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GLOBAL OVERVIEW OF LARGE-SCALE FOOD FORTIFICATION WITH ZINC

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LARGE-SCALE FOOD FORTIFICATION – AN OVERVIEW

- Large scale food fortification (LSFF) is effective:
  - Anaemia ⬇️ 34%
  - Goitre ⬇️ 74%
  - Neural tube defects ⬇️ 41%

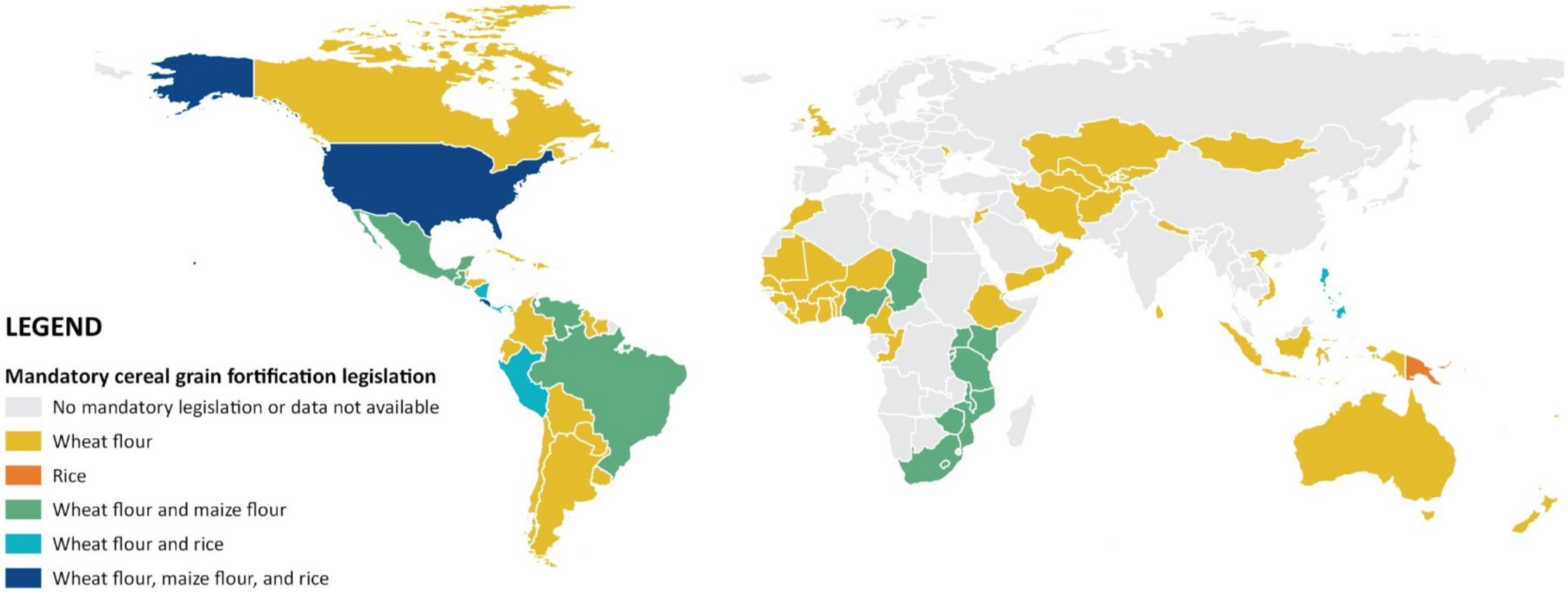
- Cost-effective: $1 invested = $27 in economic returns
- Works best when it is mandated and part of a comprehensive public health nutrition strategy
- May 2023 World Health Assembly resolution calls on Member States to accelerate LSFF as a critically important tool in the fight against micronutrient deficiencies

Keats EC, Neufeld LM, Garrett GS, Mbuya MNN, Bhutta ZA. Improved micronutrient status and health outcomes in low- and middle-income countries following large-scale fortification: evidence from a systematic review and meta-analysis. Am J Clin Nutr. 2019;109(6):1696-708.

