysis:

- **Opening of the Midland Metropolitan Hospital (MMH) with all obstetric services moving to MMH and the closure of services at City Hospital**
- **Transfer of obstetric services from the Princess Royal Hospital in Telford to The Royal Shrewsbury hospital (in Shrewsbury).**

Travel time analysis using TRACC<sup>®</sup> accessibility software was conducted to establish likely changes in patient flows under each scenario based on nearest provider. In addition a number of additional modelling assumptions relating to patient loyalty, hospital reputation and a “new hospital” effect were agreed with the reference group and applied within the model.

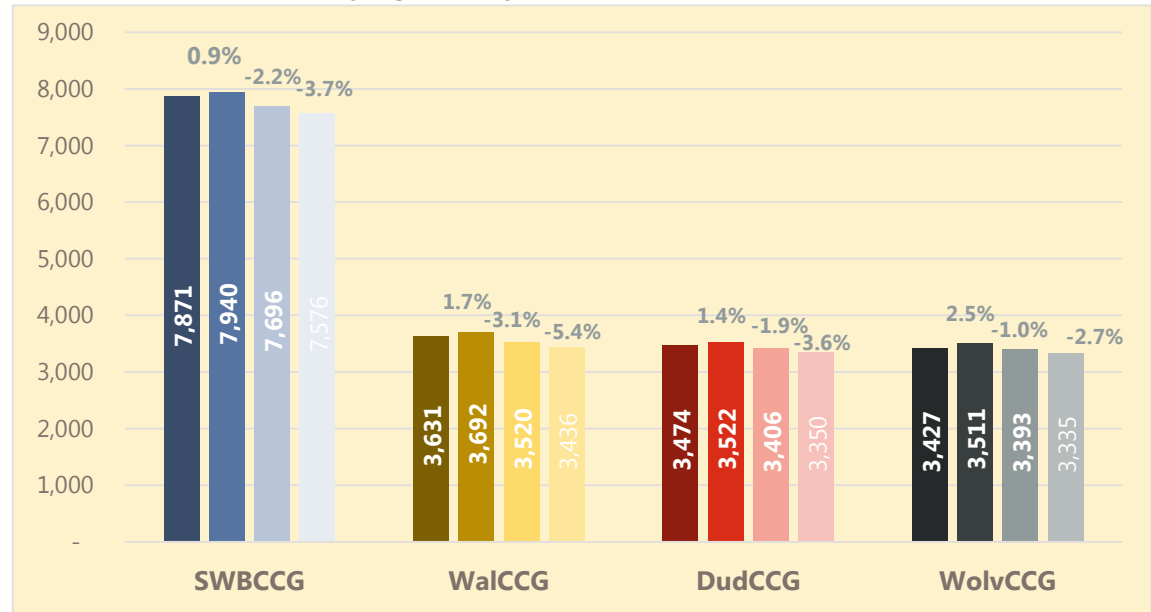




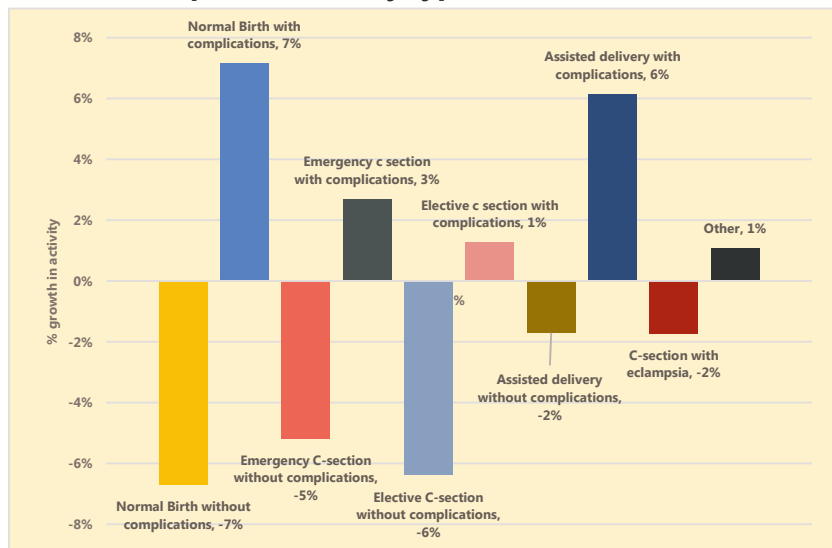
# Our results provided detailed descriptions of future need, enabling clinically meaningful planning

