

Recommendations for the Assessment of Population Zinc Status

**Results of a WHO,
UNICEF, IAEA and
IZiNCG Working
Group Meeting**

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Background

- Zinc deficiency is an important cause of morbidity and impaired growth in low income countries
 - Still little information available on the national prevalence of zinc deficiency from direct assessment
- One of the limiting factors to promoting evaluation of the prevalence of zinc deficiency in populations:
 - Lack of clear guidelines and specific recommendations for population indicators and relevant cut-off points

Framework

- A working group meeting was convened by WHO, UNICEF, IAEA (December 2005)

Reviews

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Discussants

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AIM

- Review methods of assessing population zinc status
 - provide recommendations for assessment of population zinc status using specific indicators

1

Biochemical

2

Dietary

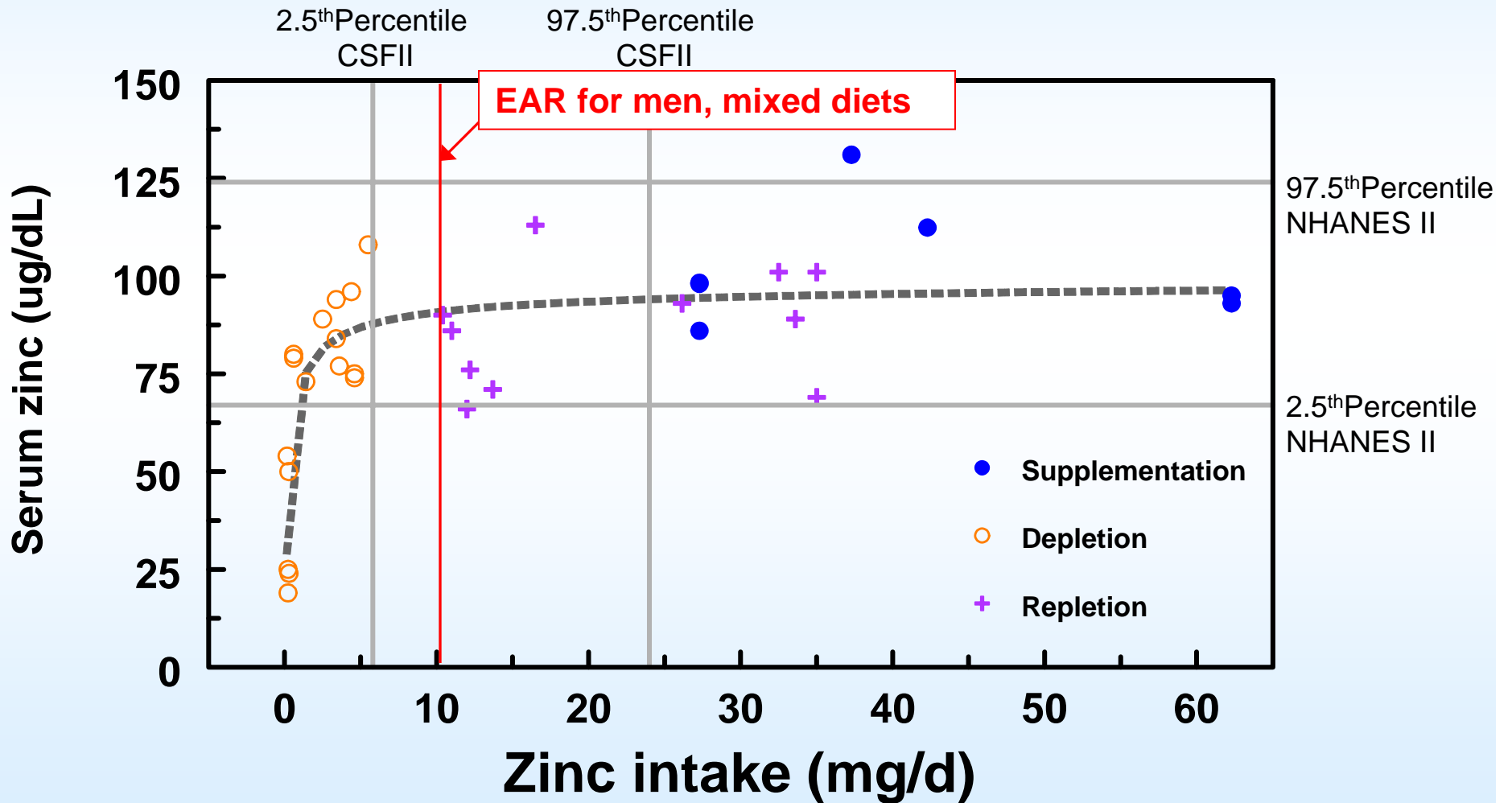
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Functional

