Chronic Outcomes
(CVD, diabetes, cancer, mortality, aging, longevity)

Dietary Patterns
(Mediterranean diet, vegetarianism, DASH, etc.)

Micronutrients
(dietary supplements, multivitamins, multiminerals)
Role of Dietary Patterns

Seven Countries Study

Mediterranean Diet Pyramid

A. Keys
What was the “Mediterranean Way”?

“…the ordinary food of common Southern Italians---
homemade minestrone (vegetable soup); pasta in endless variety, always freshly cooked,
served with tomato sauce and a sprinkle of cheese;
a hearty dish of beans and short lengths of macaroni (‘pasta e fagioli’);
lots of bread…never served with any kind of spread; great quantities of fresh vegetables;
a modest portion of meat or fish twice a week; wine…; always fresh fruit for dessert…”

“Eat Well, Stay Well, the Mediterranean Way”
Ancel Keys & Margaret Harvey (1975)
The Mediterranean Diet

- Olive Oil
- Wine
- Garlic
- Fish
- Vegetables
- Legumes
- Fruit as dessert
- *A philosophy of life…*
'Mediterranean' dietary pattern for the primary prevention of cardiovascular disease (Review)

Rees K, Hartley L, Flowers N, Clarke A, Hooper L, Thorogood M, Stranges S
ORIGINAL RESEARCH

Mediterranean-Style Diet for the Primary and Secondary Prevention of Cardiovascular Disease: A Cochrane Review

Karen Rees¹, Andrea Takeda², Nicole Martin², Leila Ellis¹, Dilini Wijesekara¹, Abhinav Vepa¹, Archik Das¹, Louise Hartley³ and Saverio Stranges⁴,⁵,⁶
Eat well. Live well.

Eat a variety of healthy foods each day

- Have plenty of vegetables and fruits
- Eat protein foods
- Make water your drink of choice
- Choose whole grain foods

Discover your food guide at Canada.ca/FoodGuide
Healthy eating is more than the foods you eat

Be mindful of your eating habits
Cook more often
Enjoy your food
Eat meals with others

Use food labels
Limit foods high in sodium, sugars or saturated fat
Be aware of food marketing

Discover your food guide at Canada.ca/FoodGuide
From Dietary Patterns to Nutritional Supplements: A potential shortcut to chronic disease prevention…?
Vitamin E Supplementation and Mortality

Mortality in Randomized Trials of Antioxidant Supplements

Selenium Supplementation & Chronic Disease Prevention

Nutritional Prevention of Cancer (NPC) Trial

JAMA 1996;276:1957-63
### Selenium Supplementation and CVD

**NPC Trial (1983-1996)**

Participants *without prevalent CVD* at randomization (n = 1,004)

Mean follow-up: 7.6 years

<table>
<thead>
<tr>
<th>CVD</th>
<th>Cases</th>
<th>Adjusted hazard ratios*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Se</td>
<td>Placebo</td>
</tr>
<tr>
<td><strong>All CVD</strong></td>
<td>103</td>
<td>96</td>
</tr>
<tr>
<td><strong>All CHD</strong></td>
<td>63</td>
<td>59</td>
</tr>
<tr>
<td><strong>ALL CVA</strong></td>
<td>40</td>
<td>37</td>
</tr>
<tr>
<td><strong>CVD Mortality</strong></td>
<td>40</td>
<td>31</td>
</tr>
<tr>
<td><strong>All-cause Mortality</strong></td>
<td>110</td>
<td>111</td>
</tr>
</tbody>
</table>

Selenium Supplementation and Diabetes
NPC Trial

Log-rank test p value = 0.050

Selenium supplementation for the primary prevention of cardiovascular disease (Review)

Rees K, Hartley L, Day C, Flowers N, Clarke A, Stranges S
Selenium Supplementation & CVD Prevention: Cochrane Systematic Review

All CVD events (fatal and non-fatal)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Selenium supplementation</th>
<th>Control</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
</tr>
<tr>
<td>Lippman 2009</td>
<td>1080</td>
<td>8752</td>
<td>1050</td>
</tr>
<tr>
<td>Stranges 2006</td>
<td>103</td>
<td>504</td>
<td>96</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>9256</td>
<td>9196</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Total events 1183 1146

Heterogeneity: Chi² = 0.09, df = 1 (P = 0.76); I² = 0%

Test for overall effect: Z = 0.65 (P = 0.51)