- Outputs included:
- Estimates of future levels of obstetric activity within Black Country CCGs
  - Estimates of changes in the type or nature of birth episodes
  - Estimates of future bed days at each provider
  - Estimates of future activity at each provider under each reconfiguration scenario

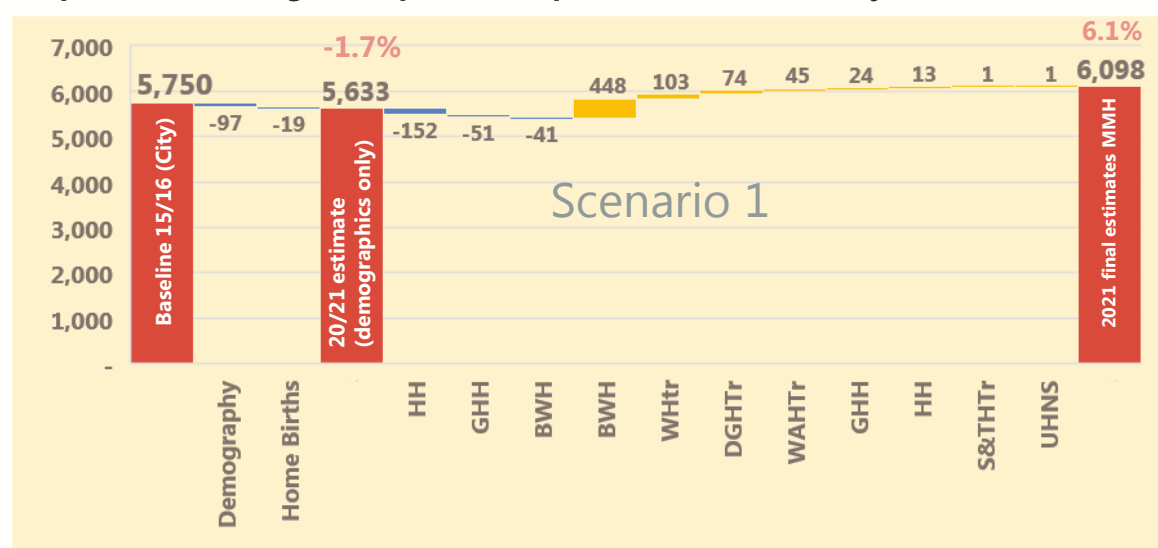
Birth episodes under varying fertility rate assumptions



Estimated impact on activity type



Impact of modelling assumptions and patient flows on activity at SWBHT



# The approach used in the Black Country STP provides a blueprint for other areas

- A facilitated collaborative modelling approach to maternity activity produces robust and well understood estimates of future activity which can support effective planning of maternity services at both a local and regional level.
- The approach provides technical sophistication and is built upon extensive analytical work conducted by the analytics team over many years.
- Stakeholder engagement, embedded within the process, ensures the level of understanding required to have confidence in the model and its outputs.
- Reference group workshops provide opportunities for commissioners, providers and clinicians to engage in debate allowing for the development of a shared understanding and vision.
- The approach is easily transferable to other maternity systems.
- The approach has been applied by the Strategy Unit in a number of different sectors including acute hospital activity (A&E, inpatient and outpatient) and non acute healthcare (Primary care, MH, social care and community).
- It is flexible and adaptable to allow the accommodation of different approaches or reconfiguration scenarios.



Jake Parsons

Analytics Manager

T: +44 (0) 121 612 3874 | 07702 444 030

E: [jake.parsons@nhs.net](mailto:jake.parsons@nhs.net)