National Cancer Institute

Web-based Compilation: Measures of the Food Environment

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health

Web-based Compilation: Measures of the Food Environment

Outline

- Background on the food environment and compilation of measures
- Overview/demonstration of the website
- Trends from recent articles
- Insights, challenges, next steps

Outline

Why is the food environment relevant?

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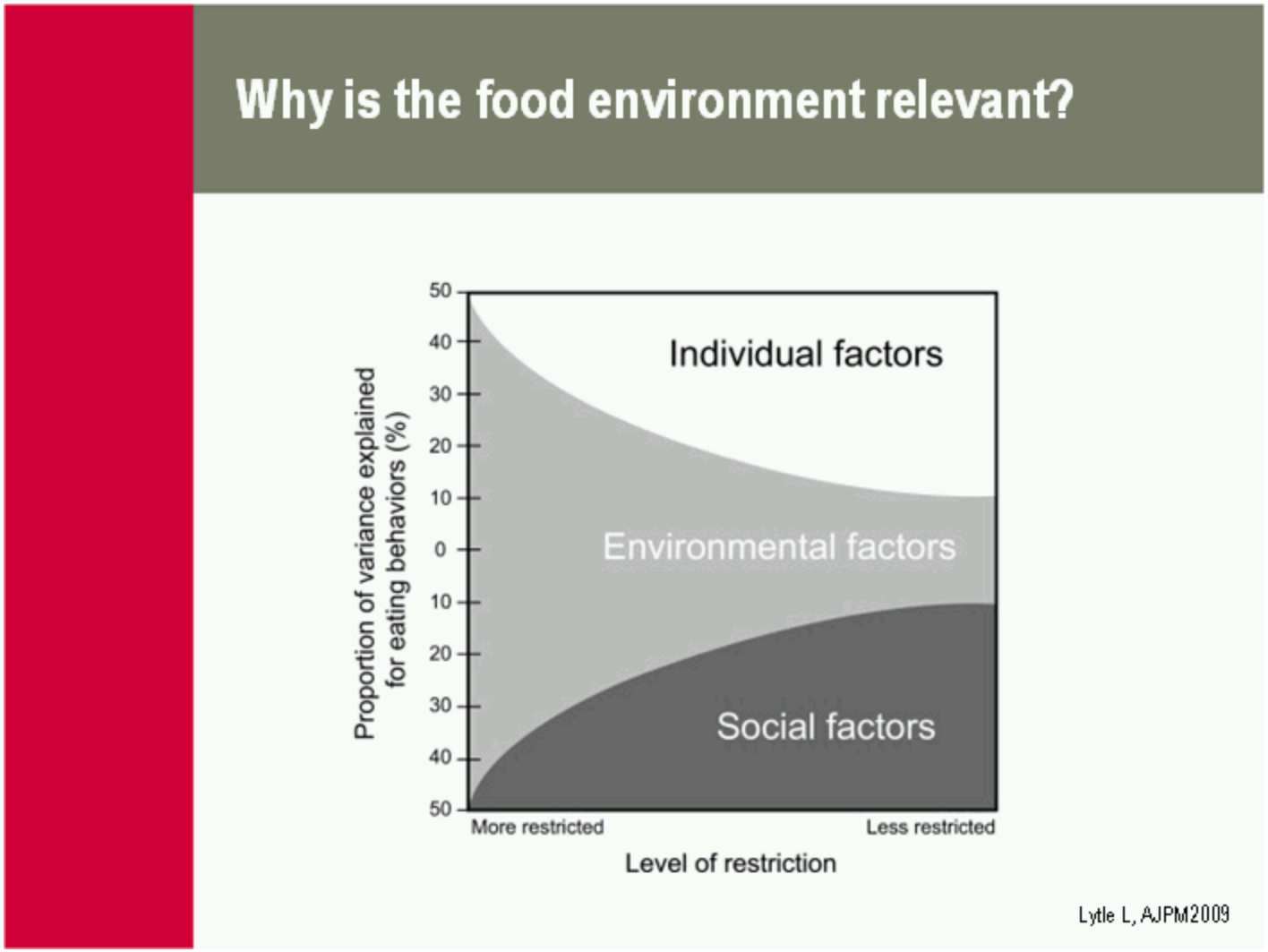
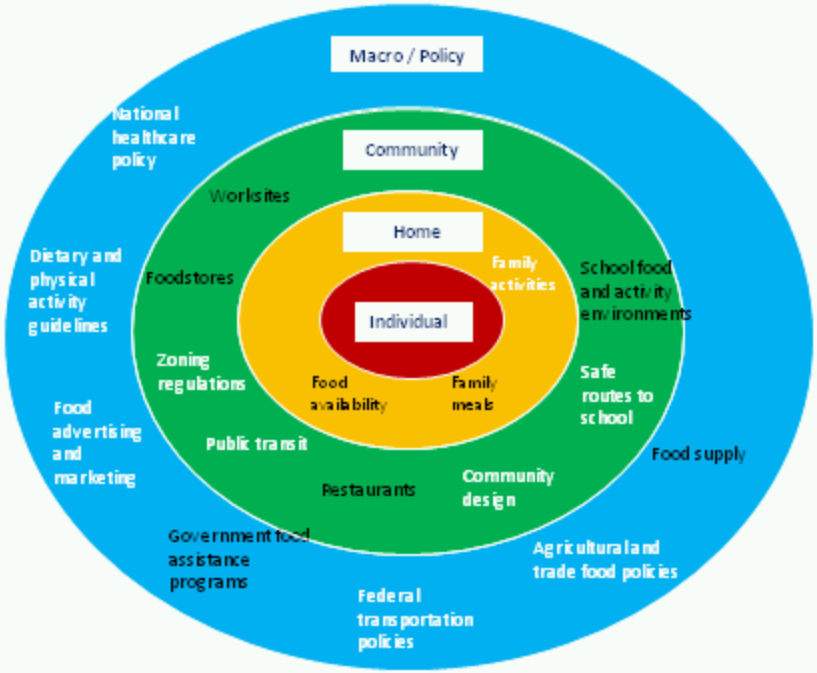
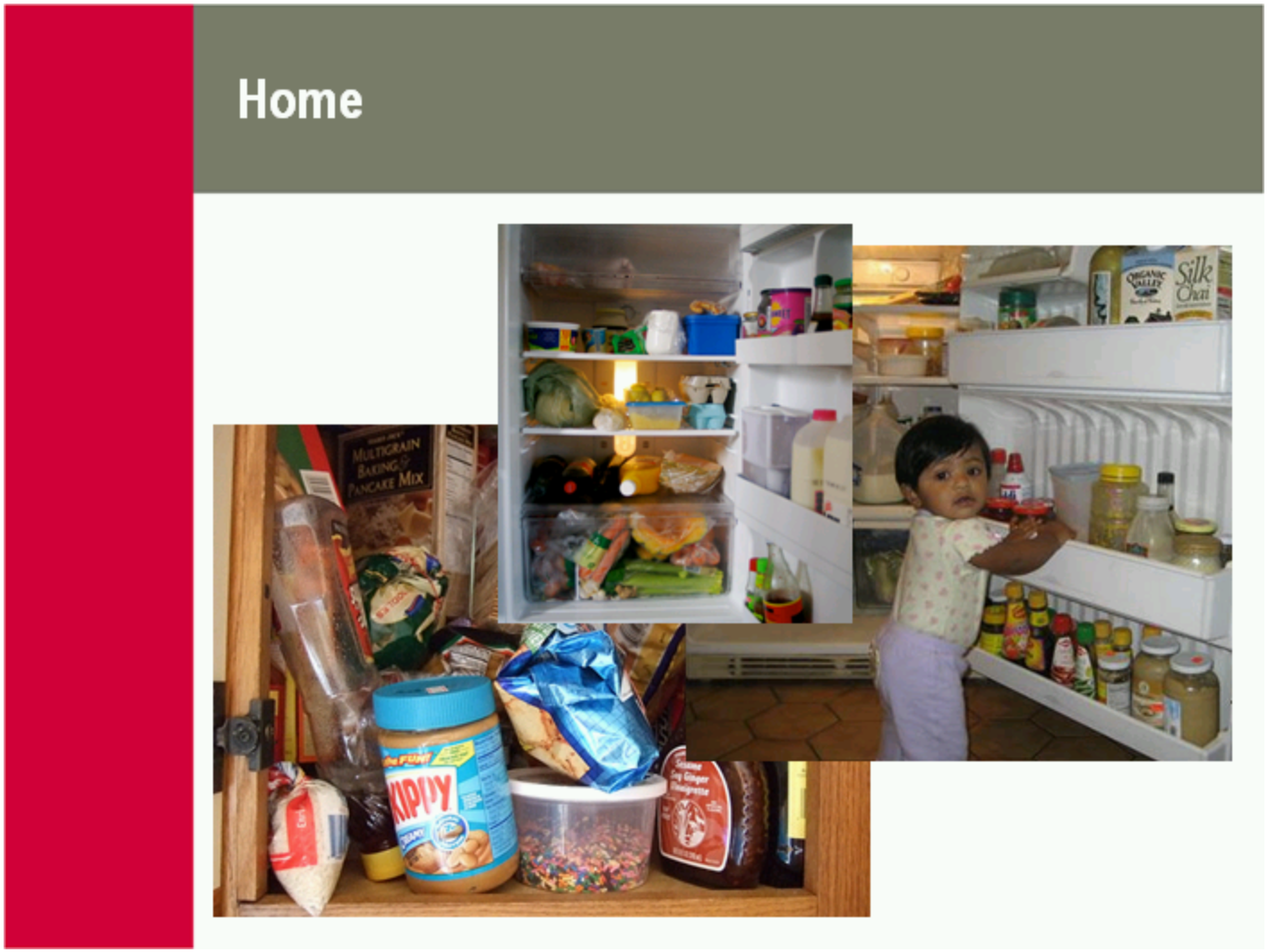


Why is the food environment relevant?

