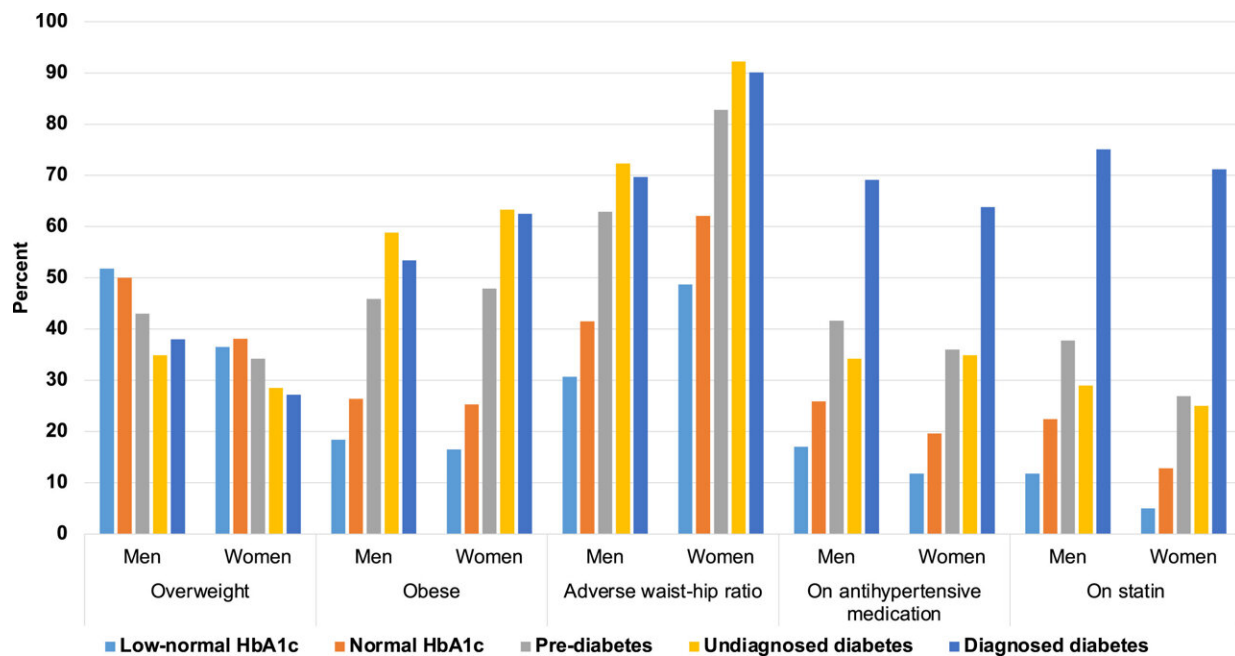


Raised blood sugar levels linked with increased risk of cardiovascular diseases

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Selected lifestyle and clinical characteristics by sex and HbA1c category. Credit: *The Lancet Regional Health - Europe* (2023). DOI: 10.1016/j.lanepe.2023.100693

Men and women with raised blood sugar levels have 30 to 50% greater risk of developing cardiovascular diseases even when these levels are below the threshold for diabetes, a new study has shown.

The study, led by researchers at the London School of Hygiene &

Tropical Medicine (LSHTM) and University College London (UCL), also found that, among people diagnosed with [diabetes](#), women's higher relative risk of developing any [cardiovascular disease](#) (CVD) than men disappeared once modifiable factors such as body measurements and medication use were taken into account.

The researchers discovered evidence that for [blood sugar](#) levels within the 'normal' range, it was a case of 'the lower the better' in protecting against CVDs. Compared to people with normal blood sugar levels, those with the lowest levels had a 10% lower risk of developing any form of CVD.

On the other hand, men with raised blood sugar below the threshold for diabetes had a 30% greater risk of developing CVDs and women with raised blood sugar below the threshold for diabetes had between 30 to 50% greater risk of developing CVDs. The risks were as much as doubled in those with diagnosed diabetes.

