University of Saskatchewan

The Use of Vitamin and Mineral Supplements in Canada: *Identification of Nutritionally Vulnerable Groups For Whom Supplement Use May Be Warranted*

Susan Whiting

Jeff Taylor, Hassan Vatanparast

Jennifer Adolphe & Colleen Hamilton

Objective 1

- **Identify healthy Canadian populations / sub-populations at risk of inadequate vitamin and mineral intakes; and profile nutrients at risk. This would include a systematic review of published literature and other available data**
  - √ **Canadian Community Health Survey Cycle 2.2 Nutrition (CCHS2.2)**
  - **Literature Review: North American focus**

Objective 2

- **Ascertain current attitudes/ knowledge/practices of vitamin and mineral use within the identified population**
  - √ **characteristics of supplement users and compare to nonusers using CCHS (income, education level, health status)**
  - √ **focus groups**

Objective 3

- **Identify gaps in research knowledge with respect to vitamin and mineral use within the identified population(s)**
  - √ **Focus groups of vulnerable popns**
  - √ **Key informants with clients in vulnerable groups**

Components of Supplement Study

QUANTITATIVE

- Determine key problem nutrients using CCHS
- Determine factors for supplement use in Canada

LITERATURE REVIEW

- Risks and benefits of supplements
- Effect of income on supplement use

QUALITATIVE

- Key informants on clients' needs
- Focus groups of target groups
- Community consultation regarding next steps
- Supplement costing

Canadian Foundation For Dietetic Research Commissioned Study

Timeline:

- Submitted grant in September 2006
  - Prior to release of 2007 Food Guide
- Conducted research throughout 2007
  - focus groups, lit review, key informants
  - lack of CCHS data on supplement use – release date May12/08
- Final report early 2008
  - July 15/08

Canada Food Guide 2007 recommendations

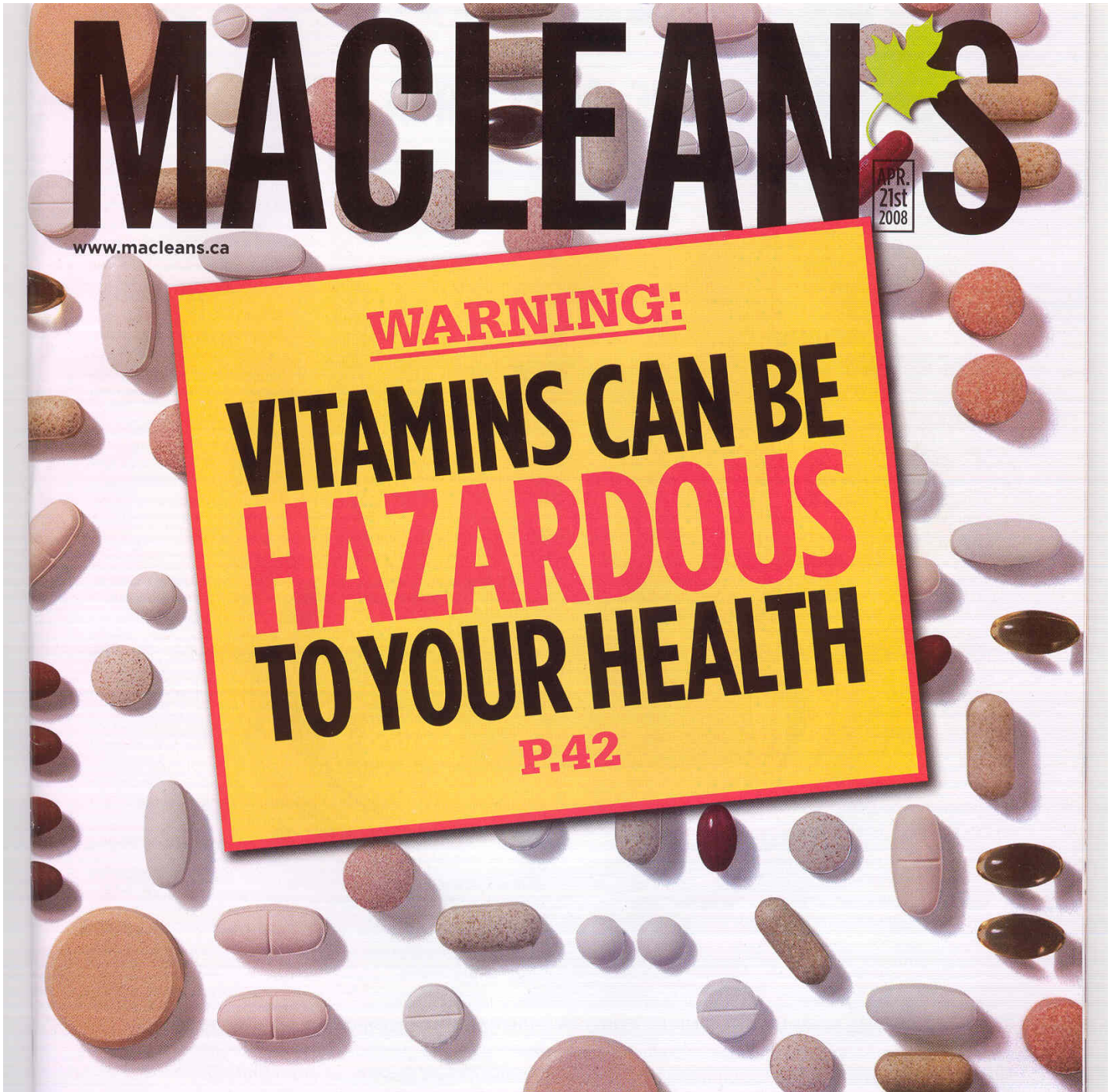
Men and women over 50

The need for **vitamin D** increases after the age of 50.

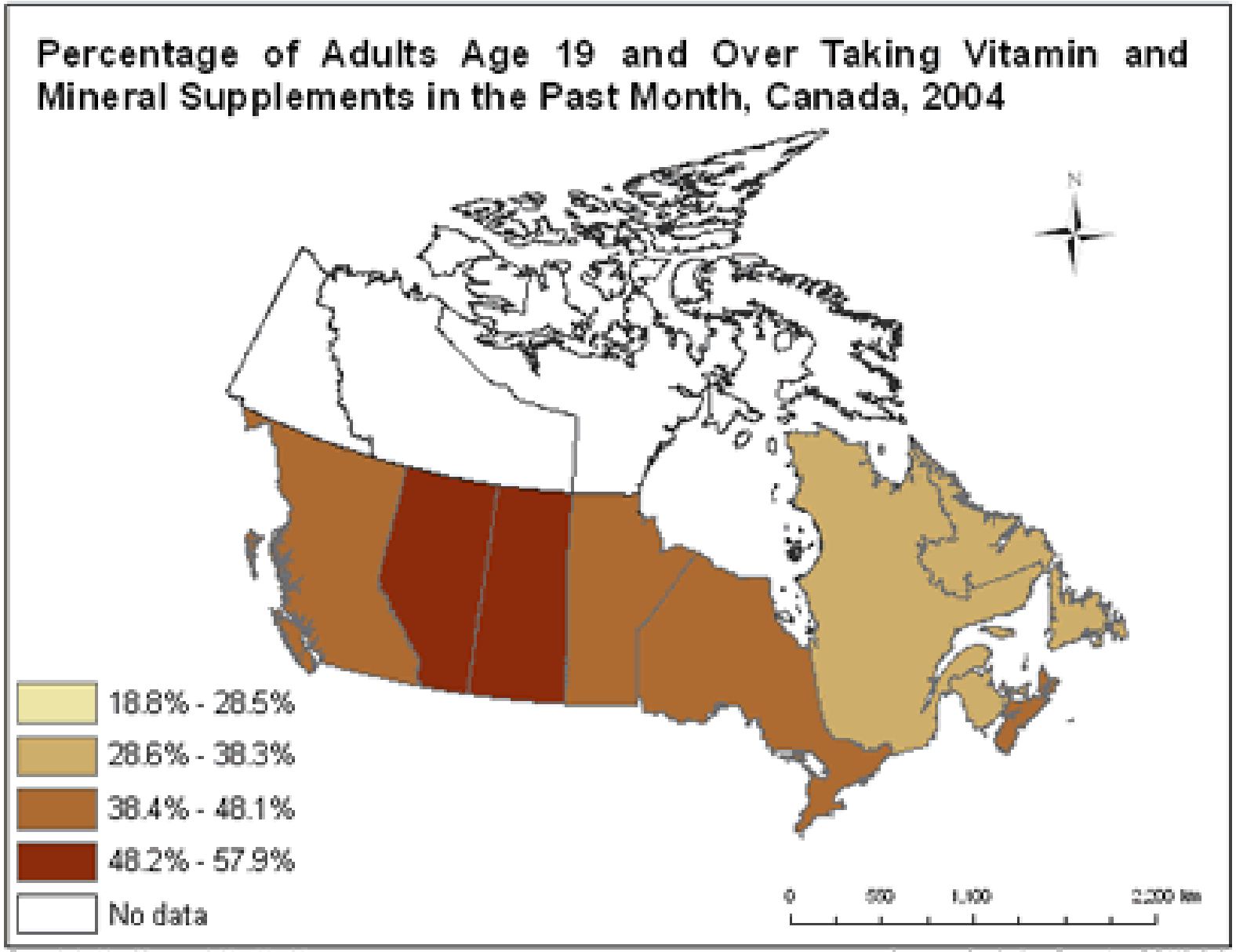
In addition to following *Canada's Food Guide*, everyone over the age of 50 should take a daily vitamin D supplement of 10 µg (400 IU).

Women of childbearing age

All women who could become pregnant and those who are pregnant or breastfeeding need a multivitamin containing **folic acid** every day. Pregnant women need to ensure that their multivitamin also contains **iron**. A health care professional can help you find the multivitamin that's right for you.


