Does Longest-held Occupation Predict Mortality Risk? Evidence from a 29-year Follow-up Study of Elderly U.S. Adults

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Abay Asfaw & Anasua Bhattacharya

Centers for Disease Control and Prevention (CDC)

National Institute for Occupational Safety and Health (NIOSH)

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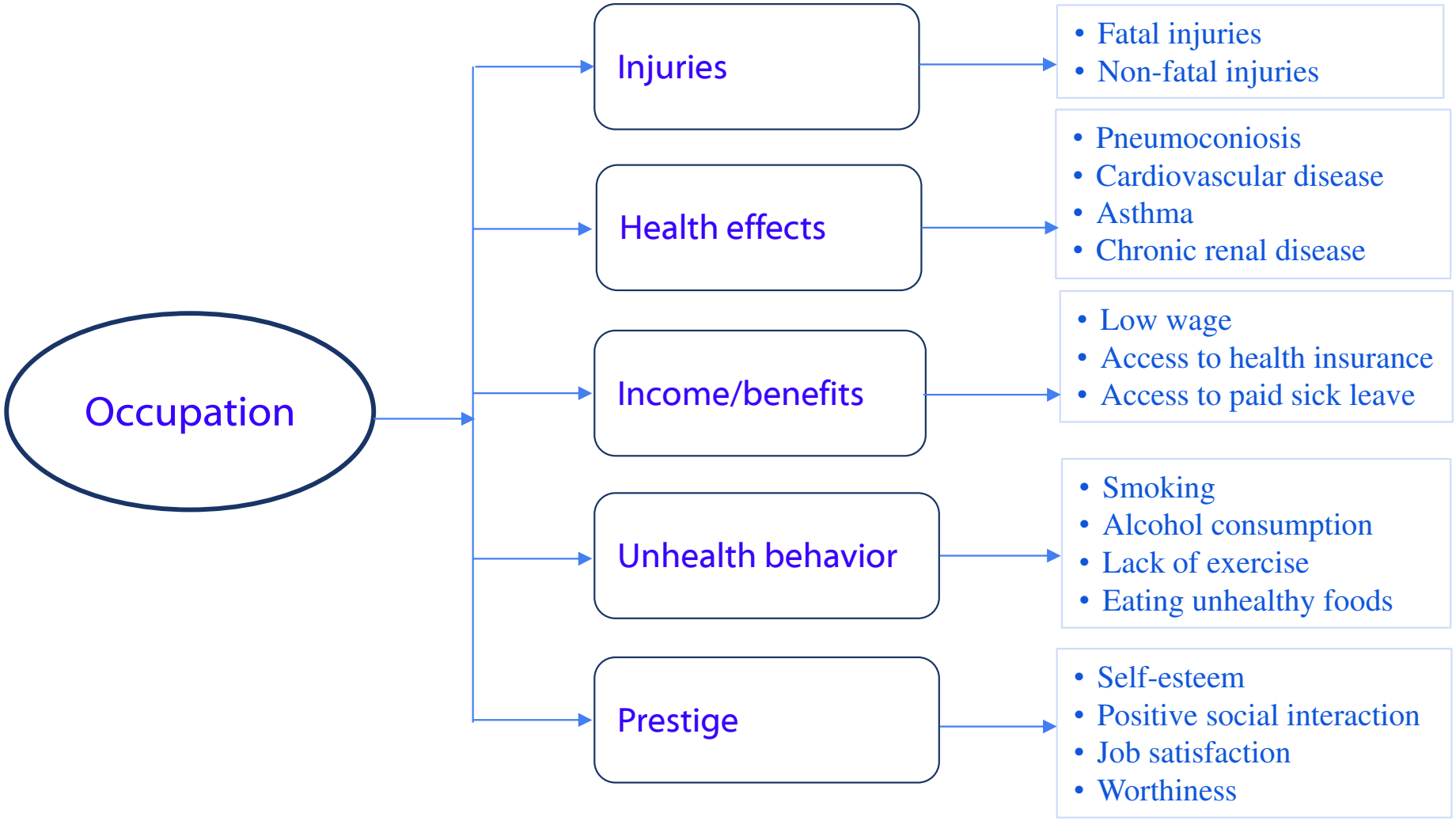
Introduction

- **Occupation is associated with a large part of daily activities, positively or negatively affecting health, lifestyle, and economic and social status.**

- **Different occupations might lead to different types of workplace exposures, and these exposures accumulate over time, affecting the health and survival of workers.**