Horton S, Alderman H, Rivera JA. Hunger and malnutrition. Global Crises, Global Solutions: Costs and Benefits. 2009 Jul 9:305-54.

GLOBAL STATUS: LSFF OF CEREAL GRAINS

94 countries have legislation to mandate fortification of at least one industrially milled cereal grain



https://www.ffinetwork.org/globalprogress

FOOD FORTIFICATION WITH ZINC: EVIDENCE

Effects of Foods Fortified with Zinc, Alone or Cofortified with Multiple Micronutrients, on Health and Functional Outcomes: A Systematic Review and Meta-Analysis

Becky L Tsang,[1,2] Erin Holsted,[1,3] Christine M McDonald,[1,4,5] Kenneth H Brown,[1,6] Robert Black,[1,7] Mduduzi NN Mbuya,[1,8] Frederick Grant,[1,9] Laura A Rowe,[1,2] and Mari S Manger[1,4]

- 59 studies included, 71% conducted in LMICs
- More than half of vehicles were cereal grains
- Median daily amount of zinc delivered: 4.4mg

Tsang BL, Holsted E, McDonald CM, Brown KH, Black R, Mbuya MNN, et al. Effects of Foods Fortified with Zinc, Alone or Cofortified with Multiple Micronutrients, on Health and Functional Outcomes: A Systematic Review and Meta-Analysis. Adv Nutr. 2021;12(5):1821-37