Socio-ecological model



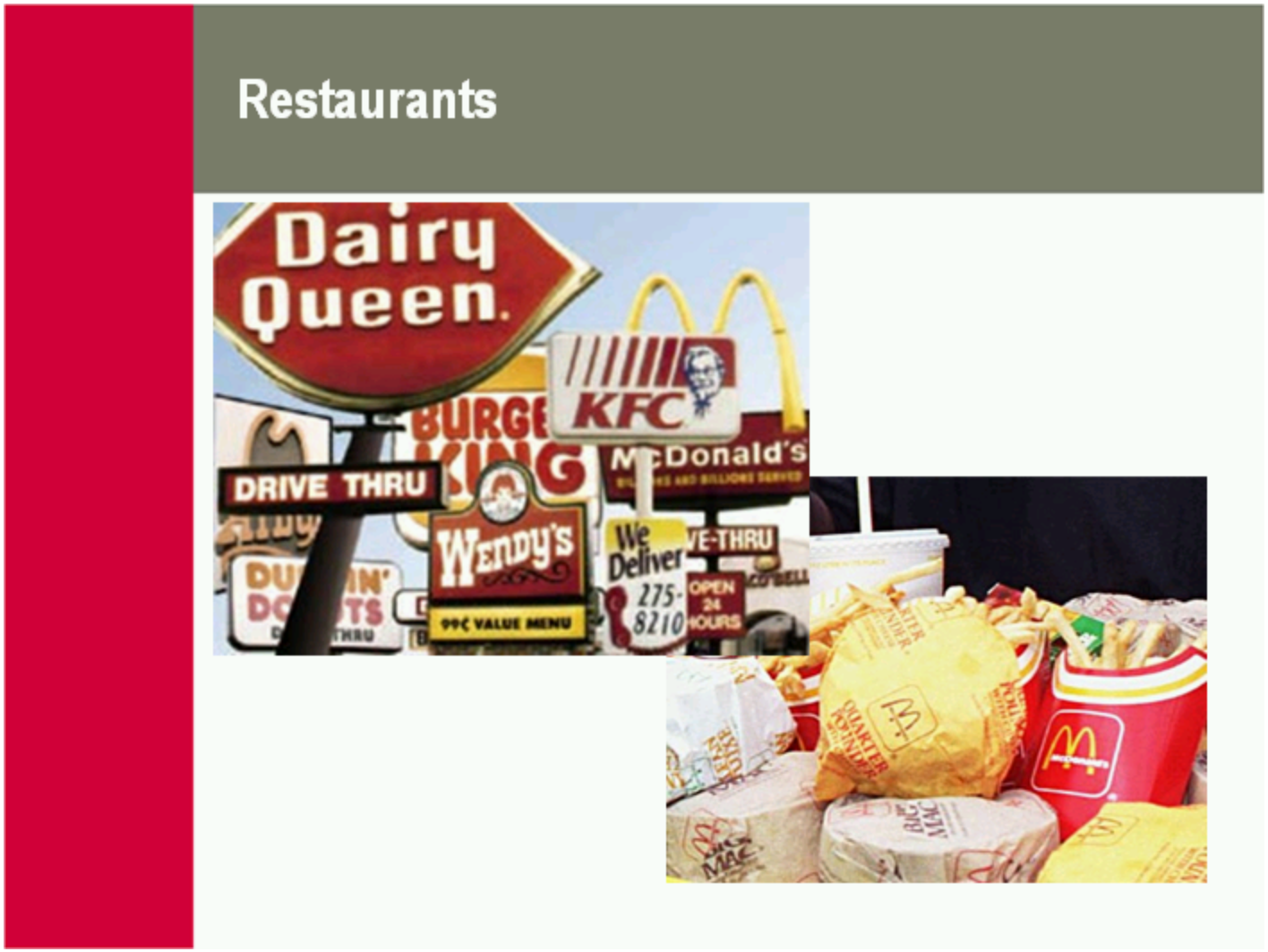
Slide 5



Home

Food stores

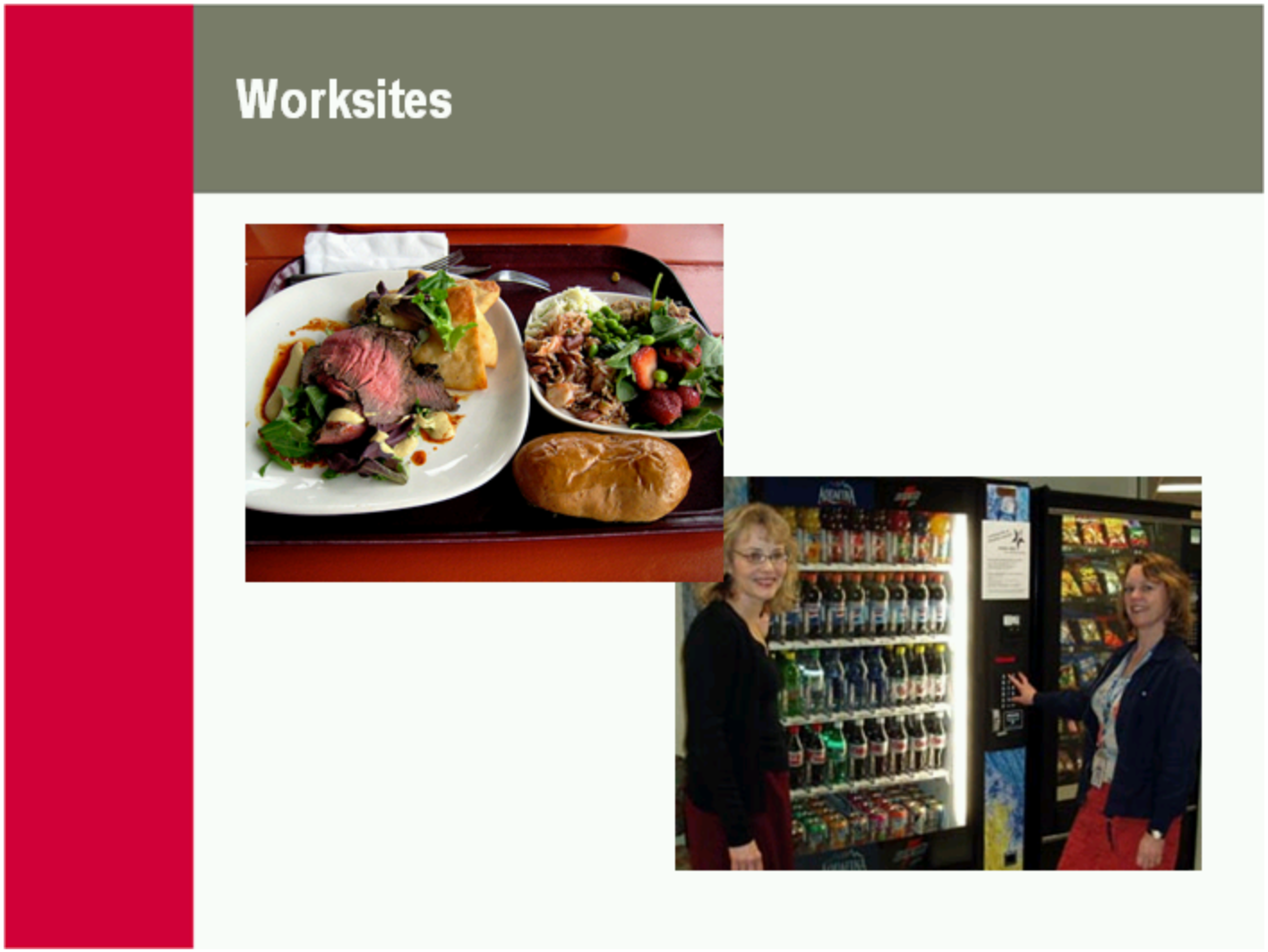
Food stores



Restaurants

Schools

Schools

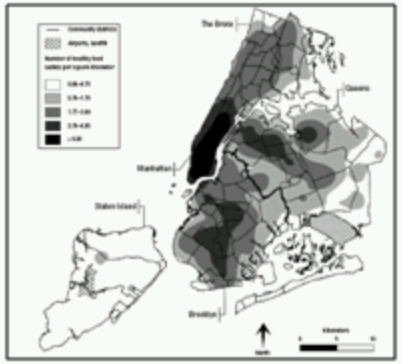


Worksites

Food Supply

Measuring the food environment: macro and micro levels

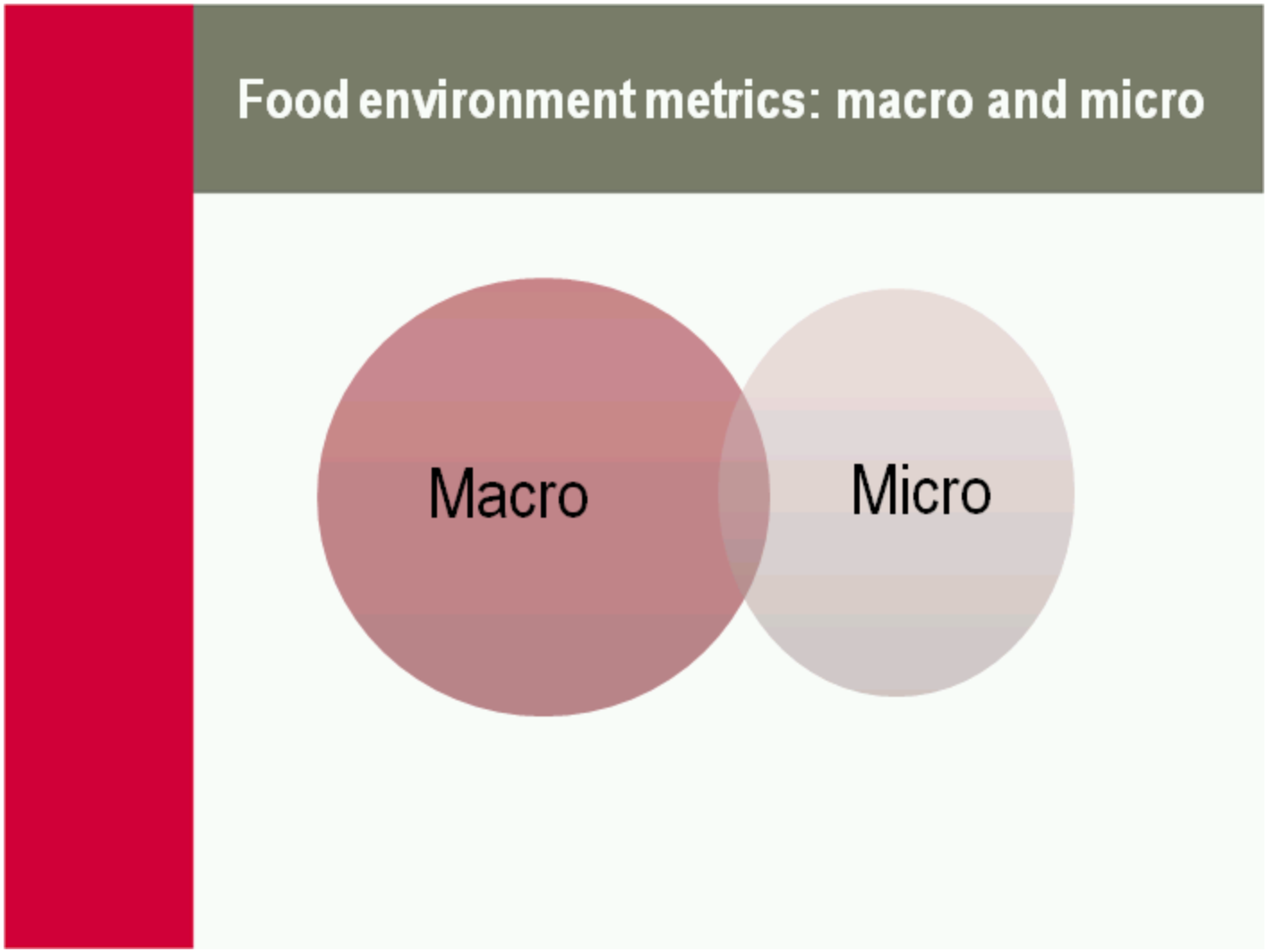
- Macro-level assessment
  - availability and spatial location of food stores, restaurants, and other food environments



