

SIPHER Consortium Info Pack

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Systems science
In Public Health and
Health Economics Research

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Using this Info Pack

Researchers in SIPHER have produced this Info Pack because our Community Panel members told us that the research can be difficult to get to grips with.

We want people to understand our research so they can help us improve it and so that the tools we build have the best chance of making a difference. Community Panel members have told us what would help them to understand the research better and have given us lots of useful feedback on drafts of the content. They asked us for a glossary in the pack, and throughout the document you can click on words that are [blue and underlined](#) to be taken to the glossary entry for that word.

We will keep improving the info pack as time goes on: please share any feedback on it with Ellen Stewart – ellen.stewart@strath.ac.uk.

Introduction to SIPHER

SIPHER is a research project that works with people in government. The research builds evidence tools that can help people in government to make decisions that will benefit all of society.

We're making computer [models](#) that will pull together information about how things like income, jobs, housing and health interact with each other. We hope that people in government can then use these models to simulate what would happen if they made this or that decision.

We're working with Sheffield City Council, the Greater Manchester Combined Authority, and the Scottish Government on this. They've all asked for our help and they're helping us too.

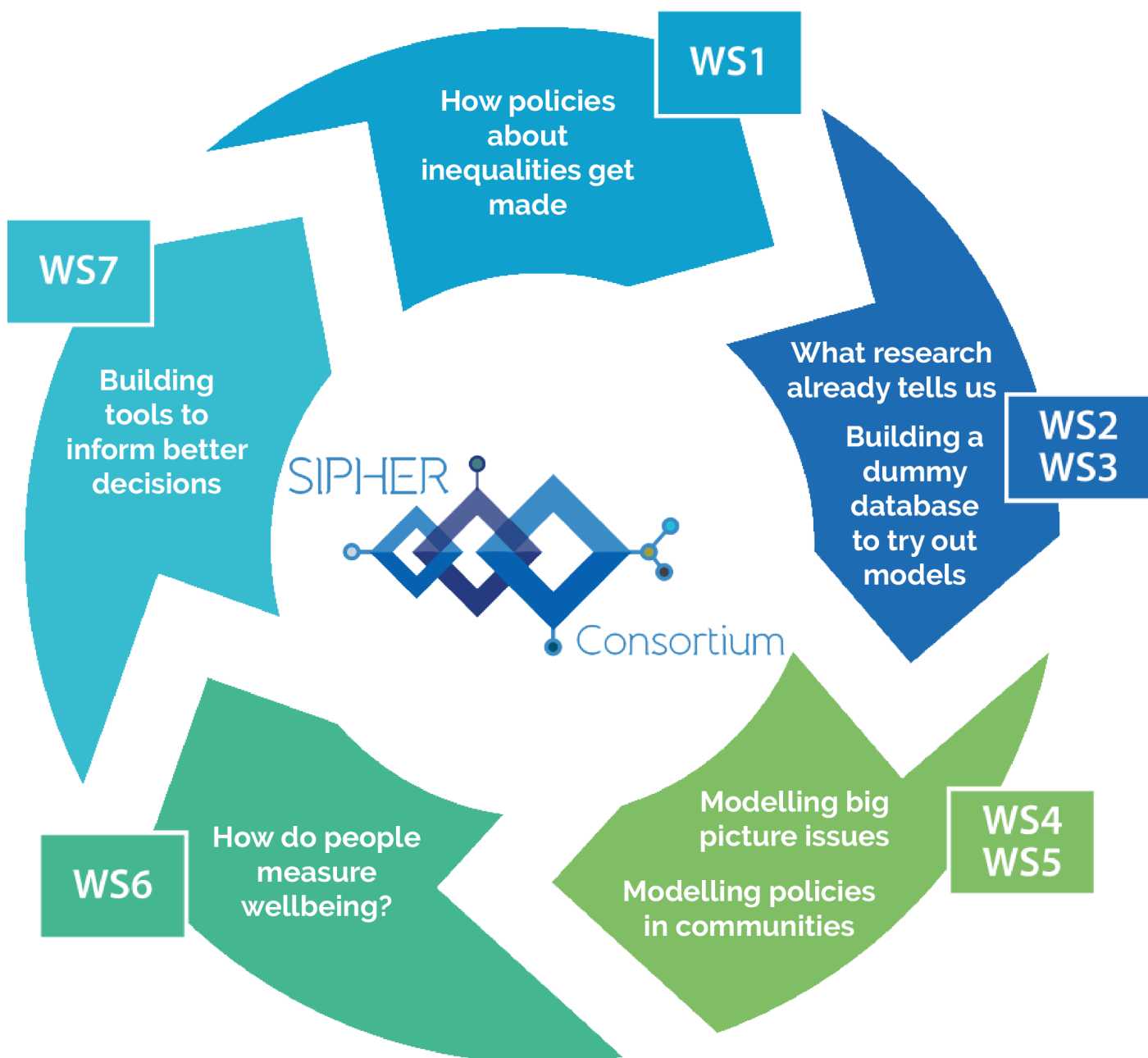
They will help us identify particular issues that they want help with. For example, [inclusive economies](#), [housing](#) and [public mental health](#). We're focusing on inclusive economies first.

