

# Do we really know the economic burden of multimorbidity?: A view from an indirect cost perspective

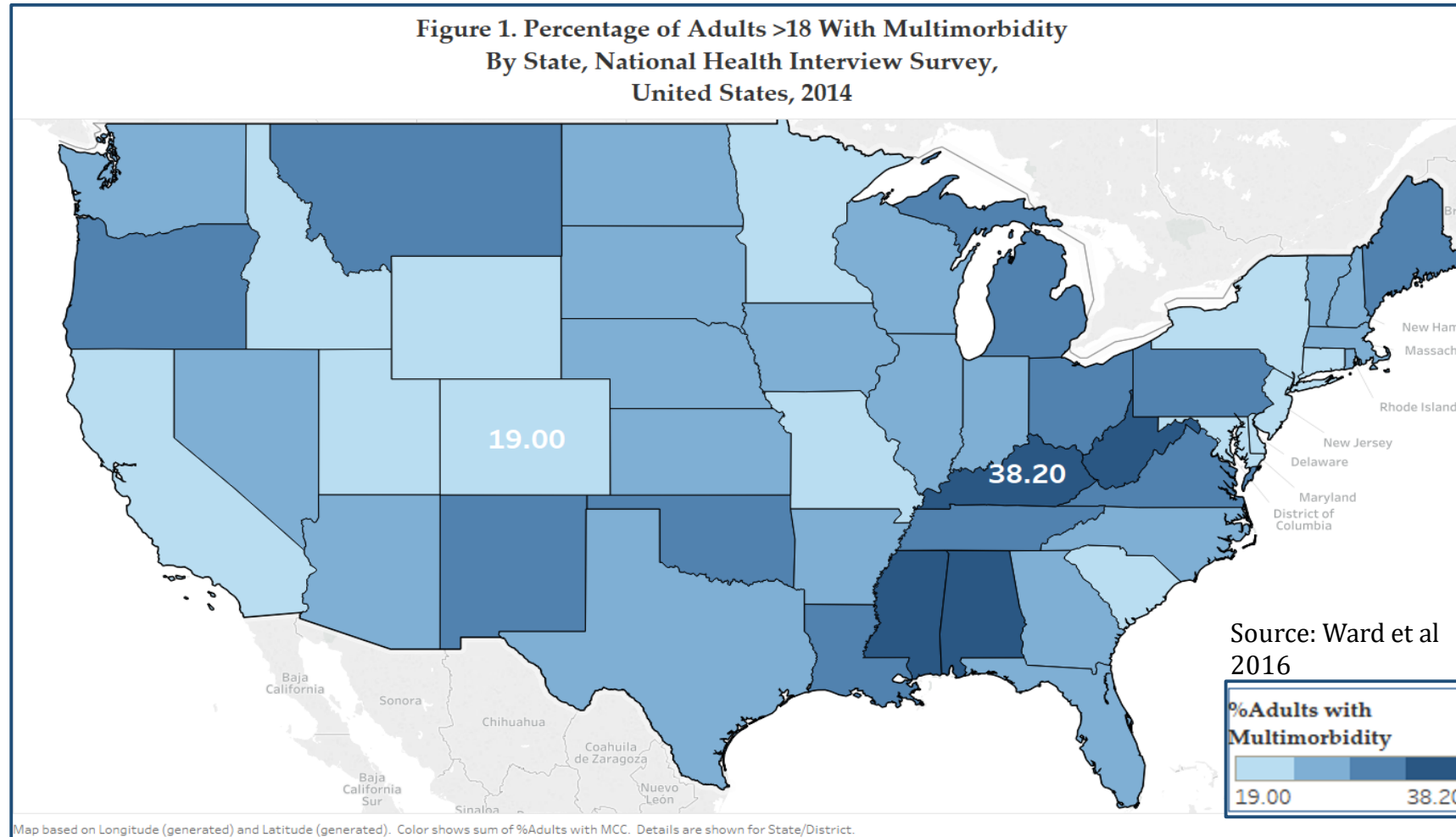
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# Background

# Multimorbidity

- Multimorbidity = “co-occurrence of >2 chronic conditions within one person, where one is not necessarily central than the others”
- Care management challenging
  - Substantial costs (66% of total health care spending in the US)
  - Requires to move beyond the traditional focus of care
- Leads to
  - Poorer health outcomes
  - Worsened functional status and quality of life
  - Limitations in employment, and reduced income