- **Some of these effects may only be recognized long after worker exposure.**

Conceptual Framework



Statement of the Problem and Objective

- **Limited research exists on the association between longest-held occupation (LHO) and early mortality.**
- **To our knowledge, no recent study has examined the association between LHO and early mortality using a nationally representative longitudinal data set in the United States.**
- **The objective of this study was to examine if LHO was associated with mortality risk among adults in America 51 years of age and older.**
- **Studies like this will shed light on the question of whether LHO is a predictor of early mortality risk.**

Data Source

- **The data source for this study was the Health and Retirement Study (HRS) (1992 to 2020).**
- **The HRS collects longitudinal data that is nationally representative of noninstitutionalized people in America aged 51 years or older.**
- **Since the launch of the HRS in 1992, the original sample of respondents have been interviewed every two years, and new cohorts are added continuously.**
- **Currently, the HRS is one of the most comprehensive and nationally representative longitudinal data sets for people in America 51 years of age and older.**

Measurement of Variables

- **Outcome variable**
  - The outcome variable was death.
  - The HRS collects mortality information including month and year of death from the respondent's proxy using exit and follow-up interviews.
  - It also matches the death information to the National Death Index database.

- **Independent/exposure variable**
  - LHO was our independent variable of interest.
  - The HRS collects information on current and LHO using the 1980, 2000, and 2010 Census Occupation Classifications.
  - To measure LHO consistently, we mapped the 2000 and 2010 occupational codes to the 1980 occupational codes using the BLS occupation crosswalks.

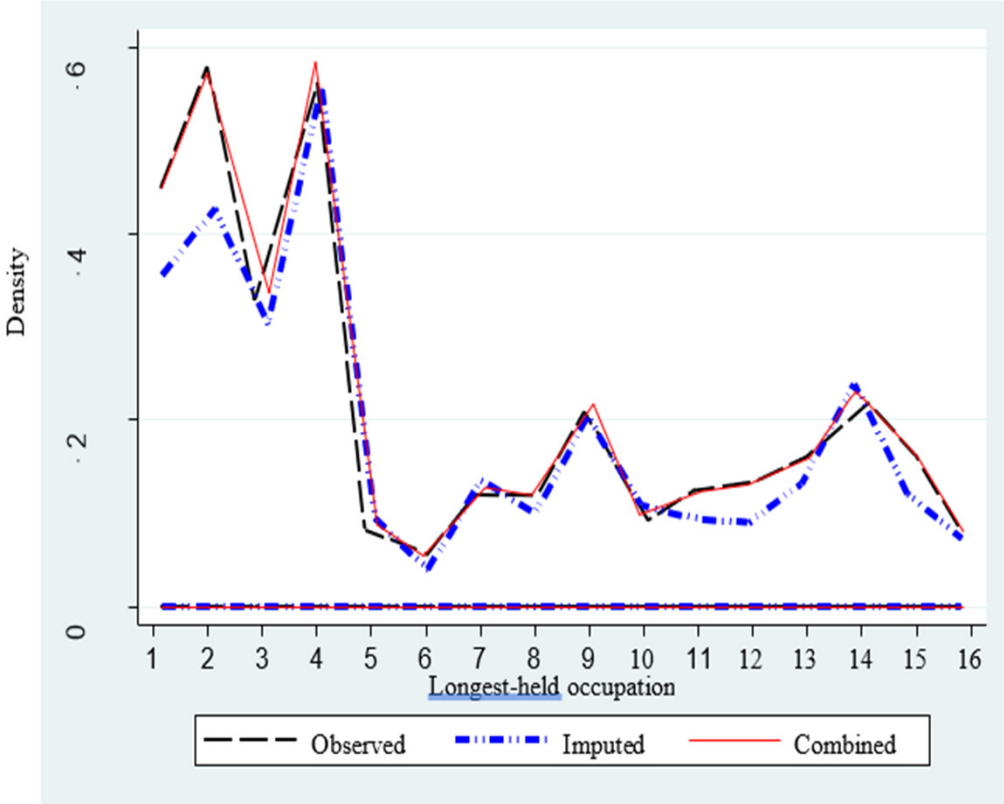
Measurement of Variables (cont.)