SIPHER is funded by a group of charities and research councils who fund research to improve health, called the UK Prevention Research Partnership. We are funded for 5 years from 2019 until 2024.



Our Teams

SIPHER includes researchers working at different universities, along with people working in our [policy partners](#) organisations. We are all organised into 8 workstrands.



Workstrand 1: How policies about inequalities get made

This SIPHER team is researching how policy decisions about reducing unfair differences and improving health are made. We have colleagues working with the [policy partners](#) who can give us a sense of what happens day-to-day. We are also interviewing people working in each of these organisations to ask them directly about their work. Finally, we are looking closely at all the reports they write. We are using all this information together to try to understand what actually happens.

Governments often say they want to improve people's health and reduce unfair differences (in things like incomes, housing, education and health), but there are lots of different ideas about how to do this. There can be difficult decisions when public money is limited – investing in one area (e.g. housing) may mean doing less in another (e.g. schools). Finally, different groups – like charities, community organisations, academic experts and business leaders – can have different opinions on what the problems are and how to fix them.

We want to know how people in government approach these difficult decisions. SIPHER's aim is to make computer [models](#) that they can use to help them weigh up the pros and cons of different decisions.



Workstrand 2: What research already tells us

This SIPHER team is using a process called ‘systematic reviewing’ to find everything that other researchers have written before to help us with the big problems we’re interested in: [inclusive economies](#), [housing](#) and [public mental health](#).

This includes working with other SIPHER teams to find the most important topics to look at, searching for relevant studies, and judging whether the studies are reliable. We’ve got procedures to do this, developed by experts, so that we can judge whether a piece of research is good enough to rely on or not. Then when we’ve got all the most useful studies together, we can combine the relevant info from them so we have the best possible overviews of the evidence.

This will make sure we can make the best use of what is already known in planning and doing our own research. We also hope that, once we’ve got this process working the first time, it will be easier to do it again and to include new evidence going forward, both from us and from others.



Workstrand 3: Building a dummy database to try out models

Firstly, this SIPHER team will work with colleagues in the Scottish Government (SG), Greater Manchester Combined Authority (GMCA) and Sheffield City Council (SCC) to find out what kind of data they already have about the people that live in their areas, especially on things that are relevant to our big topics: [inclusive economies](#), [housing](#) and [public mental health](#). There are also surveys, like the national census, that have lots of useful data and provide government agencies with information, such as who is working and paying tax, who is claiming different benefits, and so on.

A big part of this job is to access and manage the data safely and securely so that nobody breaches GDPR or confidentiality rules. We will also find out what data doesn't exist but that might be useful for how these topics affect the people in each area.

The second big part of this team's work is to use all the data they can find in different places to create a "[synthetic population](#)", who will have attributes like age, gender, income, family relationships, health status and so on, similar to the real people in these areas. The useful thing is that this population is made up of individuals, rather than being based on averages. Once we've got that done and in the [model](#) then the politicians and staff at the Scottish Government, GMCA and SCC will be able to try out different policy ideas to see what the effects might be on the population. This is SIPHER's aim in the end: to make computer models that help inform people in government who are making decisions that could benefit all of society.