# Prevalence of Multimorbidity



- 25% of US adults in 2014
- Expected to grow to 81 million by 2020



HHS



The Academy of Medical Sciences

# Indirect Costs

- Indirect costs = “individuals’ loss of production of goods and services due to their disease”
- Four potential sources:
  - Absenteeism- voluntary or involuntary absence from work
  - Presenteeism- reduced productivity despite being at work
  - Disability- lost productivity due to disability
  - Premature mortality- present value of future earnings lost due to mortality
- Lost productivity of caregivers- important but often overlooked

# Multimorbidity and Indirect Costs

- Majority of the multimorbid conditions affect working age population
- Important to health services researchers
  - Magnitude of the disease/condition
  - Justify intervention programs
  - Research fund allocation (NIH, the Congress, NIA, NINR, NHLBI, VA, NCI)
  - Inform decision making and health policy
- A systematic review by Wang et al (2018) – no studies estimated indirect costs
- Indirect costs- immense value for cost-of-illness studies from a societal perspective

# Hypotheses

- 1) The indirect costs associated with multimorbidity are unexplored
- 2) Studies underestimate indirect costs associated with multimorbidity

# Methods



# Exclusion Criteria (A priori)

- Focused on an index disease and comorbidities
- Did not include a population with multimorbidity
- Did not evaluate indirect costs associated with multimorbidity
- Non-US studies

# Data Sources- HSRProj Excel Database

- Downloaded HSRProj Database Excel file
- Imported file in Python
- Title, Abstract, Keywordlist, and MeSHwordlist fields searched
- Accuracy checked manually using conditional formatting and custom sort in Excel and online database search

	Keywords	MeSH Terms
<b>Multimorbidity</b>	multimorbidity, multi-morbidity, comorbidity, co-morbidity, multiple chronic conditions/illnesses/diseases, multiple long-term/long term	comorbidity
<b>Lost Productivity</b>	absenteeism, sick leave*, sickness absen*, illness day*, absence day*, productivity loss*, work abilit*, work disabilit*, early retirement*, premature mortal*, workplace*, labor*, occupation*, job*	absenteeism, employment, premature mortality
<b>Costs/ Expenditures</b>	spending, cost-of-illness, cost of illness, indirect cost/burden/expenditure, cost/s	forecasting, health expenditures, costs and cost analysis, cost of illness

# Additional Data Sources

- To identify a gap in the published literature:
  - Systematic search of three other online databases with the help of a librarian at WVU HSC
    - PubMed
    - Ovid Medline
    - Web of Science
- Studies combined and duplicates removed using a reference management software (confirmed using another software)
- Titles and abstracts screened by two independent reviewers
- Full-text articles retrieved, if necessary

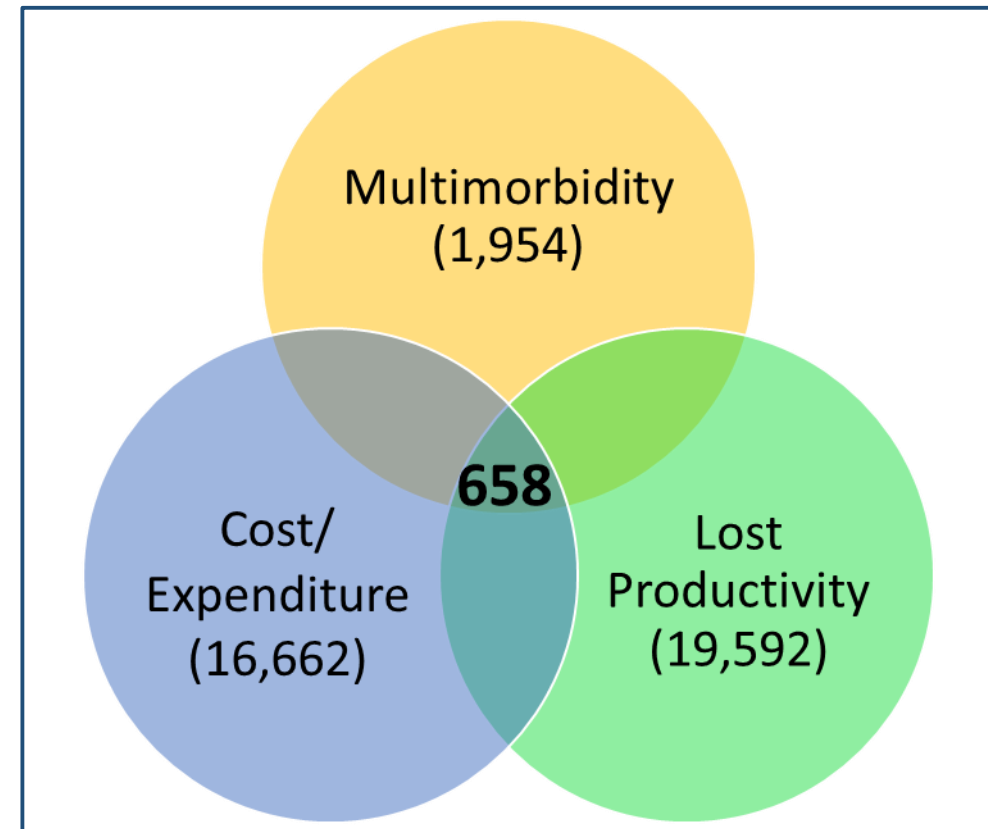
A detailed list of key words and MeSH terms used to search each database is provided at the end of this presentation