FOOD FORTIFICATION WITH ZINC IS EFFECTIVE

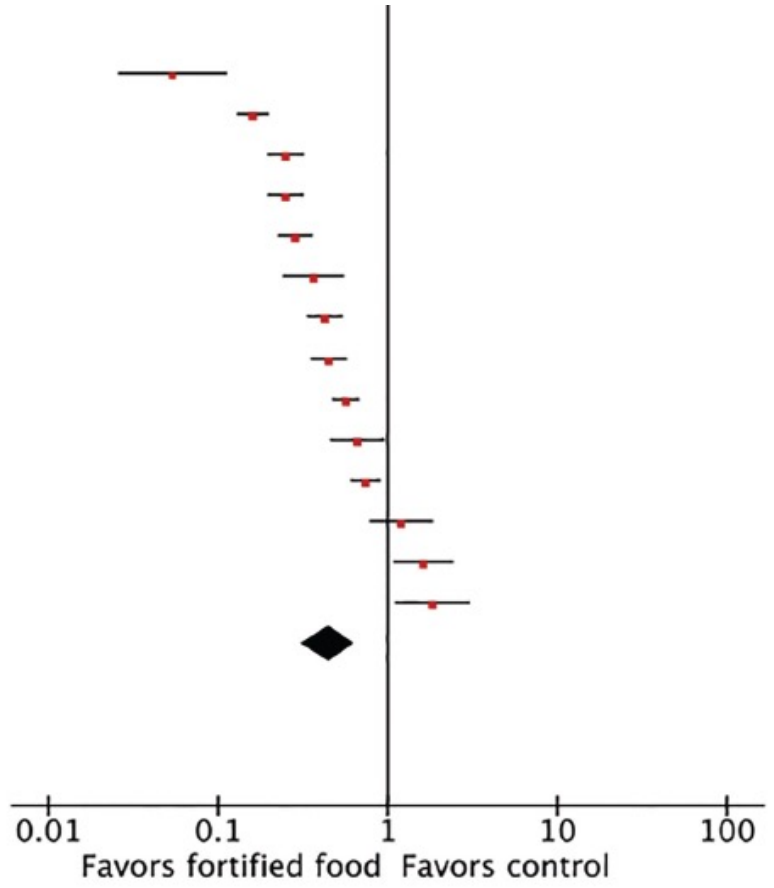
Prevalence of zinc deficiency

1.28.2 Effectiveness studies				
Tukvadze 2013 (34)	-2.9232	0.38	5.8%	0.05 (0.03, 0.11)
Kuong 2019 (89)[10]	-1.8326	0.112	7.5%	0.16 (0.13, 0.20)
Kuong 2019 (89)[11]	-1.3863	0.128	7.4%	0.25 (0.19, 0.32)
Kuong 2019 (89)[12]	-1.3863	0.125	7.4%	0.25 (0.20, 0.32)
Sun 2014 (84)	-1.2575	0.123	7.4%	0.28 (0.22, 0.36)
Stuetz 2012 (73)	-1.0076	0.214	7.0%	0.37 (0.24, 0.56)
Engle-Stone 2017 (43)[13]	-0.8548	0.126	7.4%	0.43 (0.33, 0.54)
Engle-Stone 2017 (43)[14]	-0.8005	0.126	7.4%	0.45 (0.35, 0.57)
Dutta 2019 (45)	-0.5716	0.096	7.5%	0.56 (0.47, 0.68)
Varea 2011 (85)[15]	-0.4157	0.19	7.1%	0.66 (0.45, 0.96)
Ara 2019 (19)	-0.3045	0.105	7.5%	0.74 (0.60, 0.91)
Varea 2012 (79)	0.1811	0.221	6.9%	1.20 (0.78, 1.85)
Varea 2011 (85)[16]	0.4818	0.21	7.0%	1.62 (1.07, 2.44)
Ohiokpehai 2009 (20)	0.6066	0.26	6.6%	1.83 (1.10, 3.05)
Subtotal (95% CI)			**100.0%**	**0.45 (0.31, 0.64)**

Heterogeneity: $Tau^2 = 0.43$; $Chi^2 = 287.64$, df = 13 ($P<0.00001$); $I^2 = 95\%$

Test for overall effect: Z = 4.44 ($P<0.00001$)

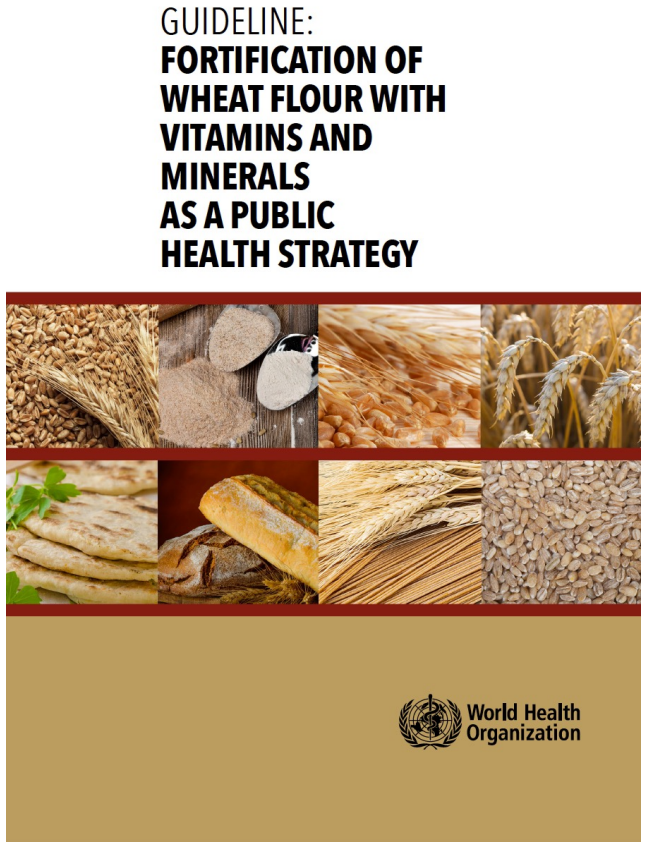
Test for subgroup differences: $Chi^2 = 5.98$, df = 1 ($P = 0.01$), $I^2 = 83.3\%$



FOOD FORTIFICATION WITH ZINC IN WHO GUIDELINES

Fortification of wheat flour with zinc may be used as a public health strategy to improve serum/plasma zinc status of populations

(conditional recommendation, low certainty of evidence)



COST EFFECTIVENESS OF FOOD FORTIFICATION WITH ZINC

Senegal: Mandatory fortification, but zinc is not included in the standard.