MACLEAN'S
APR. 21st 2008
www.macleans.ca
WARNING:
VITAMINS CAN BE HAZARDOUS TO YOUR HEALTH
P.42

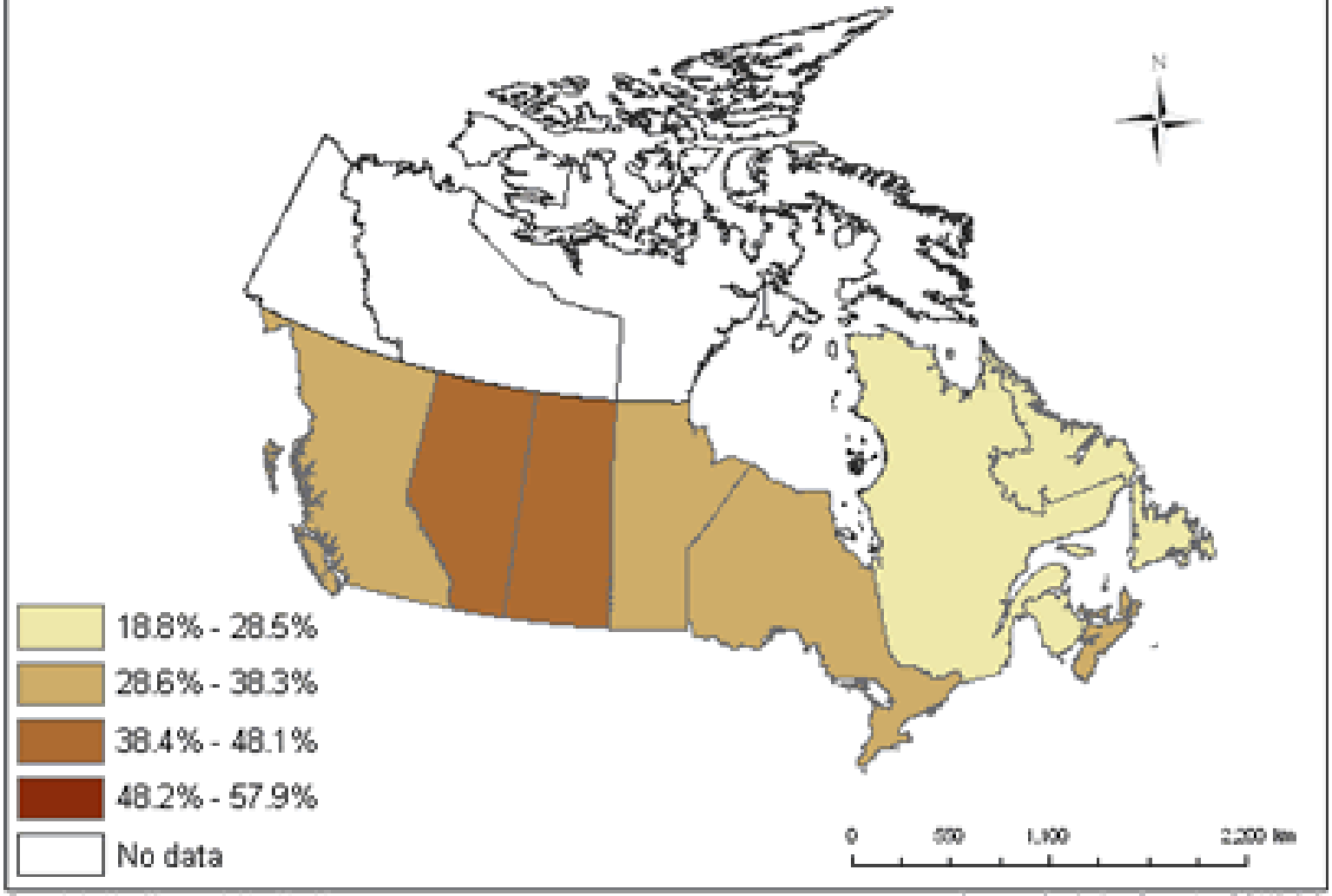
Percentage of Adults Age 19 and Over Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004



Canada's Nutrition and Health Atlas

Source: Statistics Canada, CCHS 2.2

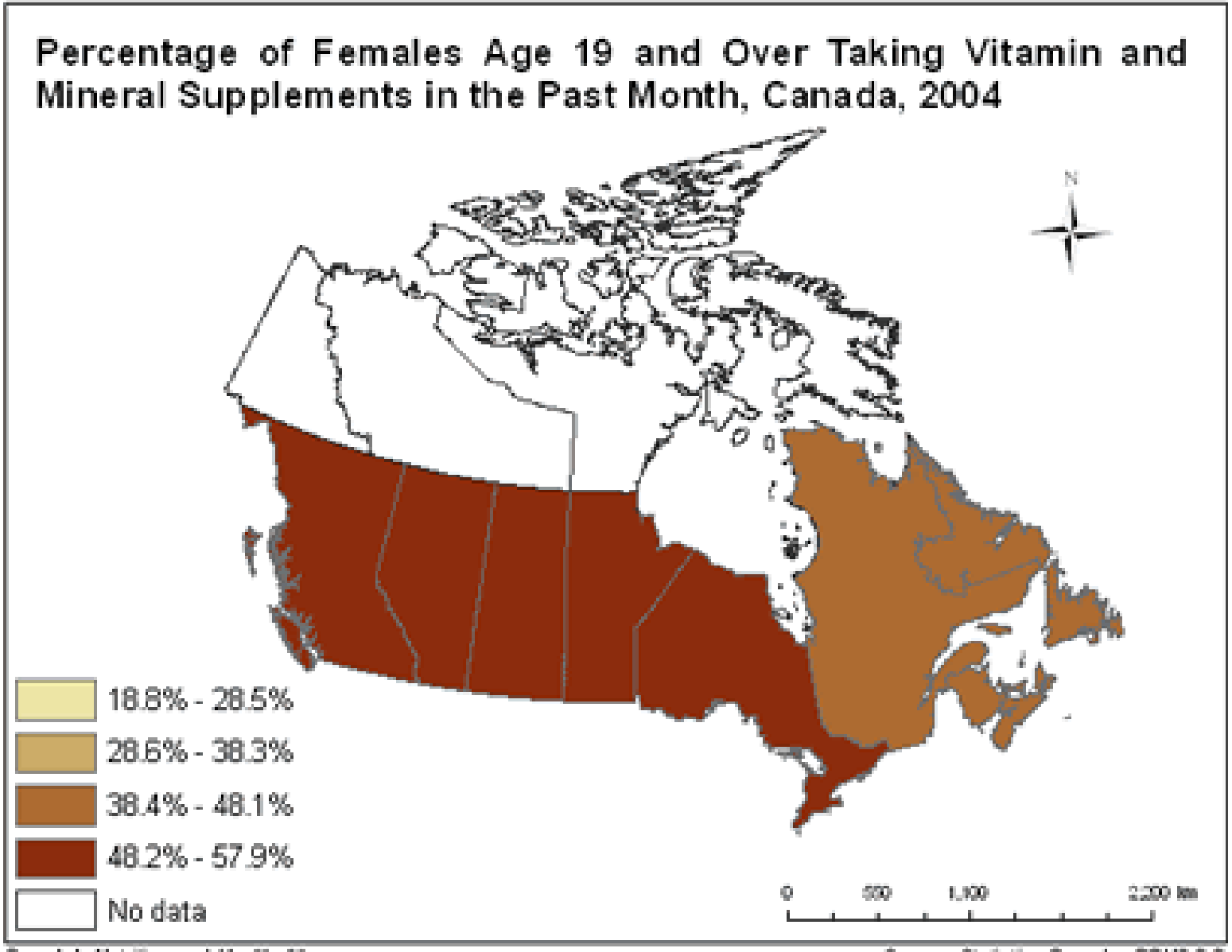
Percentage of Males Age 19 and Over Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004



Canada's Nutrition and Health Atlas

Source: Statistics Canada, CCHS 2.2

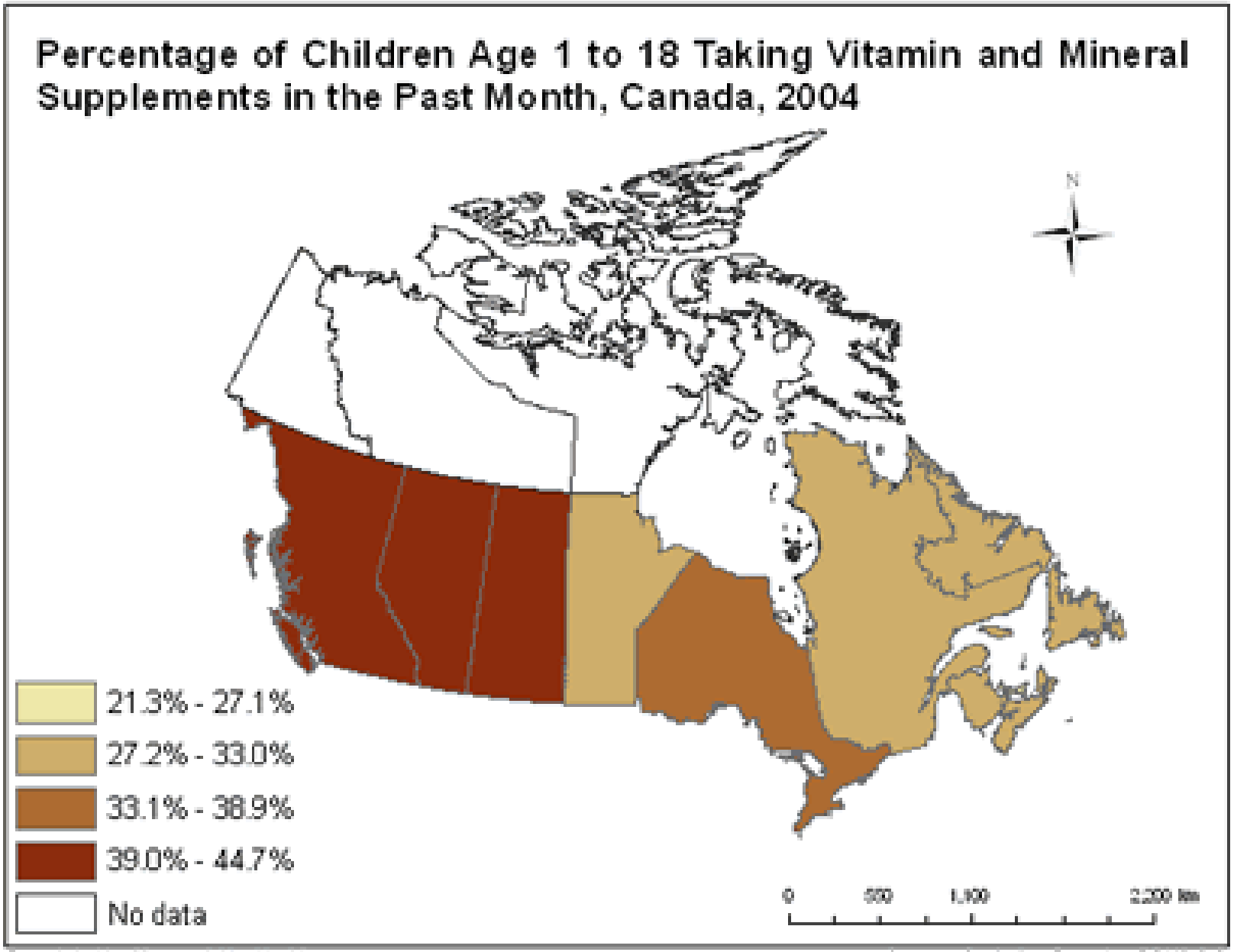
Percentage of Females Age 19 and Over Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004