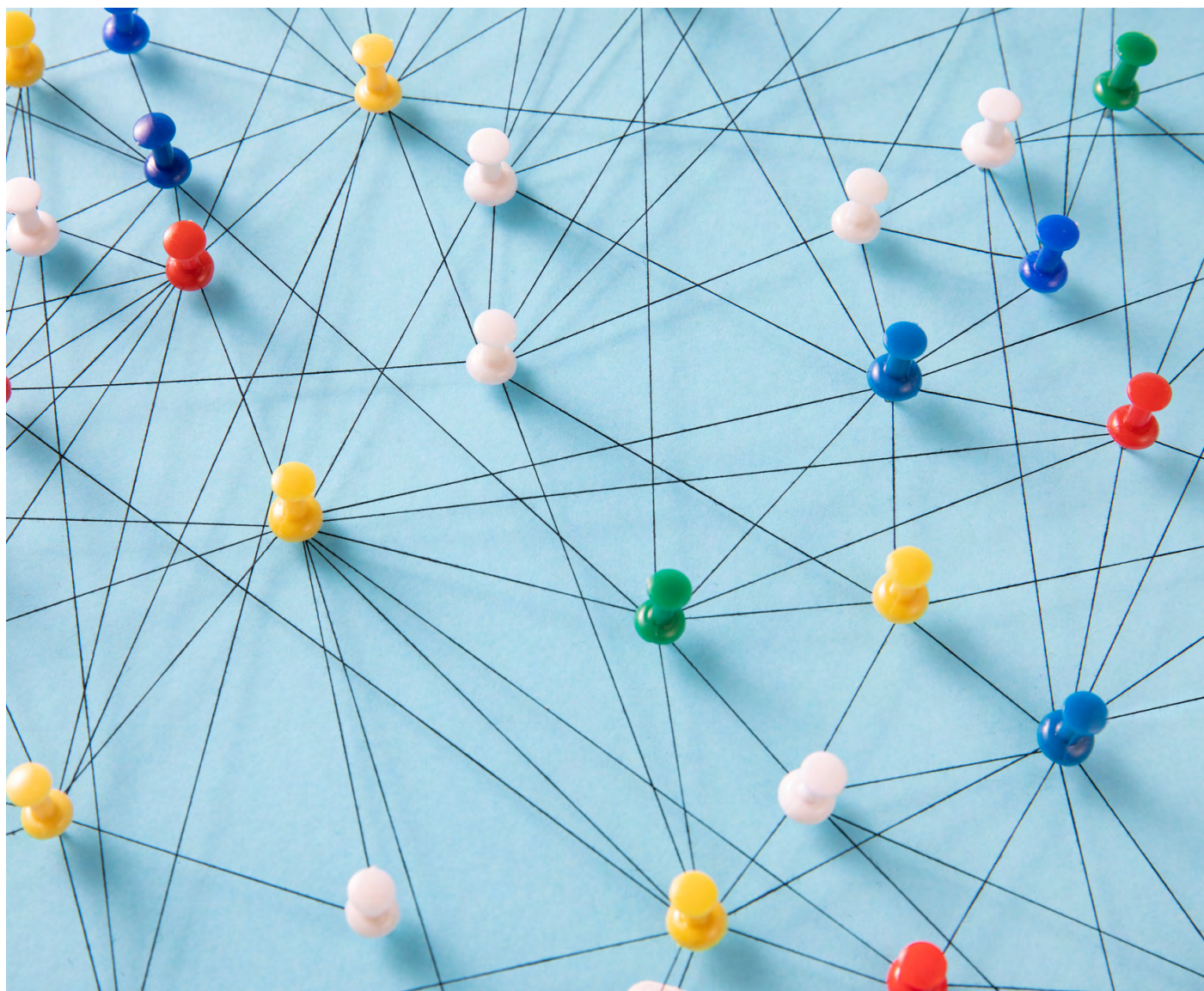


Workstrand 4: Modelling ‘big picture’ issues

This SIPHER team is working on the part of the computer [model](#) that’s all about what causes what and how. This mostly involves numbers and equations and trying to work out exactly what those numbers and equations should be.

For example, if a local politician wanted to raise bus fares by 10%, we want the model to be able to predict what might happen. Would it raise more money for the buses? If so, how much more? Or would people use buses less often? If so, which people would use them less? Would they then be stuck where they are, or would they walk, cycle or get lifts? If they were stuck where they are, what effect would that have on their lives?

This team will look for evidence to plug into their equations and test them against what happens in real-life situations until they’ve got a set of formulas in the model that reflect the real world.



Workstrand 5: Modelling policies in communities

This SIPHER team is going to work with the [synthetic population](#), the dummy database of people created by WS3. Firstly, it's going to try to keep it up-to-date by working out how it's likely to change over time because we expect that getting updates on how the real population is changing might be tricky and expensive. That also includes estimating the effects of new policies on the population.

Secondly, this team is also going to help the policy partners to experiment with the synthetic population to test different options out. For example, "what if we targeted help-to-work schemes at young men in this neighbourhood, what impacts would that have?" or "what if we targeted middle-aged men instead, or women, or a different neighbourhood?"

