Riboflavin Deficiency is an Urgent Global Health Priority Affecting Women and Children across High and Low-Middle Income Countries Worldwide

H. Jarrett [1] [2]H. McNulty[2], A. Flynn[3], M. Kerr[1], J. Walton[3], Y. Lamers[4], L. Cox[5], A. Prentice[5], L. McAnena[1], M. Ward[1]

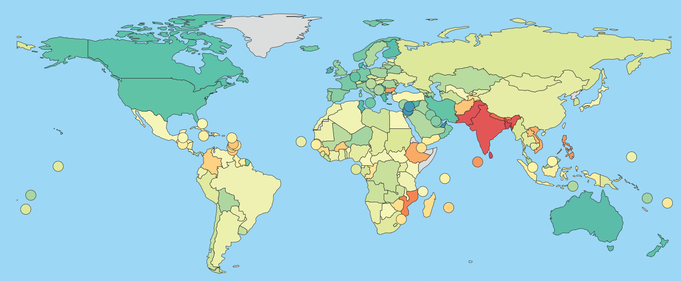
[1]Nutrition Innovation Centre for Food and Health, Ulster University, UK, [2]Heights, Department for Research and Development, UK [3]School of Food and Nutritional Sciences, University College Cork, Ireland, [4]Food, Nutrition and Health, University of British Columbia, Canada, [5]Medical Research Council Elsie Widdowson Laboratory, and MRC Epidemiology Unit, University of Cambridge, UK

Why are we interested in Riboflavin (Vitamin B2)?

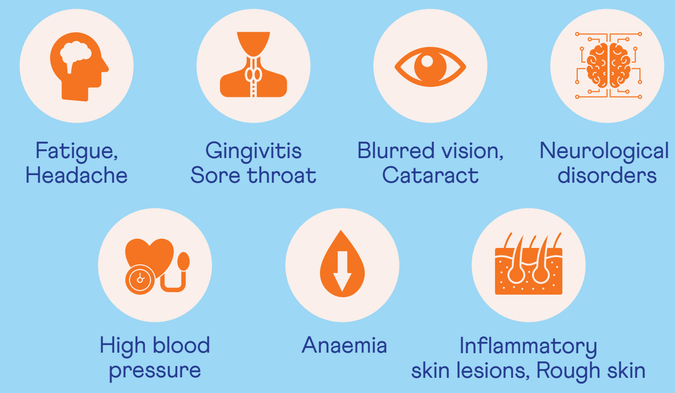
Riboflavins plays a fundamental role in:

- Oxidation-reduction reactions
- Energy production
- Cellular antioxidant function
- Synthesis of niacin from tryptophan
- Interactions with Vitamin B6 and One-carbon metabolism
- Metabolism of iron

4.1 Billion (55%) of the global population have inadequate Riboflavin Intake[1]



Vitamin B2 Deficiency



Aim: To investigate Riboflavin Blood levels in women of reproductive age and children from international cohorts

Our Approach

How did we measure Riboflavin Levels?

Erythrocyte Glutathione Reductase activation coefficient (EGRac)

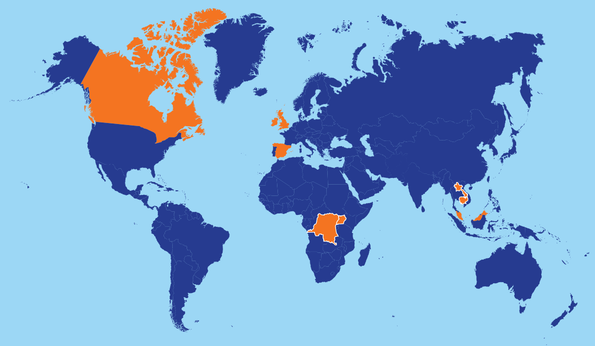
- **A** Blood samples collected
- **B** Red Blood Cells processed
- **C** Blood Samples analysed for Riboflavin
- **D** Riboflavin levels calculated

In Who and Where did we measure Riboflavin Blood Levels?

Who?

- Women of childbearing age (18—45 yrs)
- Children (<18 yrs)

10 countries across the globe



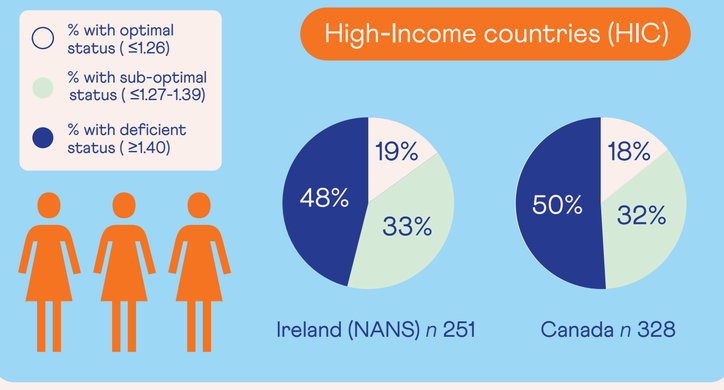
- 5 High-Income Countries
- 5 Low-Income Countries

Global distribution of cohorts investigated.
1. Ireland; 2. UK; 3. Spain; 4. Canada; 5. Laos; 6. Cambodia; 7. Malaysia; 8. Uganda; 9. Democratic Republic of the Congo

Findings: What are the levels Riboflavin in populations across the globe?

What's the picture across the UK?

Riboflavin Levels *n* (%)			
	Optimal	Suboptimal	Deficient
Women	30 (18)	52 (32)	82 (50)
Men	34 (26)	38 (29)	58 (45)
1-5 years	28 (60)	10 (21)	9 (19)
6-10 years	26 (27)	46 (48)	23 (24)
11-14 years	17 (18)	22 (24)	54 (58)
15-17 years	14 (16)	29 (33)	45 (51)



What does this mean for populations across the globe?

- Riboflavin Deficiency in women of reproductive age and their children is a Major Global Public Health Concern.
- Riboflavin Deficiency in high-income countries including the UK and Ireland is a much Greater Problem than currently recognised due to lack of population biomarker data.
- Low-middle income countries are at the Greatest risk of Riboflavin Deficiency.
- Given its wide-ranging functional roles, the health consequences of riboflavin deficiency for populations globally could be considerable.
- Population-based Strategies to optimize Riboflavin Status in both HIC and LMIC globally are Urgently Needed.

References: 1Passarelli S, Free CM, Shepon A, Beal T, Batis C, Golden CD. Global estimation of dietary micronutrient inadequacies: a modelling analysis. Lancet Glob Health 2024;12:1590–9; Jarrett H, McNulty H, Hughes CF, Pentieva K, Strain JJ, McCann A, et al. Vitamin B-6 and riboflavin, their metabolic interaction, and relationship with MTHFR genotype in adults aged 18-102 years. Am J Clin Nutr 2022;116:1767–78. 3McNulty H, Pentieva K, Ward M. Causes and Clinical Sequelae of Riboflavin Deficiency. Annu Rev Nutr 2023;43:101–22.