Canada's Nutrition and Health Atlas

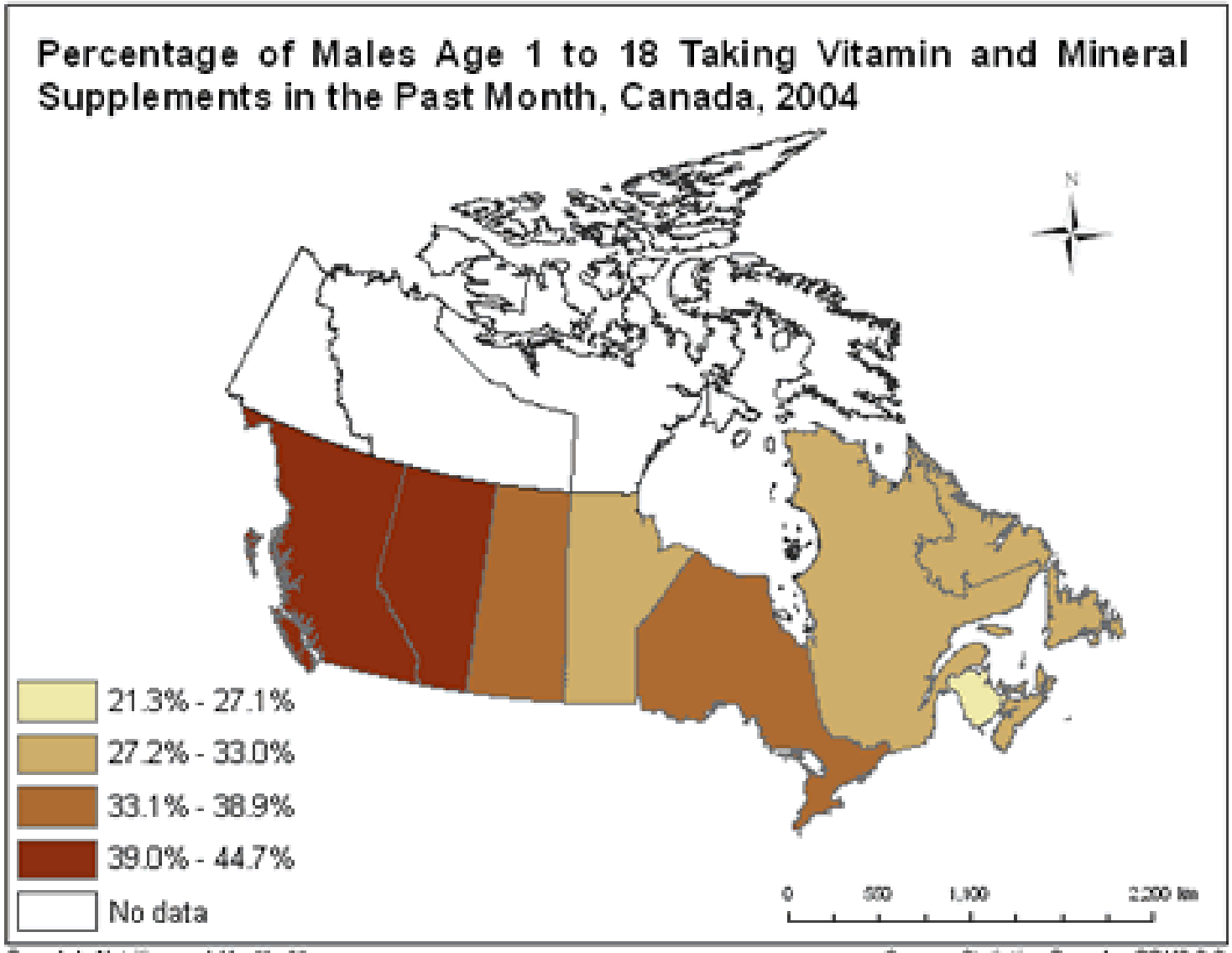
Source: Statistics Canada, CCHS 2.2

Percentage of Children Age 1 to 18 Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004

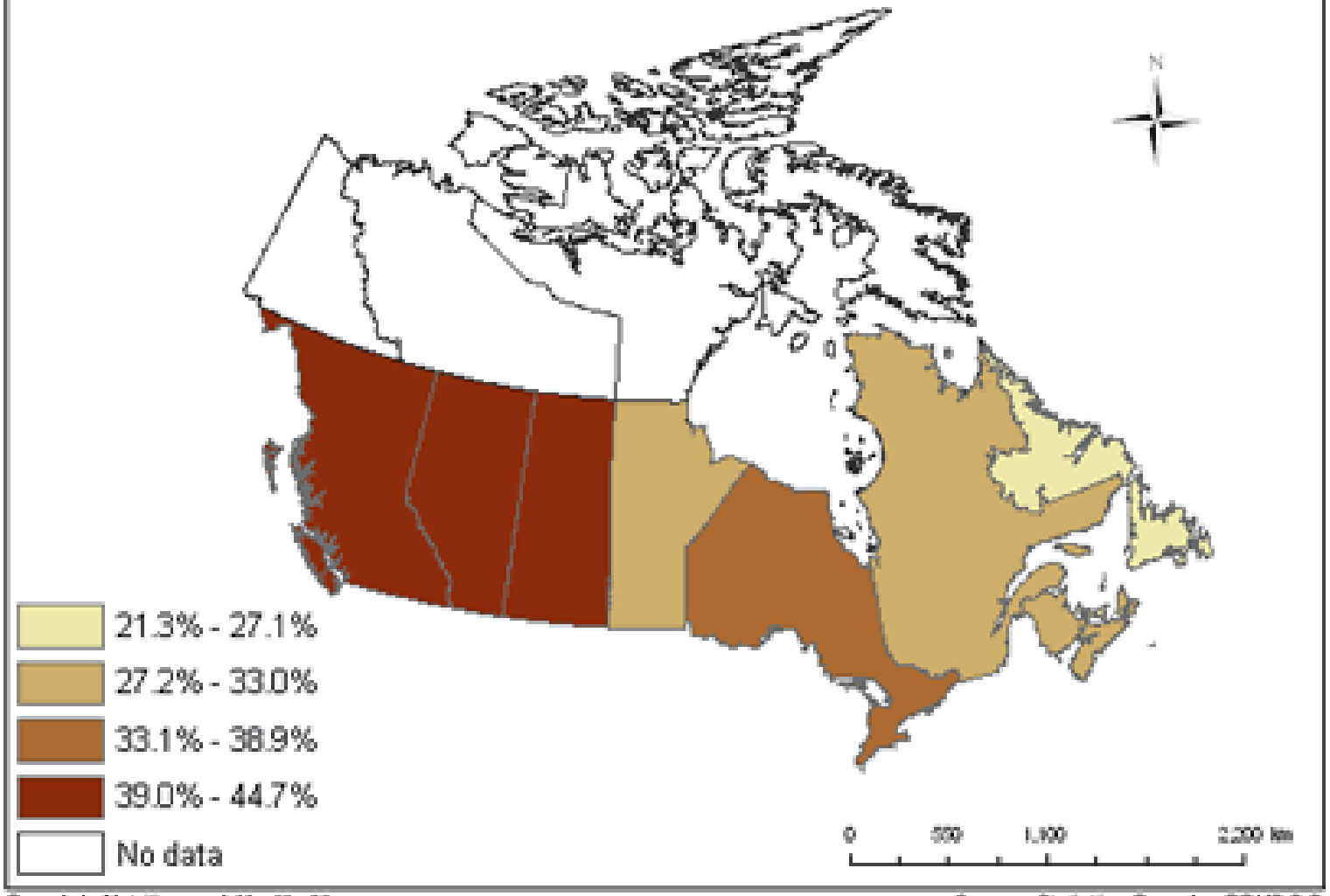


Canada's Nutrition and Health Atlas

Source: Statistics Canada, CCHS 2.2


Percentage of Males Age 1 to 18 Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004
N
21.3% - 27.1%
27.2% - 33.0%
33.1% - 38.9%
39.0% - 44.7%
No data
0
500
1,000
2,000 km
Canada's Nutrition and Health Atlas
Source: Statistics Canada, CCHS 2.2

Percentage of Females Age 1 to 18 Taking Vitamin and Mineral Supplements in the Past Month, Canada, 2004



Canada's Nutrition and Health Atlas

Source: Statistics Canada, CCHS 2.2

Objective 1. What are the Current Nutrient Concerns for Canadians?

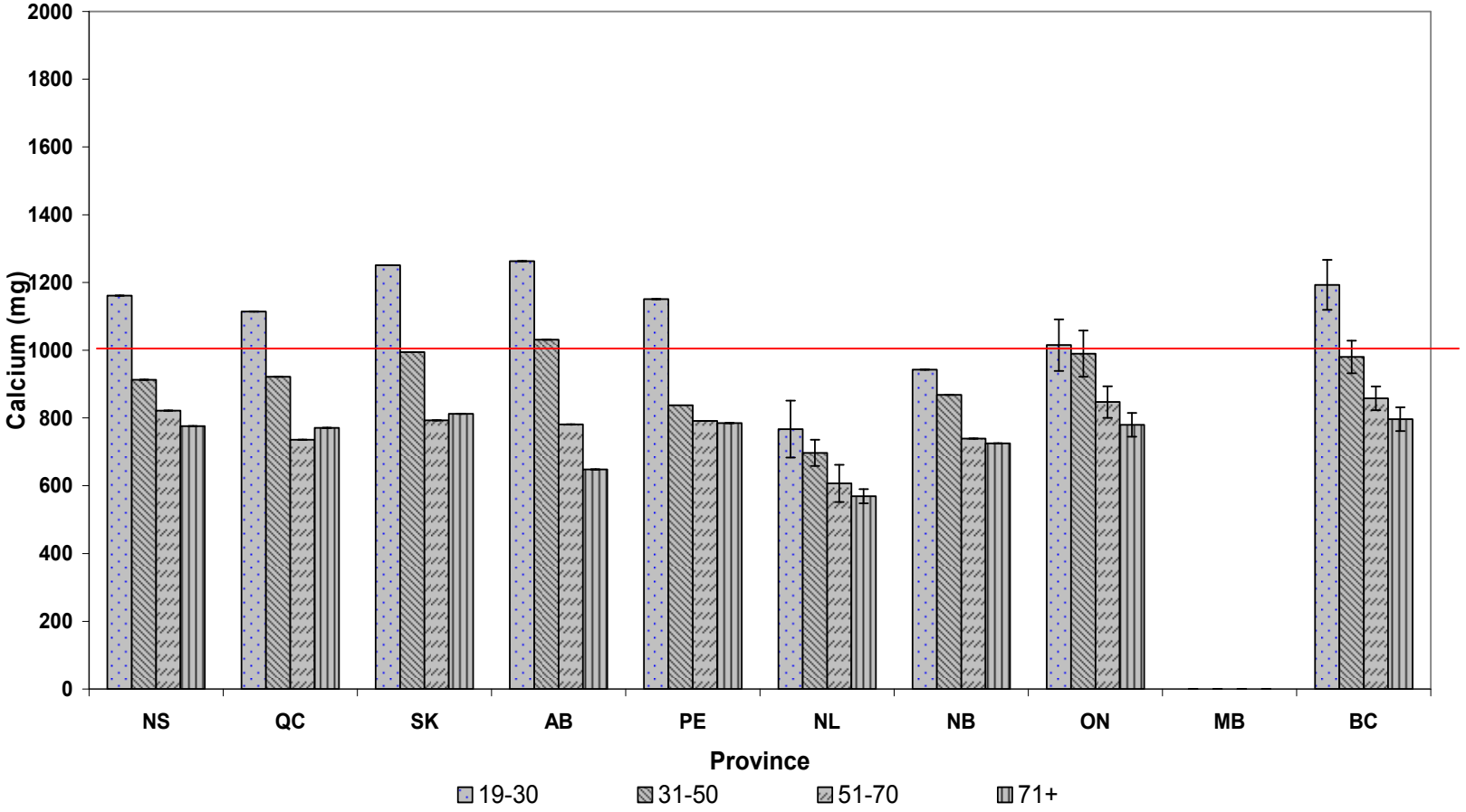
Calcium
Vitamin D
Vitamin C
Vitamin A
Vitamin B6
Vitamin B12
Iron
Magnesium
Zinc