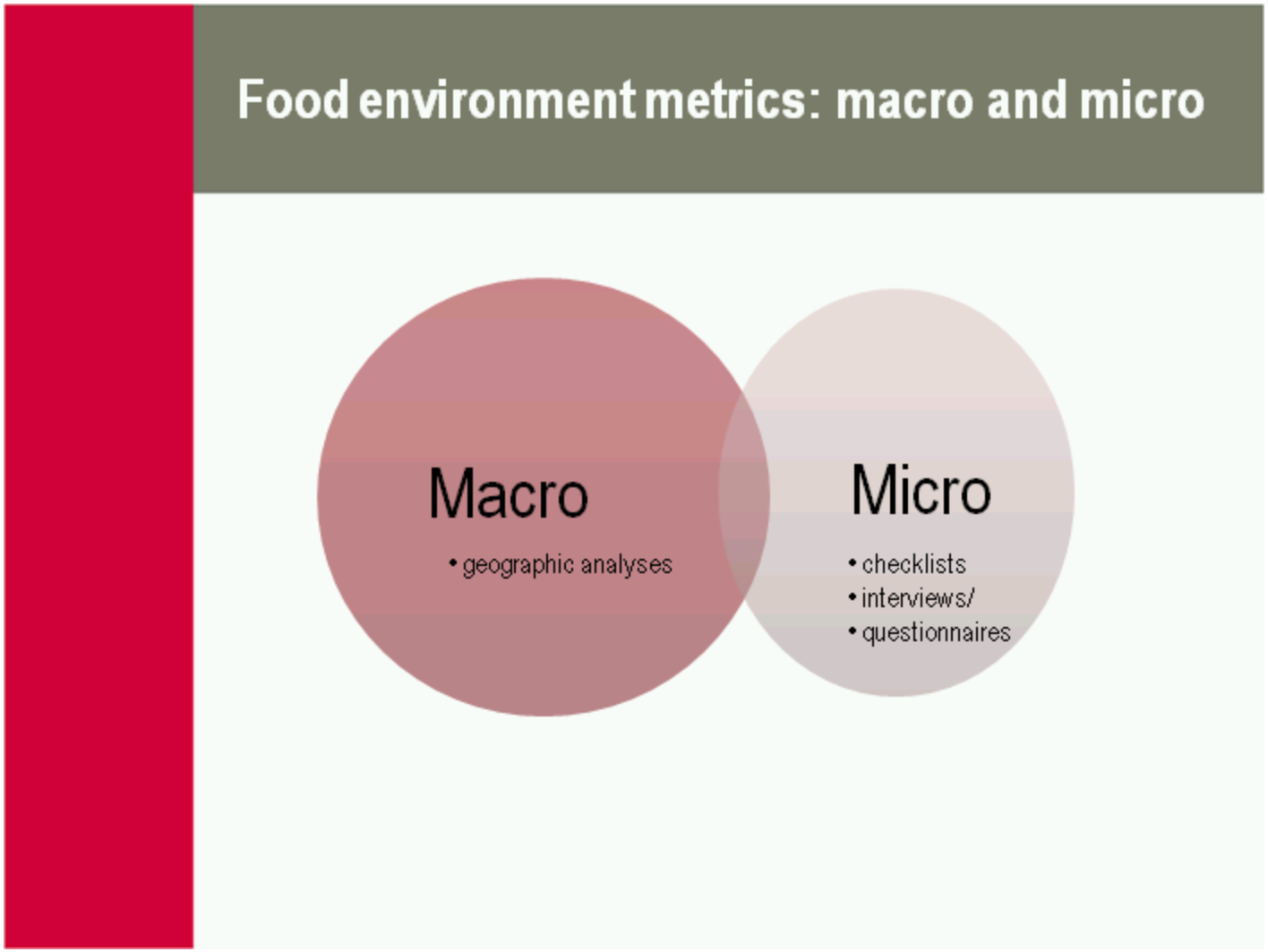
Rundle et al, EHP 2009

- Micro-level assessment
  - availability, quality, and cost of foods within environments

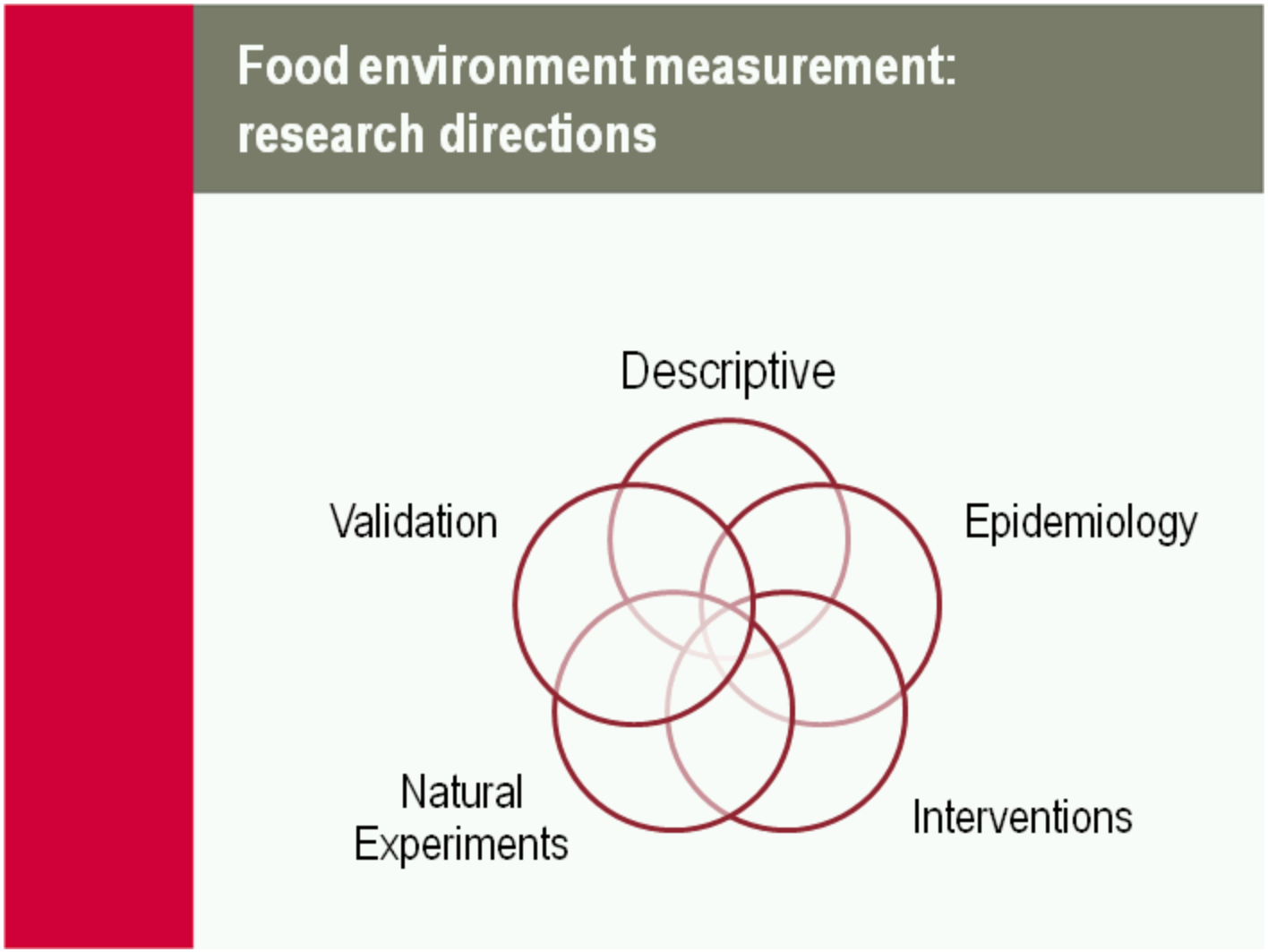
Measuring the food environment: macro and micro levels



Food environment metrics: macro and micro



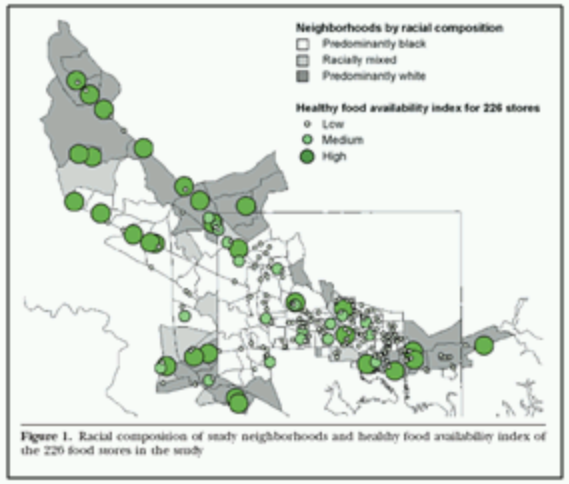
Food environment metrics: macro and micro



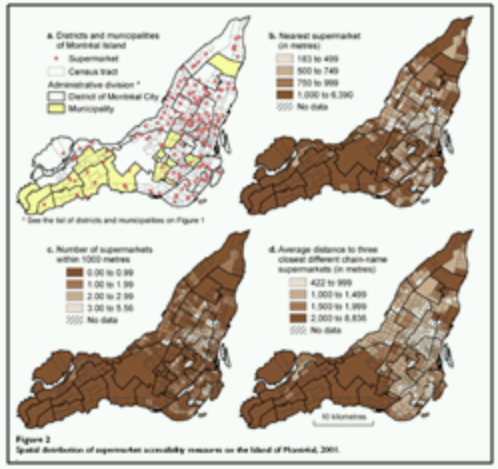
Food environment measurement: research directions

Descriptive research

- What are the characteristics of the food environment in a particular area or city in relation to socioeconomic status or race/ethnic composition?



Franco et al, AJPM2008



Apparicio et al, IJHG 2007

Descriptive research

Epidemiology research

- How does proximity to a supermarket or shelf space allocated to fruits and vegetables in a corner store relate to fruit and vegetable consumption?
- How does density of fast food outlets relate to area-level rates of obesity?


