BMJ 2019;366:l5407 doi: 10.1136/bmj.l5407 (Published 11 September 2019)

EDITORIALS

Trends in type 2 diabetes

Falling or stalling rates can be deceptive

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The increasing prevalence of type 2 diabetes frequently makes headline news, apparently pointing towards a failure of prevention strategies. Although incidence and prevalence are still confused in the media—and even in more scientific reporting, Magliano and colleagues' new systematic review (doi:10.1136/bmj.l5003) of trends in diabetes emphasises that prevalence and incidence data tell very different things about a disease or epidemic.[1]

Prevalence is important to guide allocation of resources for management, but prevention strategies must be directed against incidence. Effective prevention always reduces incidence (new cases) but won't necessarily reduce prevalence, which can continue to rise through better treatment and an increase in the number of survivors.

Magliano and colleagues reviewed published data on the incidence of type 2 diabetes over three periods, across more than 100 populations in mostly high income countries.[1] They report that although incidence increased consistently until 2005, about one third of more recent studies suggest decreasing incidence and another third suggest stable incidence. The authors suggest that these trends might reflect the effectiveness of diabetes prevention activities.

In the US, for example, Magliano and colleagues suggest that the declining incidence of type 2 diabetes might be related to a small decrease in consumption of sugar sweetened beverages. However, there has been no decline in total sugar consumption and evidence linking type 2 diabetes to sugar or sugar sweetened beverages in adults is less convincing than evidence that weight gain or overweight is the dominant cause.[2] The incidence of type 2 diabetes is unlikely to decrease without a decline in weight gain, overweight, or obesity, but the inexorable rise in obesity in the US has continued, after a brief falter.

Conditions are very different in low and middle income countries, less than 5% of the populations studied, where type 2 diabetes develops at lower body weights and the impact of marketing Western food on diabetes incidence has not yet peaked.

As with most systematic reviews, this study seeks to answer a different question from that posed by the source studies, so caution is always required. Studies were carefully selected using prespecified inclusion and exclusion criteria, but several potentially confounding factors could further complicate interpretation of the reported trends. Some are mentioned, such as variable application of new diagnostic criteria for diabetes, and uncertain influences from changing to glycated haemoglobin (HbA_{1c}) for diagnosis, rather than the variety of earlier methods: diagnosis was based on "an algorithm" for about half the participants in the review.

In other cases, diagnosis might have been based on a transient raised random glucose level. Applying stricter and more accurate diagnostic criteria over time will cause an apparent decline in incidence. For some, diabetes onset was based on the start of treatment. As newer guidelines are adopted, with earlier introduction of metformin, adding previously diagnosed but untreated cases will have swollen the incidence figures, which would then decrease when new prescriptions were being issued only to people with a new diagnosis.

Review data from population based surveys is likely to be fairly complete and differentiate between new and old diagnoses, although the authors acknowledge that in more recent years the number of people with undiagnosed diabetes might have decreased through increased screening. A proportion of new cases also came from registries and insurance databases. Exactly when diabetes developed or was first recorded, self reported, or treated, are not necessarily the same. For example, in the first years after the Scottish diabetes registry was created, dates of diagnosis or onset were not always distinguishable from the date the patient was added to the register. Only after all previously diagnosed cases had been added would recorded incidence fall to its true level.

Finally, social and financial factors can influence the likelihood that new people with diabetes are identified. Falling or stalling incidence could reflect individuals' increasing unwillingness to engage with health checks or screening, through life stresses or disinterest or because some people reject the possibility of being labelled as sick. A diagnosis of diabetes impairs morale and many other aspects of life, and populations remain relatively unaware of the potential for life changing complications, further

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influencing decisions around screening. The cost of travel insurance, mortgages, and life insurance all go up.[3]

These factors are driving action to achieve remissions through effective weight management programmes for people with type 2 diabetes.[4] If these programmes are provided for people with screen detected prediabetes, incidence of type 2 diabetes will fall. While we all long for signs that diabetes is in retreat, this sensibly optimistic systematic review does not provide definitive evidence that true incidence is finally falling.

Competing interests: *The BMJ* has judged that there are no disqualifying financial ties to commercial companies. The authors declare the following other interests: ML is doing research on a drug treatment for obesity funded by Novo Nordisk. He has given paid advice to Roche on obesity. The BMJ policy on financial interests is here: https://www.bmj.com/sites/default/files/attachments/resources/2016/03/16-current-bmj-education-coi-form.pdf."

Provenance and peer review: Commissioned; not peer reviewed.

1 Magliano DJ, Islam RM, Barr ELM, etal . Trends in incidence of total or type 2 diabetes: systematic review. *BMJ* 2019;366:l5003.
2 Taylor R, Al-Mrabeh A, Zhyzhneuskaya S, etal . Remission of human type 2 diabetes requires decrease in liver and pancreas fat content but is dependent upon capacity for β cell recovery. *Cell Metab* 2018;28:547-556.e3. 10.1016/j.cmet.2018.07.003 30078554
3 McCombie L, Leslie W, Taylor R, Kennon B, Sattar N, Lean MEJ. Beating type 2 diabetes into remission. *BMJ* 2017;358:j4030. 10.1136/bmj.j4030 28903916
4 Lean MEJ, Leslie WS, Barnes AC, etal . Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. *Lancet* 2018;391:541-51. 10.1016/S0140-6736(17)33102-1. 29221645