

# Socio-Economic Status and Occupational Differences in the Experience of Mortality

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## Abstract

It is well recognized that work is a very important part of our everyday lives and that the type of work we do, coupled with our socioeconomic standing in society, can have a large impact on our health. Using data from the Utah Population Database to look at occupational differences in the experience of mortality among women born prior to 1900, I compare mortality and its causes by socioeconomic status, while specifically looking at the prevalence of first causes of death by occupational type. I find there are differences in causes of death and survival rates, by occupation and socioeconomic status.

## INTRODUCTION

Work is a very important part of our everyday lives. In fact, many individuals spend one-half or more of their waking hours in an occupational/work setting. Furthermore, the socioeconomic status we enjoy, and the accompanying quality of life, depends largely on our occupation. Therefore, as work makes up such a dominate portion of our lives, and influences not just our ability to earn income, but also to creating important social networks, it is important to understand how one's occupation and workplace characteristics impacts our lives, and what greater impact is there than individual health and the experience of mortality?

Though much contemporary research has been done to examine workplace characteristics and their impacts on worker health, as well as to explore the link between one's socioeconomic status and individual health and mortality, relatively little is known about these relationships among historical populations. Furthermore, little is know about how the various causes of death differ by occupational type and socioeconomic status among historical populations.

In this research, I use data from the Utah Population Database to look at occupational differences in the experience of mortality among women born prior to 1900. Through making broad categories of the 1980 Census version of occupation and industry, I compare mortality and its causes by occupational type, specifically looking at the prevalence of first causes of death by occupational type, while controlling for such individual factors as LDS

membership, birth year an individual's mother and father's age of death, the number of children, church involvement, and whether the individual has been widowed. I find there are differences in causes of death and survival rates, by occupation and socioeconomic status.

In what follows, I will provide an overview of the relevant literature, followed by a presentation of hypotheses and the data and methods, followed by results and discussion.

## REVIEW OF RELEVANT LITERATURE

First, it is important to understand what scholarly work has already been done to look at the connection between occupation, SES, and mortality. In what follows, I will review the relevant literature that addresses (1) impacts of Job characteristics on worker health, (2) gender differences in the impacts of job characteristics on worker health, (3) the SES/occupational-health link and job characteristics as mediators of SES/occupational-health relationship, and (4) SES/occupational-mortality link and gender differences.

## IMPACTS OF JOB CHARACTERISTICS ON WORKER HEALTH

There is a large body of workplace literature across disciplines that indicate a variety of job quality indicators and workplace characteristics (i.e. job security, pay, worker autonomy, interesting work, etc.) that may have an impact health. The foundation for most research in this field is Karasek's (1979) job strain model. In this model, two key work characteristics—(1) one's job demands and (2) the level of one's decision latitude—combine to determine the

risk of psychological strain and physical illness. If one has high job demands and low decision latitude, the likelihood of illness is high. On the other hand, if either job demands are low or decision latitude is high, there would be less risk for psychological strain and physical illness. However, despite the wide use of Karasek's model in the literature (as well as variations such as the demand-control-support model), empirical evidence for this model is mixed (Totterdell, Wood, and Wall, 2006). Several studies explore worker health difference by gender and occupational type (see Bekker, Croon, and Bressers, 2005; Jamison, Wallace, and Jamison, 2004; Bogart, Vranceanu, and Walt, 2004; Morrison and Payne, 2003; Tsutsumi et al., 2003), while examining job characteristics as mediators of the SES-health relationship (Warren, et al., 2004).

Jamison, Wallace, and Jamison (2004) investigated the impact of contemporary work characteristics on worker stress and overall health and found that occupational status is negatively associated with ill health. Additionally, Bogart, Vranceanu, and Walt (2004) examined the independent and joint effects of occupational status and perceived demands, control, and social support at work on ambulatory systolic blood pressure and heart rate in women and found that occupational status and job characteristics accounted for 18% and 22% of the inter-individual variability in ambulatory systolic blood pressure. Finally, they found that women with both low status occupations and stressful job circumstances are at a disproportionately high risk of cardiovascular illness.