- $1.40 per year per child aged 6-59 months who achieves adequate dietary zinc intake due to fortification.

Adams K, Jarvis M, et al. Micronutrient Intervention Modeling Tool (MINIMOD). University of California, Davis; personal communications. 2021.

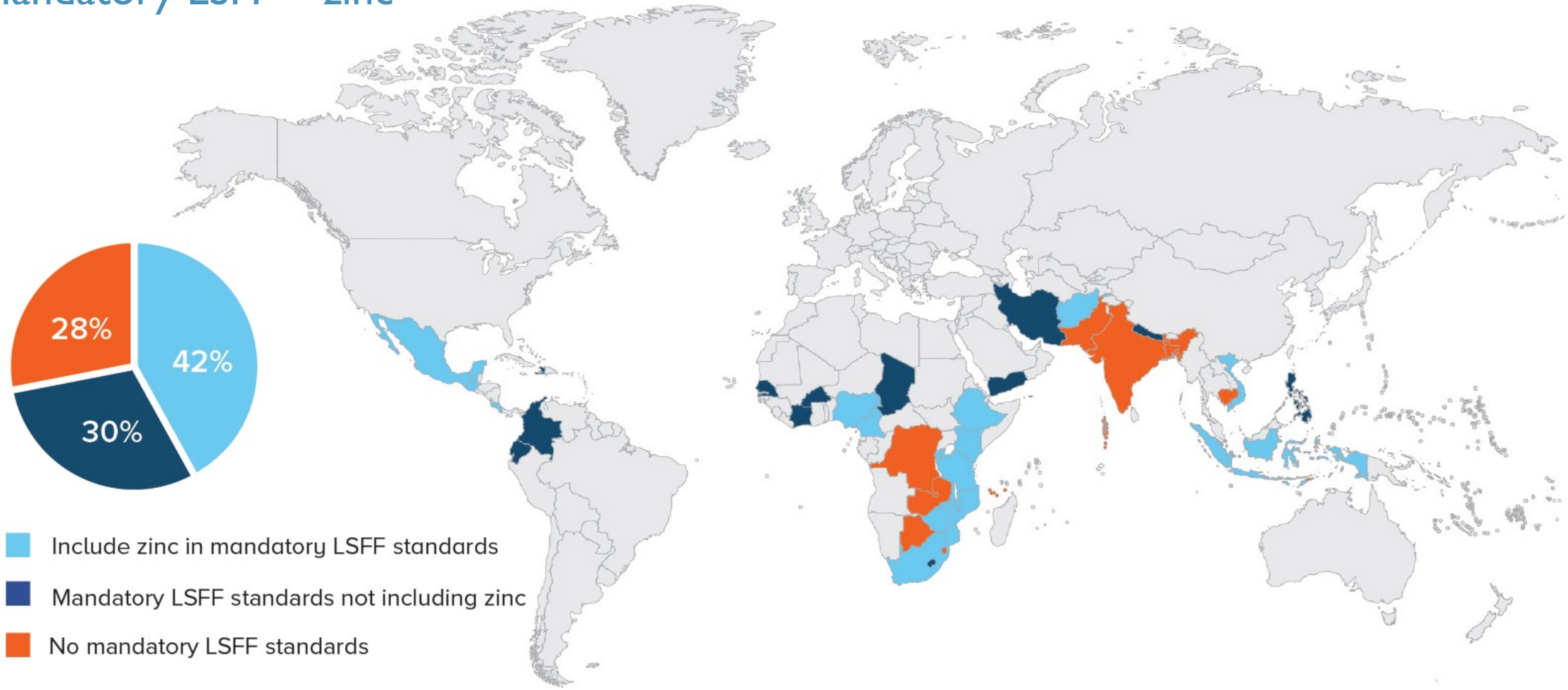
Cameroon: Mandatory fortification, zinc included in standard.

- $0.44 to $0.62 per year per child aged 6-59 months who achieves adequate dietary zinc intake due to fortification.