Mean intake below AI

Prevalence of Inadequacy values > 10

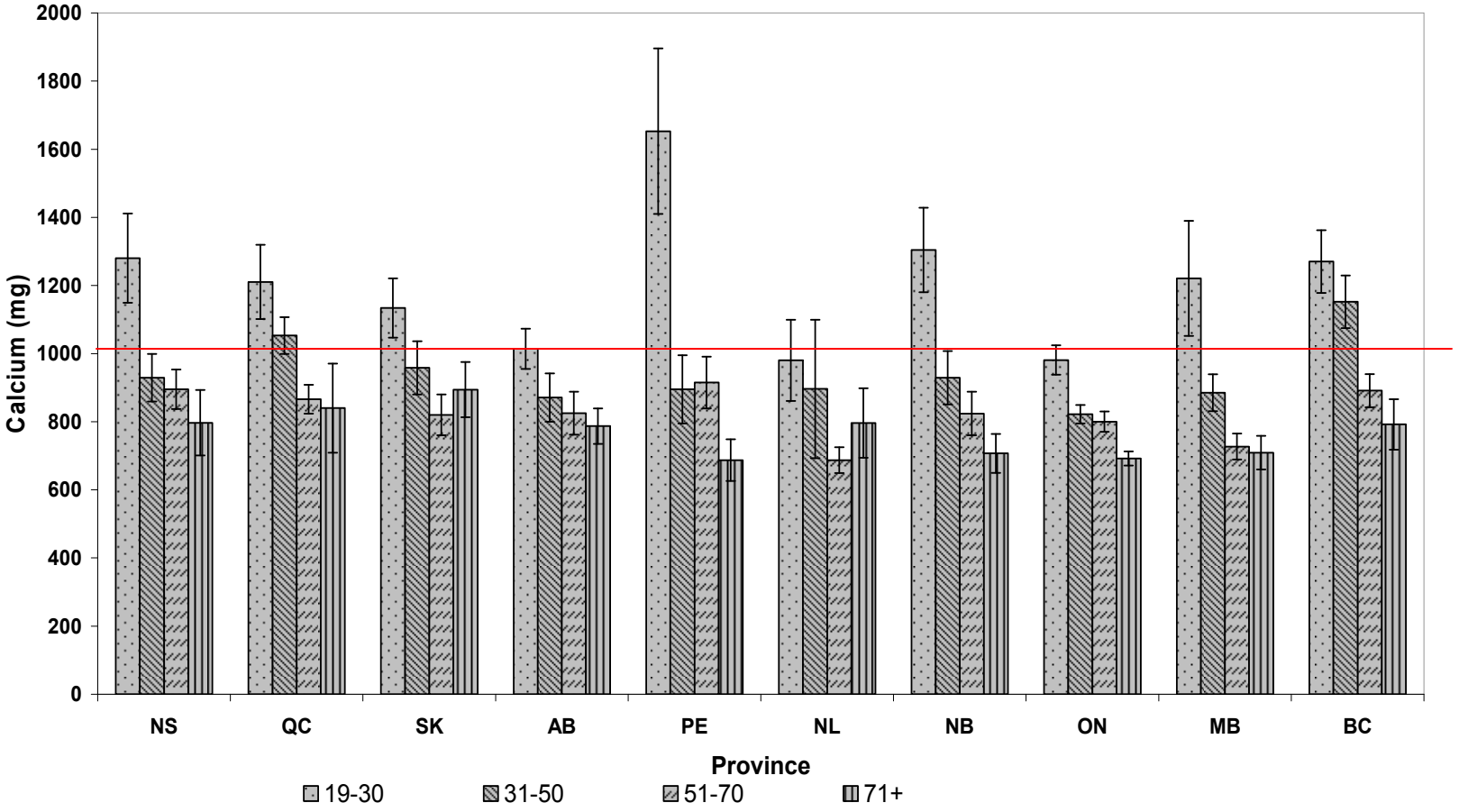
CCHS 2004 data. Kirkpatrick & Tarasuk J Nutr 2008

Calcium intake by adult women
CCHS 2004 (mg/day)



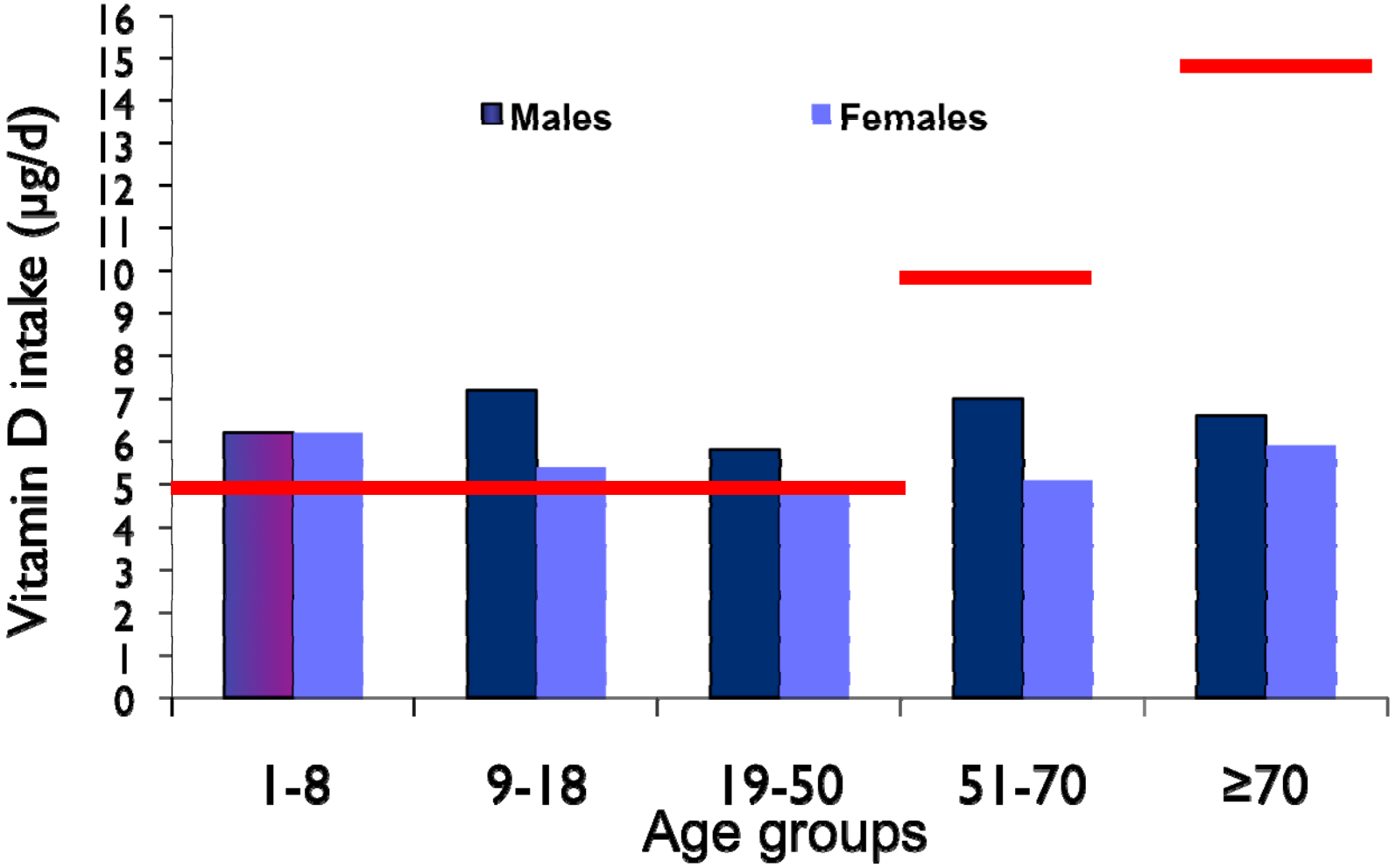
Dolega-Cieszkowski et al. 2008 submitted

Calcium intake by adult men
CCHS 2004 (mg/day)