# Results

# Research Gap in HSRProj Database

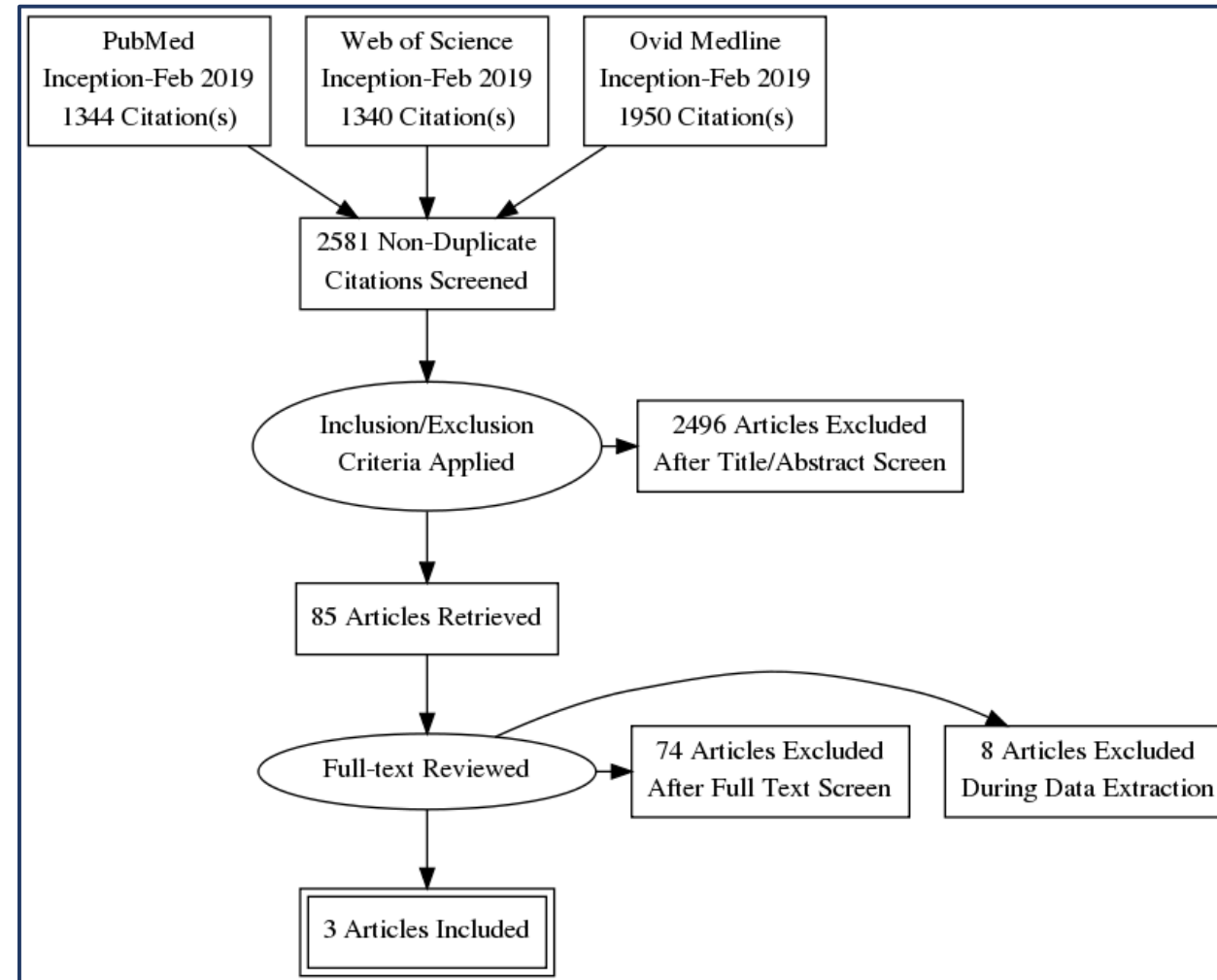
- HSRProj Excel Database
- 658 projects identified
- None of the identified projects evaluated indirect costs associated with multimorbidity
- Reasons for exclusion of studies
  - Did not include multimorbid population (n=271)
  - Did not evaluate indirect costs associated with multimorbidity (n= 387)

