Global patterns of water intake: how intake data affect recommendations

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Studies to assess water intake have been undertaken in many countries around the world. Some of these have been large-scale studies, whereas others have used a small number of subjects. These studies provide an emerging picture of water and/or fluid consumption in different populations around the world. Studies of this nature have also formed the basis of a number of recommendations published by different organizations, including the US Institute of Medicine and the European Food Safety Authority. The results of these intake studies indicate substantial differences in water and/or fluid intake in different populations, which have translated into different intake recommendations.

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INTRODUCTION

Studies to assess water intake have been conducted in many countries around the world. Some have been part of large-scale food intake surveys, whereas others have been smaller-scale studies or studies with another main aim. There are also published food intake surveys from which total water consumption data is now being extracted and published.

Studies assessing water consumption use a variety of methods to record consumption and collect data at different times of the year in different seasons and environmental conditions. Results have also been expressed in different ways. Some researchers report total water intake, as discussed in the present article, whereas others report total beverage intake. Nonetheless, these data allow a picture of drink and/or water consumption to be assembled for the populations in which they have been collected. It has also contributed to the definitions of adequate intakes for water.

The present article summarizes some of the reliable water consumption data collected from large-scale studies in different populations and considers them alongside published adequate intakes. Some consideration is then given to the emphasis that should be placed on intake data when attempts are made to define consumption recommendations.

DATA AVAILABLE FROM STUDIES

A summary of data on total water intake in five studies from different countries is shown in Table 1. The studies presented recruited large numbers of subjects ranging from 831 to more than 4,000. In some studies, data are available to allow comparisons between the sexes to be made, and when this is done, females generally seem to be consuming less water than males in the same population. Comparing data between countries is not so straightforward because different methodologies to assess water intake have been used. In France, a 7-day dietary record was used to collect data, whereas in the Netherlands, a 2-day dietary record was used; in Germany, a 1-day dietary record was used, and in the United States, a 24-hour recall was used. How these different methods influence the reporting of water consumption is likely to be the same as in studies looking at other nutrients or food consumption, including reliance on respondent memory, potential recall bias, and misreporting.

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One clear finding from these studies is that the populations consumed significant proportions of their total water intake from nonbeverage sources, which amounted to approximately 18% in the United States, 23% in Sweden, 35% in France, and 29% in Germany. But because these contributions are so different in quantity, it is difficult to use extrapolation to determine total water intake from studies that only assess water consumption from beverages (e.g., de Francisco et al. 10; Devriese et al. 11; Garriguet 12; Hoare et al. 13; Ji et al. 14).

Adequate intakes for water consumption have been defined and published by a number of organizations, most notably the Food and Nutrition Board of the Institute of Medicine (IOM) in the United States and the European Food Safety Authority in Europe. As summarized below, the values they defined are not similar to each other, even though the populations they are aimed at appear to be similar, i.e., healthy young adults located in moderate environmental conditions and having moderate activity levels.

In 2004, the Food and Nutrition Board of the IOM published adequate intake (AI) values for total water intake in temperate climates.15 The AI for total water (from a combination of drinking water, beverages, and food) was set based on the median total water intake from US survey data. The recommended intakes are based on median intakes of generally healthy individuals who are adequately hydrated; however, as highlighted in the report, individuals can be adequately hydrated at levels below, as well as above, the suggested AIs. For young men and women (aged 19–30 years), the AIs set by the IOM are 3.7 L/day and 2.7 L/day, respectively.

The recent recommendations produced by the European Food Safety Authority (EFSA) in 2010 are more conservative than the IOM values and are 2.5 L/day for adult males and 2.0 L/day for adult females.16 The methods by which the EFSA AIs were determined are not entirely clear from the report, but they may be derived from a combination of observed intakes in population groups with desirable osmolarity values of urine and desirable water volumes per energy unit consumed. The EFSA values for total water intake also include water from drinking water, beverages of all kinds, and food moisture. They also only apply to conditions of moderate environmental temperature and moderate physical activity levels.

The data presented in Table 1 were published after both the IOM and EFSA reports were compiled and would not significantly alter the AIs derived.

### CONCLUSION

Total water consumption data are available for a number of populations around the world, but comparisons of the different data sets must be considered in light of the different methodologies used to collect the data.

Because water consumption requirements for adequate body hydration are determined by body water losses, the environmental conditions in which the subjects reside during data collection, the physical activity levels of the subjects, and the individual physiology of the subjects will all influence their water consumption requirements. Thus, a low water intake will not necessarily be associated with hypohydration and a high water intake will not necessarily be associated with euhydration or overhydration.

The question therefore arises as to whether less emphasis should be placed on intake data as the basis for intake recommendations and more should be placed on assessment of water loss data. Further research is required to address this question.

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### REFERENCES


