ZOE

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SYMPTOM TRACKER PREDICTS 1.9 MILLION HAVE SYMPTOMATIC COVID-19 IN THE UK

LONDON, UK - According to preliminary analysis on data from the new COVID-19 Symptom Tracker app, 1.9 million people aged 20-69 in the UK currently have symptomatic COVID-19. Developed by researchers at King's College London and healthcare science company, ZOE, the COVID-19 Symptom Tracker has already been downloaded by 2 million people across the UK. Contributors are using the app to track their daily health and any potential COVID-19 symptoms. It is also being used by healthcare and hospital workers nationwide.

The research highlights wide variation across the UK, with COVID hot spots including major cities like London, Birmingham, Liverpool, Manchester, Glasgow, and Belfast but also rural areas of South Wales currently experiencing problems with bed shortages.

To make this data actionable by the NHS, a secure, anonymised data pipeline has been established to deliver contributor information from the COVID Symptom Tracker app into the NHS via BREATHE – the Health Data Research Hub for Respiratory Health and SAIL Databank at Swansea University, supported by Health Data Research UK. This can support the effective deployment of limited NHS resources such as healthcare personnel, testing kits or ventilators to where they are most likely to be needed.

Regular downloads of anonymised data from the app will be securely delivered through BREATHE – the Health Data Research Hub for Respiratory Health into the SAIL Databank, making it accessible to NHS decision-makers and academic researchers. This also means that the app data can be linked together with other COVID-19 datasets generated by the NHS digital transformation unit, NHSX, and others.

The research team at King's College London and ZOE are working day and night to analyse the data to generate new insights about the disease and its progression. For example, they have discovered that loss of smell or taste is more likely to be an early symptom of COVID-19 than fever. An interactive map allowing anyone to see the distribution of COVID in their area is available at covid.joinzoe.com as well as frequent science updates.

The researchers have developed a statistical model which analyses millions of COVID Symptom Tracker data points, including thousands of people who have had tests for COVID, in order to predict which combination of symptoms indicate someone is likely to test positive for COVID-19. This model is then applied to the UK population aged 20-69. The most predictive individual symptoms, with most important first, were: lack of taste & smell, fatigue, shortness of breath, fever and persistent cough. As of 1st April 2020 there were 1,626,355 users of Covid Symptom Tracker aged 20-69 who had recorded their symptoms, healthy or not. The model estimates that 79,405 of these users would be positive if tested (4.9%). As contributors continue to share symptoms, the model will become more accurate and sophisticated.

In order to create a clearer picture of COVID-19 in each individual area of the UK, and predict the demand on the NHS in each hospital over the coming weeks, the app needs as many participants as possible spending one minute a day to log their health, even if feeling well. ZOE and the King's

College team are urging people to help support the NHS and their local regions by downloading the app and checking in daily - download here: https://covid.joinzoe.com

Lead researcher Professor Tim Spector from King's College London, says: "Accurate real-time data is essential if we are to beat this disease. What we are sharing today are just preliminary results from the two million people who are tracking their symptoms daily. The more people we can get logging their symptoms on the app, the quicker we will be able to really understand this disease. With so many across the country potentially infectious we have to rethink our policy of testing everyone and come up with other methods to rapidly understand the state of every part of our country. It is clear levels of infection are very different around the country. We would like to thank every single person who is already participating, and would urge everyone else to download the app and check in every day, whether you are experiencing any symptoms or feeling fine."

Professor Aziz Sheikh, Director of BREATHE, from the University of Edinburgh says: "Data from the COVID-19 Symptom Tracker app will be vital in the fight against COVID-19. We greatly welcome the opportunity to work with colleagues at King's College London and ZOE to securely host these data on the accredited SAIL Databank in order to assist UK efforts to enable the ethical and safe use of these sensitive data for public benefit."