Vosti, S. A., Adams, K. P., Michuda, A., Ortiz-Becerra, K., Luo, H., Haile, D., & Engle-Stone, R. (2023). Impacts of micronutrient intervention programs on effective coverage and lives saved: Modelled evidence from Cameroon. Annals of the New York Academy of Sciences, 1519, 199–210.

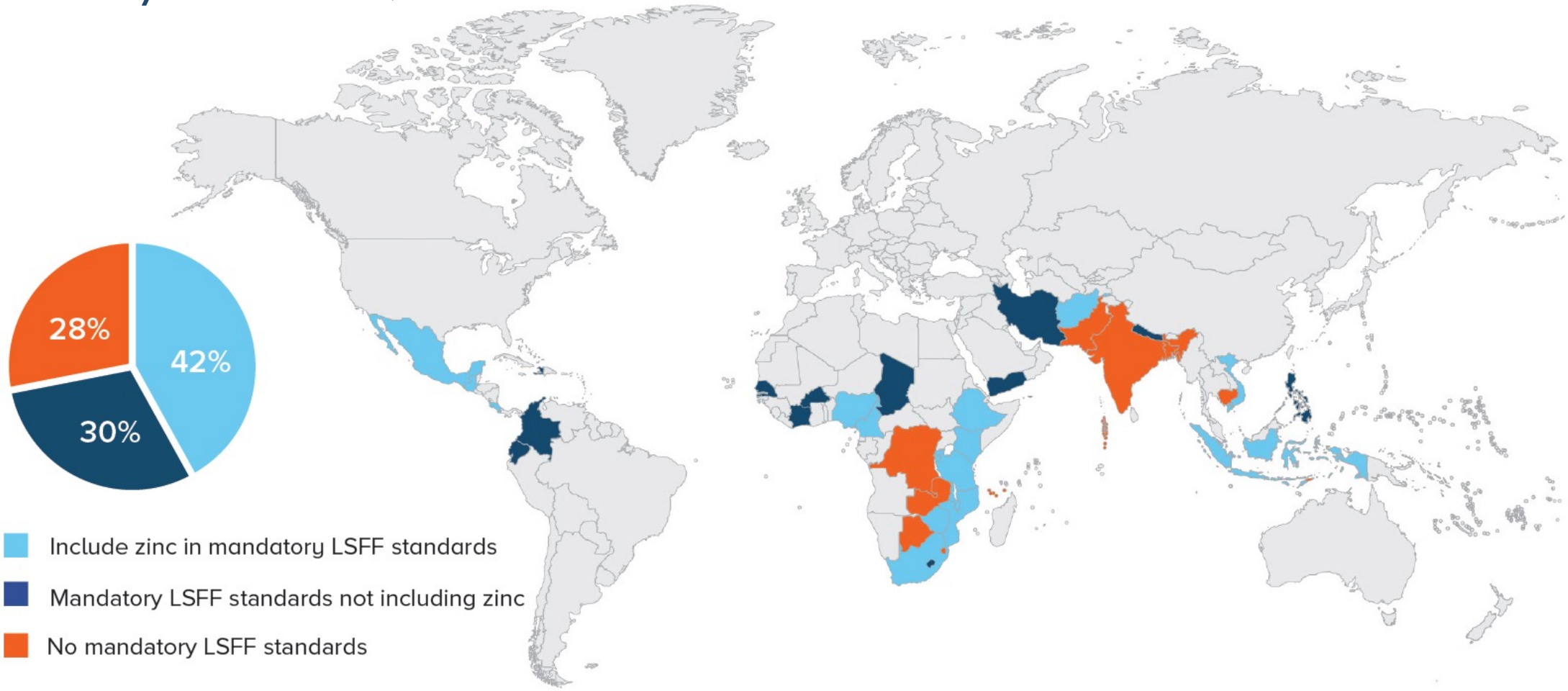
STATUS OF LSFF IN 40 COUNTRIES WHERE ZINC DEFICIENCY IS A PUBLIC HEALTH PROBLEM

Mandatory LSFF + zinc