- **We considered 16 major occupations (excluding military occupation).**
- **We used the Professional and technical support occupation as a reference LHO because it was the largest and relatively safe category.**
- **We included race/ethnicity, marital status, college education, BMI, smoked ever, drank alcohol ever, and region as covariates.**
- **Except race, all covariates were time-varying.**

Longest-held Occupations (LHO)	
1	Professional and tech. support
2	Managerial
3	Sales
4	Clerical
5	Private household service
6	Protective service
7	Food preparation
8	Health services
9	Personal services
10	Farming and fishing
11	Mechanics and repair
12	Construction and extractives
13	Precision production
14	Machine operators
15	Transportation
16	Handlers and helpers

Measurement of Variables (cont.)

- **Missing cases**
  - Around 27% of respondents in our sample had missing values for LHO.
  - We imputed LHO using chained equations and a multinomial logistic model.
  - We evaluated the validity of the imputation outcomes by comparing their distributions with actual and combined distributions.



Statistical Analysis

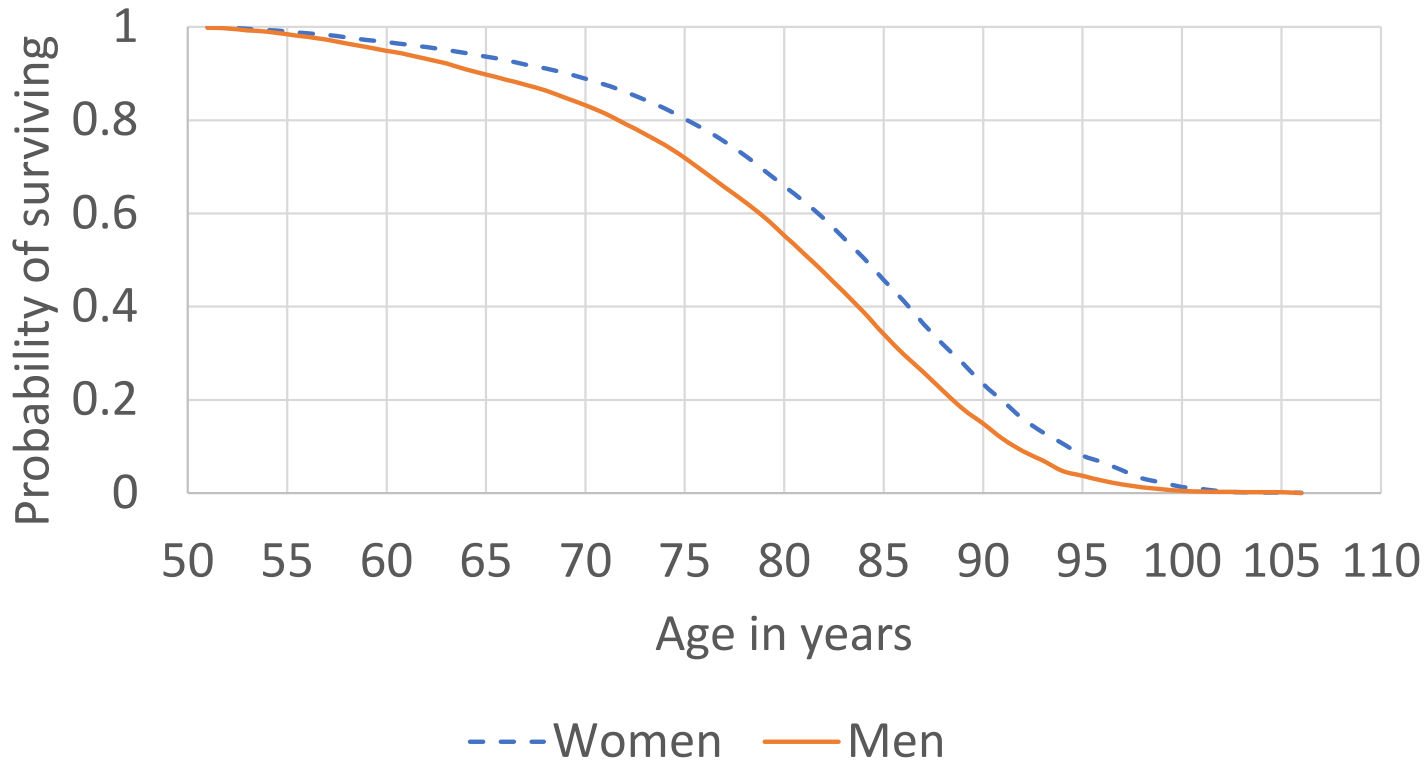
- In our sample, between 1992 and 2020, 22% of the respondents requested to be permanently removed from the HRS sample.
- This means that these respondents were no longer at risk of death from the date they asked to be removed up to the end of the follow-up period.
- We used a competing-risks model suggested by Fine and Gray, 1999.
- The follow-up period was from the age of entry into the HRS survey until death, request to be removed from the HRS, or the end of the survey year (2020), whichever came first.
- We estimated different the model separately for women and men.