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For more information about the app or to request an interview with Professor Spector, please contact both; Victoria Vazquez: +44 (0)777 613 7091victoria.vazquez@kcl.ac.uk and Eleanor Griffiths: +44 (0)7950 335916 eleanor@joinzoe.com

The app is available to download from the Apple App Store and Google Play from the links at covid.joinzoe.com. Daily symptom maps and other content are available via https://covid.joinzoe.com/blog

About Research Methodology

Based on data from the Covid Symptom Tracker app (covid.joinzoe.com) and the assumptions that we lay out below, we estimate that there are a total of 1.9m people in the UK with symptomatic Covid (aged 20-69 only) as of 1st April 2020.

Our estimate was calculated in 3 steps:

1. Learn which symptoms best predict Covid, based on app users who have been tested
2. Estimate total number of app users with Covid by applying those rules to all users' logged symptoms (people who don't report symptoms are not part of the model)
3. Extrapolate to the whole UK population from app users, based on region, age & gender proportions

In more detail:

1. Learn which symptoms best predict Covid
   2,932 users of Covid Symptom Tracker both recorded their symptoms and have been tested for Covid, with 1,130 testing positive and 1,802 testing negative. We used machine learning* on this data to learn which symptoms are most predictive of a positive test. The most predictive symptoms, with most important first, were: anosmia (lack of taste & smell), fatigue, shortness of breath, fever and persistent cough.

2. Estimate total number of our users with Covid
   In total there were 1,626,355 users of Covid Symptom Tracker aged 20-69 who have recorded their symptoms, healthy or not, as of 1st April 2020. We applied the rules learnt from the tested users to estimate that 79,405 out of these total users would be positive if tested (4.9%).

3. Extrapolate to the whole UK population from app users
   We segmented the whole UK population by location, age-decade and gender. For each such segment, we applied the percentage predicted as positive by our rules amongst app users, and then combined back to a total UK estimate.

More details available upon request.

About King's College London

King's College London is one of the top 10 UK universities in the world (QS World University Rankings, 2018/19) and among the oldest in England. King's has more than 31,000 students (including more than 12,800 postgraduates) from some 150 countries worldwide, and some 8,500 staff.

King's has an outstanding reputation for world-class teaching and cutting-edge research. In the 2014 Research Excellence Framework (REF), eighty-four per cent of research at King's was deemed 'world-leading' or 'internationally excellent' (3* and 4*).

Since our foundation, King's students and staff have dedicated themselves in the service of society. King's will continue to focus on world-leading education, research and service, and will have an increasingly proactive role to play in a more interconnected, complex world. Visit our website to find out more about Vision 2029, King's strategic vision for the next 12 years to 2029, which will be the 200th anniversary of the founding of the university.

World-changing ideas. Life-changing impact. kcl.ac.uk

About ZOE

ZOE was founded by Professor Tim Spector and data science experts Jonathan Wolf and George Hadjigeorgiou as a spin-out from King's College London. Based in Boston, US, and London, UK, ZOE is harnessing the power of data science and large-scale research studies to bring precision health and nutrition to everyone. joinZOE.com

About BREATHE

BREATHE is one of seven Health Data Research Hubs across the UK.

Coordinated by Health Data Research UK (HDR UK), the Hubs are part of a four-year £37.5million investment from UK Research and Innovation's Industrial Strategy Challenge Fund, to enable the safe and responsible use of health-related data at scale for research and innovation.

BREATHE is the Health Data Research Hub for Respiratory Health. Our mission is to facilitate and support responsible access to respiratory health data, sparking research and innovation for the benefit of UK patients.ed.ac.uk/usher/breathe

About SAIL Databank

Containing billions of person-based records, SAIL Databank at Swansea University, is a rich and trusted population databank. It improves lives by providing researchers with secure, linkable and anonymised data that can be accessed and analysed from anywhere in the world.

Swansea University, home of the SAIL Databank, is a partner of BREATHE.

https://saildatabank.com/