Type 2 Diabetes

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Selenium supplementation</th>
<th>Control</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
</tr>
<tr>
<td>Algotar 200μg 2010</td>
<td>1</td>
<td>47</td>
<td>2</td>
</tr>
<tr>
<td>Algotar 800μg 2010</td>
<td>3</td>
<td>47</td>
<td>2</td>
</tr>
<tr>
<td>Klein 2011</td>
<td>913</td>
<td>8752</td>
<td>869</td>
</tr>
<tr>
<td>Stranges 2007</td>
<td>58</td>
<td>600</td>
<td>39</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>9446</td>
<td>9344</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Total events 975 912

Heterogeneity: Chi² = 4.75, df = 3 (P = 0.19); I² = 37%

Test for overall effect: Z = 1.33 (P = 0.18)

Rees K, Stranges S. Cochrane Database Systematic Reviews 2013;1:CD009671
Effect of Selenium Supplementation (5 years) on All-cause Mortality – DK PRECISE Trial

Geographic variations in Selenium status might explain inconsistent results across populations (biological plausibility).

GPx3 concentration in plasma is basis of Se requirements.

Selenoprotein P: transports Se to body tissues.

Selenoprotein P:
- Transports Se to body tissues
- Level required to optimise GPx3 activity

Level required to optimise selenoprotein P


## Selenium and Vitamin E Cancer Prevention Trial (SELECT)

<table>
<thead>
<tr>
<th>Selenium (200 μg/day)</th>
<th>Vitamin E (400 IU/day)</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>8,100</td>
<td>16,200</td>
</tr>
<tr>
<td>-</td>
<td>8,100</td>
<td>16,200</td>
</tr>
<tr>
<td>T</td>
<td>16,200</td>
<td>32,400</td>
</tr>
</tbody>
</table>

- Cost: $175,000,000 (NCI, NIH, etc.)
SELECT: Findings…Stopped after 5.5 y n=35,533 US male adults

JAMA. 2009; 301:39-51
Enough Is Enough: Stop Wasting Money on Vitamin and Mineral Supplements

Eliseo Guallar, MD, DrPH
Johns Hopkins Bloomberg School of Public Health
Baltimore, Maryland

Saverio Stranges, MD, PhD
Warwick Medical School, University of Warwick
Coventry, United Kingdom

Cynthia Mulrow, MD, MSc
Annals of Internal Medicine, American College of Physicians
Philadelphia, Pennsylvania

Lawrence J. Appel, MD, MPH
Edgar R. Miller III, MD, PhD
Johns Hopkins School of Medicine
Baltimore, Maryland
COMMENTARY

Nutrition and health: Time for a paradigm shift for climate change

Saverio Stranges a,b,c,e,*, Isaac Luginaah a,b,d

a Departments of Epidemiology & Biostatistics, Family Medicine & Medicine, Western University, London, ON, Canada
b Western Centre for Climate Change, Sustainable Livelihoods and Health, Western University, London, ON, Canada
c Department of Precision Health, Luxembourg Institute of Health, Strassen, Luxembourg
d Department of Geography and Environment, Western University, London, ON, Canada
e The Africa Institute, Western University, ON, Canada
Health for all and all for health

PROMOTING HEALTH, PROMOTING SUSTAINABLE DEVELOPMENT

World Health Organization
WWW.WHO.INT/SHANGHAI2016

9th Global Conference on Health Promotion
SHANGHAI 2016
Emerging Risk Factors: Sleep Health & Chronic Disease
In whatever disease sleep is laborious, it is a deadly symptom; but if sleep does good, it is not deadly.

Hippocrates, 460-370 BC
Ancient Greek physician, the “Father of Medicine”

On average, we spend a third of our lives sleeping...

**SLEEP TIME INFOGRAPHIC**

- 0-3 months
- 3-5 years
- 4-11 months
- 6-13 years
- 7-9 years
- 10-13 hours
- 11-15 hours
- 14-17 hours
- 18-21 hours

**Societal-Level Factors**
- Globalization
- 24/7 Society
- Geography
- Public Policy
- Technology and Progress
- Racism and Discrimination
- Economics
- Natural Environment

**Social-Level Factors**
- Home
- Family
- Work
- School
- Neighborhood
- Religion
- Culture
- Race/Ethnicity
- Socioeconomic Status
- Social Networks

**Individual-Level Factors**
- Genetics
- Beliefs
- Attitudes
- Behaviors
- Physiology
- Psychology
- Health
- Choices

**SLEEP**
Physical/Social Environment and Sleep Health. CHEST. 2020;157:1304-1312
Sleep Health: Can We Define It? Does It Matter?

