TYPE 2 DIABETES

The relationship between socio-economic status and Type 2 diabetes varies with a country’s stage of development. A new study from China, the world’s most populous developing nation, reveals a significant shift in this relationship between 2000 and 2011. The findings have important implications for Type 2 diabetes prevention strategies everywhere.
Socio-economic status (SES) is a contributing factor to Type 2 diabetes around the world. Understanding the role played by SES is essential in the development of population-wide prevention strategies, so they may be effectively directed towards different groups in society.

Socio-economic status is a complex construct. There is no agreed ‘gold standard’ for its measurement. Indicators that are used to measure SES include income, education and occupation. Family average income, which is the total monthly household income, divided by the number of household members, does give a measure of a household’s material wealth and has been found to be a sensitive measure of SES, compared with other indicators.

The relationship between SES and Type 2 diabetes is complicated. It can act in either a negative or positive direction in the same setting, but at different stages in a country’s development. Previously, Type 2 diabetes has been a sign of affluence, with prevalence of the condition increasing with social position in higher-income countries. But we are now beginning to see a negative association between SES and Type 2 diabetes within higher-income societies, with those of lower SES being more likely to have the condition, independent of their ethnicity.

As an example of how the association between SES and Type 2 diabetes can differ in the same ethnic population in societies in different stages of development, compare Chinese communities in Hong Kong with those in mainland China. In the former, which is relatively prosperous, the association is negative, while in the latter the association is positive. In lower income countries, such as Bangladesh and India, the association between SES and Type 2 diabetes remains positive.

China is the world’s most populous developing country. After the launch of its Open Door policy in 1978, rapid economic development and lifestyle transition has occurred here. Gross domestic product (GDP) has gone up by a factor of around 185.4 in 2015 compared with 1978. In a new study, researchers based in Nanjing, China, and Brisbane, Australia, hypothesise that, as the Chinese economy grows, the association between socio-economic status and Type 2 diabetes is complicated. It can act in either a negative or positive direction in the same setting but at different stages in a country’s development. The 2.6-fold increase in the prevalence of diagnosed Type 2 diabetes in Nanjing from 2000 to 2011 coincides with a period of rapid economic growth in China.

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relationship between SES and Type 2 diabetes will gradually reverse from the current positive status to a negative one. Their research takes a detailed look at this association in Nanjing between 2000 and 2011, to see whether a point of inflexion, between positive and negative has been reached.

Investigating Type 2 diabetes in Nanjing

The researchers carried out two independent population-based surveys of residents aged 35 or older in the same urban areas of Nanjing. The population of the city, in the east of China, grew from 5.6 million in 2000 to 6.4 million in 2011. At the same time, GDP per capita had increased nearly five-fold. The new study aimed to find out what impact this change had had upon the prevalence of Type 2 diabetes.

The primary purpose of the 2000 survey was to investigate the prevalence of chronic conditions, including Type 2 diabetes and cancer, in Nanjing. Participants were given a structured health questionnaire that has been used widely in China since 1995. This questionnaire gathered sociodemographic, income, clinical, lifestyle and dietary information. The outcome variable was diagnosed Type 2 diabetes. Participant responses on the questionnaire were checked against medical records. Meanwhile, SES was measured using family average income. This was divided into lower, middle and higher tertiles. Covariates considered included diabetes risk factors, such as age, family history, smoking, weight, blood pressure and physical activity.

Analysis and results

Two models were constructed from the data through statistical analysis. Model 1 was a univariate model with average family income as the main effect. Model 2 was a multivariate model with family average income as the main effect and risk factors for Type 2 diabetes as covariates.

The number of participants who completed the survey in 2000 was 19,861 and in 2011 was 7,824. The proportion of those over 65 had increased from 16.5 per cent to 17.7 per cent. There were no significant demographic differences between respondents and non-respondents in each survey. Mean family average income had increased 2.9 times between 2000 and 2011.