Health & Place 16 (2010) 489–499

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Neighborhoods and obesity in New York City

Jennifer L. Black[a,*], James Macinko[b], L. Beth Dixon[b], George E. Fryer, Jr.[c]

[a] University of British Columbia, Food, Nutrition and Health, Faculty of Land and Food Systems, Vancouver, Canada
[b] New York University, Department of Nutrition, Food Studies and Public Health, New York, USA
[c] University of Arkansas for Medical Sciences, Arkansas Center for Health Improvement, Little Rock, USA

Epidemiology research

National Cancer Institute

Interventions and Natural Experiments

Health & Place 15 (2009) 1158–1162

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Short report

A farmers' market in a food desert: Evaluating impacts on the price and availability of healthy food

Kristian Larsen[a,1], Jason Gilliland[b,*]

[a] University of Toronto, Department of Geography and Planning, St. George Campus, Sidney Smith Hall, 100 St. George Street, Toronto, Ontario, Canada M5S 3G3
[b] The University of Western Ontario, Department of Geography, Social Science Centre, Rm 1403, 1151 Richmond Street, London, Ontario, Canada N6A 5C2

Public Health Nutrition: 11(9), 963–970 doi:10.1017/S136898000700105X

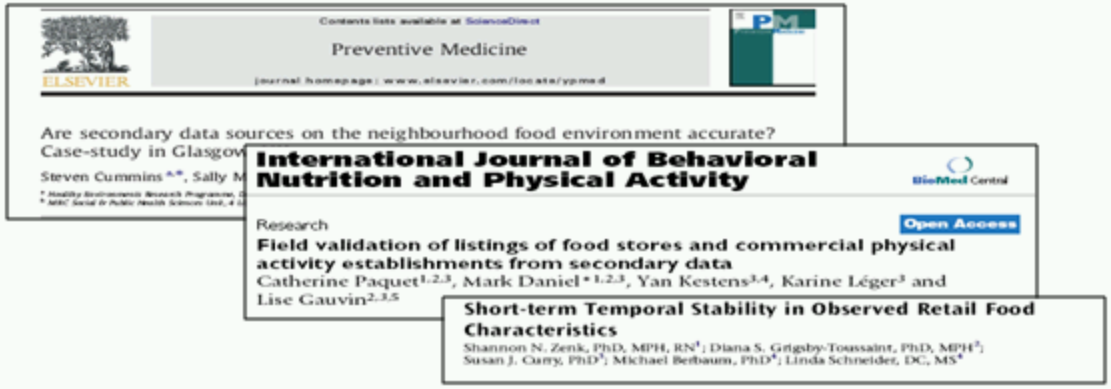
Changes in neighbourhood food store environment, food behaviour and body mass index, 1981–1990

May C Wang[1,*], Catherine Cubbin[2,3,4], Dave Ahn[4] and Marilyn A Winkleby[4]
[1]School of Public Health and the Center for Weight and Health, University of California at Berkeley, 2180 Dwight Way – Unit C, Berkeley, CA 94704, USA: [2]Center on Social Disparities in Health, University of California at San Francisco, San Francisco, CA, USA: [3]Population Research Center, University of Texas at Austin, Austin, TX, USA: [4]Stanford Center for Prevention Research, Stanford University School of Medicine, Stanford, CA, USA

Interventions and Natural Experiments

Validation research

- Checklists and questionnaires for assessing foods offered in food stores, restaurants, and schools
- Groundtruthing and other assessments of accuracy of geocoded databases



Validation research

Why a web-based compilation?

Why a web-based compilation?

Why a web-based compilation?

- Food Environment Work Group
- Workshop on Measures of the Food and Physical Activity Environments: Enhancing Research Relevant to Policy on Diet, Physical Activity, and Weight
  - Instruments & Measures Work Group
- Journal Supplement
  - Compilation by McKinnon et al
  - Work Group summary by Saelens & Glanz

Why a web-based compilation?

Goals of the Measures of the Food Environment web-based compilation

- Enable access to existing measures of the food environment
- Stimulate the development of the next generation of tools to strengthen research on the effects of the community-level food environment

Goals of the Measures of the Food Environment web-based compilation

Outline

- Background on the food environment and compilation of measures
- Overview/demonstration of the website
- Trends from recent articles
- Insights, challenges, next steps

Outline

Searchable database of citations

- Searchable fields include:
  - Food environment
  - Type of measure (instrument, methodology)
  - Psychometric properties
  - Specific populations of interest (e.g., low SES; children, African-American)

Searchable database of citations

Categorizing the food environment

- Food store
- Restaurant
- School
- Worksite
- Macro (food supply)
- (Home)

Categorizing the food environment

Classification of measures

- **Instruments*:**
  - Checklists
  - Inventories
  - Market basket measures
  - Interviews/questionnaires

*Instruments shared by authors are available for download.

Classification of measures

Classification of measures

- **Methodologies:**
  - Geographic analysis
  - Menu analysis
  - Nutrient analysis
  - Sales analysis
  - Food supply analysis

Classification of measures

Current status

- Bibliography of almost 300 research articles (*updated weekly*)
- Inventory of almost 50 instruments
- Listing of recent review articles and commentaries
- Details of funding opportunities related to food environment measures
- Listserv for periodic updates (visit the home page to join)
- >2000 hits/month

Current status

National Cancer Institute

Demonstration of the Measures of the Food Environment web-based compilation

https://riskfactor.cancer.gov/mfe

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Demonstration of the Measures of the Food Environment web-based compilation
https://riskfactor.cancer.gov/mfe

Questions?

Outline

- Background on the food environment and compilation of measures
- Overview/demonstration of the website
- Trends from recent articles
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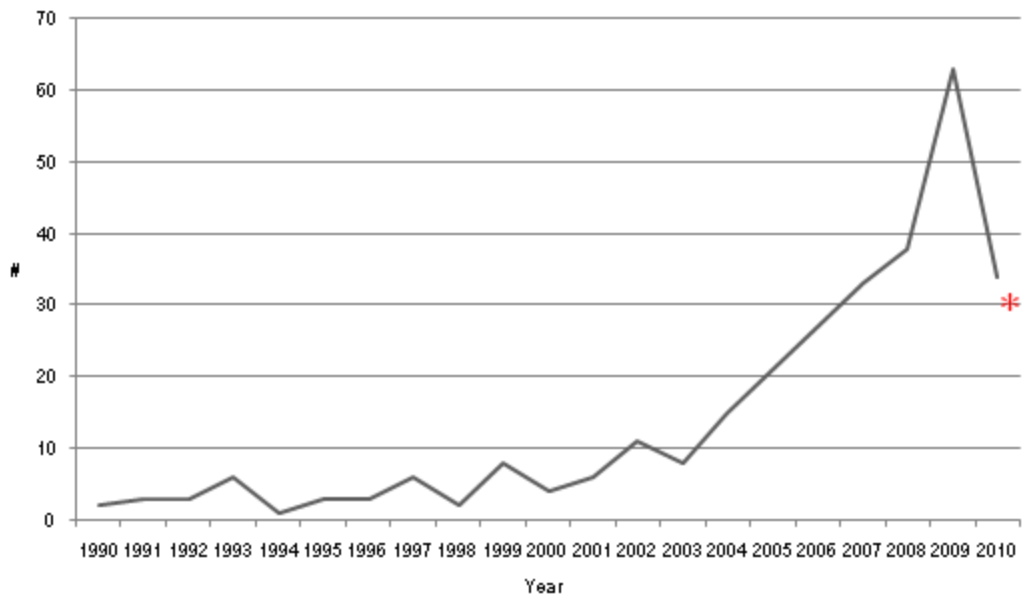
Outline

Insights gleaned from web compilation – 'state of the literature'

- Provides continually updated snapshot of the state of & trends in the field
- Summary statistics and methodological considerations drawn from articles published in 2009/10 (n=97)

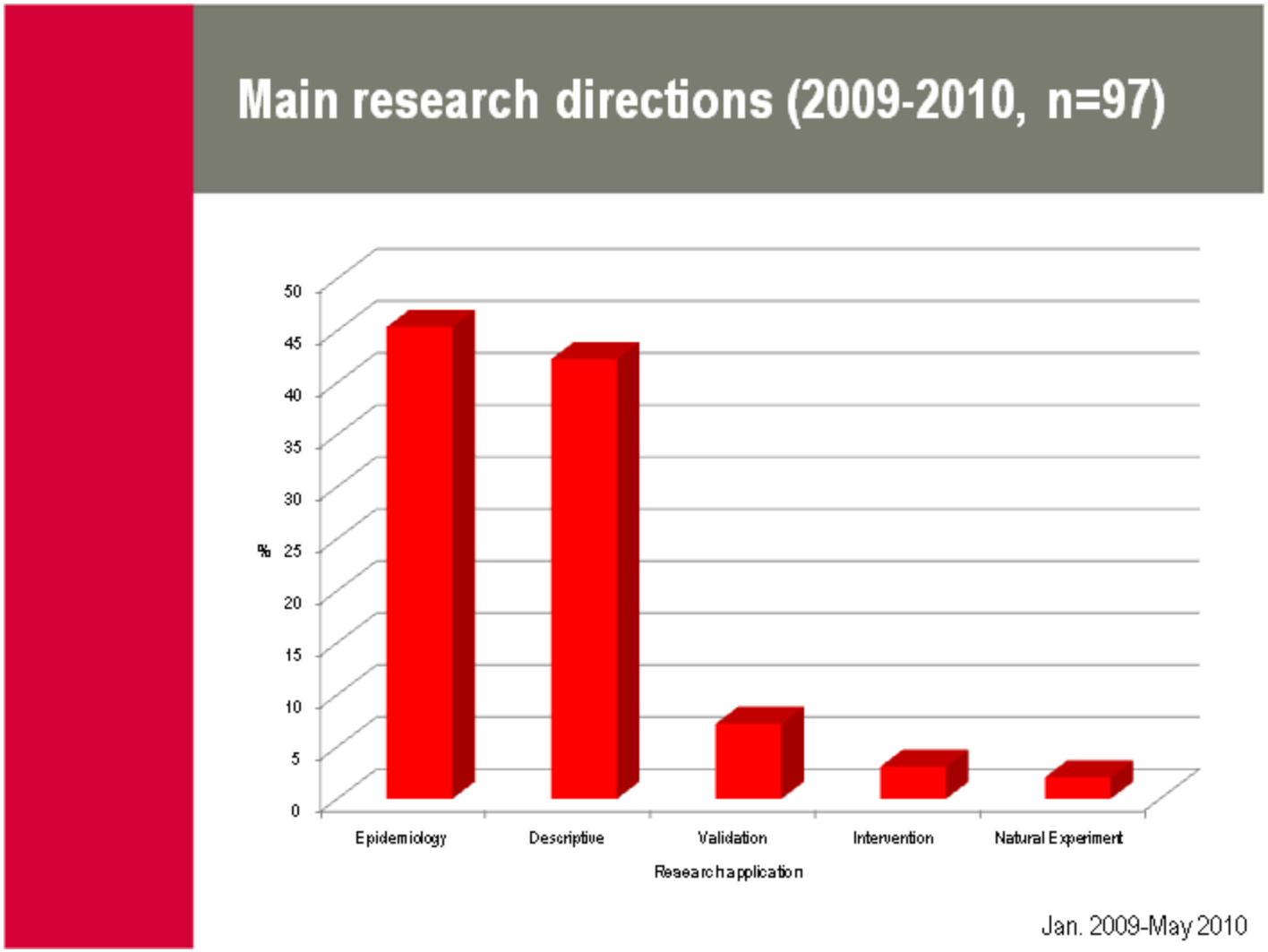
Insights gleaned from web compilation – 'state of the literature'

Growth in number of research studies published (1990-2010, n=297)