Results

- **Overall, we considered 26,758 respondents with a total of 189,941 records.**
- **These respondents were followed for an average of 20.5 years.**
- **These respondents represented 114.2 million people aged 51 years or older in the country.**
- **During the 29-year follow-up period, of the 26,758 respondents:**
  - 9,640 (36%) died,
  - 5,899 (22%) requested to be permanently removed from the HRS, and
  - 11,219 (42%) were alive.

Results

Probability of surviving by sex (male n=16,609 and female n=19,836): 1992–2020 - Unadjusted Kaplan-Meier survival curves



Results: Competing-risks regression results*

Longest-held occupation	Sub-Hazard Ratio			
	Missing LHO Excluded		Missing LHO Imputed	
	Women (n=103,488)	Men (n=86,453)	Women (129,846)	Men (n=101,104)
Professional (Ref.)				
Managerial	1.09	1.10	1.12	1.12
Sales	1.15*	1.23***	1.20***	1.26***
Clerical	1.04	1.27***	1.13***	1.31***
Private household service	0.85	0.67	1.00	0.81
Protective service	1.14	1.31***	1.24	1.34***
Food preparation	1.39***	1.43***	1.44***	1.52***
Health services	1.11	0.74	1.13	0.80
Personal services	1.16*	1.34***	1.25***	1.36***
Farming and fishing	0.89	1.26***	1.19	1.34***
Mechanics and repair	0.96	1.02	1.13	1.11
Construction and extractives	0.83	1.09	1.00	1.17*
Precision production	0.96	1.20***	1.07	1.26***
Machine operators	1.42***	1.36***	1.46***	1.45***
Transportation	0.71	1.13	0.97	1.20**
Handlers and helpers	1.35*	1.32***	1.43***	1.38***

* After controlling for all covariates (HRS: 1992-2020)

Limitations

- **First, there was significant variation in the duration of LHO. While the average tenure at LHOs was 19 years, nearly 10% of respondents stayed at their LHOs for less than 5 years.**

- **Second, we used very aggregated (16) LHO. This might camouflage the excess risk of mortality for some specific occupations.**

- **Third, the association between LHO and early mortality should not be taken as causation because of potential reverse causality as respondents might choose their occupations based on their overall health status.**

Concluding Remarks

- **Work-related diseases and injuries were responsible for the deaths of 1.9 million people in 2016.**
- **We examined if LHO was one of the risk factors for early mortality.**
- **We found that workers had elevated risks of mortality in food preparation, machine operation, personal services, precision production, handlers and helpers, protective service, agriculture, and sales occupations.**
- **Overall, LHO might be taken as one of the risk factors for early mortality.**
- **Researchers and decision makers might consider occupation as one of the social determinants of health.**

Thank you!

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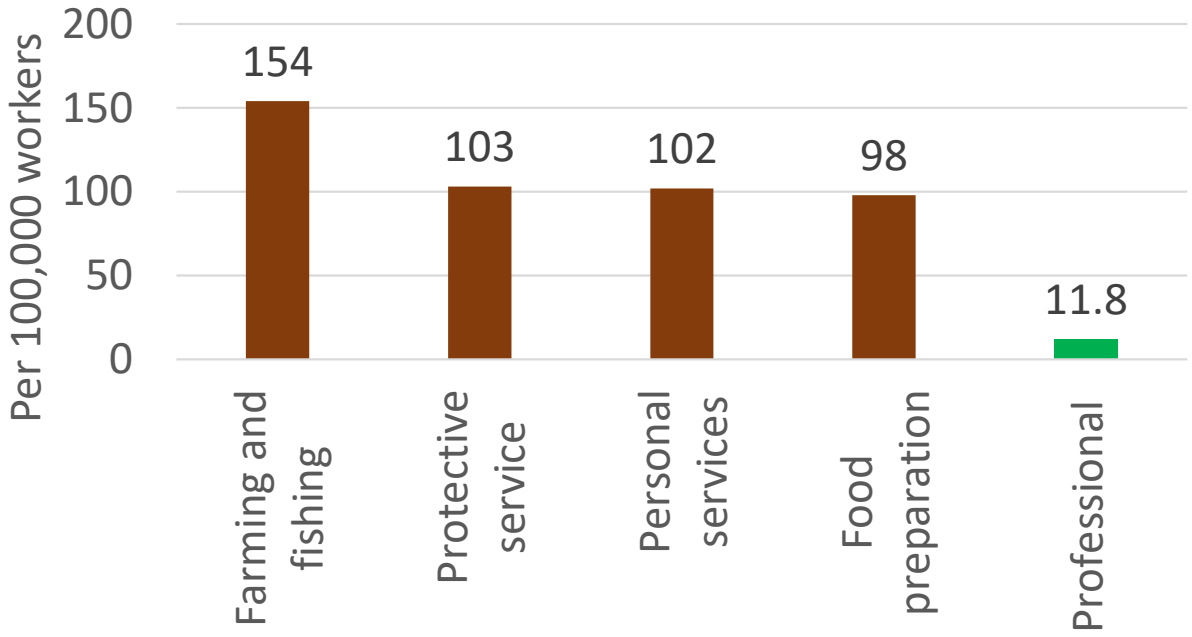
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U. S. Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry.