Dolega-Cieszkowski et al. 2008 submitted

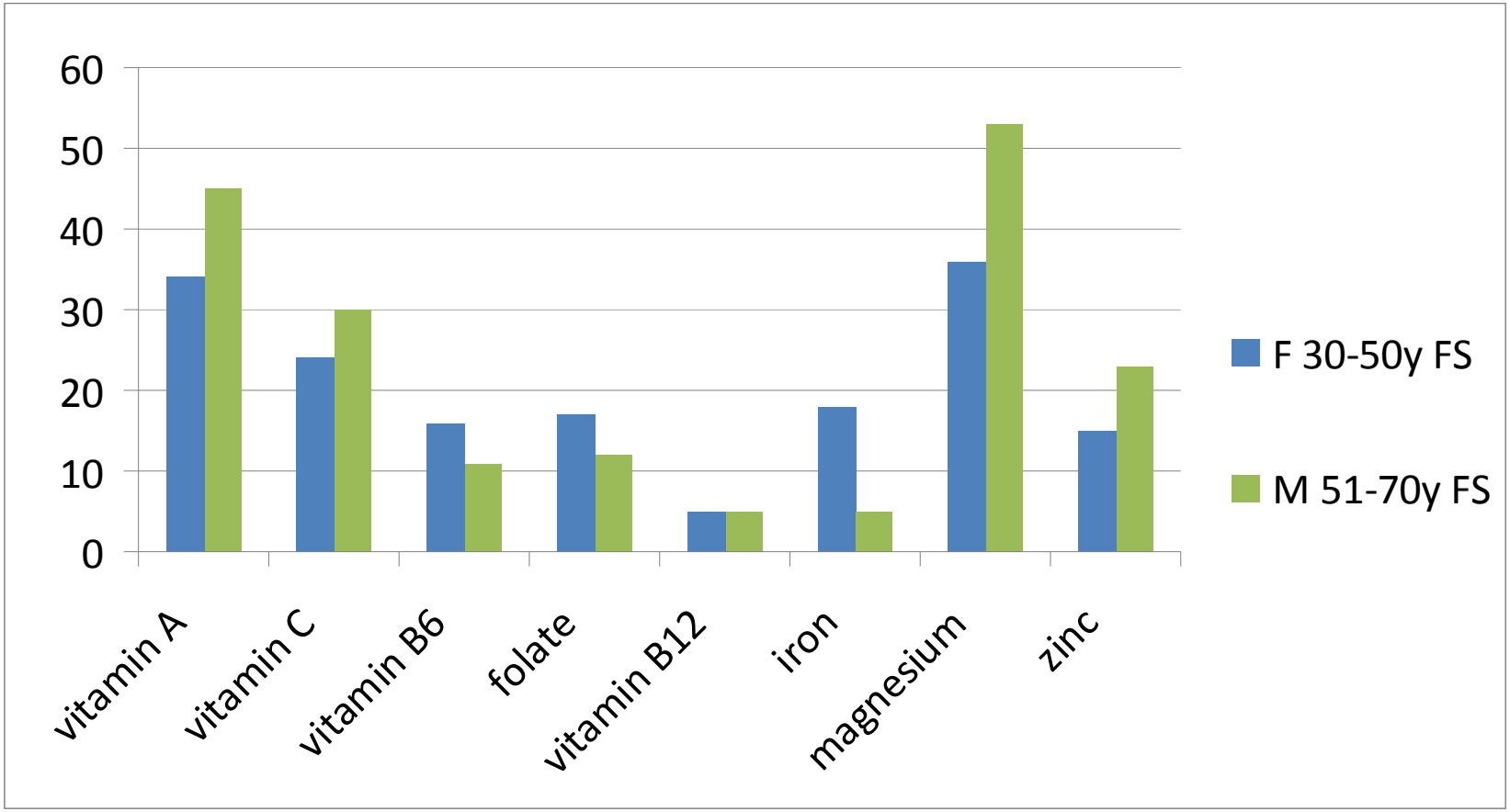
Mean vitamin D intake of Canadians



DRI Adequate intake value for vitamin D

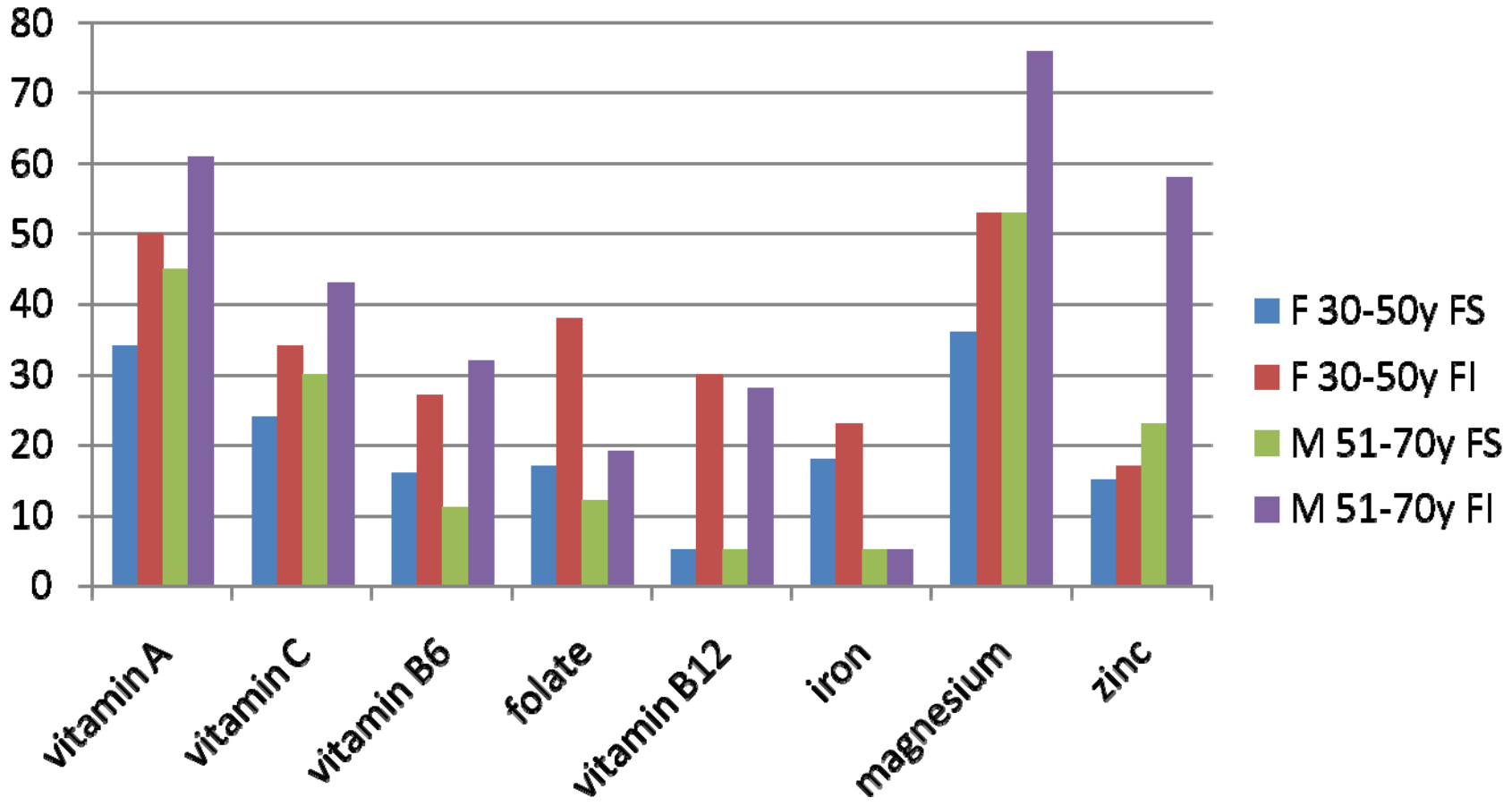
Vatanparast et al. 2008: CCHS Cycle 2.2, submitted to JADA

Prevalence of Inadequacy of Food Secure (FS) Canadians



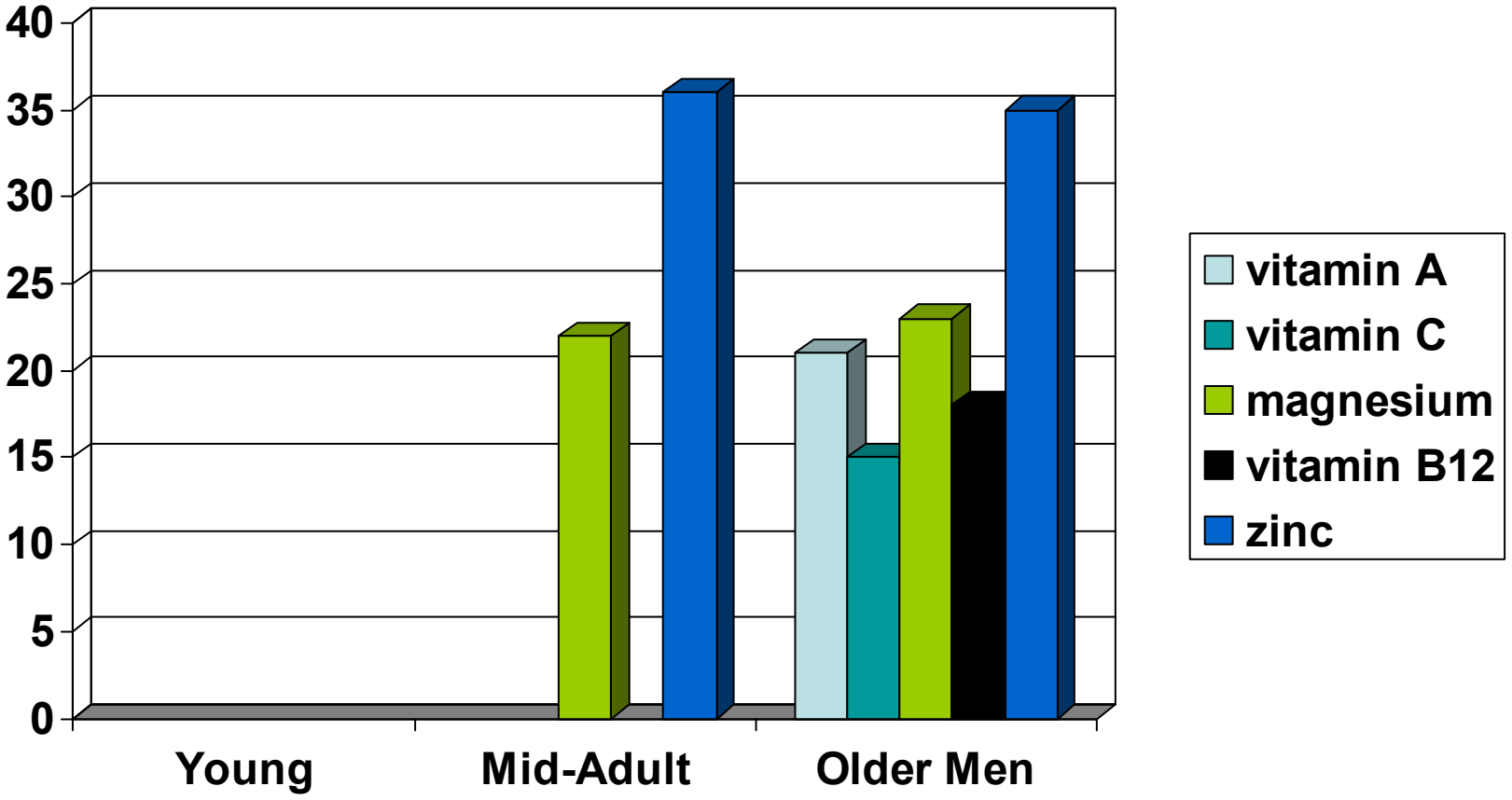
CCHS 2004 data. Kirkpatrick & Tarasuk J Nutr 2008

Prevalence of Inadequacy: Food Secure (FS) and Food insecure (FI)