1 Biochemical indicators

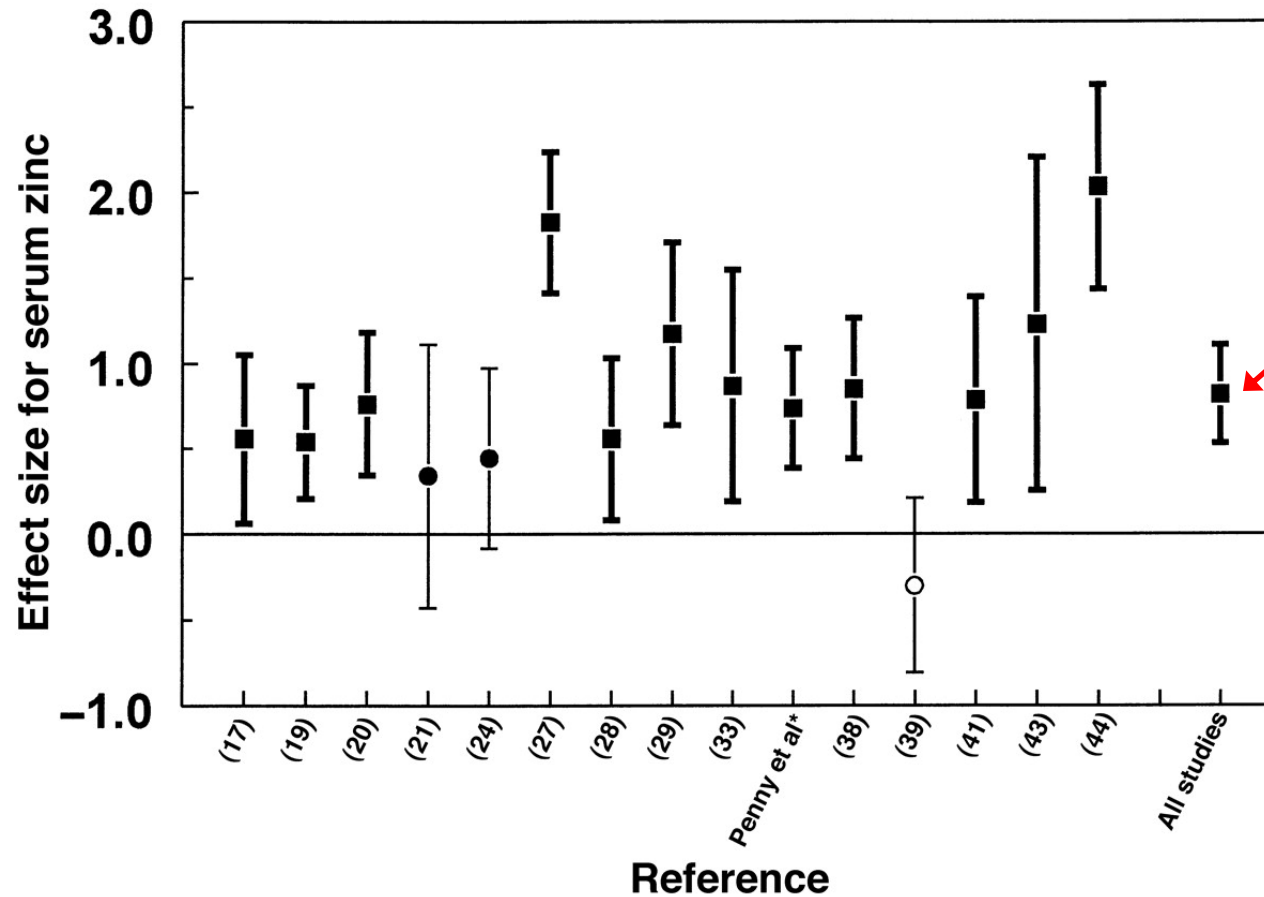
- Serum (plasma) zinc concentration
- Rationale
 1. Reflects dietary zinc intake
 2. Responds consistently to zinc supplementation
 3. Reference data are available for most age/sex groups (still limited for children <3 yrs)