Additional materials

How occupation can affect mortality

1. Significant difference in incidences of severe occupational injury by occupation

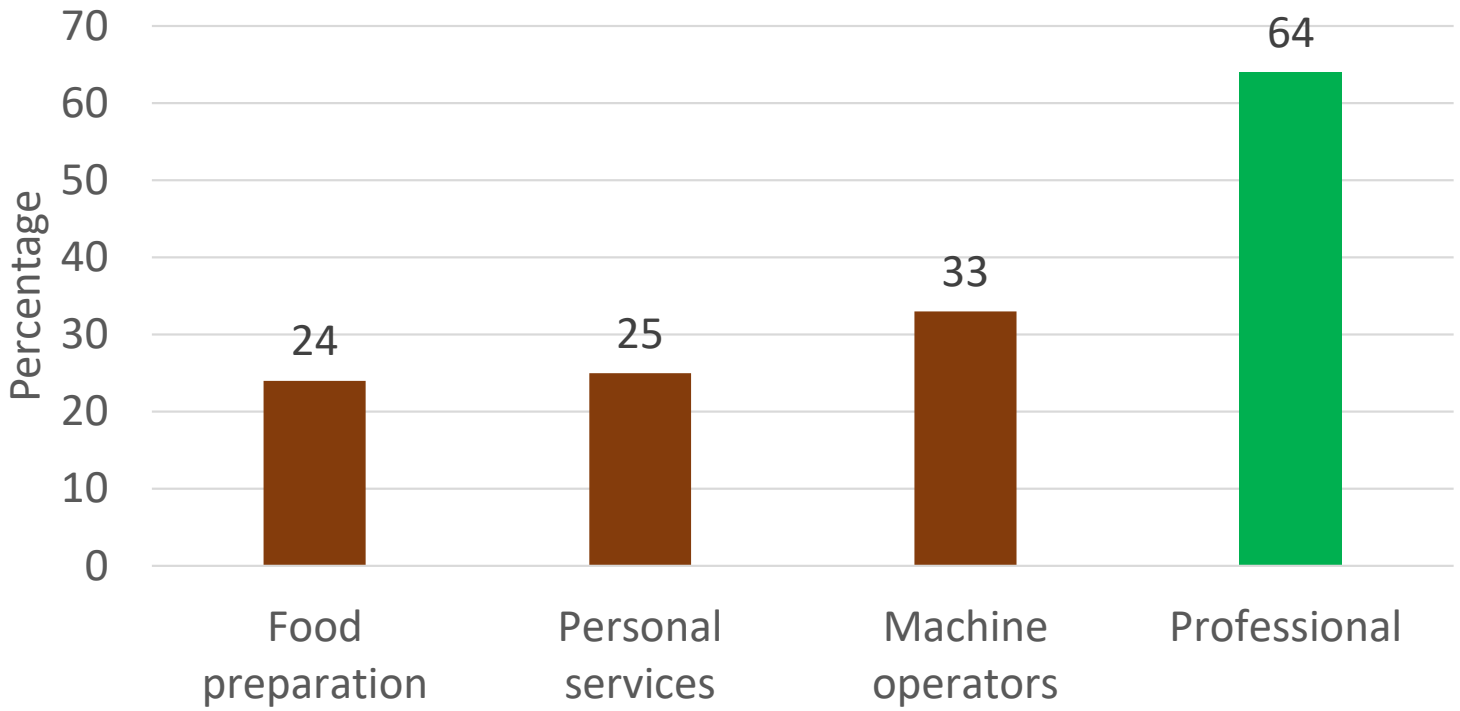
Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers in 2020



