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## Environmental impact of blue water use by adults aged 18-64 on the Island of Ireland

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Blue water is sourced from rivers, lakes, and reservoirs and is used for drinking water, growing crops, and food production<sup>(1)</sup>. Approximately 75% of blue water use (BWU) comes from food systems<sup>(2)</sup>. Dietary change is necessary to meet net zero BWU sustainability goals by 2050<sup>(3)</sup>. While there is some information on diet-associated BWU for the Republic of Ireland (ROI)<sup>(4)</sup>, BWU across the Island of Ireland is unknown. This study aimed to quantify the environmental impact of BWU of daily diets across adults aged 18-64 on the Island of Ireland, to determine population characteristics, nutrient intakes and key food sources influencing emissions.

The Northern Ireland sub cohort of the UK National Dietary Nutrition Survey (2016-2019)<sup>(5)</sup> and the Irish National Adult Nutrition Survey (2008-2010)<sup>(6)</sup> were analysed. Information on food and nutrient intakes was extracted from four-day food diaries for a total of 1,484 adults aged 18-64 years. BWU values were assigned for each food<sup>(7)</sup> and the population was grouped into tertiles of low (T1), medium (T2), and high (T3) BWU. Differences in population characteristics, key nutrients (%TE or per 10MJ) and contributing food sources were examined across these tertiles. Statistical analysis was performed using chi-square and one-way ANOVA with covariates (age, BMI, Sex, Survey type and social class) and correcting for multiple comparisons as appropriate ( $P < 0.001$ ).

BWU for the Island of Ireland was  $481.9 \pm 440.4$  L/day,  $524.7 \pm 448.0$  L/day for Northern Ireland and  $474.9 \pm 438.6$  L/day for the ROI and 100% of the population did not exceed the BWU planetary boundary of  $\leq 786$  L/day<sup>(8)</sup>. Males had a higher contribution to the total BWU than females on the Island of Ireland ( $513.3 \pm 482.2$  L/day vs  $453.2 \pm 385.8$  L/day). 'Tea, coffee and water' (76%), 'rice and rice dishes' (4%) and 'fruit and fruit juice' (2.5%) were the greatest contributors to BWU. When tertile analysis was performed, BWU from 'tea, coffee and water' was significantly higher for T3 at  $837 \pm 468.8$  L/day versus T1 ( $57 \pm 50.9$  L/Day), this was similar for 'rice and rice dishes', where BWU in T3 was  $26.3 \pm 44.0$  L/Day versus T1 ( $13.3 \pm 25.2$  L/Day). When nutritional analysis was performed, differences ( $P < 0.001$ ) across tertiles of BWU were observed for energy (11% increase between tertile 1 and 3), magnesium (12% increase across tertiles) and potassium (8% increase across tertiles).

Overall, a shift to more sustainable diets is needed to prevent BWU boundaries being exceeded in the future. By filling a literature gap on the environmental impact of the Northern Irish diet, this study complements previous research on the ROI, offering a comprehensive view of the BWU footprint and providing a basis for the development of strategies to improve diet-related BWU on the Island of Ireland.

### References

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