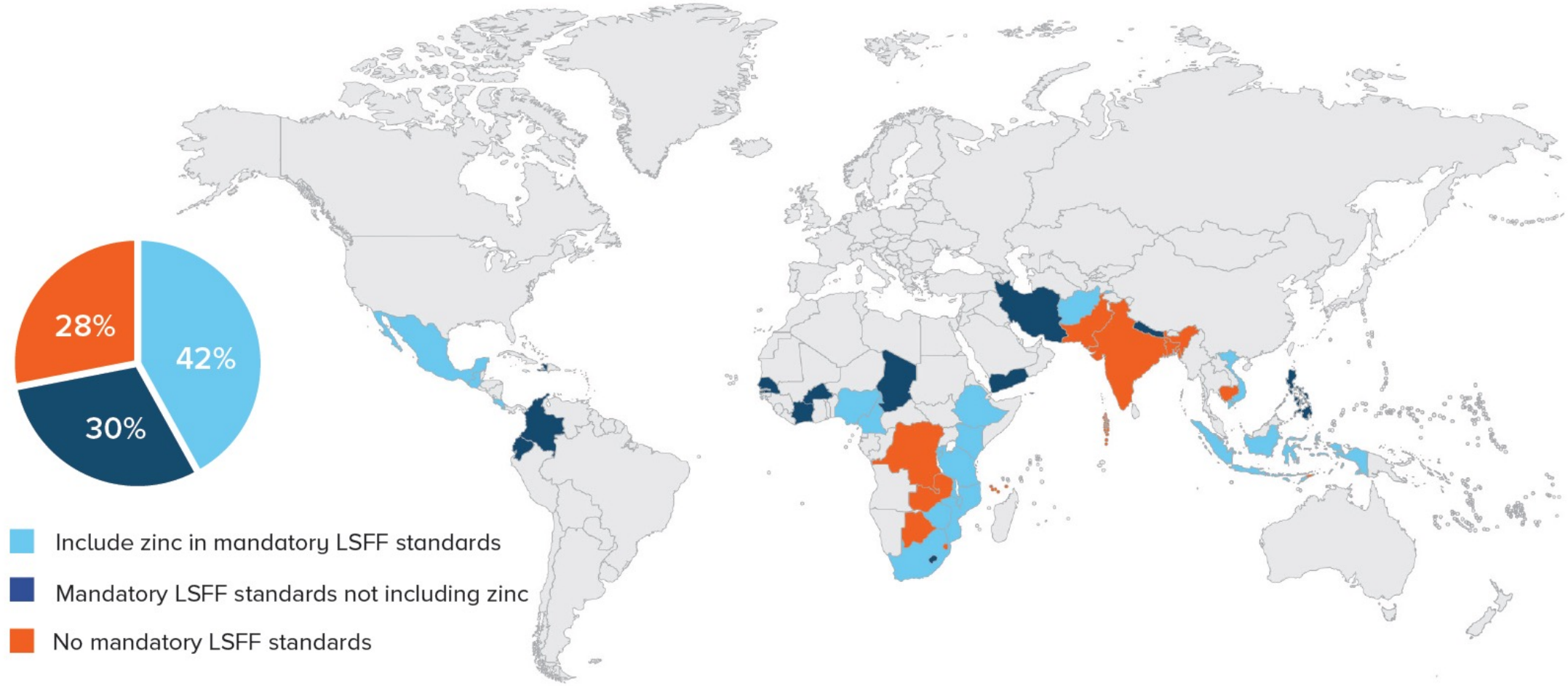
STATUS OF LSFF IN 40 COUNTRIES WHERE ZINC DEFICIENCY IS A PUBLIC HEALTH PROBLEM

Mandatory fortification, no zinc



STATUS OF LSFF IN 40 COUNTRIES WHERE ZINC DEFICIENCY IS A PUBLIC HEALTH PROBLEM

No fortification



THANK YOU!

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- Laura Rowe, Nutrition International
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