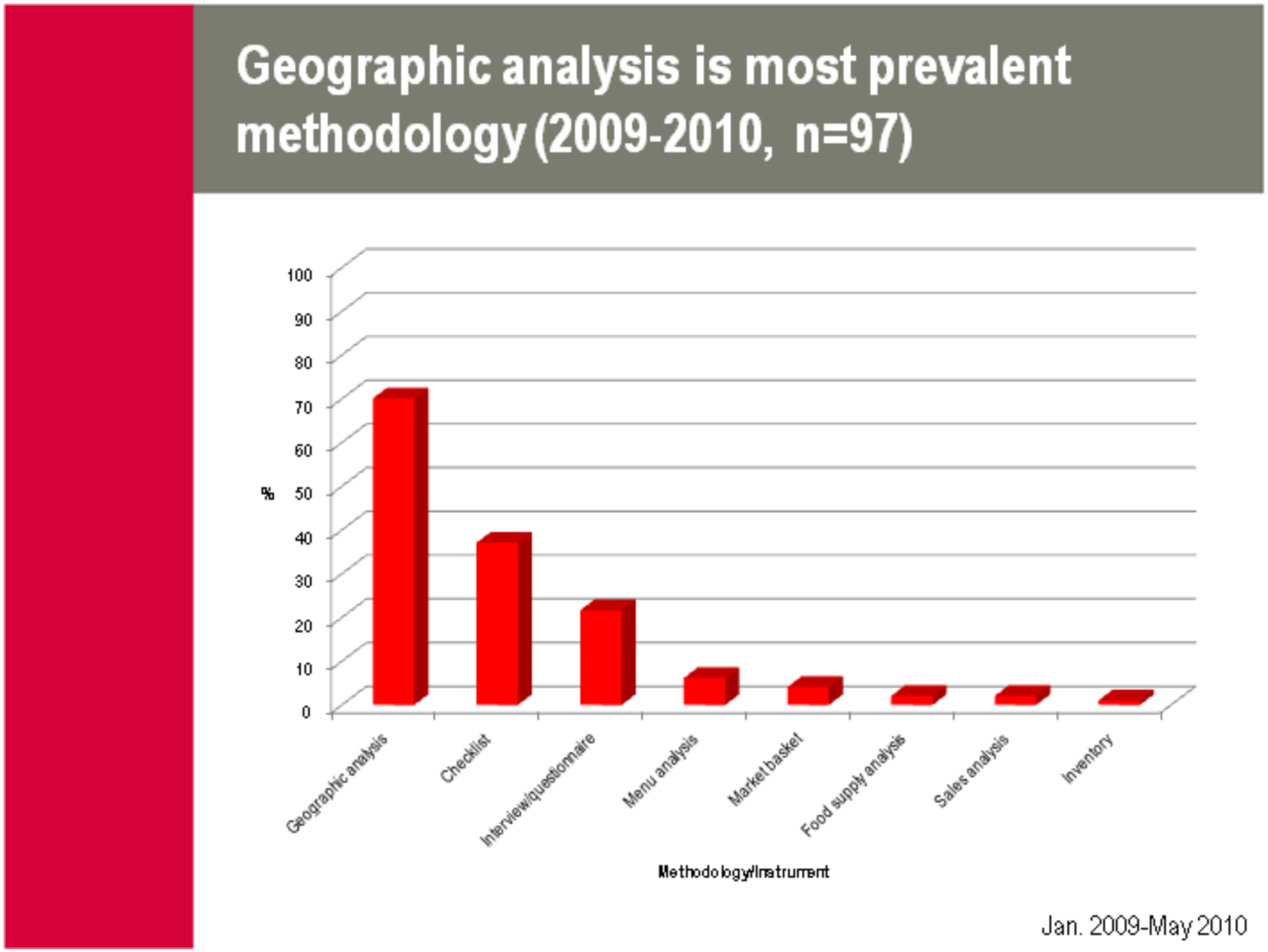


*Reflects articles published to May 2010

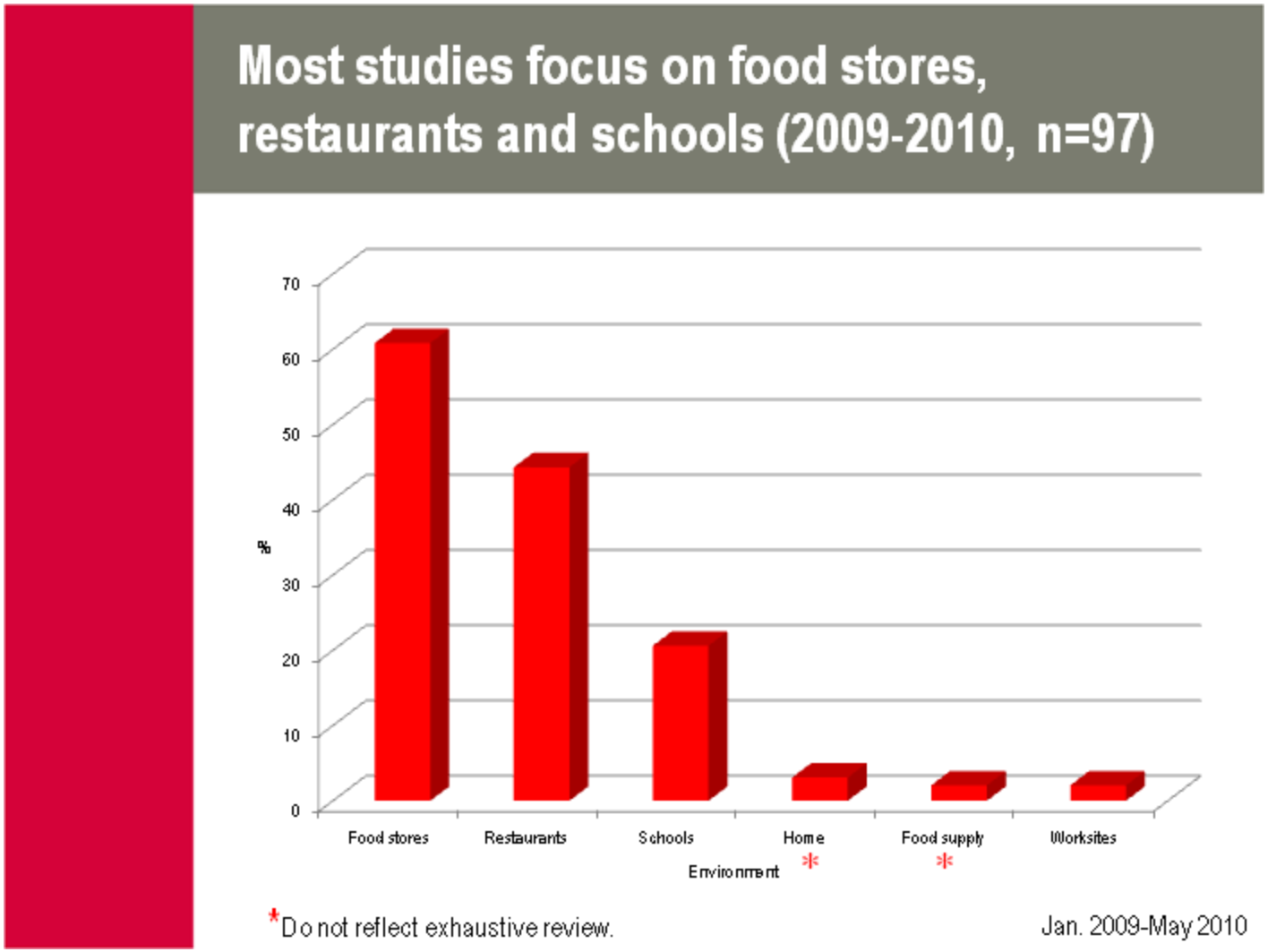
Growth in number of research studies published (1990-2010, n=297)



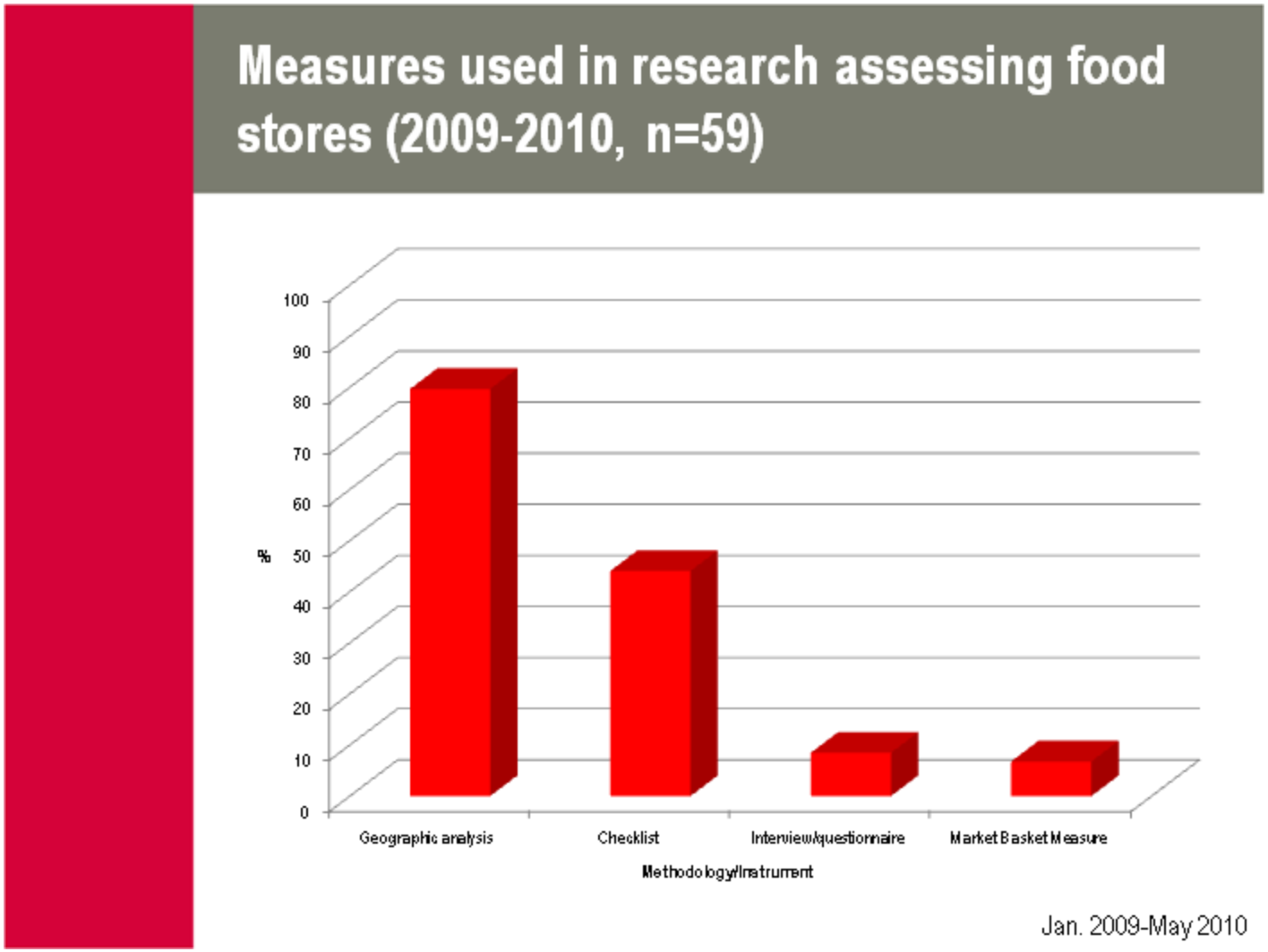
Main research directions (2009-2010, n=97)