<table>
<thead>
<tr>
<th></th>
<th>Rarely/ Never (0)</th>
<th>Sometimes (1)</th>
<th>Usually/ Always (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Satisfaction</strong></td>
<td>Are you satisfied with your sleep?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alertness</strong></td>
<td>Do you stay awake all day without dozing?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Timing</strong></td>
<td>Are you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>Do you spend less than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Do you sleep between 6 and 8 hours per day?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total for all for items ranges from 0-10

0 = Poor Sleep Health  Good Sleep Health = 10

Buysse DJ. *SLEEP* 2014;37:9-17
"Insufficient sleep is a public health EPIDEMIC" - CDC
Why sleep matters – the economic costs of insufficient sleep

A cross-country comparative analysis

Marco Hafner, Martin Stepanek, Jirka Taylor, Wendy M. Troxel, Christian van Stolk

Rand Health Q. 2017; 6(4):11
Sleep Problems: An Emerging Global Epidemic? Findings From the INDEPTCH WHO-SAGE Study Among More Than 40,000 Older Adults From 8 Countries Across Africa and Asia

Saverio Stranges, MD, PhD; William Tigbe, MD, PhD; Francesc Xavier Gómez-Olivé, MD; Margaret Thorogood, PhD; Nganga-Bakwin Kandala, PhD

1Division of Health Sciences, University of Warwick Medical School, Coventry, UK; 2MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa; 3INDEPTH Network, Accra, Ghana
Sleep Problems: an Emerging Global Epidemic?

Decline in Sleep Duration over time:
Canadian National Population Health Survey (2002-2011), N=8,673

SLEEP PROBLEMS & CHRONIC DISEASE

➢ Cardiometabolic Risk Factors/Disease
  • Obesity/Body Fat Distribution
  • Type 2 Diabetes
  • Hypertension
  • Cardiovascular Disease/Stroke

➢ Cancer

➢ Mental Disorders

➢ Multimorbidity

➢ Neurodegenerative Disease/Cognitive Decline

➢ Overall & Cause-Specific Mortality
Sleep problems and mortality in South Africa: Agincourt Study, Health & Demographic Surveillance System (HDSS)

Women

Kaplan-Meier survival estimates

No feeling rested
Feeling rested

Log rank test $P<.001$

Men

Kaplan-Meier survival estimates

No feeling rested
Feeling rested

Log rank test $P<.001$.

Gender-specific associations of short sleep duration with prevalent and incident hypertension: the Whitehall II Study

Francesco P Cappuccio†, Saverio Stranges‡, Ngianga-Bakwin Kandala§, Michelle A Miller†, Frances M Taggart†, Meena Kumari†, Jane E Ferrie†, Martin J Shipley†, Eric J Brunner†, and Michael G Marmot†

†Clinical Sciences Research Institute, Warwick Medical School, Coventry, UK
‡International Centre for Health & Society, University College London Medical School, London, UK

A population-based study of reduced sleep duration and hypertension: the strongest association may be in premenopausal women

Saverio Strangesa,b, Joan M. Dornb,c, Francesco P. Cappucciod, Richard P. Donahueb, Lisa B. Rafelsone, Kathleen M. Hoveyb, Jo L. Freudenheimb, Ngianga-Bakwin Kandalad, Michelle A. Millerd and Maurizio Trevisanb,f

Journal of Hypertension 2010, 28:896–902
A short questionnaire discriminating different levels of sleep disturbances should be routinely adopted in CVD prevention programs to identify individuals at increased risk for early-onset
Short Sleep Duration is Associated with the Development of Impaired Fasting Glucose: The Western New York Health Study

LISA RAFALSON, PhD, RICHARD P. DONAHUE, PhD, MPH, SAVERIO STRANGES, MD, PhD, MICHAEL J. LAMONTE, PhD, MPH, JACEK DMOCHOWSKI, PhD, JOAN DORN, PhD, AND MAURIZIO TREVISAN, MD, MS

Objective and subjective sleep measures are associated with HbA1c and insulin sensitivity in the general population: Findings from the ORISCAV-LUX-2 study