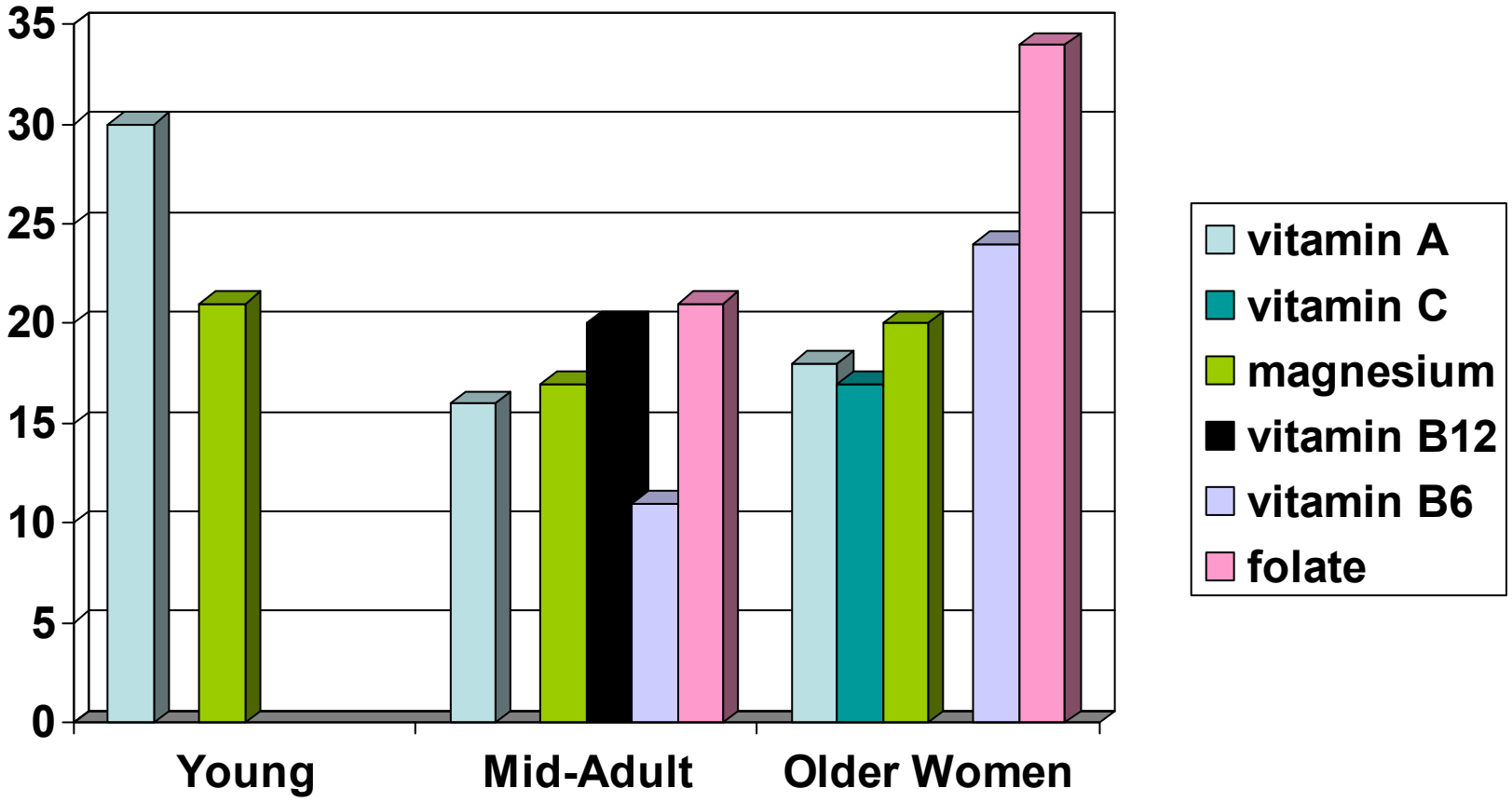
CCHS 2004 data. Kirkpatrick & Tarasuk J Nutr 2008

Amount (%) that food insecure men have prevalence of inadequacy greater than food secure men



CCHS 2004 data. Kirkpatrick & Tarasuk J Nutr 2008

Amount (%) that food insecure women have prevalence of inadequacy greater than food secure women

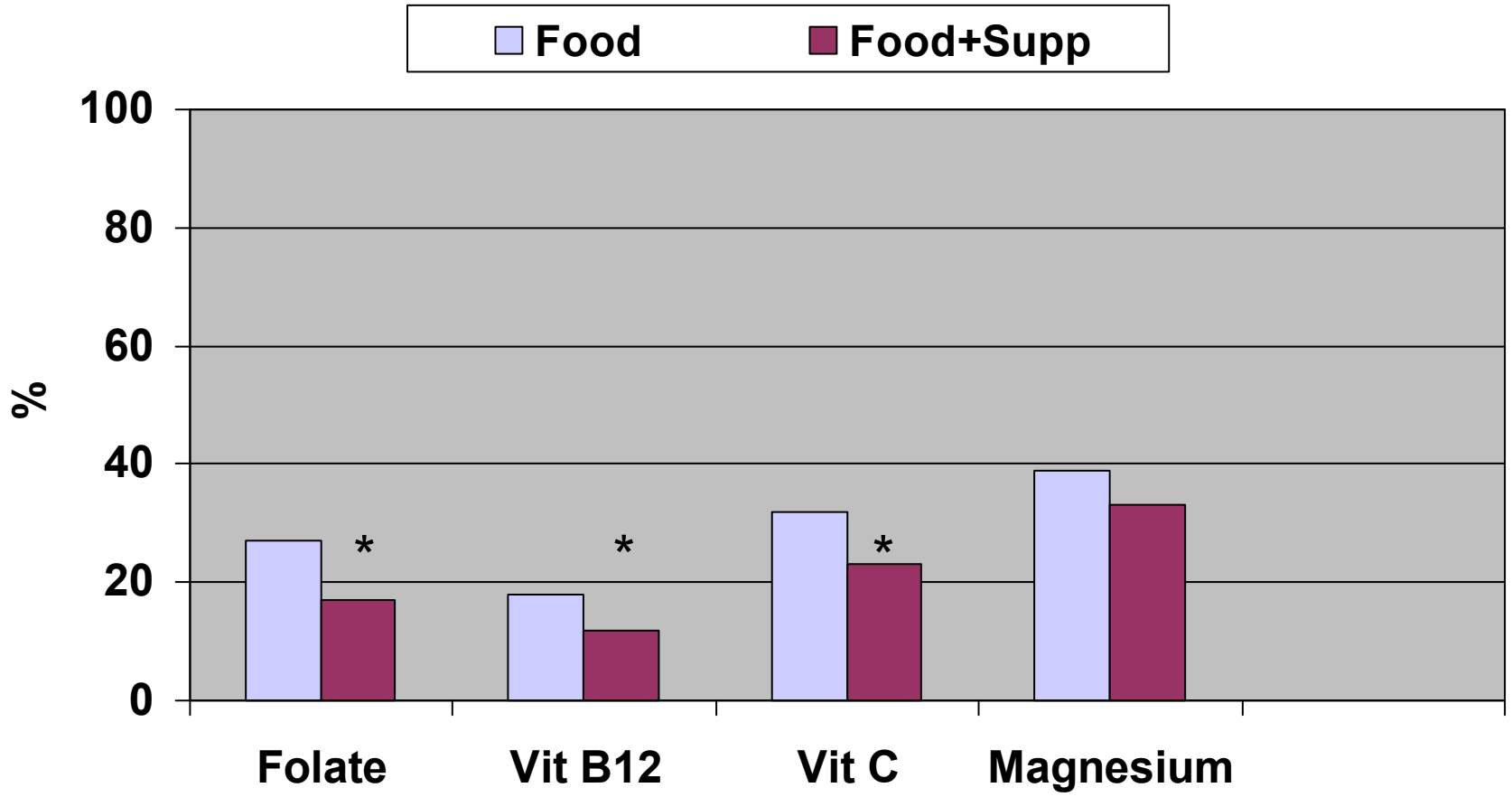


CCHS 2004 data. Kirkpatrick & Tarasuk J Nutr 2008

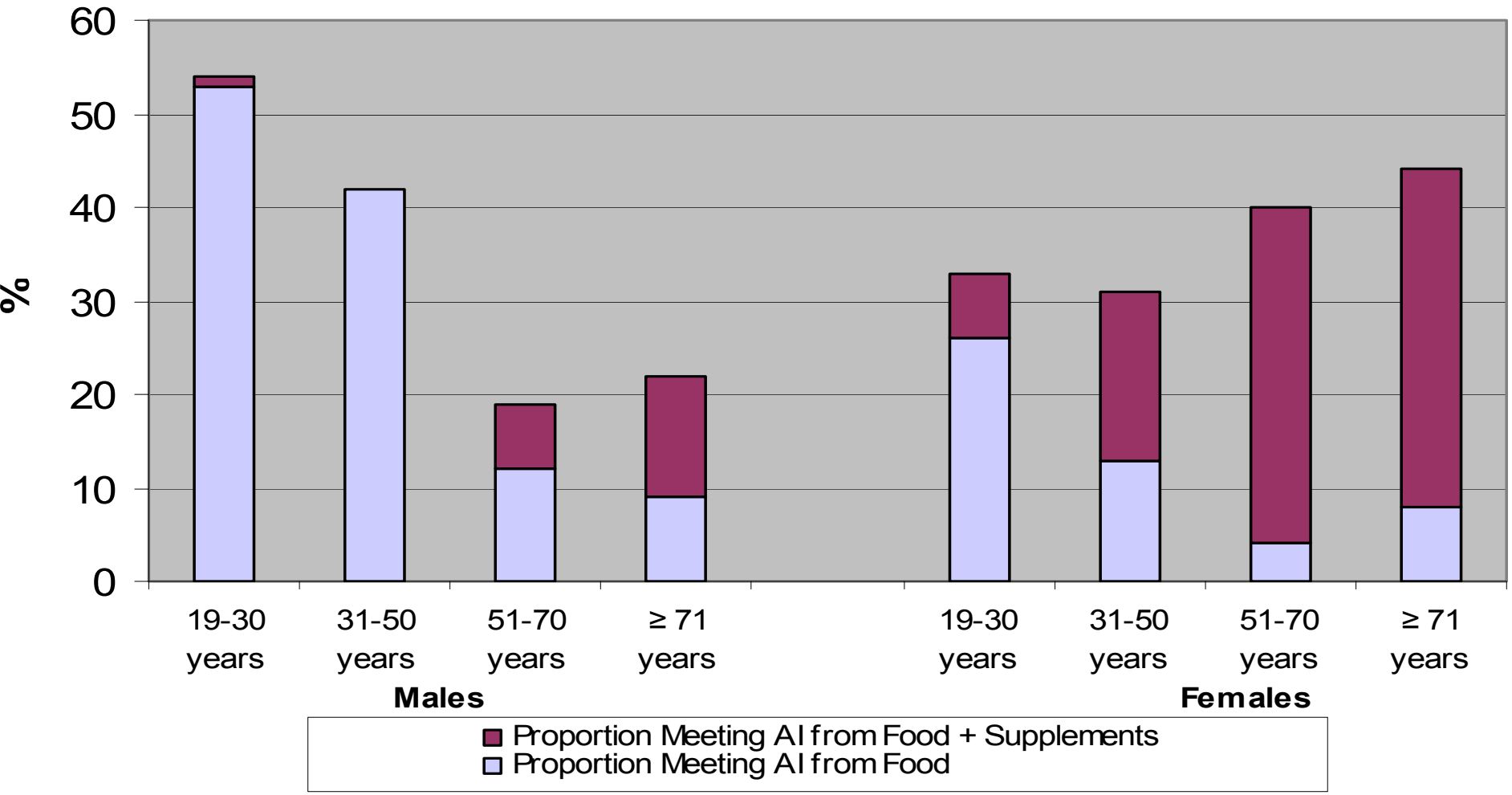
Does Supplement Use Improve Poor Nutrient Intakes of Canadians?

- Our intent is to answer this question
- Can give some idea of answer through BC Nutrition Survey 1999

Prevalence of nutrient inadequacy, British Columbia, 1999



% Meeting adequate intakes (AI) for calcium, British Columbia, 1999



Relationship of Supplement Use to Income

A general conclusion regarding supplement use tended to be:

- *those who used supplements didn't need supplements the first place*

This Question has never posed:

- *do those who do not use supplements actually need them*?