**Figure 2. Search Terms and Number of Identified Studies in Downloaded HSRProj Excel Database**



# Research Gap in Published Literature

**Figure 3. Study Selection Flow Chart from Additional Data Sources**



# Research Gap in Published Literature

Identified Studies from Published Literature		
Study	Method Used to Measure Indirect Costs	Health Conditions Studied
Patrick et al 2007	Absenteeism	Obesity with 2 or more of the following conditions: hyperlipidemia, hypertension, and diabetes
Guy et al 2017	Absenteeism, Lost Productivity Due to Disability	Cancer with any other physical or mental chronic health condition
Druss 2000	Absenteeism, Lost Productivity Due to Disability	Depression with any other physical or mental chronic health condition

- Indirect costs associated with presenteeism, premature mortality, caregiver burden- not evaluated
- Indirect costs of most common multimorbid conditions not assessed:
  - physical (hypertension, high cholesterol, and diabetes)
  - mental (depression and anxiety)
  - Physical and mental (arthritis, osteoporosis, depression, anxiety)

# Significance of the Research Gap



# What is the Real Economic Burden of Multimorbidity?

- Knowledge of indirect costs along with direct costs is required
  - Identify the magnitude of the problem
  - Optimal allocation of resources
- Healthcare providers, policy makers, patients, and payers can benefit
  - Justify collaborative care
  - Improve preventive and treatment efforts
  - Reduce future direct and indirect costs
- Employees and employers
  - Wellness programs
- Government
  - Efforts to improve labor force participation and tax revenue

# Proposed Solutions

# Potential Solutions

- Identify indirect costs associated with the most common clusters of physical and/or mental health conditions
  - Compare indirect costs of concordant and discordant multimorbid conditions
- Use publicly available datasets like Medical Expenditure Panel Survey and National Health Interview Survey
- Create data linkages between existing registries, insurance claims, medical records, and surveys to estimate indirect costs
- Evaluate caregiver burden as part of indirect economic burden assessment
- Adopt the established definition of multimorbidity for uniformity in findings (WHO, AMS)

# Acknowledgements

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- Ms. Anna Crawford (Associate University Librarian, WVU HSC)

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Tableau Public: Free Data Visualization Software. <https://public.tableau.com/en-us/s/>

Python Software Foundation. Python Language Reference, version 3.7. Available at <https://www.anaconda.com/distribution/>

Microsoft Excel for Office 365. Available at: <https://products.office.com/en-us/excel>

PRISMA Flow Diagram Generator. Available at <http://prisma.thetacollaborative.ca/>

# Thank you!

# List of Abbreviations

US: United States

NIH: National Institutes of Health

NIA: National Institute on Aging

NINR: National Institute of Nursing Research

NHLBI: National Heart, Lung, and Blood Institute

VA: US Department of Veterans Affairs

NCI: National Cancer Institute

MeSH: Medical Subject Heading

WVU: West Virginia University

HSC: Health Sciences Center

WHO: The World Health Organization

AMS: The Academy of Medical Sciences



# Appendix- Search Strategy

Online HSRProj Database				
(((multimorbidity) OR (multi-morbidity) OR (comorbidity[MeSH]) OR (co-morbidity) OR ((multiple) AND (chronic OR long-term OR "long term") AND (illness* OR disease* OR condition*))))	AND	((("Sick Leave"[Mesh]) OR (Sick Leave*) OR (Sickness Absen*) OR (Sick Absen*) OR (Sick Day*) OR (Work Absen*) OR (Work Leave* ) OR (Illness Day*) OR (Illness absen*) OR ("Absenteeism"[Mesh]) OR (Absenteeism) OR (Absence Day*) OR (Absent Day*) OR (Presenteeism) OR (Work Productivit*) OR (Productivity Loss*) OR (Work Abilit*) OR (Work Disabilit*) OR (Disability Pension*) OR (Early Retirement*) OR ("Mortality, Premature"[Mesh]) OR (Premature Mortal*) OR (Premature Death*) OR ("Employment"[Mesh]) OR (Employment*) OR (Employee*) OR (Workloss*) OR (Workplace*) OR (Workday*) OR (Worker*) OR (Labour*) OR (Labor*) OR (Occupation*) OR (Job*)))	AND	((forecasting[MeSH]) OR (health expenditures[MeSH]) OR (spending) OR (costs and cost analysis[MeSH]) OR (cost-of-illness) OR (cost of illness) OR (indirect cost) OR (indirect burden) OR (absenteeism[MeSH]) OR (Cost OR Costs OR Economic* OR Indirect Expenditure* OR Indirect Expense* OR "Cost of Illness"[Mesh] OR "Costs and Cost Analysis"[Mesh]))