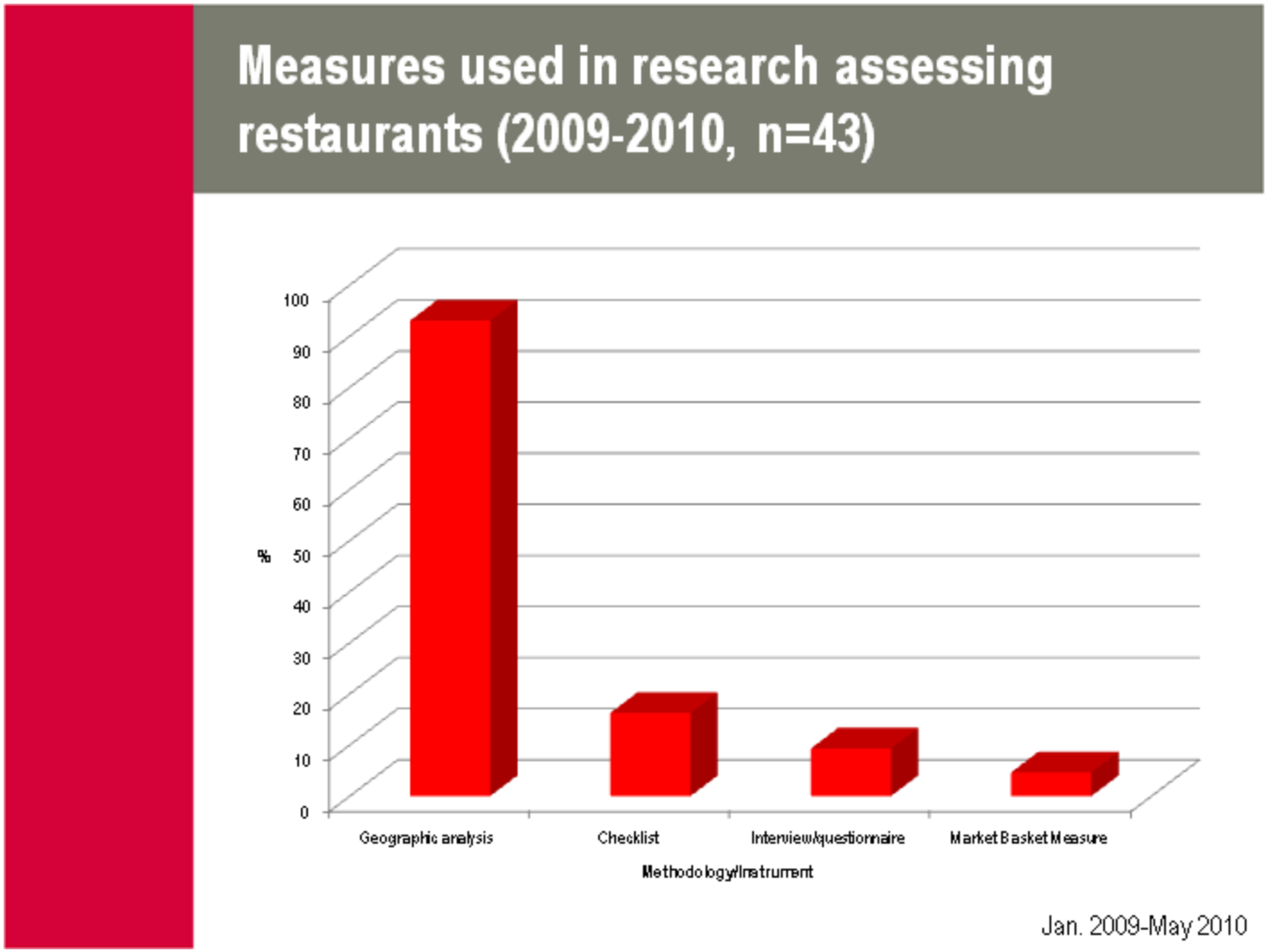
Geographic analysis is most prevalent methodology (2009-2010, n=97)



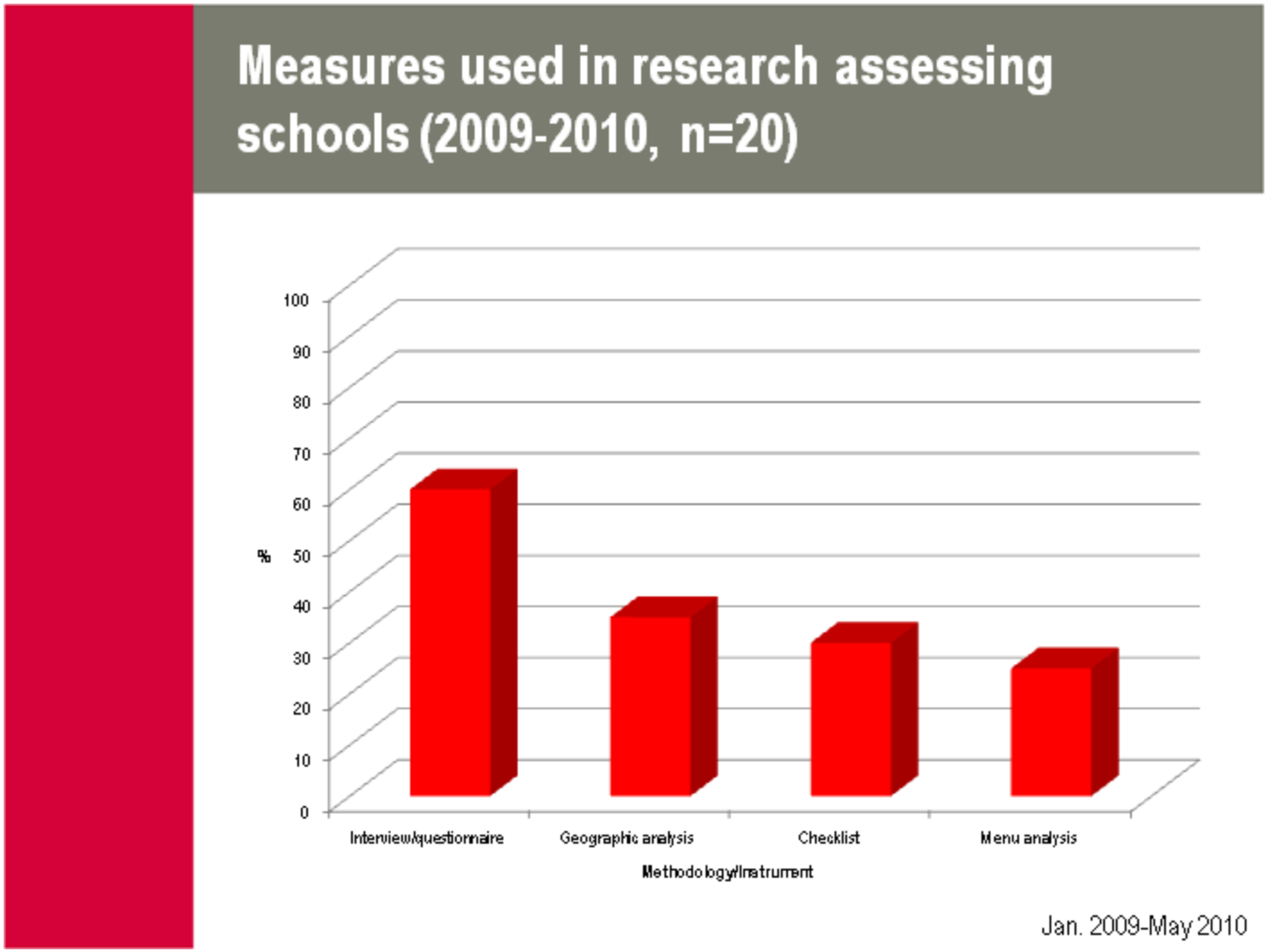
Most studies focus on food stores, restaurants and schools (2009-2010, n=97)



Measures used in research assessing food stores (2009-2010, n=59)

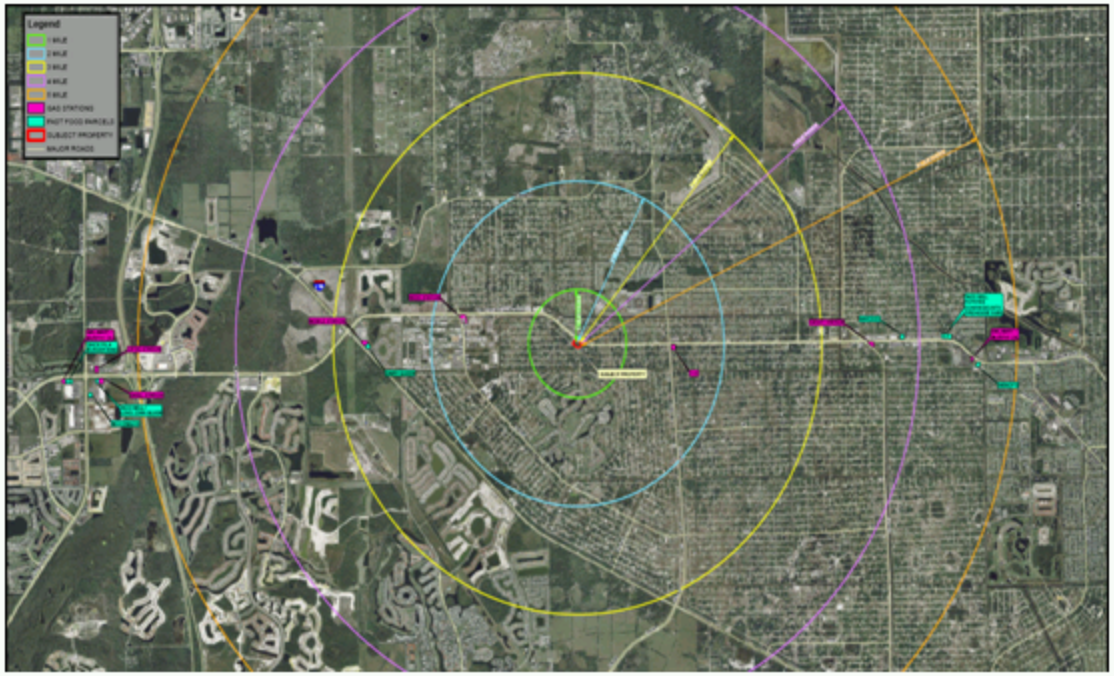


Measures used in research assessing restaurants (2009-2010, n=43)



Measures used in research assessing schools (2009-2010, n=20)

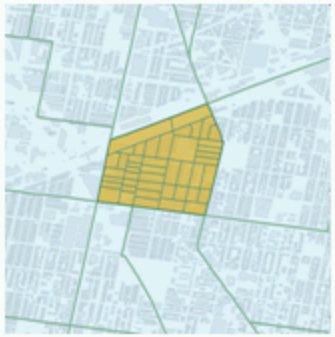
Considerations at the macro level



Considerations at the macro level

Defining the area of interest

- Census tract or other administrative boundaries
- Natural boundaries
- Sociodemographic characteristics (e.g., low income or high minority neighborhoods)
- Individual's perception of his or her 'neighbourhood'



Defining the area of interest

Complexities in defining the area of interest

- Which area is most relevant:
  - Where an individual/household lives, works, learns, plays?
- How to account for how one interacts with food environments?
  - Networks of travel throughout the day
  - Access to private and public transportation
  - Economic resources that influence where one obtains food
  - Other factors?