How occupation can affect mortality

2. Significant difference in prestige scores by occupation

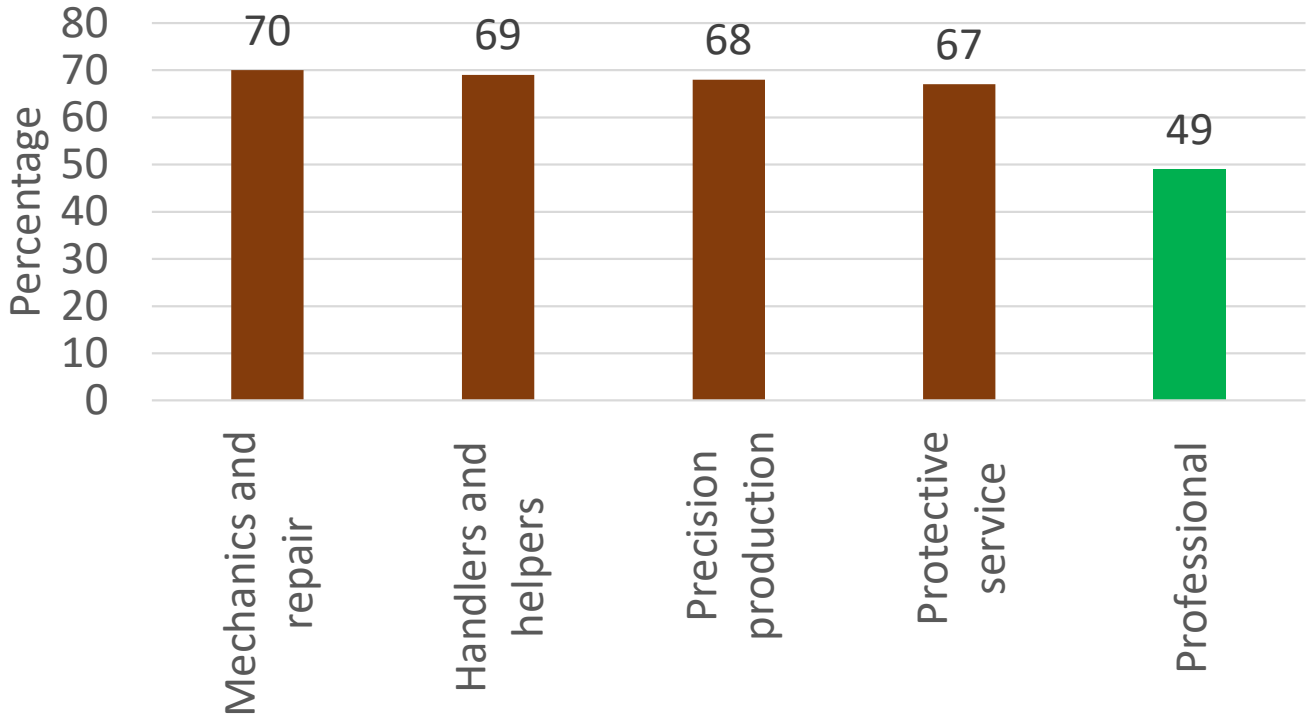
Average prestige scores, 2002 & 2006 General Social Survey (GSS)