This is an important part of SIPHER's overall aim to help inform people in government who are making decisions that could benefit all of society.



Workstrand 6: How do people measure wellbeing?

This SIPHER team is investigating how the public decide how valuable different options are, when there are pros and cons either way.

For example, if politicians have the chance to approve a new factory that will bring jobs to a local area but the jobs will be low-paid and the factory will cause noise and pollution, how will they make that decision? Or if they could invest public money more efficiently in a richer area than in a poorer area, should they do so, even if it makes inequality worse?

These difficult decisions can't always be solved by facts. There may not be a simple right or wrong answer because they're about what we value as a society. How much do we care about these things? So, this SIPHER team is working out how to include people's preferences about what they value into the computer [models](#) that we're building to help people in government make better decisions.



Workstrand 7: Building tools to inform better decisions

This SIPHER team brings together the other teams' work to create tools our [policy partners](#) can use to give them information for their decisions.

This team works with Workstrands 1, 2, 3, 4 and 5 to draw maps of how the decisions of different parts of government might affect others. For example, how do health decisions affect employment, and how do employment decisions affect transport, and how do transport decisions affect health, and how do housing decisions affect employment, and so on. This means people in government will be able to better understand and communicate the knock-on effects of their decisions.

This team then uses the [models](#) built by Workstrands 3, 4 and 5 to help inform people in government about decisions they need to make. These models are computer software that can simulate decisions and predict their knock-on effects, both good and bad. This includes knock-on effects in the economy, as well as for the daily lives of people living in the community.

When there are both good and bad effects, the public preferences learned by Workstrand 6 will help people in government to balance their choices.

This is the ultimate aim of SIPHER – to give people in government tools to inform their decisions about ways to improve people's wellbeing and reduce inequalities.



Workstrand 8: How are we doing?

We need to collect information along the way about how SIPHER is doing, instead of waiting until SIPHER's funding ends to find out. We want to know if something isn't working, so that we can make changes before it is too late. This SIPHER team has three main jobs that are all about looking at how SIPHER is doing.

Firstly, we want to know whether we're actually making a difference to the way our [policy partners](#) think about policy. We have representatives of each as part of our management team, and we also have what we call 'embedded researchers' who are working on SIPHER but employed by our policy partners. Secondly, we want to understand whether our ways of working are the best ways or whether we should be doing anything differently. Thirdly, we have our Community Panels, where we talk about SIPHER's work to people who have life experience of the policy issues we are looking at. This means we can learn from what they know about their communities and make sure we're more-or-less on the right track. This is the bit that Ellen is responsible for.



Glossary of Terms

Sometimes in SIPHER we can use terms that seem like jargon. We use them as shortcuts to talk to other researchers, and in the Community Panels we try to avoid them. But we definitely still sometimes do, so we hope this glossary will help. Please let Ellen know of any other terms that you would like us to add.

Complex systems

When we talk about **complex systems** think about times when the whole is more than the sum of its parts. It can be difficult - or impossible - to explain the whole of something by talking about each part. Parts are interlinked and have knock-on effects on each other.

There are examples of this in nature: the human body is an obvious one. Our modern society is a man-made complex system. It's really difficult to explain how all the individual people, businesses, schools, factories, homes, organisations, transport networks, villages, towns and cities interact to make the economy and the society that we live in. They all affect each other.

In SIPHER, we try to do this using computer models to help us. SIPHER's aim in the end is to make **complex system models** that people in government can use to inform their decisions about policies that could benefit all of society.

Health inequalities

Health inequalities are the differences in health between people that are unfair and could be prevented. For example, the average life expectancy for people who live in Greater Manchester is lower than for England overall. Even within Greater Manchester there's a big difference between the health of people in richer areas like Trafford and in poorer areas like Manchester City.

That's not just because of things those people are doing, it's because of the social determinants of health – things like housing, jobs and income that are not really within people's control. But they are within the control of governments.

One of the main aims of SIPHER is to inform people in government who are making decisions that could reduce unfair and preventable health inequalities.

Housing

We all know what **housing** is, but in SIPHER, we're thinking about how government policies might be able to improve housing in an entire country, region or city.

Greater Manchester Combined Authority have told us they're especially interested in working out how best to improve housing with their policies.

Poor quality housing can harm your health if it's damp, or if it's small and cramped, or if it's unaffordable or insecure it can cause stress and depression. Of course, people who are homeless or sleeping on friends' sofas might be struggling in various ways too.