Complexities in defining the area of interest

Considering the complexity of interactions with food environments

- Example: supermarket availability in relation to access to public transportation

Figure 2
Location of bus routes and supermarkets in London, 2005. *Source: Statistics Canada, 2001; Vernon's City Directory, 2005.*
Shows the location of the supermarkets in London and all of the bus routes of the London Transit Commission.

Larsen & Gilliland, IJHG2008

Considering the complexity of interactions with food environments

What food outlets should be assessed?

- What food outlets are most relevant?
  - All stores selling food? Or only corner stores or supermarkets?
  - All restaurants? Or only fast food outlets?
  - What about other retail outlets that sell food? e.g., gas stations, super stores, etc.

What food outlets should be assessed?

Identifying and mapping food outlets

- Data sources:
  - Commercial databases
  - Yellow pages/business listings
  - Groundtruthing

- Sources of error:
  - Accuracy/completeness of databases/listings, including geographic coordinates
  - Temporal issues

Identifying and mapping food outlets

Defining spatial access

- Distance/proximity:
  - Euclidian (straight line)
  - Manhattan (city block)
  - Network (by road or street)
- Travel time:
  - By what mode?
- Density:
  - Buffer (e.g., supermarkets within 1000 m, clustering)
  - Network
  - Cluster

Defining spatial access

Defining spatial access

- Perceived access:
  - As a proxy for geographic access
  - As a predictor of diet or disease outcomes in its own right

Defining spatial access

Defining spatial access

- What thresholds are most relevant?
  - How close to a grocery store is close enough?
  - How many grocery stores or fast food restaurants should be in a neighborhood?
  - Are ratios of one type of outlet to another meaningful?

Defining spatial access

Considerations at the micro level

What aspects at the micro level are most relevant?

- What features of the environment to focus on?
- Food
  - Availability/shelf space
  - Cost
  - Quality
- Other factors
  - Accommodations for disabilities
  - Other?

What aspects at the micro level are most relevant?

What foods should be assessed?

- 'Total diet' type of approach
  - Inventory or market basket
- Indicator foods
  - Checklists
    - Fruits and vegetables
    - Salty or sugary snacks

What foods should be assessed?

What tools should be used to assess the food environment at the micro level?

- What is the most appropriate tool?
  - Inventory
  - Market basket
  - Checklist
  - Index
  - Other?

- Is there a gold standard?
- How should validity and reliability be assessed?

What tools should be used to assess the food environment at the micro level?

Linking to individual- or area-level data on diet, disease, or sociodemographics

- What individual- or area-level data are being used:
  - As outcome data (e.g., to assess the impact of the food environment on diet or disease?)
  - As covariates (e.g., to adjust for socioeconomic status or behavioral factors such as shopping preferences)
- Similar data quality considerations should apply to all study variables, regardless of food environment(s) assessed or measure(s) used

Linking to individual- or area-level data on diet, disease, or sociodemographics

Outline

- Background on the food environment and compilation of measures
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Outline

Insights from reviews and commentaries

- Over 30 review articles and commentaries published in past 5 years
  - In 2010: 7 published already
    (Health & Place, Journal of Nutrition, Public Health Nutrition, JADA)

Insights from reviews and commentaries

Insights from reviews and commentaries

- Focus not only on conclusions from existing research, but also methodologic challenges and recommendations for the future

Insights from reviews and commentaries

Key challenges

- Lack of conceptual framework for data collection and analysis
- Lack of well-defined metrics for key concepts
- Lack of research with combined metrics (macro and micro)
- Lack of validated instruments and standards for spatial analyses means that most studies are not comparable

Key challenges

Key challenges

- Most research focuses on local communities, small areas
- Heterogenity and lack of comparability across studies leads to a fragmented understanding of food environments at state/national levels

Key challenges

Key challenges

- Is it feasible/desirable to create a system of food environment surveillance at the state or national levels?
  - What metrics are most important?
  - What levels of the socio-ecologic framework are most relevant?
  - What about measures of perception of the food environment? How do subjective and objective measures compare?

Key challenges

Next steps for food environment research

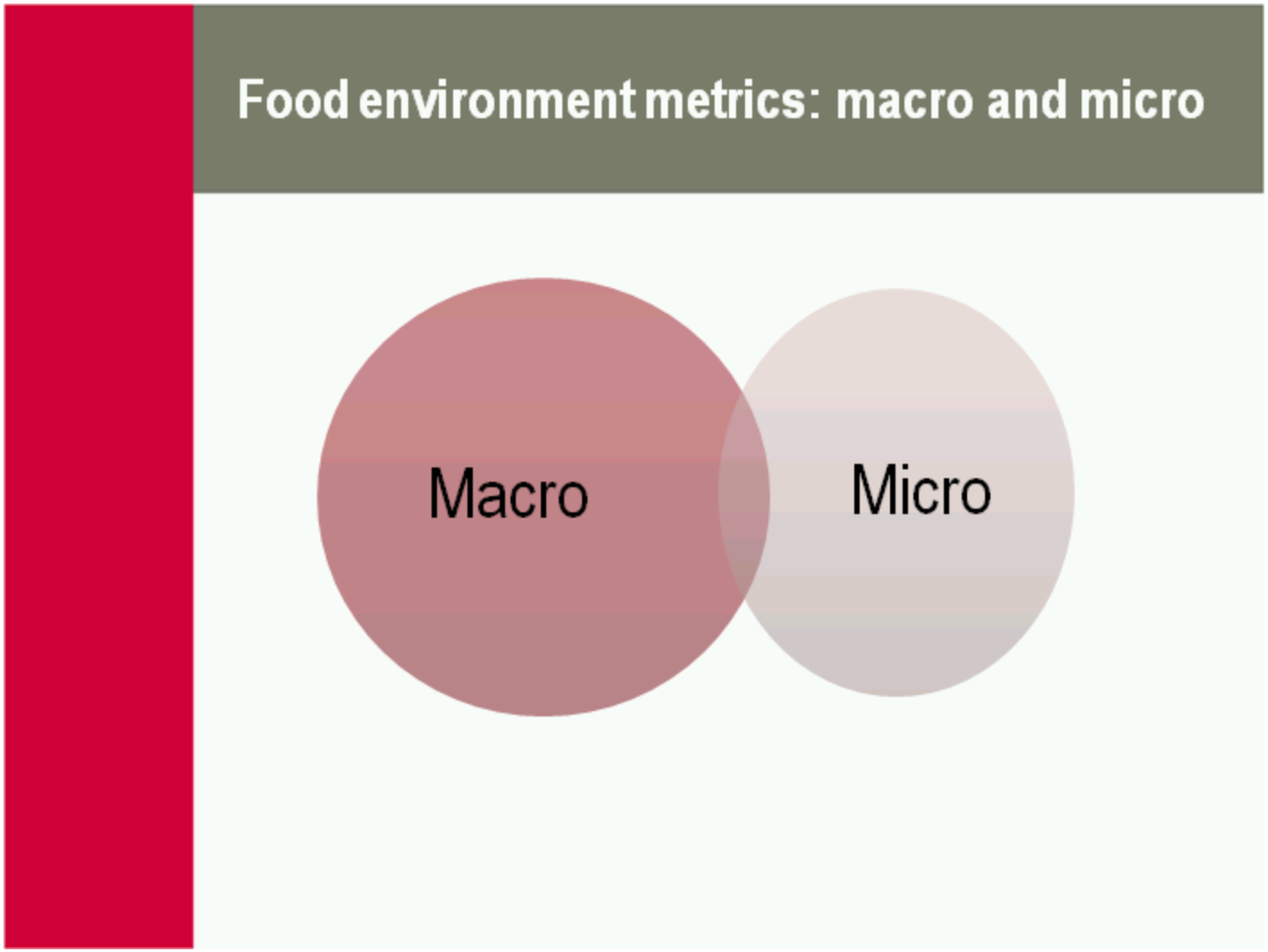
- Include well-defined conceptual framework for data collection and analysis
- Create clearly defined metrics for key concepts
- Develop standards/protocols for measuring environments at both micro- and macro- levels
- Encourage research that accounts for complexity inherent in food environments and combines data at micro- and macro- levels