Studies Examining Supplement Usage by Income/Income-Related Variables

	Higher Income	Employed	Higher Level of Education	Smaller House-hold Size
Men and Women				
Archer et al. 2005	+	-	+	+
Balluz et al. 2005	+	+	+	
Balluz et al. 2000	+	+	+	
Fennel 2004	+		+	
Nayga et al. 1999	+		+	
Pelletier et al. 1997			+	
Ma et al. 2007			+	
Reedy et al. 2005			+	
Women Only				
Ahluwalia et al. 07			+	
Children				
Briefel et al. 2006	**NS**		**NS**	+

Focus Group Findings

- September – November, 2007
- 12 focus groups; total of 73 participants.
- Participants recruited by a community liaison through community development organizations working primarily with people living in the core neighborhoods.
- Diversity of participants with regards to age, income, level of education, health status and cultural background.
- Most were female (n = 63, 86%)
- **A large proportion (n=33, 45%) were receiving some or all of their income from social programs.**

Focus Group Findings

- Five themes emerged regarding ***barriers to healthy eating:***
  - Preferences
  - Knowledge
  - Income
  - Accessibility
  - Health

Focus Group Findings

- Five themes emerged regarding ***barriers to healthy eating:***
  - Preferences – **eating is social; others determine foods**
  - Knowledge – **not sure which foods are needed**
  - Income – **higher cost of healthy foods**
  - Accessibility – **need to travel to store; storage of foods**
  - Health – **mental health issues, food safety, allergies**

Focus Group Findings

- Five themes emerged regarding ***barriers to supplement use:***
  - Preferences
  - Knowledge
  - Income
  - Accessibility
  - Health

Focus Group Findings

- Five themes emerged regarding ***barriers to supplement use:***
  - Preferences – **pills vs liquids**
  - Knowledge – **too many choices; unsure if need**
  - Income – **cost**
  - Accessibility – **forget to take; rules regarding Status FN**
  - Health – **side effects**

Key Informants

- We initially chose to interview dietitians who worked with clients in the core neighbourhood of Saskatoon, an area that is known to have health disparities (Lemstra, Neudorf, & Opondo, Can J Publ Hlth '06).
- Using snowball techniques, we contacted other dietitians as well as other health professionals and persons working in food programs.

Key Informants

- 4 Dietitians [RD1-RD4]
- Pharmacist – retail, core neighborhood
- Nurse – public health nurse, core neighborhood
- 5 CBOs [CBO1-5]

- Have since learned through our consultation (April 23) that focus group members seek help and advice from herbalists, elders, naturopaths, iridologists among others.

What factors influence the eating habits of your clients?

Population level

- Advertising; Vending machines in schools
- Retail food industry moving away from smaller stores towards larger stores on the outskirts of cities that people have to drive to
- International purchasing policies – global food economy

Individual, Family and Community

- Change in family structure (less time at home)
- More difficult to get local produce
- Health issues
- Becoming pregnant
- Functioning at a lower level developmentally due to FASD
- Feel ashamed to get food from charity organizations
- Change in the ways people prepare, store and purchase food over the last generation

Vitamin/mineral supplements taken by clients of Key Informants

Calcium: for people over 50, lactose intolerant (Rx)

Vitamin D drops for breastfeeding infants (Rx)

Prenatal multivitamin (Rx)

Iron (Rx): anemia

Vitamin D: recommend for people over 50

Folic acid: prenatal

Multivitamin: is covered for children up to age 6 (Rx)

Rx = covered for First Nations with prescription but access is difficult

Reasons why clients do decide to take a vitamin/mineral supplement

SPECIFIC [RECOMMENDED, PRESCRIBED]

- Health of baby for prenatal
- Specific health issue,
- Know why; believe it will work

OTHER FACTORS

- Build a relationship
- Providing education
- Personal contact with someone suggesting supplements
- Media
- Friends, family

Barriers that influence the vitamin/mineral supplement intake of clients when these are recommended

- INCOME: Not covered by drug plan, Cost
- KNOWLEDGE: Perception they don't need it, Lack of information, incorrect information
- ACCESSIBILITY: Time and energy to get a prescription from MD; availability of MD in communities; Transportation to go to pharmacy or doctor's office; No local pharmacy; Having to return for prescription refill.
- PREFERENCE: Don't like to take pills, Think that it's not natural, Remembering to take supplements, Suspicion about taking pills of any kind
- HEALTH: Makes them feel sick, have a hard time swallowing it. Already taking numerous medications and don't want to take any more pills.

Ways to eliminate the barriers to taking a vitamin/mineral supplement

- Available in the community/supplied at health clinics
- Lower cost
- More coverage
- Dietitians having samples
- Have them available in nutrition/food programs
- Have good information available at programs and in newsletters to remove barrier of lack of information and incorrect information
- Liquid supplements
- Provide pill crusher
- Fortify common foods with nutrients of concern instead of having to take a supplement e.g. vitamin D

What are the gaps in knowledge regarding vitamin/mineral use in target populations?

Using literature review, determine target groups for whom supplement use could be beneficial

Key Informant Interviews

Focus groups

Reasons why clients not always able to use supplements

Reasons why they not always able to use supplements

Agreement in INDIVIDUAL/COMMUNITY factors
= accessibility, income, health, knowledge, preferences

Key Informants also able to identify POPULATION factors
= support, validation

Observations on Retail Supplements

(Community Liaison went shopping for prices)

When customers were in aisle looking there was no one answer their questions unless they went in line to the pharmacy. Sometime a clerk would come from the pharmacy and help.

- Supplements in some stores were very visible. Other stores, not visible (small areas, in a corner).
- Knowledge of what to buy: a lot of people would just look and leave.
- Packaging: could not easily read bottles and did not know meaning of amounts (IU)

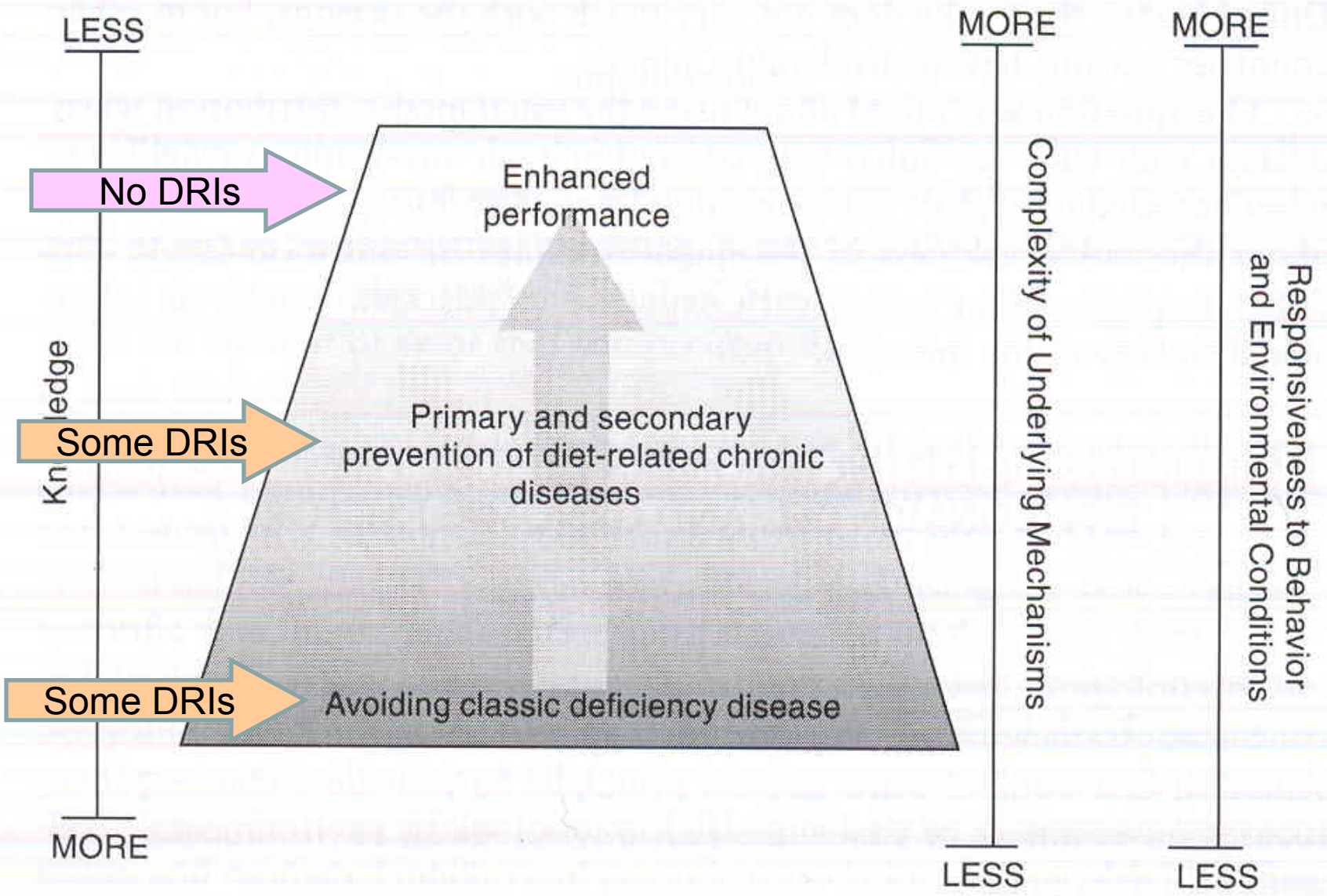


FIGURE 3-12 Nutritional health continuum.

The Development of the DRIs 1994-2004 Lessons Learned and New Challenges. NAP 2008

Benefits and Risks of Supplement Use

- Benefits
  - RCTs for chronic diseases
  - Knowledge of primary and secondary deficiency diseases
  - Genetic differences in requirements
  - Dietary intake studies for gap between food intake and recommended intakes
- Values range from AI/RDA to "megadoses"

Systematic Review

- NIH State of the Science Conference 2007
- ↓ Cancer incidence with some multivit/min combinations
- ↓ progression of age-related macular degeneration
- ↓ in CVD death; decreased angina and stroke (vit E)
- ↓ fracture, falls with Ca and vit D