In addition to the research of work conditions and psychological and physical health, another important area of this literature addresses repetitive strain injuries in relation to worker physical health. Cole, Ibrahim, and Shannon (2005) examined the predictors of work-related repetitive strain injuries using data from four waves of the Canadian National Population Survey (CNPS) and found that female gender, some college or university education, job insecurity, high physical exertion levels, and high levels of psychological demands were all positively associated with work-related repetitive strain injuries.

In addition to the direct impacts of work characteristics on worker health, other studies look at the impact work characteristics have on worker health behaviors, which then in turn impact worker health. Tsutsumi et al. (2003) examined the association between job characteristics and health behaviors in Japanese rural workers and found that high psychological demands were associated with heavy

smoking and alcohol consumption, as well as high work-related physical activity. Furthermore, low job control was associated with lower consumption of vegetables, less smoking, and a lower level of work-related physical activity. Additionally, job strain was associated with lower vegetable consumption, less smoking, and greater alcohol consumption.

### **GENDER DIFFERENCES IN THE IMPACTS OF JOB CHARACTERISTICS ON WORKER HEALTH**

Another important aspect of the workplace and health research is a look at potential gender differences in the impacts of particular work characteristics on health. The research on gender differences has produced inconsistent and sometimes contradicting results. Some researchers have found key gender differences in the impact of key variables on ill health (Jamison, Wallace, and Jamison, 2004; Tsutsumi, et al., 2003). For example, Bogart, Vranceanu, and Walt (2004) found that women with both low status occupations and stressful job circumstances are at a disproportionately high risk of cardiovascular illness. Additionally, Cole, Ibrahim, and Shannon (2005) found that female gender was positively associated with work-related repetitive strain injuries.

However, other researchers have had less clear results on the differences between health outcomes by gender. For example, Morrison and Payne (2003) examined the effect of gender on the relationship between work characteristics, job satisfaction, and psychological distress and found that job characteristics have predictable effects on men's health, but not on women's health. Furthermore, Bekker, Croon, and Bressers (2005) investigated the role of childcare involvement, job characteristics, gender, and worker attitudes on emotional exhaustion and sickness absence from work and found that women did not have higher levels of absenteeism and that men had higher levels of emotional exhaustion, linked to having significantly more working hours. Finally, the researchers found that a combination of work load and care load predicted emotional exhaustion and sickness absence from work.

### **THE SES/OCCUPATIONAL-HEALTH LINK AND JOB CHARACTERISTICS AS MEDIATORS OF SES/OCCUPATIONAL-HEALTH RELATIONSHIP**

Additionally, much research has found a persistent link between socioeconomic status and individual health (see Feinstein, 1993; Williams, 1990; Palmer, 1989; Feldman et al, 1989; Kitagawa and Hauser, 1973). Williams (1990)

argues that one's socioeconomic interacts with other factors, such as demographic factors, biomedical factors, and psychosocial factors, which in turn impact health outcomes. Furthermore, in a review of key literature, Feinstein (1993) found that psychosocial factors such as one's educational attainment, access to health care, health practices, social ties, and stress all play an important role in this SES-health link. Additionally, Warren, et al. (2004) examined the mechanisms that link SES and health, focusing in on job characteristics as mediators for this relationship and found that job characteristics explain between 27-44 percent of the association between education and health.

### **SES/OCCUPATIONAL-MORTALITY LINK AND GENDER DIFFERENCES**

Kitagawa and Hauser (1973) find that socioeconomic status had been in the past and continues to be a major determinant of mortality in the U.S. Furthermore, it is consistently acknowledged that females live longer than males (see Erhardt and Berlin, 1974). Additionally, Link and Phelan (1995) explore the social fundamental causes of disease, acknowledging the role that stigmatization, social support, gender, race, and SES all play. They find that SES is important as it grants access to resources, including money, knowledge, power, prestige, and social support.

Once more, Antonovsky (1967), in a review of several early historical epidemiological studies, including an analysis of historical pre-World War II data, found that there were class and occupational differences in both life expectancy rates and also causes of mortality, with a relatively small gap between the high and middle classes as compared to the much larger gap between them and the lowest class. Additionally, he found that individuals in higher-status occupations experienced lower death rates.