How occupation can affect mortality

3. Significant difference in health behaviors by occupation: smoking

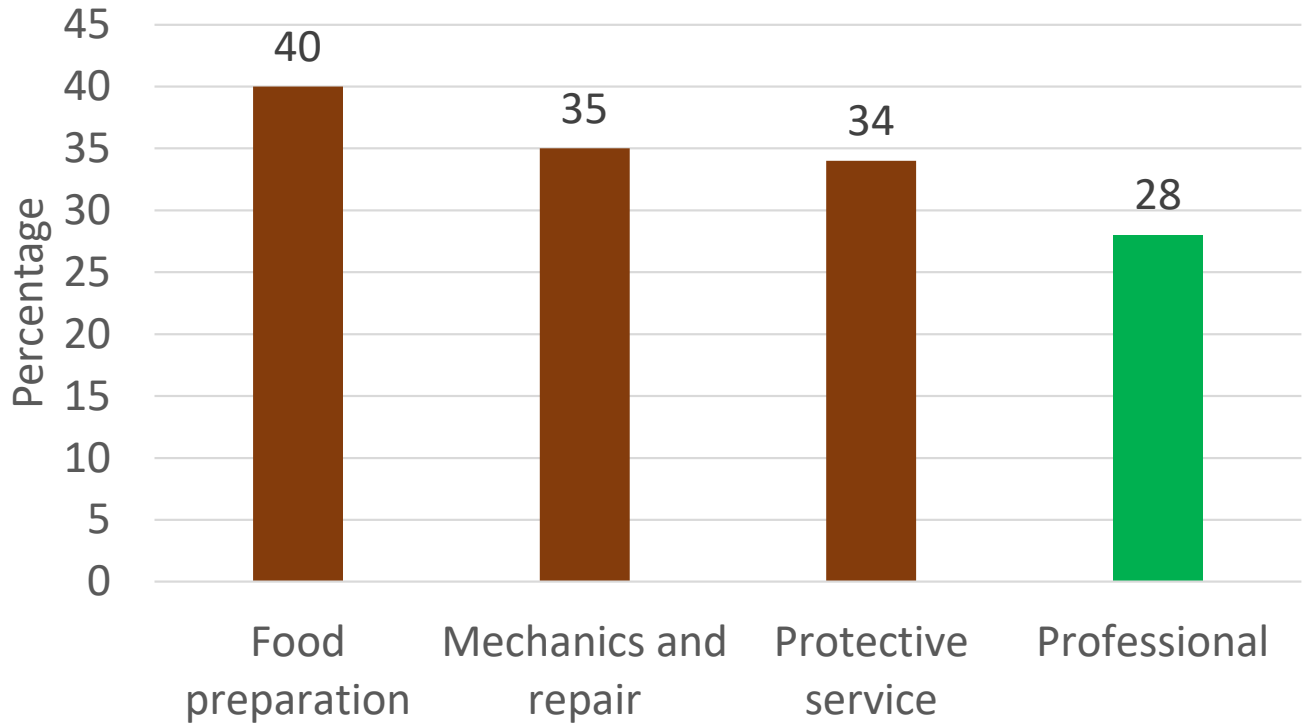
Percentage of current or former smokers (HRS)



How occupation can affect mortality

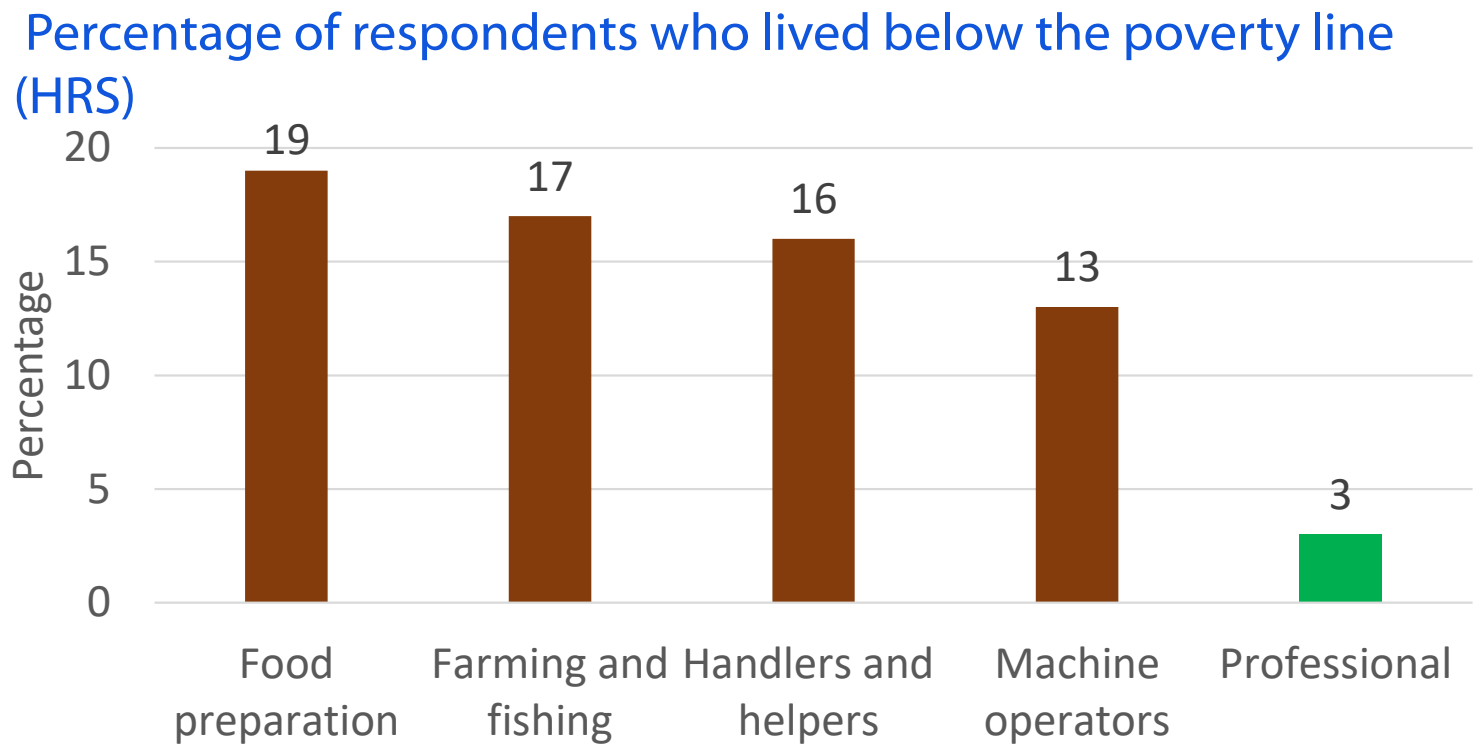
4. Significant difference in health behaviors by occupation: obesity