# Appendix- Search Strategy

PubMed					
(((multimorbidity[Title/Abstract]) OR (multimorbidity[Title/Abstract]) OR (comorbidity[MeSH]) OR (comorbidity[Title/Abstract]) OR ((multiple[Title/Abstract]) AND (chronic[Title/Abstract] OR long-term[Title/Abstract] OR "long term"[Title/Abstract]) AND (illness*[Title/Abstract] OR disease*[Title/Abstract] OR condition*[Title/Abstract]))	AND	(("Sick Leave"[Mesh]) OR (Sick Leave*[Title/Abstract]) OR (Sickness Absen*[Title/Abstract]) OR (Sick Day*[Title/Abstract]) OR (Work Absen*[Title/Abstract]) OR (Work Leave*[Title/Abstract]) OR (Illness Day*[Title/Abstract]) OR (Illness absen*[Title/Abstract]) OR ("Absenteeism"[Mesh]) OR (Absenteeism[Title/Abstract]) OR (Absence Day*[Title/Abstract]) OR (Absent Day*[Title/Abstract]) OR (Presenteeism[Title/Abstract]) OR (Work Productivit*[Title/Abstract]) OR (Productivity Loss*[Title/Abstract]) OR (Work Abilit*[Title/Abstract]) OR (Work Disabilit*[Title/Abstract]) OR (Disability Pension*[Title/Abstract]) OR (Early Retirement*[Title/Abstract]) OR ("Mortality, Premature"[Mesh]) OR (Premature Mortal*[Title/Abstract]) OR (Premature Death*[Title/Abstract]) OR ("Employment"[Mesh]) OR (Employment*[Title/Abstract]) OR (Employee*[Title/Abstract]) OR (Workloss*[Title/Abstract]) OR (Workplace*[Title/Abstract]) OR (Workday*[Title/Abstract]) OR (Worker*[Title/Abstract]) OR (Labour*[Title/Abstract]) OR (Labor*[Title/Abstract]) OR (Occupation*[Title/Abstract]) OR (Job*[Title/Abstract]))	AND	((forecasting[MeSH]) OR (health expenditures[MeSH]) OR (spending[Title/Abstract]) OR (costs and cost analysis[MeSH]) OR (cost-of-illness[Title/Abstract]) OR (cost of illness[Title/Abstract]) OR (indirect cost[Title/Abstract]) OR (indirect burden[Title/Abstract]) OR (absenteeism[MeSH]) OR (Cost[Title/Abstract] OR Costs[Title/Abstract] OR Economic*[Title/Abstract] OR Indirect Expenditure*[Title/Abstract] OR Indirect Expense*[Title/Abstract] OR "Cost of Illness"[Mesh] OR "Costs and Cost Analysis"[Mesh]))	

# Appendix- Search Strategy

Web of Science (Using Search Terms as Topics)/ Ovid Medline (Using multi-field search)				
("multimorbidity" OR "multi-morbidity" OR "comorbidity" OR "co- morbidity" OR ("multiple" AND ("chronic" OR "long- term" OR "long term") AND ("illness*" OR "disease*" OR "condition*"))))	AND	("Sick Leave" OR "Sick Leave*" OR "Sickness Absen*" OR "Sick Absen*" OR "Sick Day*" OR "Work Absen*" OR "Work Leave*" OR "Illness Day*" OR "Illness absen*" OR "Absenteeism" OR "Absenteeism" OR "Absence Day*" OR "Absent Day*" OR "Presenteeism" OR "Work Productivit*" OR "Productivity Loss*" OR "Work Abilit*" OR "Work Disabilit*" OR "Disability Pension*" OR "Early Retirement*" OR "Premature Mortal*" OR "Premature Death*" OR "Employment" OR "Employment*" OR "Employee*" OR "Workloss*" OR "Workplace*" OR "Workday*" OR "Worker*" OR "Labour*" OR "Labor*" OR "Occupation*" OR "Job*")	AND	("forecasting" OR "health expenditures" OR "spending" OR "costs and cost analysis" OR "cost- of-illness" OR "cost of illness" OR "indirect cost" OR "indirect burden" OR "absenteeism" OR "Cost" OR "Costs" OR "Economic*" OR "Indirect Expenditure*" OR "Indirect Expense*" OR "Cost of Illness" OR "Costs and Cost Analysis")