At SIPHER, we want to develop models that will help inform people in government so they can make better policy decisions, including about housing. In the end we hope these policies will help all of society.

Inclusive Economies

When we talk about **Inclusive Economies** (or sometimes **Inclusive Growth**) think about a society where everyone is able to get involved and live well. It's an ambition that all our policy partners – Scottish Government, Greater Manchester Combined Authority, and Sheffield City Council – have told us they want to aim for.

In the past, policy often relied on the idea of the 'trickle-down' economy, where wealthy people do well and it's assumed that jobs and money and opportunities will 'trickle-down' to everyone else. In an inclusive economy, the government does things to spread opportunities for work and education around, so that everyone can both contribute and benefit.

Indicators

When people in government make decisions, they need to know what the results are. They keep an eye on how things are going by looking at the **indicators**. For example, one important indicator is the youth unemployment rate.

So, if they compared the unemployment rate among young people in this neighbourhood to that neighbourhood, that might say a lot about the government decisions that have already been made and about what decisions might improve things.

Indicators give answers about how things are going. So, what questions should they be asking?

How many children are living in poverty? How many young people don't get qualifications? How many people don't have internet access? SIPHER and our policy partners want to know which questions are the most important and which indicators help us to answer them.

Public Mental Health

Everyone has their own mental health, but for SIPHER, we're thinking about how government policies might affect mental health across an entire country, region or city. That's **Public Mental Health**. The Scottish Government have told us they're especially interested in working out what policies might improve people's mental health.

In Scotland, people living in poorer areas are much more likely to have poor mental health than people in richer areas. Having mental health problems can have lots of negative effects on people's lives. For example, people might struggle with their relationships, to get a good job, or might turn to unhealthy habits to help themselves feel better but that make them ill in the end.

At SIPHER, we want to develop models that will help inform people in government who are making decisions about things that impact mental health. In the end, we hope these policies will help all of society.

Models

When we talk about computer **models** think about a recipe. Imagine you're baking a cake without a recipe. You'll have to think about all the different ingredients you might include, where to get them from, how much they cost, and how to cook them all. How much flour, butter or water do you need? What flavourings will you add? How long does everything have to cook for? When do you need to start so that it's ready when you want it? There's lots of things to consider that you'll pull together in your head, and you might organise it by writing things down and using timers. Only when it's done will you know if you got it right or if you should do it differently next time.

People in government want to get decisions that affect society right the first time, they don't want to use trial-and-error like you can for baking a cake. So, SIPHER is trying to build computer **models** that can be like recipes for good decisions. If you use these ingredients and these methods you'll reduce inequality, or if you use those ingredients and those methods you'll increase employment, and so on. We hope this will lead to decisions that are good for us all as a society and good for our health. That's what all the teams within SIPHER are working on.

Policy partners

SIPHER's **policy partners** are people working in local, regional, and national government - Scottish Government, Greater Manchester Combined Authority, and Sheffield City Council. Sometimes we might abbreviate them to SG, GMCA and SCC.

They already talk to other groups – like charities, community groups and business leaders – about what to do, but they are also interested in our idea to develop computer models to inform their decisions. So, they're working with us to help us do that. They are partners in the research, which means they talk to us often about the challenges they face, and they employ some of our researchers, so they received some of the money that funds the research.

Social Determinants of Health

When we talk about the **Social Determinants of Health**, think about ways that your health is affected by what's around you, rather than by choices you make.

Most people think that health is different for different people because of behaviours (like smoking and exercise), genetics or luck.

That is part of it, but lots of evidence also shows that external things like education, jobs and housing have much bigger effects on people's health. And people don't have much control over these things. Opportunities for education, good jobs and housing need to be available to all and people need to know how to access them.

On the other hand, people in government do have some control of these things, so decisions that they make can affect the health of everyone in society. In the end, SIPHER's aim is to make computer models that can inform people in government who are making decisions that could benefit all of society.

Synthetic population

SIPHER's computer models will be able to predict the impacts of government decisions on people in Scotland, Greater Manchester and Sheffield. So we need to know things like the age, gender, income, qualifications, job status, health status and so on of people in those areas.

Then we'll build a dummy database or '**synthetic population**' to represent the populations of those areas in our models, so that people in government can see what the effects of their decisions might be.

There are a few reasons to have a dummy database. One is to gather together all the data that is currently scattered around in surveys and different databases into one place. Another reason is so we can predict what the effects of policies on individuals might be, when a lot of the data just now only tells us about averages, not individuals.



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