G.A. Aguayo a,*, J. Pastore a, A. Backes a, S. Stranges a,b, D.R. Witte c,d, N.J. Diederich e, A. Alkerwi f, L. Huiart a, M. Ruiz-Castell a, L. Malisoux a, G. Fagherazzi a on behalf of the Oriscav-Lux Study Group
Major Health Behaviors & Sleep Problems: Canadian Community Health Surveys (2015-2017), N=44,911

➢ Only half of all respondents met the recommended sleep duration (7-9 hours)
➢ 55% of women and 41% of men reported sleep problems
➢ Binge drinking and smoking were associated with increased risk of sleep problems
➢ Increased fruit & vegetable consumption associated with lower risk of sleep problems
➢ There is a high prevalence of sleep problems among Canadians
➢ Sleep problems tend to cluster with unhealthy lifestyle behaviors

Nunez EC, Nunes S, Khan A, Stranges S, Wilk P. Behav Sleep Med. 2022
Poor sleep: an emerging risk factor for CVD?
Sleep duration (new): Sleep duration is associated with cardiovascular health. Measured by average hours of sleep per night, the ideal level is 7-9 hours daily for adults. Ideal daily sleep ranges for children are 10-16 hours daily for ages 5 and younger; 9-12 hours for ages 6-12 years; and 8-10 hr. for ages 13-18 years.
Approximately 70% live with multimorbidity using the primary care definition (females: 67.9%; males 57.9%), whereas nearly 30% live with multimorbidity using the public health definition (females: 30.9%; males: 24.0%). The odds of multimorbidity were higher for participants who self-reported either short or long sleep duration, as well as dissatisfaction with sleep quality. Associations were stronger among younger age groups (45-54 years and 55-64 years). Disrupted sleep may be a risk factor for multimorbidity across sexes and age groups.
The relationship between sleep health and multimorbidity in community dwelling populations: Systematic review and global perspectives

Patricia Nistor\textsuperscript{a,}\textsuperscript{,}\textsuperscript{1}, Brittany Chang-Kit\textsuperscript{a,}\textsuperscript{1}, Kathryn Nicholson\textsuperscript{a}, Kelly K. Anderson\textsuperscript{a}, Saverio Stranges\textsuperscript{a,}\textsuperscript{b}

Highlights

✓ Systematic review of studies published between Jan 1990-Jan 23
✓ Twenty-four cross-sectional and five cohort studies from 16 countries included with a total participant number of 481,862
✓ Focus on relationship between sleep health and multiple concurrent chronic diseases
✓ Sleep duration outside guidelines associated with multimorbidity
✓ Poor sleep quality consistently associated with multimorbidity
Relationships between sleep and internalizing problems in early adolescence: Results from Canadian National Longitudinal Survey of Children and Youth

Sophia Nunes, M. Karen Campbell, Neil Klar, Graham J. Reid, Saverio Stranges

Sleep Problems and Psychological Well-Being: Baseline Findings from the Canadian Longitudinal Study on Aging

Rebecca Rodrigues, Kathryn Nicholson, Giuseppe Guaiana, Piotr Wilk, Saverio Stranges and Kelly K. Anderson
Epidemiological observational evidence links excessive social media use to poor sleep quality and negative mental health in youth (aged 16-25)
Shiftwork was significantly associated with poorer performance for executive functioning. Our findings confirm the association between shiftwork and cognitive performance among middle-aged and older adults.
CANADIAN 24-HOUR MOVEMENT GUIDELINES FOR ADULTS AGED 18-64 YEARS:
An Integration of Physical Activity, Sedentary Behaviour, and Sleep

Make your whole day matter.
The Canadian 24-Hour Movement Guidelines for Adults (18-64 years) integrate recommendations for physical activity, sedentary behaviour and sleep. Following the guidelines can help you obtain health benefits and live your best life!
Physical activity promotion in primary care: a Utopian quest?

Alexis Lion¹,², Anne Vuillemin³, Jane S. Thornton⁴, Daniel Theisen¹, Saverio Stranges⁵,⁶,⁷, and Malcolm Ward⁸,*
BRAIN HEALTH

- A state of complete physical, mental and social well-being through a full, balanced continuous development and exercise of the brain.