Next steps for food environment research

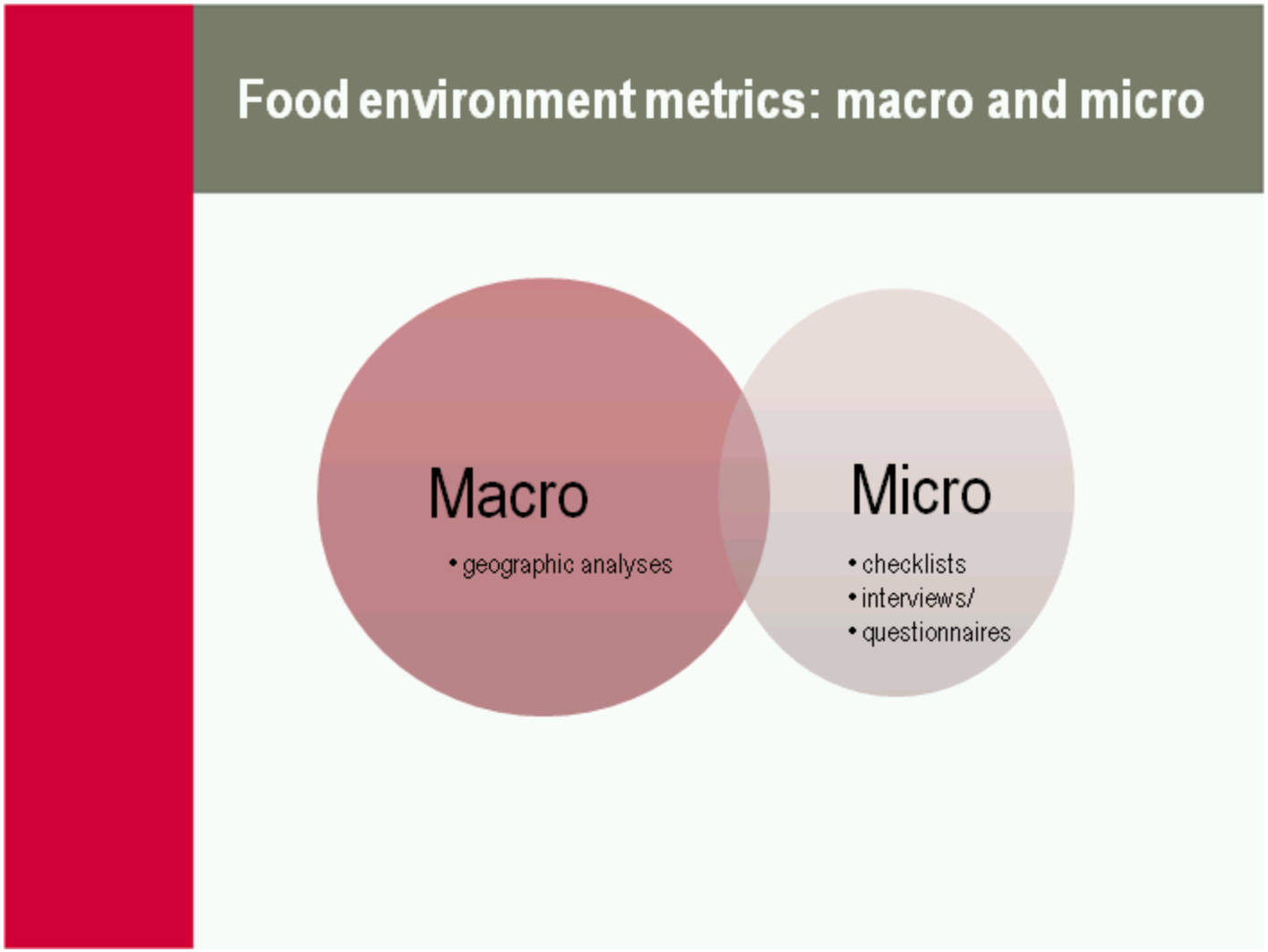
Next steps for food environment research

- Emphasize validity and reliability of measures
- Encourage use of food environment data with robust individual-level data for the purposes of assessing relevance of various features of the food environment to diet and disease outcomes
- Develop peer review guidelines for publications related to measurement of food environments for major journals publishing in this field

Next steps for food environment research



Food environment metrics: macro and micro



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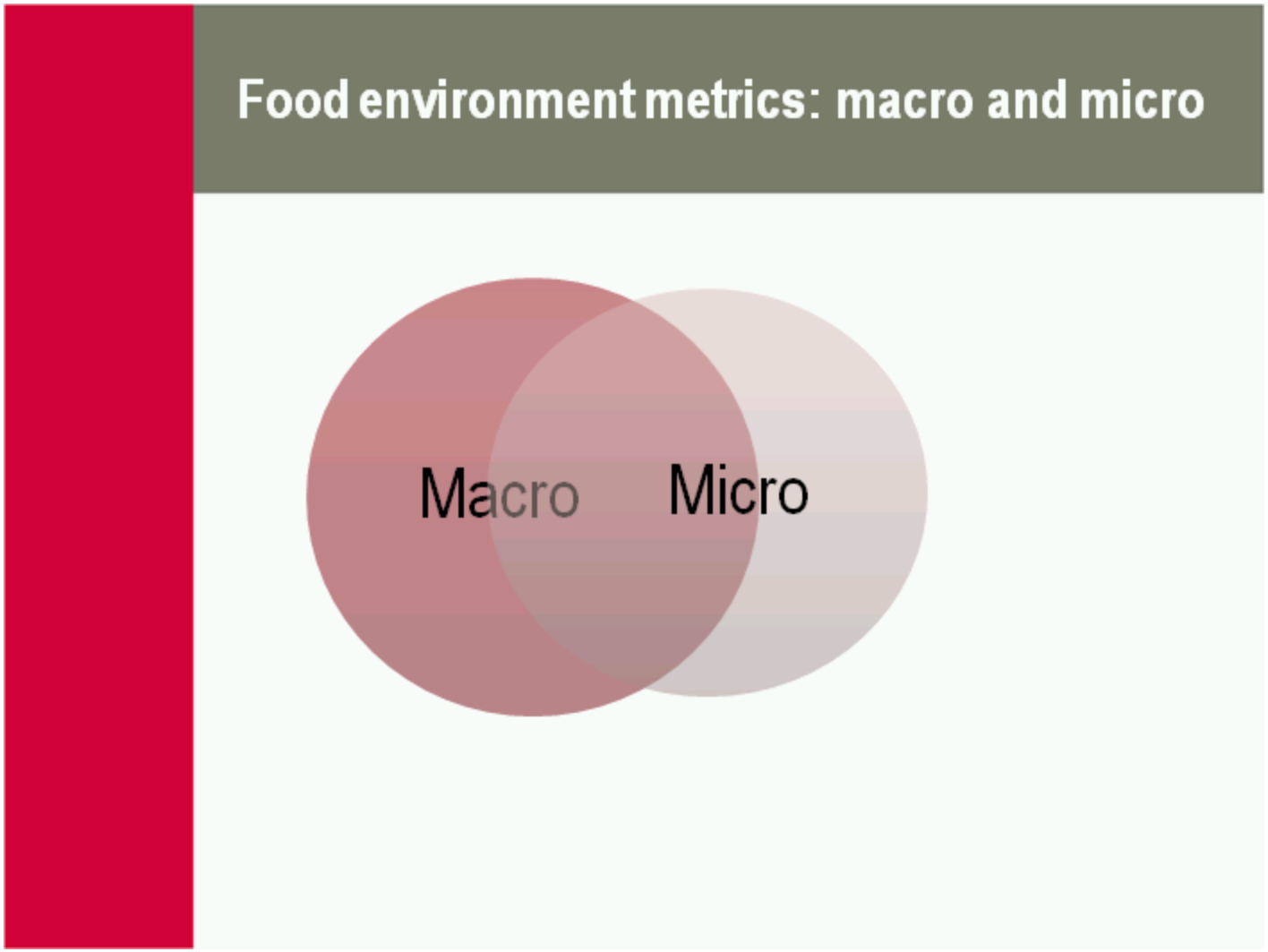

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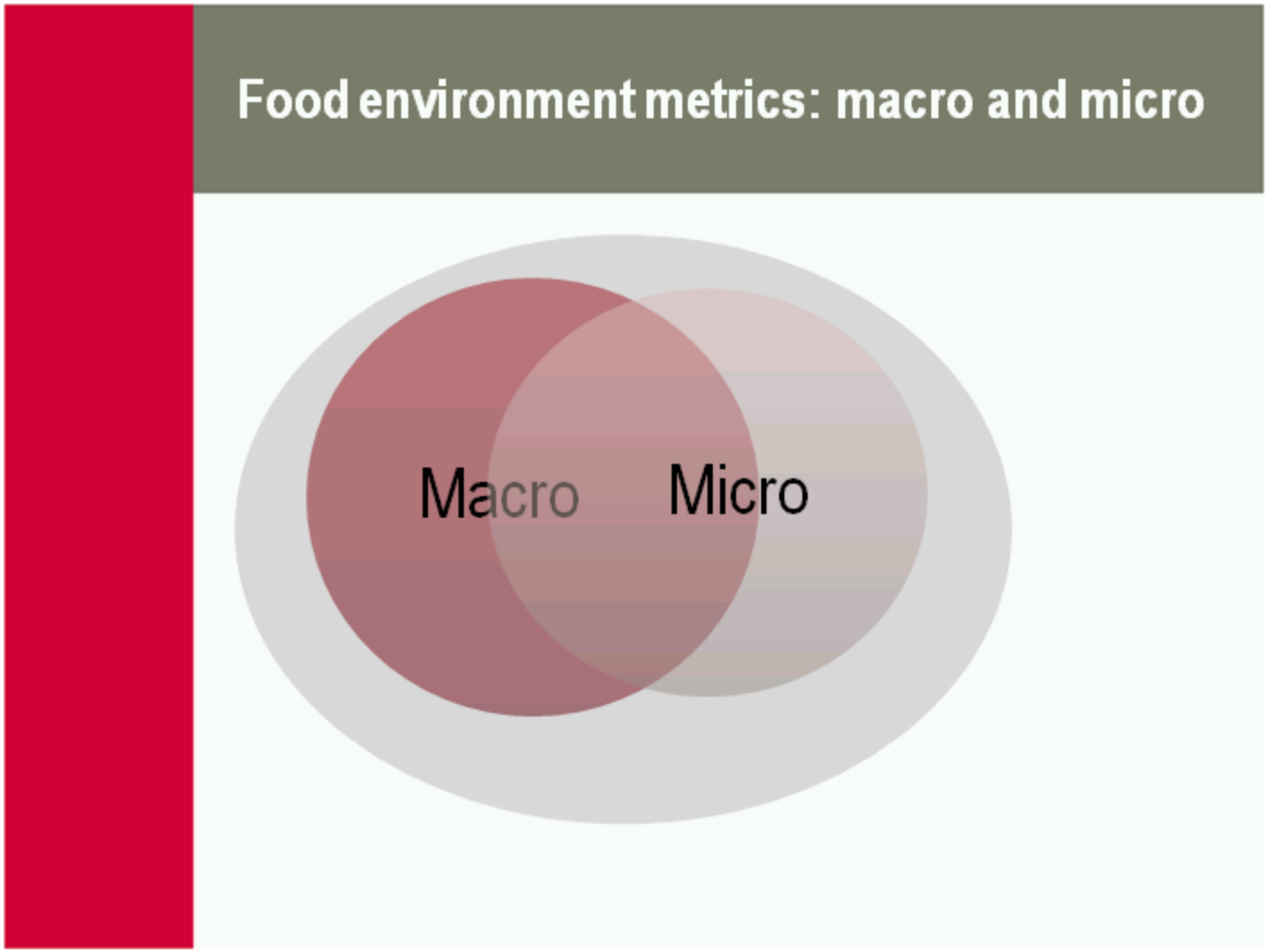

Food environment metrics: macro and micro

How can the web-based compilation facilitate rigorous methods and validated instruments?

- Highlight research that uses metrics at macro and micro levels?
- More heavily emphasize research using validated measures and provide more specific data on psychometrics?
- Create a separate section for validation-related research?
- Post validated instruments only?
- Other strategies?

How can the web-based compilation facilitate rigorous methods and validated instruments?

Next steps for web-based compilation

- Revisit goals
  - Enable access to existing measures of the food environment
  - Stimulate the development of the next generation of tools to strengthen research on the effects of the community-level food environment
- Consider how goals should evolve
- Consider how the compilation can be structured to best meet goals

Next steps for web-based compilation

Measures of the Food Environment web-based compilation

- https://riskfactor.cancer.gov/mfe
- Listserv for periodic updates: visit the home page - https://riskfactor.cancer.gov/mfe - to join
- Questions, comments or to share an article or instrument:
  - reedyj@mail.nih.gov
  - kirkpatricksi@mail.nih.gov

Measures of the Food Environment web-based compilation