There was a 2.6 times increase in the overall prevalence of diagnosed Type 2 diabetes between 2000 and 2011, from 3.0 per cent to 8.2 per cent. After age-standardisation, these figures were 2.5 per cent and 7.0 per cent.

In terms of SES, the unadjusted odds ratio for developing Type 2 diabetes in 2000 for the top and middle tertile compared with the bottom tertile were 3.31 and 2.50, respectively. In 2011, these figures had decreased to 2.11 and 1.68, suggesting that diabetes in China is approaching the predicted point of inflexion.

SES and Type 2 diabetes

The 2.6-fold increase in the prevalence of diagnosed Type 2 diabetes in Nanjing

Strengths and limitations of this study

Strengths

✓ Participants were representative of local regular residents.
✓ The sample size was large enough to identify sufficient cases of Type 2 diabetes.
✓ The same principal investigator led both the 2000 and the 2011 survey.
✓ The same questionnaire was used in both surveys.
✓ Participants were limited to urban regular residents within each survey.
✓ Diagnostic criteria for diabetes in China were the same for both surveys.
✓ A sensitive indicator, family average income, was used to measure SES.
✓ Recognised potential confounders were adjusted for in the analyses.

Limitations

✘ Only people diagnosed with Type 2 diabetes were included in analyses, which would underestimate the true prevalence of the condition. Some of the observed increase between 2000 and 2011 may be accounted for by more people being diagnosed by 2011.
✘ Incomes were self-reported and there could have been some under-reporting.
✘ The sampling approach used means that the participant may not have been strictly comparable with those in the latest census data in terms of education.
✘ The relationship between SES and Type 2 diabetes was analysed at an individual level, which means that macro-level indices of socio-economic development were not included in the analyses.
This is a digested version of Xu F, He J, Wang Z et al (2018). The relationship between socio-economic status and diagnosed Type 2 diabetes is changing with economic growth in Nanjing, China. Diabetic Medicine 35 (5); 567–575.

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from 2000 to 2011 coincides with a period of rapid economic growth in China. The relationship between SES and Type 2 diabetes remains positive, but the gap in prevalence between different groups is beginning to close. The findings of this study suggest that the relationship between SES and Type 2 diabetes in mainland China remains the same as that in other lower-income societies. This is the opposite to that seen in higher income societies. But that relationship is starting to change as China continues to grow as an economic power.

Whatever the direction of the relationship between SES and Type 2 diabetes – positive or negative – it is important to know, at any stage of a population's development, which groups of individuals are most at risk of the condition. From a public health standpoint, prevention strategies will be more effective if these groups are identified and targeted.

There are several factors embedded in people's SES which influence their risk of Type 2 diabetes. These include:

- unhealthy lifestyles and behaviours (unhealthy eating, insufficient physical activity)
- inadequate access to healthcare
- other inequalities in material circumstances
- psychological stress.

Dietary and physical activity patterns vary for people with different SES groups in higher and lower-income societies. For instance, people with lower SES in higher-income societies are more likely to eat fried/red meat, do insufficient physical activity and to be obese compared with those of higher SES. These differences may, in part, account for differing prevalence of Type 2 diabetes according to SES. The relationship between SES and dietary patterns, engagement in physical activity and body weight are in the same direction as the relationship between SES and Type 2 diabetes in both higher and lower-income societies.

Focus on China

China is the most populous developing country in the world. Over the last few decades, it has experienced continuous rapid economic development. This has led to a 4.6-fold increase in GDP per capita, along with a shift from the traditional Chinese to a more Westernised way of life. In particular, Chinese people are now consuming more high-dense energy foods and have become less physically active – lifestyle changes that put them at risk of Type 2.

So, it is perhaps hardly surprising that SES disparities in Type 2 diabetes have been decreasing in recent years. In the future, it is likely that the relationship between SES and Type 2 diabetes will transition through an inflexion point and become negative rather than positive, as found in other higher-income nations.

For policymakers, the question is – ‘at what level of economic development will the inflexion point be reached?’ Vulnerable subgroups will emerge at different stages of development and public health Type 2 prevention strategies will need to be adapted accordingly.

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