THE DEMENTIA PREVENTION/BRAIN HEALTH GROUP

Charles Alessi, Public Health England
Shehzad Ali, Western U
Robert Andersen, Ivey School of Business
Reza Azarpazhooh, Western U
W David Colby, Chatham Kent Health Unit
Ruthe Anne Conyngham, LHSC
Mark Daley, Western U
Valery Feigin, Auckland U
Serge Gauthier, McGill U
Jason Gilliland, Western U
Moira Kapral, U of Toronto
Nadia Khan, Hypertension Canada
Patrice Lindsay, HSFC
Janet Martin, Western U
Matthew Meyer, Western U
Naghmeh Mokhber, Western U
Kathryn Nicholson, Western U
Kenneth Rockwood, Dalhousie U
Kem Rogers, Western U
Eric Smith, U of Calgary
Sandy Steinwender, Western U
Saverio Stranges, Western U
Piotr Wilk, Western U
Vladimir Hachinski, Western U
Population attributable fraction of potentially modifiable risk factors for dementia

Up to 40% of dementia can be prevented

The Lancet 2020
FINGER TRIAL - Multidomain lifestyle intervention

WHAT IS ALZHEIMER’S DISEASE?
RISK AND PROTECTIVE FACTORS

RISK FACTORS
- Alcohol misuse
- Hypertension
- Dyslipidemia
- Unhealthy diet
- Obesity
- Smoking
- Diabetes
- Vascular insults
- Neuronal damage

PROTECTIVE FACTORS
- APOE, Other genes
- Physical activity
- Cognitive and social activity
- Education
- Brain reserve

INTERVENTION SCHEDULE

INTENSIVE MULTIDOMAIN INTERVENTION
NUTRITION:
- 7 group sessions
- 3 individual sessions

EXERCISE:
- 1-2x/wk moderate exercise
- 2-4x/wk aerobic

EXERCISE:
- 2x/wk muscle strength training
- 5-8x/wk aerobic training

COGNITIVE TRAINING:
- 6 group sessions
- Independent training

COGNITIVE TRAINING:
- 2 group sessions
- Independent training

MONITORING AND MANAGEMENT OF METABOLIC AND VASCULAR RISK FACTORS
- Nurse: Visit every 3 months
- Physician: 3 additional visits

REGULAR HEALTH ADVICE

Kivipelto et al., Alzheimer & Dementia 2013
Review article

Strategies to improve health status among adults with multimorbidity: A scoping review

Kathryn Nicholson\textsuperscript{a,}\textsuperscript{*}, Tatjana T. Makovski\textsuperscript{b}, Iveta Nagyova\textsuperscript{c}, Marjan van den Akker\textsuperscript{d,e,f}, Saverio Stranges\textsuperscript{a,}\textsuperscript{g}

\textsuperscript{a} Department of Epidemiology & Biostatistics, Schulich School of Medicine & Dentistry, Western University, Canada
\textsuperscript{b} Department of Epidemiology, Care and Public Health Research Institute (CAPHRI), Maastricht University, the Netherlands
\textsuperscript{c} Department of Social and Behavioural Medicine, Faculty of Medicine, PJ Safarik University, Kosice, Slovakia
\textsuperscript{d} Institute of General Practice, Goethe University Frankfurt am Main, Germany
\textsuperscript{e} Department of Family Medicine, Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands
\textsuperscript{f} Department of Public Health and Primary Care, Academic Centre of General Practice, KU Leuven, Leuven, Belgium
\textsuperscript{g} Department of Precision Health, Luxembourg Institute of Health, Strassen, Luxembourg
WHAT MAKES CANADIANS SICK?

50%
YOUR LIFE
- INCOME
- EARLY CHILDHOOD DEVELOPMENT
- DISABILITY
- EDUCATION
- SOCIAL EXCLUSION
- SOCIAL SAFETY NET
- GENDER
- EMPLOYMENT/WORKING CONDITIONS
- RACE
- ABORIGINAL STATUS
- SAFE AND NUTRITIOUS FOOD
- HOUSING/HOMELESSNESS
- COMMUNITY BELONGING

25%
YOUR HEALTH CARE
- ACCESS TO HEALTH CARE
- HEALTH CARE SYSTEM
- WAIT TIMES

15%
YOUR BIOLOGY
- BIOLOGY
- GENETICS

10%
YOUR ENVIRONMENT
- AIR QUALITY
- CIVIC INFRASTRUCTURE

THESE ARE CANADA'S SOCIAL DETERMINANTS OF HEALTH #SDOH
Position Paper

Addressing Social Determinants to Improve Patient Care and Promote Health Equity: An American College of Physicians Position Paper

Hilary Daniel, BS; Sue S. Bornstein, MD; and Gregory C. Kane, MD: for the Health and Public Policy Committee of the American College of Physicians*

Social determinants of health are nonmedical factors that can affect a person’s overall health and health outcomes. When a person is born and the social conditions they are born into can affect their risk factors for premature death and their life expectancy. In this position paper, the American College of Physicians acknowledges the role of social determinants in health, examines the complexities associated with them, and offers recommendations on better integration of social determinants into the healthcare system while highlighting the need to address systemic issues hindering health equity.