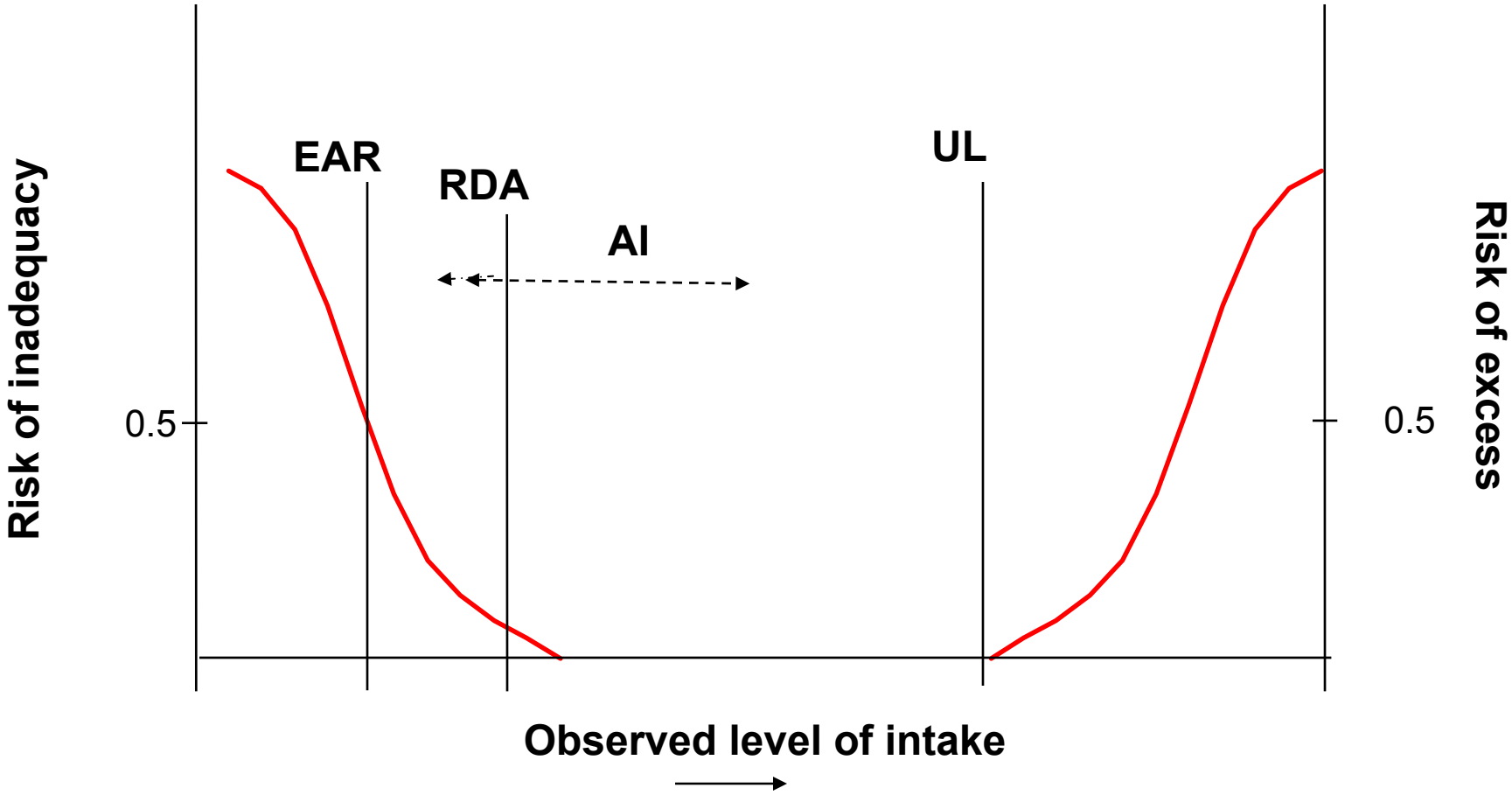
Benefits and Risks of Supplement Use

- Risks
  - Case reports for adverse effects
  - RCTs of studies related to chronic disease
  - Unintended outcomes of efficacy studies
- Values
  - UL for safest upper intake levels
  - “LOAEL” = lowest level of high intake that causes adverse effect

Studies 2005-08

- β-carotene and cancer, CVD and all-cause mortality (e.g. CARET 30 mg)
- Vitamin A and all cause mortality (e.g. CARET 25000 IU)
- Vitamin E and all cause mortality
- Folate and risks of specific breast cancers

DRI Figure Showing "Risk" of inadequacy and of adverse effects



DRI Diagram Should Change to Show risk of benefit curve steeper than risk of harm

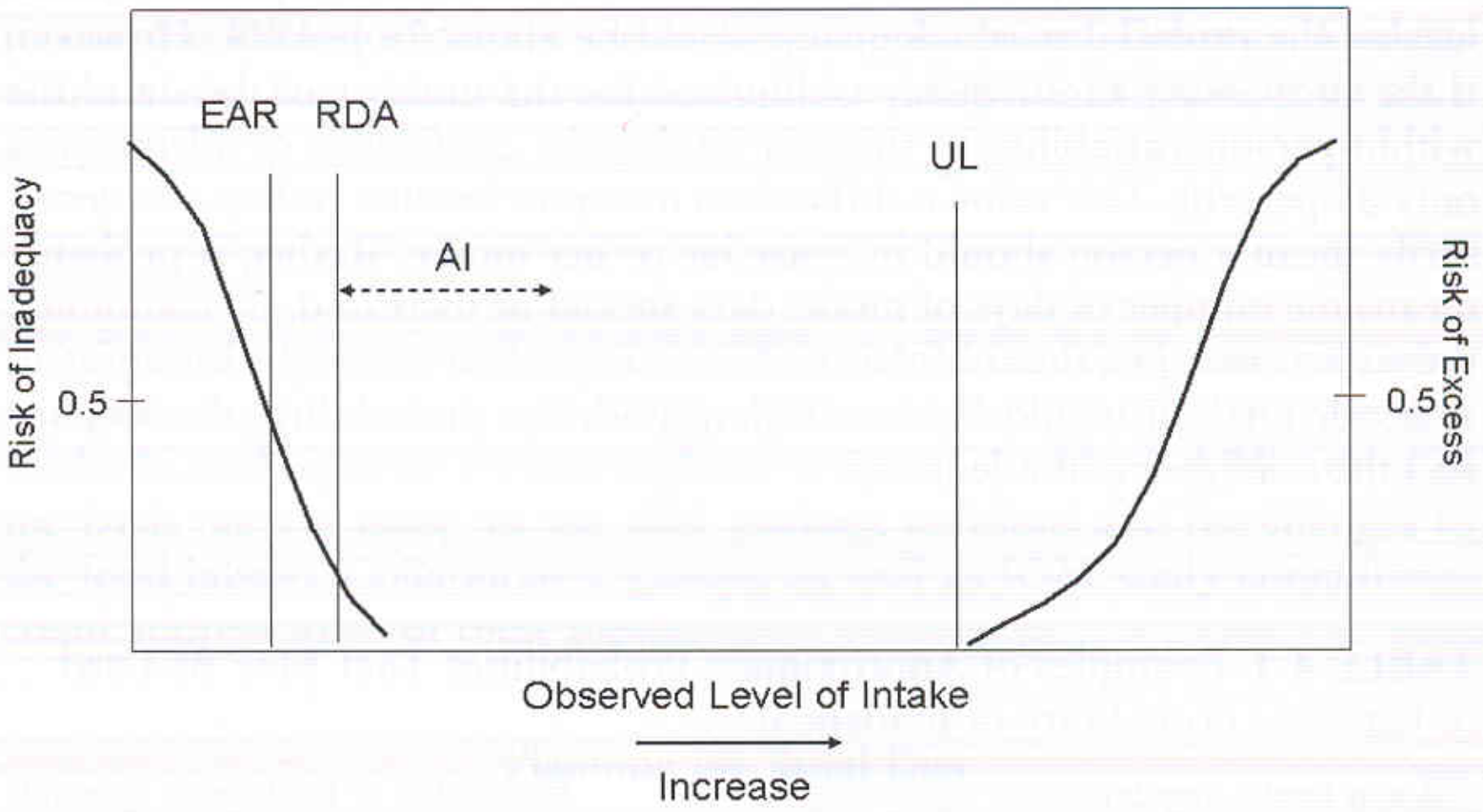


FIGURE 4-2 Relationship of the AI to the EAR and RDA.
NOTE: EAR = Estimated Average Requirement; RDA = Recommended Dietary Allowance; AI = Adequate Intake; UL = tolerable upper intake level.

The Development of the DRIs 1994-2004 Lessons Learned and New Challenges. NAP 2008

Micronutrients That Have ULs

- **Minerals:**
- Calcium
- Phosphorus
- Iron
- Magnesium*
- Zinc
- Selenium
- Iodine
- Molybdenum
- Manganese
- Fluoride

* acute

- **Vitamins:**
- Vitamin A
- Vitamin E
- Vitamin D
- Niacin
- Folate
- Vitamin B-6
- Vitamin C
- Choline
- **Electrolytes**
- Sodium
- Chloride

Micronutrients That Have A UL related to supplement use only

- **Minerals:**
- Magnesium

- **Vitamins:**
- Vitamin E
- Niacin
- Folate

How Are ULs Used?

- UL is upper end of “safe level of intake”
- Values assume chronic intake (excl. Mg)
- Risk of Adverse effects is zero for healthy person
- Planning diets
  - Not to exceed UL
- Assume healthy person maintaining stores, not repletion of deficiency

Uses of Supplements

- **Treatment** under Doctor's supervision is not an issue for UL
- **Prevention**
  - DRIs "encourage" additional synthetic forms of folic acid (women), vitamin B12 (> 50y)
  - Levels of some RDAs/AIs for some groups must be met with supplements: Ca, vitamin D, F, Fe, folate,

Defining the role of supplements in nutrient intake

Compute nutrient intake from foods
And determine nutrients with inadequacy

Kirkpatrick & Tarasuk 2008

Compare to nutrient intake from food and supplements:
Has prevalence of inadequacy decreased?

Formulate strategy to improve intakes, taking into account Food Insecurity

Improve food supply

Food Fortification

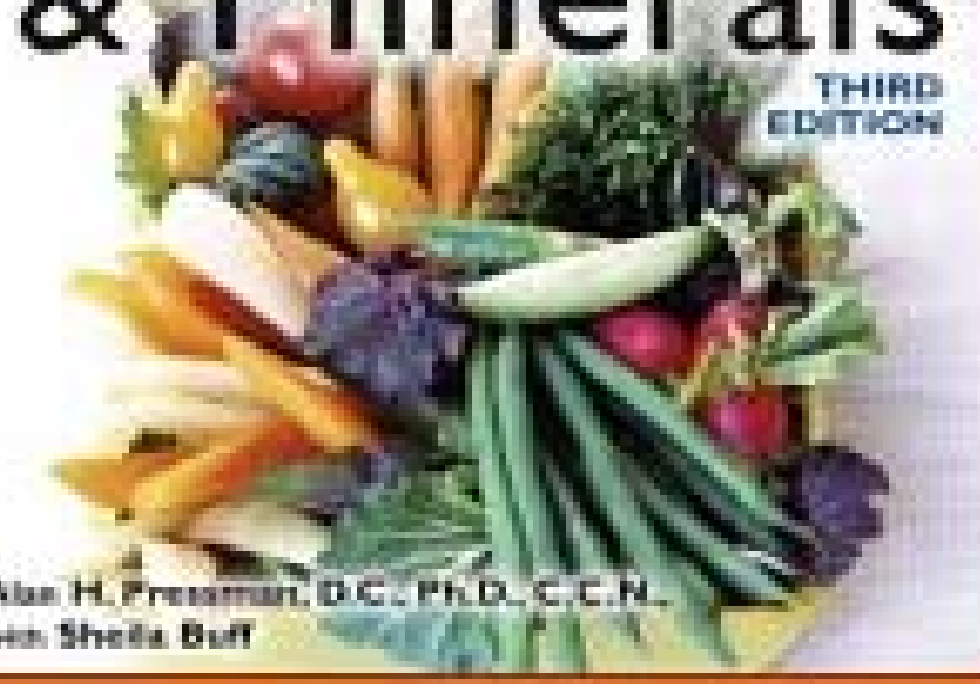
Supplementation

COMPLETE IDIOT'S GUIDE

The ABCs of nutrition's building blocks

Vitamins & Minerals

THIRD EDITION



Alan H. Pressman, D.C., Ph.D., C.C.N.
with Sheila Buff