Fortification’s Contribution to Meeting Dietary Nutrient Recommendations

Eric Hentges, PhD
May 17, 2012
Disclosure of interest

• Currently Executive Director of ILSI North America a non-profit research foundation with major funding from its industry members.

• Previously Executive Director of USDA’s Center for Nutrition Policy and Promotion
Data Development

- ILSI North America’s Fortification Committee initiated and funded the development of data to be presented
- Data development and analysis conducted by Nutrition Impact, LLC
- Science Advisor - Johanna Dwyer, DSC, RD, Tufts University
- Gov’t Liaison - Regan Bailey, PhD, RD, NIH/ODS
Background

Americans are urged to meet nutrient needs through nutrient-dense food sources, while not exceeding energy needs.

However, the reality is that many individuals consume diets that are lower in one or more nutrients and higher in energy than recommended.
Research Purpose

To determine total usual nutrient intakes of Americans from all sources, as well as to understand the specific nutrient contributions from:

– Enriched and fortified foods
– Dietary supplements
General Methodology

- NHANES 03-04 and 05-06 data were used for dietary intake
- NCI method was used to estimate usual intakes
- USDA FNDDS 2.0 and 3.0 and standard release 18 and 20 were used for 03-04 and 05-06 food composition data, respectively*
- A database was created to separate the amount of intrinsic and added nutrients found in each food
General Methodology

• Nutrient intake from supplements was determined from the NHANES dietary supplement questionnaire
• Nutrient composition of supplements were determined using the NCHS dietary supplement database
• 19 micronutrients were examined
Study One

Study Purpose

To assess the contributions of micronutrients to usual intakes from all sources (intrinsic to food, fortified and enriched, and dietary supplements) and compare usual intakes to the DRIs for Americans $\geq 2$ y.
Prevalence (%) of Intakes < EAR by source in Americans, ages 2+y

Fulgoni VL, Keast DR, Bailey RL, Dwyer J. Journal of Nutrition, 2011;141(10)L1805-12
Prevalence (%) of Intakes < EAR by source in Americans, ages 2+y

Fulgoni VL, Keast DR, Bailey RL, Dwyer J. Journal of Nutrition, 2011;141(10)L1805-12
Prevalence (%) of Intakes < EAR by source in Americans, ages 2+y

- **Magnesium**: 59% Naturally Occurring, 55% Enriched/Fortified, 45% Total (Foods + Supplements)
- **Iron**: 22% Naturally Occurring, 7% Enriched/Fortified, 5% Total (Foods + Supplements)
- **Zinc**: 15% Naturally Occurring, 11% Enriched/Fortified, 8% Total (Foods + Supplements)

Fulgoni VL, Keast DR, Bailey RL, Dwyer J. *Journal of Nutrition*, 2011;141(10)L1805-12
Study One: Conclusions

- Major sources of most water soluble vitamins were enrichment/fortification and/or supplements
- Major sources of most minerals (except for iron) were intrinsic to foods
- Fortification/enrichment plays an important role in increasing the % of population >EAR for vitamins A, thiamin, folate, and iron
Study One: Conclusions

• Supplements increase the % of the population meeting the EAR
  – especially for nutrients that are not prevalent in foods (vitamins D and E)

• Supplements also increase the % > UL
Study One: Take home

• Most Americans met recommended nutrient target for the majority (but not all) of vitamins and minerals evaluated

• However…..
  – far fewer individuals would have done so without intakes of enriched and fortified foods
  – and even fewer if dietary supplements are excluded
Studies Two and Three


Dietary Supplement Use Over Time in the U.S. 1999-2008 (n=44,137)

Data Source: National Heath and Nutrition Examination Survey, 1999-2008
Purpose (both studies combined)

To assess the vitamin and mineral intakes of adults from the diet by supplement-use categories, and how these supplements contributed to meeting or exceeding DRIs for selected micronutrients.
Users versus Non-users Defined