The study analyzed UK Biobank data from 427,435 UK individuals (54.2% women, 45.8% men) across the glycaemic spectrum, including people with blood sugar levels within a 'normal' range, those with prediabetes, and those with diabetes. The research is published in *The Lancet Regional Health—Europe*.

After adjusting for age, the researchers found that both men and women with moderately elevated blood sugar levels below the threshold for diabetes were at increased risk for any CVD, with relative increases higher for women than men.

Differences in the relative risk of developing CVDs between men and women largely disappeared after the researchers accounted for measures of obesity and the use of antihypertensive and statin therapies.

The research uncovered differences in the use of antihypertensive and statin therapies between men and women, with more men than women on these medications. It suggests that women are not prescribed these preventative medications at the same rate as men with similar blood sugar levels. The researchers say a study focusing on the factors behind this 'prescribing gap' is needed.

Lead author Dr. Christopher Rentsch from LSHTM said, "This work represents a meaningful step forward from decades of research on diabetes and [heart disease](#). We quantified differences in the risk of heart disease between men and women across the full range of blood sugar levels. What we discovered is that those risks are not only confined to people with diagnosed diabetes, that men and women with prediabetes are also significantly affected. Our team also uncovered compelling evidence that within the 'normal' blood sugar range, a lower level appears to be better for protecting against heart disease."

Senior author Professor Krishnan Bhaskaran from LSHTM said, "Our results suggest that the increased risks seen in both men and women could be mitigated through modifiable factors, including weight reduction strategies and greater use of antihypertensive and statin medications. This is an important new insight that should help guide future public health strategies."

Ruth Goss, senior cardiac nurse at the British Heart Foundation, said, "This large study adds to what we know about the association between consistently elevated blood sugar levels and an increased risk of heart and circulatory diseases. However, it's important to note that this can't be applied to type 1 diabetes as people with the condition weren't included in the analysis.

"As well as keeping your blood sugar levels in check, it's important to look at your lifestyle as a whole to ward off future heart problems. Try

to embrace a [healthy lifestyle](#) by eating well balanced meals, getting regular physical activity, and stopping smoking. Keeping tabs on risk factors for heart and circulatory diseases—including keeping your blood pressure and cholesterol at a healthy level and controlling your weight—can all help to reduce your risk of developing heart and circulatory diseases in the future.

"If you're aged 40–74 you can ask for an NHS health check in England, and similar schemes are available in other parts of the UK. This can tell you whether you're at higher risk of developing heart and circulatory disease and help you identify and address all relevant risk factors."

Dr. Lucy Chambers, head of research communications at Diabetes UK, said, "Every week, diabetes leads to more than 770 strokes, 590 heart attacks and 2,300 cases of heart failure, and we know women are at particular risk of poor outcomes. This important new research highlights strategies that could tackle sex-based inequalities in cardiovascular disease outcomes, including greater use of antihypertensive and statin medications in women.

"The research is also an important reminder that having higher than normal blood sugar levels over long periods damages blood vessels, increasing risk of cardiovascular diseases, and that this effect can be seen not only in people with diabetes but also prediabetes.

"If you are living with diabetes it's essential that you attend your annual diabetes tests and checks, and get support from your health care team to lower blood [sugar](#) levels and manage risk of diabetes complications, including discussing available medication options. If you have a diagnosis of prediabetes your health care team can support you to make changes to lower [blood sugar levels](#) to prevent or delay type 2 diabetes. Find out your risk of having type 2 diabetes by completing Diabetes UK's Know Your Risk tool."

About the study

Limitations of the study include that UK Biobank participants are healthier than the overall UK population, and that lifestyle data were self-reported.

The researchers conducted an observational cohort study using data from UK Biobank. The final analysis included 427,435 participants, including 195,752 (45.8%) men and 231,683 (54.2%) women aged 40–69 recruited between 2006 and 2010 across England, Scotland, and Wales, and followed through to 2021.

The researchers categorized participants at standard clinical cut-off points: low-normal (

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