For author affiliations, see end of text.


Opinion

Forty Years After Alma-Ata: At the Intersection of Primary Care and Population Health

SANDRO GALEA and MARGARET E. KRUK

RESEARCH ARTICLE

Organizational factors influencing successful primary care and public health collaboration

Ruta Valaitis1, Donna Meagher-Stewart2, Ruth Martin-Misener3, Sabrina T. Wong1, Marjorie MacDonald4, Linda O’Mara4 and The Strengthening Primary Health Care through Primary Care and Public Health Collaboration Team

doi:10.1017/S1463423617000806

Strengthening primary health care through primary care and public health collaboration: the influence of interpersonal and interprofessional factors

Ruta K. Valaitis1, Linda O’Mara2, Sabrina T. Wong3, Marjorie MacDonald4, Nancy Murray5, Ruth Martin-Misener6 and Donna Meagher-Stewart7

1Associate Professor and Dorothy C. Hall Chair in Primary Health Care Nursing, School of Nursing, Faculty of Health Sciences, McMaster University, Hamilton ON, Canada
2Associate Professor, School of Nursing, McMaster University, Hamilton, ON, Canada
3Professor, School of Nursing, University of British Columbia, Vancouver, BC, Canada
4Professor, School of Nursing, University of Victoria, Victoria, BC, Canada
5Research Coordinator, School of Nursing, McMaster University, Hamilton, ON, Canada
6Professor, School of Nursing, Dalhousie University, Halifax, NS, Canada
7Associate Professor, School of Nursing, Dalhousie University, Halifax, NS, Canada

RESEARCH

International Journal of Public Health
https://doi.org/10.1007/s00038-019-01278-1

The integration of primary care and public health to improve population health: tackling the complex issue of multimorbidity

Kathryn Nicholson1 · Tatjana T. Makovski2,3,4 · Saverio Stranges1,5
Immorality of inaction on inequality
Our collective failure to reverse inequality is at the heart of a global malaise

Kate E Pickett professor of epidemiology, Richard G Wilkinson honorary visiting professor

Department of Health Sciences, University of York, York, UK; Correspondence to: K E Pickett kate.pickett@york.ac.uk
Big "I" Integration

Public Health System

Health Promotion and Policy

Protection of Vulnerable People

Medical Care System

Patient-Centered Primary Care

Complex Disease Care

Community Partnerships & Individual Engagement

*Adapted from Centers for Disease Control and Prevention, "A Health System: Health Protection for Life!", 2007.
Lessons learned

✓ Lifestyles (including poor sleep) play a major role in chronic disease

✓ Socioeconomic determinants play a major role in chronic disease

✓ There are widening disparities in chronic disease burden driven by SES

✓ NCDs are an additional public health burden in LMICs

✓ Geographic variation analyses are important for public health policy

✓ Have we seen the end of long-term decline in CVD mortality?
Chronic Disease Prevention: the way forward

✓ Translate research findings in “real-world” settings

✓ From “what works” to “how can we make this happen…”

✓ Increase the proportion of people with ideal cardiovascular health

✓ Combining population and high-risk strategies

✓ Increase research focus and policy on disadvantaged subgroups

✓ Reconfigure health systems to tackle multimorbidity burden

✓ Need for multisectoral approaches

Study Populations

- Western New York Health Study, USA
- Nutritional Prevention of Cancer Trial, USA
- National Health & Nutrition Examination Survey, USA
- National Population Health Survey, Canada
- Canadian Community Health Surveys, Canada
- Canadian Longitudinal Study on Aging, Canada
- National Diet & Nutrition Survey, UK
- Whitehall II Study, UK
- PRECISE Trial, UK/Denmark
- EPIC Study & Olivetti Heart Study, Italy
- Demographic & Health Surveys (DHS), LMICs
- INDEPTH-WHO-SAGE, LMICs
- ORISCAV & EHES, Luxembourg
“The primary determinants of disease are mainly economic and social, and therefore remedies must also be economic and social.”

Geoffrey Rose