Relationship between mean dietary zinc intake and mean serum zinc concentration among adults compiled from multiple studies



Hess et al, Food Nutr Bull, 2007 in press.

Serum zinc responds to zinc supplementation



Overall effect size = 0.82; $p < 0.001$

1

Biochemical indicators

Indicator

Prevalence of low serum zinc concentration

- Adjusted for indicators of infection/inflammation (CRP, AGP)

Reference data

Age/sex/time of day specific cut-offs

- Derived from NHANES II 2.5th percentile*

Elevated risk

Population prevalence >20%;
Intervention warranted

* IZiNCG, Food Nutr Bull 2004; Hotz et al., Am J Clin Nutr 2003

2 Dietary intake indicators

- Daily dietary zinc intake (mg/day)
 - Estimate bioavailability using phytate:zinc molar ratio
- Rationale
 1. Key for the appropriate design of food/diet-based interventions
 2. Useful to identify sub-groups at risk of inadequate zinc intakes (eg., young children; rural inhabitants)
 3. Reasonable agreement between prevalence of inadequate zinc intakes and low serum zinc

2 Dietary intake indicators

Indicator

Prevalence of dietary zinc intake
<Estimated Average Requirement

- Intakes estimated by quantitative dietary assessment methods (eg., 24-hour recall
– see Gibson & Ferguson. ILSI; 1999)

