

# Fruit and vegetable consumption is associated with reduced all-cause and cardiovascular mortality

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**Commentary on:** Wang X, Ouyang Y, Liu J, *et al.* Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies. *BMJ* 2014;349:g4490

## Context

Dietary guidelines from around the world recommend the daily consumption of a variety of fruits and vegetables. For example, the '5 a day' public health campaign in the UK encourages people to consume at least five 80 g portions of fruits and vegetables every day. These guidelines are largely based on recommendations from the WHO to consume at least 400 g of fresh fruits and vegetables a day to lower blood pressure and risk of coronary heart disease and stroke.<sup>1</sup> Recent evidence from a large prospective study suggests that the optimal consumption of fruits and vegetables that is associated with the lowest risk of total mortality could, in fact, be greater than five portions a day.<sup>2</sup>

## Methods

Wang and colleagues performed a systematic review and dose-response meta-analysis of the association of fruit and vegetable consumption and all-cause, cardiovascular and cancer mortality. The review included 16 independent prospective studies including 56 423 deaths among 833 234 participants.

## Findings

The meta-analysis showed that each additional portion of fruits and vegetables (approximately 80 g) was associated with a 5% (HR 0.95, 95% CI 0.92 to 0.98) lower risk of all-cause mortality and a 4% (HR 0.96, 95% CI 0.92 to 0.99) lower risk of cardiovascular disease mortality. Results from the dose-response analysis showed that the optimal intake of fruits and vegetables associated with the lowest risk of mortality was five portions per day, beyond which there was no further reduction in the risk of mortality. There was no statistically significant association between intake of fruits and vegetables and cancer mortality (HR 0.97, 95% CI 0.90 to 1.03).

## Commentary

While Wang and colleagues tested for publication and related biases, other large prospective studies have published analyses for fruit and

vegetable consumption and cancer incidence,<sup>3</sup> and dietary fibre intake and all-cause mortality,<sup>4</sup> but have not yet published results on fruit and vegetable consumption and all-cause mortality. The results of the present meta-analysis could change based on later publications.

In the 1990s, evidence suggested that a higher intake of fruits and vegetables reduced the risk of developing certain types of cancer.<sup>5</sup> However, more recent large prospective analyses have shown weak or no statistically significant associations of fruit and vegetable intake with the risk of total cancer incidence.<sup>3 6</sup> These prospective studies showed inverse associations of fruit and vegetable intake with cancers caused by smoking and alcohol, which highlights the possibility of residual confounding. Taken together with the lack of a statistically significant association with cancer mortality in the meta-analysis by Wang and colleagues, it appears that there is little evidence to support a clear link between the intake of fruit and vegetables and total cancer incidence and mortality.

The finding of a threshold effect at five portions of fruits and vegetables a day is consistent with dietary guidelines. Not only might fruit and vegetable intake be associated with a lower risk of mortality, but fruits and vegetables contribute a number of essential nutrients as well as dietary fibre.<sup>7</sup>

Despite the widespread publicity of the '5 a day' campaign, on average, the daily intake of fruits and vegetables among British adults (aged 19–64 years) is 4.1 portions, and boys and girls aged 11 to 18 years consume an average of 3 and 2.7 portions, respectively. Only 30% of adults and 9% of children consume at least five portions of fruits and vegetables a day.<sup>7</sup> Several measures have been proposed to help increase consumption of fruits and vegetables including behavioural interventions, social marketing, and subsidies on fruits and vegetables. The success of these measures to create healthier food environments need to be rigorously evaluated and successful programmes and policies implemented to ensure better population health.

**Competing interests** None.

**Provenance and peer review** Commissioned; internally peer reviewed.



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