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Do conclusions drawn from spot urine sodium measurements agree with the conclusions drawn from the 24-h urine measurements?

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We read with interest the report of Tan *et al.* [1] showing that measurements of spot urinary sodium concentration accurately reflected a relative decrease in population average 24-h urine sodium excretion between 2006 and 2014 in England. As noted by Tan *et al.*, measurements of 24-h sodium excretion are considered the most accurate way to assess population salt intake. However, collection of 24-h urine samples is cumbersome and difficult to carry out in large population samples. The findings of Tan *et al.* are of considerable interest because they could pioneer the way to simpler and more convenient spot urine sodium measurements to monitor relative changes in population salt intake after implementation of salt reduction programs.

In March of 2006, the Food Standards Agency of the United Kingdom issued salt reduction targets for the food industry. The food salt reduction program substantially decreased the sodium density of nearly all foods in the United Kingdom by 20%, a significant decrease that was sustained through at least 2017 if not longer [2–4]. Based on an analysis of 24-h urine sodium measurements, Public Health England (PHE) investigators, like Tan *et al.*, found a significant downward trend in salt intake between 2006 and 2014 in England [5]. However, according to PHE, there was no significant downward linear trend in salt intake between 2006 and 2019 (Fig. 1) [6].

In their analysis of the period from 2006 to 2014, PHE investigators observed a statistically significant sex effect on the downward linear trend in salt intake assessed by measurements of 24-h urine sodium excretion [5]. Specifically, when PHE investigators analyzed the 24-h urine sodium excretion data from the national surveys in England, they found no significant downward step-change in salt intake in women at any time between 2006 and 2014 [3,5] or 2019 [3,6] (Fig. 1). In men, there was a temporary decrease in salt intake between 2006 and 2009 with no significant step-change thereafter [3,5,6]. The failure of salt intake to show a statistically significant downward step-change in women after introduction of the food salt reduction program in 2006 was surprising because the salt intake surveys involved more women than men [3,6]. Moreover, women were the main target of the public health awareness campaign conducted before, during, and after launch of the national food salt reduction program in 2006 [7]. Women were also more likely than men to be aware of the government guidance to reduce salt intake [8].