Percentage of obese workers (HRS)



How occupation can affect mortality

5. Significant difference in income by occupation



Description of Longest-held Occupation

Major occupation (1980 Occupation Codes)	Detailed occupation
Managerial (003-037)	Executive, Administrative, and Managerial Management Related
Professional and technical support (043-235)	Engineers, Architects, and Surveyors Mathematical and Computer Scientists Natural Scientists Health Diagnosing Health Assessment and Treating Therapists Teachers Librarians, Archivists, and Curators Social, Recreation, and Religious Workers Lawyers and Judges Writers, Artists, Entertainers, and Athletes Health Technologists and Technicians Engineering and Related Technologists and Technicians Science Technicians Technicians, Except Health, Engineering and Science
Sales (243-285)	Sales Representatives Sales Workers Sales-Related
Clerical and administrative support (303-389)	Supervisors, Administrative Support Computer Equipment Operators Secretaries, Stenographers and Typists Information Clerks Records Processing Duplicating, Mail, and Other Office Machine Operators Communications Equipment Operators Mail and Message Distributing Material Recording, Scheduling, and Distributing Clerks Adjusters and Investigators Miscellaneous Administrative Support

Private household service (403-407)	Private household, cleaning and building services
Protective service (413-427)	Supervisors, Protective Service Firefighting and Fire Prevention Police and Detectives Guards
Food preparation service (433-444)	
Health services (445-447)	
Personal services (448-469)	Cleaning and Building Service Occupations Personal Service
Farming, forestry, fishing (473-499)	Farm Operators and Managers Forestry and Logging Fishers, Hunters, and Trappers
Mechanics and repair (503-549)	Vehicle and Mobile Equipment Mechanics and Repairers Electrical and Electronic Equipment Repairers Miscellaneous Mechanics and Repairers
Construction trade and extractors (553-617)	Supervisors, Construction Construction Trades Extraction
Precision production (633-699)	Precision Metal Working Precision Woodworking Precision Textile, Apparel, and Furnishings Machine Precision Workers, Assorted Materials Precision Food Production Precision Inspectors, Testers, and Related Plant and System Operators
Machine operators (703-799)	Metalworking and Plastic Working Machine Operators Metal and Plastic Processing Machine Operators Woodworking Machine Operators Printing Machine Operators Textile, Apparel, and Furnishings Machine Operators Machine Operators, Assorted Materials Fabricators, Assemblers, and Hand Working Production Inspectors, Testers, Samplers, and Weighers
Transportation (803-859)	Motor Vehicle Operators Rail Transportation Water Transportation Material Moving Equipment Operators
Handlers and helpers (863-889)	Handlers, Equipment Cleaners, Helpers, and Laborers Helpers, Construction and Extractive Occupations Freight, Stock, and Material Handlers

Source: 1980 Occupation Codes. Available at: https://usa.ipums.org/usa/volii/98occup.shtml. Accessed on 9/12/2017.