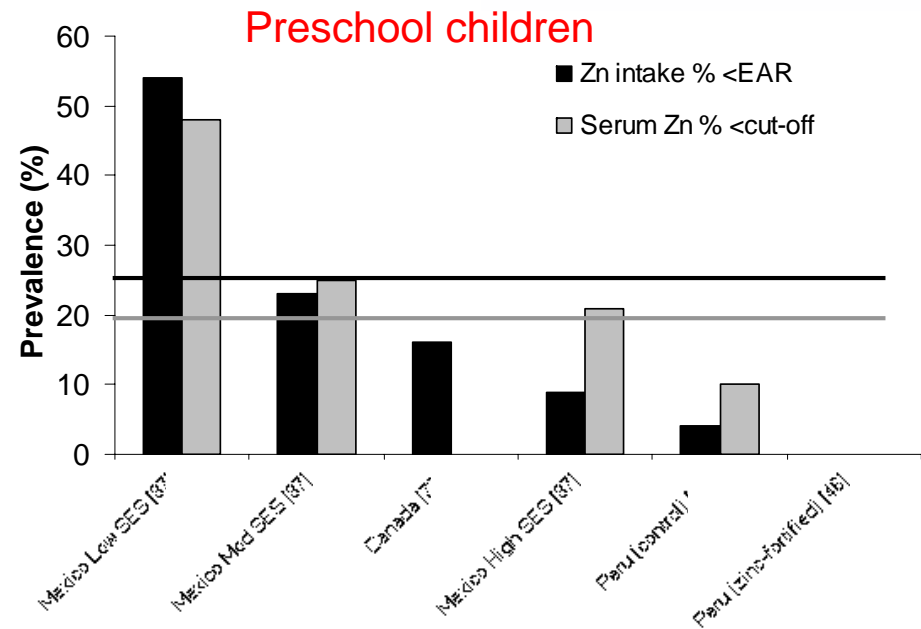
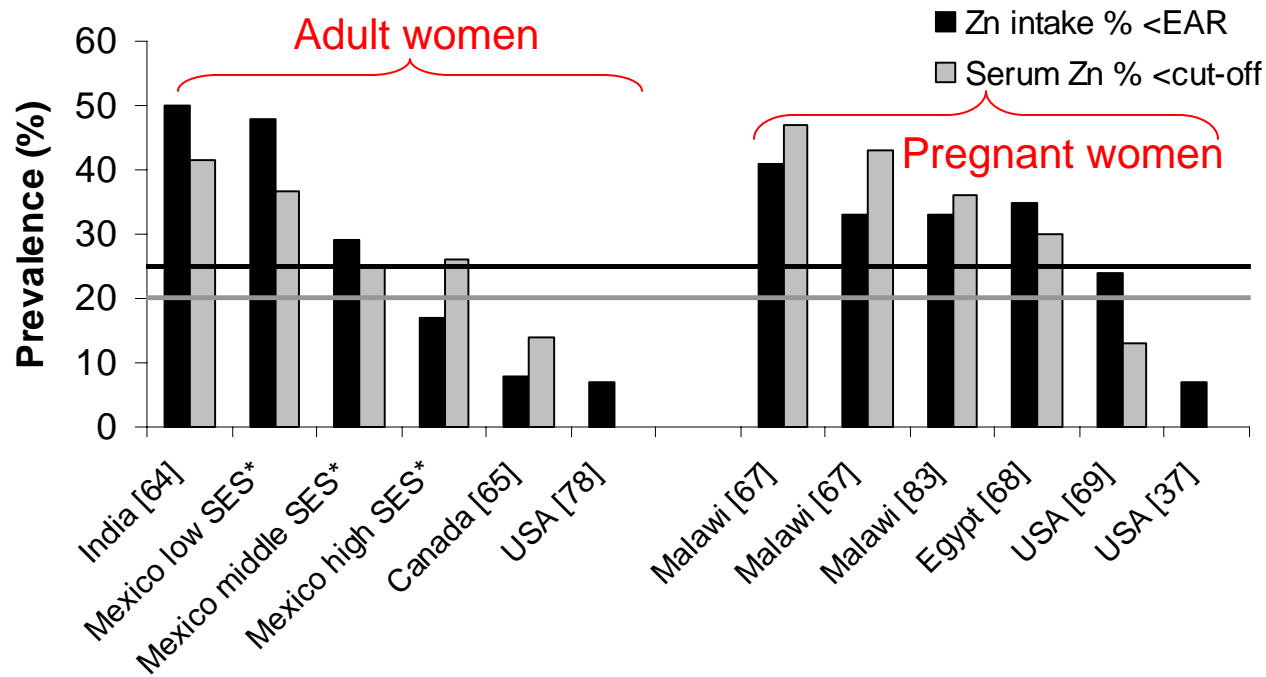
Reference data

IZiNCG recommended Estimated
Average Intakes (EARs)

Elevated risk

Prevalence of inadequate zinc intake
>25%

- Intervention to increase zinc intakes
warranted



Prevalence of low serum zinc and prevalence of inadequate zinc intakes from published data

-Reasonable conformity between the two indicators

3

Functional indicators

- Linear growth stunting
- Rationale
 1. Meta-analysis indicates linear growth in stunted populations is responsive to zinc
 2. Length- or height-for age is typically measured by standardized methods in national surveillance programs
 3. Reference data are available

3

Functional indicators

Indicator

Prevalence of low length- or height-for age Z-scores

**Reference
data**

Median length / height-for-age of WHO/CDC/NCHS reference distributions

**Elevated
risk**

Prevalence of linear growth stunting
>20%
-Intervention warranted

Monitoring impact of programs

- Monitor the impact of micronutrient interventions that include zinc
 - Multi-mn supplements, sprinkles, fortified foods, dietary modifications

Change in prevalence of low serum zinc

- Monitor impact of food/diet-based interventions

Change in prevalence of inadequate zinc intakes

Conclusions

- All three indicators can be used to identify at risk populations and determine degree of risk
- Prevalence of low serum zinc concentration should be used as the primary quantitative indicator
- Review papers and guidelines to be published
 - Food and Nutrition Bulletin, September 2007