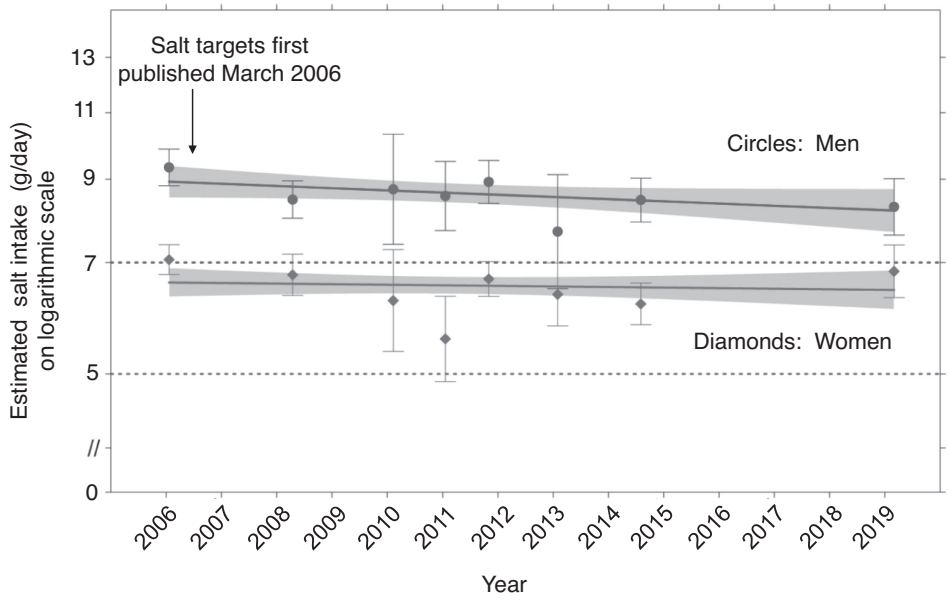

FIGURE 1 Public Health England graph of salt intakes in men and women in England as determined by 24-h urine collections from 2006 and 2019 [6]. Results are geometric means and 95% confidence intervals for the means. The gray shading indicates 95% confidence intervals for the regression lines. The dashed lines indicate the UK population target for maximum salt intake in men of 7 g/day and in women of 5 g/day. The change in salt intake for men from 2006 (before publication of the food salt targets) to 2009 was statistically significant with no significant step-changes thereafter [3,5,6]. In women, there were no significant step-changes in salt intake at any time after publication of the salt reduction targets in 2006 [3,5,6]. The slope of the line for salt intake over the entire period is not significantly different from zero for men ($P = 0.07$; 95% confidence interval −1.4–0.1%) or for women ($P = 0.61$; 95% confidence interval −0.8–0.5%) [6]. Details on the survey sample sizes, the graph, and statistical analysis are available in Public Health England's report on the 2019 national survey [6]. This graph from the Public Health England report is reproduced here under the UK Open Government License for Public Sector Information.

The PHE analysis showing an effect of sex on trends in salt intake determined by 24-h urine sodium measurements, and the report of Tan *et al*. on the performance of spot urine sodium measurements, raise the question: Is sex also a statistically significant factor influencing the downward trend in spot urine sodium concentrations reported by Tan *et al*. for the period of 2006–2014? Specifically, first, does a trend analysis of the spot urine sodium concentrations in women, like the trend analysis of 24-h urine sodium measurements in women, show that there were no significant downward step-changes in salt intake between 2006 and 2014? Second, does a trend analysis of spot urine sodium concentrations in men, like the trend analysis of 24-h urine sodium measurements in men, signal the occurrence of a statistically significant decrease in salt intake between 2006 and 2009 with no significant step-change thereafter? The answer to these questions will help determine whether spot urine sodium measurements are useful in monitoring for separate trends in salt intake in women and men.

ACKNOWLEDGEMENTS

The current work was not supported by any source and represents an original effort of the authors.

Conflicts of interest

M.P. and S.E.D. have nothing to disclose. T.W.K. is a cofounder and stockholder of Mission Salt, Inc, that has filed patents for salty food compositions with nitrate-rich vegetable ingredients. The company goal is developing methods to prevent salt-induced hypertension. T.W.K. does not receive any funds from Mission Salt and no funds from Mission Salt were used for this work.

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Journal of Hypertension 2022, 40:2316–2320

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DOI:10.1097/HJH.0000000000003254

Cuffless blood pressure devices: the gap between patient acceptability and need for validation

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In the recent statement by the European Society of Hypertension on 'Cuffless blood pressure measuring devices', Stergiou *et al.* [1] conclude that fundamental questions remain regarding the accuracy and performance of wearable cuffless blood pressure (BP) monitoring technology. These devices have emerged as a novel approach to continuously measure BP, rather than single snapshot clinic measures that are subject to substantial variability. Long-term BP readings are increasingly recognized to better relate to cardiovascular outcomes than cross-sectional readings [2]. Hence, major hypertension guidelines recommend out-of-office BP measures – but home BP monitoring is tedious for patients, subject to measurement error, and does not capture night-time readings, whereas 24-h monitoring is costly, often associated with discomfort [3], and thus poorly adopted [4]. Cuffless BP devices provide automated out-of-office BP readings without any cuff disturbance or user awareness. Given the accuracy of cuffless devices remains to be established, they have not been recommended for clinical use [1,3].

Given poor patient engagement with home and 24-h BP monitoring, we explored patient attitudes towards the use of a cuffless device (Aktiia device, Switzerland) [5] compared to classic methods. Two researchers (S.G., I.T.) conducted in-depth, semi-structured audio-recorded interviews with consecutive participants ($n = 15$, age 59 $\pm$ 10 years, female 33%, hypertension 100%, coronary artery disease 6.7%) recruited in a study in Perth, Australia comparing experiences wearing the Aktiia cuffless BP device for at least 7 days versus a classic 24-h ambulatory BP monitor for two separate days (Microlife WatchBP O3,