• Users: those who reported taking at least one dietary supplement within the previous 30 days
  • Diet: food sources only
  • Total intakes: diet + supplements

• Non-users: no supplement use
  • Diet: food sources only
Nutrient Intakes from Food Sources Only

- **Males** - users had higher intakes than non-users
  - Folate
  - Vitamin A
  - Vitamin E
  - Vitamin K
  - Magnesium
  - Potassium
  - Copper
  - Selenium

- **Females** - users had higher intakes than non-users
  - Folate
  - Vitamin A
  - Vitamin C
  - Vitamin D
  - Vitamin E
  - Calcium
  - Iron
  - Magnesium
  - Zinc
  - Phosphorus
  - Copper
  - Potassium
% of Adults with Intakes < EAR by Supplement Use

% of Adults with Intakes < EAR by Supplement Use

- **Folate**: Non-users 14, Users 1
- **Vitamin C**: Non-users 48, Users 3
- **Vitamin A**: Non-users 58, Users 2
- **Vitamin D**: Non-users 96, Users 25
- **Vitamin E**: Non-users 96, Users 5

% of adult of dietary supplement users who exceed the UL by gender

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>4.5</td>
<td>7</td>
</tr>
<tr>
<td>Iron</td>
<td>12.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Zinc</td>
<td>11.2</td>
<td>7.2</td>
</tr>
<tr>
<td>Magnesium</td>
<td>3.6</td>
<td>7.2</td>
</tr>
</tbody>
</table>

% of adult of dietary supplement users who exceed the UL by gender

Studies Two and Three: Conclusions

- Adults who use dietary supplements tend to have higher mineral and vitamin intakes from foods than non-users.

- Supplements help users meet the EAR for all micronutrients (except potassium).
  - This is especially true for nutrients that are not prevalent in foods (e.g. vitamin D, vitamin E).

- Non-users had significantly higher prevalence of intakes below the EAR.

- Supplement use also creates the potential for intakes above the UL for some nutrients (folic acid, vitamins A, B-6 and C and calcium, iron, zinc and magnesium).
Studies Two and Three: Take Home

- More than half of adults use dietary supplements in the U.S.
- Dietary habits of supplement users and non-users are different
- Supplement use is associated with a greater percentage of individuals exceeding the UL for some nutrients
Study Four

Purpose

To assess whether micronutrient supplements given to children help fill gaps in nutritionally inadequate diets or whether they contribute to already adequate diets and contribute to excessive micronutrient intakes from foods.
% of Children with Intakes < EAR by Supplement Use

Bailey et al., J of Pediatrics, in press.

- Calcium: 50% (Non-users), 35% (Users)
- Magnesium: 37% (Non-users), 20% (Users)
- Zinc: 6% (Non-users), 1% (Users)
- Phosphorus: 18% (Non-users), 9% (Users)
- Vitamin A: 31% (Non-users), 2% (Users)
- Vitamin C: 21% (Non-users), 2% (Users)
- Vitamin D: 87% (Non-users), 30% (Users)
- Vitamin E: 83% (Non-users), 9% (Users)
% of Children with Intakes > UL by Supplement Use

Bailey et al., J of Pediatrics, in press.
Studies Four: Conclusions

- No differences in the vitamin or mineral intakes from food sources between users and non-users
  - Different than adults
- Higher % of users meet the EAR, particularly for vitamin D and E
  - Similar to adults
- Users have higher prevalence of intakes > UL
  - Both children and adult users have excessive intakes of iron, zinc, folic acid, and vitamin A (retinol).
Next Steps

- **Food Sources Paper**
  - What foods are providing micronutrients?

- **Examining the Nutrition Facts Panel Scenarios**
  - How may changes in DV change nutrient intakes?
If the basis for calculating %DV changes would some products or categories be reformulated or re-labeled in order to make a claim?

Do you have any information suggesting that changes in nutrient intakes and consumption behavior will result from newly reformulated or newly labeled products to make these claims?
Thank you!

Eric Hentges, PhD