Furthermore, similar to the SES-health link explored above, despite much evidence suggesting a similar persistent relationship between SES and mortality, some recent researchers have found that the link is much weaker among women (McDonough et al., 1999). However, McDonough et al. (1999) find that, in direct contrast to men, increasing spousal income decreases women's odds of dying, but that there are little-to-no gender differences in the effect of an individual's own socioeconomic status and their own mortality risk.

### **RESEARCH QUESTION/HYPOTHESES**

The review of relevant literature in the previous section shows the well-documented impact of various occupational

characteristics on worker health and gender differences within those impacts. Additionally, the review above shows the persistent link between SES/Occupation and health and SES/Occupation and mortality, each of which provide a foundation to understanding the key question to be further explored here-in: are there SES/occupational differences the prevalence of first causes of death and in the overall experience of mortality among women born in Utah prior to 1900? To help answer this question, I will test the following hypotheses:

Hypothesis 1: Individuals with more production/labor intensive jobs will have causes of death more closely associated with "external causes" and other labor-related ailments, while individuals with managerial, administrative, and service occupations will have causes of death more closely associated with more natural causes, such as cancer, diabetes, and heart disease.

Hypothesis 2: Individuals with more production/labor intensive jobs will experience shorter life spans, while individuals with managerial, administrative, and service occupations will experience longer life spans. Additionally, housewives will experience longer life spans than women who work outside the home.

Hypothesis 3: Individuals in occupations with higher Nan-Powers score (index of occupation and socioeconomic status) and occupational prestige will experience longer life spans.

### **DATA AND METHODS**

In this research, I use data from the Utah Population Database to look at occupational differences in the experience of mortality among women born prior to 1900. Through making broad categories of the 1980 Census version of occupation and industry, I compare mortality and its causes by occupational type, specifically looking at the prevalence of first causes of death by occupational type, while controlling for such individual factors as LDS membership, birth year an individual's mother and father's age of death, the number of children, church involvement, and whether the individual has been widowed.

### **SAMPLE**

The total number of cases included in this analysis is 36,272 (including individual females born prior to 1900's with a work classification, or a housewife, cause of death, and socioeconomic status link to their death certificate.

**STATISTICAL METHODS USED**

To test the three hypotheses stated in the previous section, I use STATA 9 for all analysis, including descriptive statistics, cross-tabulation, survival curves, and a Cox proportional hazards model.

**KEY VARIABLES AND DESCRIPTIVE STATISTICS**

As can be seen in Table 1 below, I used 10 variables in the primary analysis.

**Figure 1**

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Death Year	36272	1957.99	20.27	1894	2002
Years Lived Past 50	36272	28.85	11.28	1	62
Man Admin/Serv	36272	0.06	0.24	0	1
Prod/Labor	36272	0.01	0.08	0	1
# Child	36272	6.19	3.30	1	22
LDS	36272	0.69	0.46	0	1
Mom Death Age	36272	70.96	15.86	16	108
Dad Death Age	36272	71.84	13.64	19	105
Birth Year	36272	1879.62	15.27	1814	1900
Husband SES	36272	47.43	16.70	3	99

Death Year: This is the year of the individual’s death.

Years Lived Past 50: This is an integer variable and another measure of longevity, which looks at the number of years each individual lived past the age of 50.

Man/Admin/Serv: This is a variable derived from the 1980 U.S. Census Occupational classifications that were applied to occupational descriptions of the respondents in the UPDB. This designation includes all management, administrative, and service industry occupations (occupation codes 0-469).

Prod/Labor: This is another variable derived from the 1980 U.S. Census Occupational classifications that were applied to occupational descriptions of the respondents in the UPDB. This designation includes all production and labor occupations (occupation codes 473-889).

# Children: This is an integer variable of the total number of children the individual had.

LDS: This is a dummy variable for whether or not the individual was a member of the LDS faith.

Mom Death Age: This variable looks at the death age of the individual’s mother.

Dad Death Age: This variable looks at the death age of the individual’s father.

Birth Year: This variable simply indicates the individual’s year of birth.

Husband SES: This variable (NanPowers Score) is a

measure of occupational prestige and socio-economic status.

Additional Variables in Specific Analysis not Included in Descriptive Statistics

Cause of Death Dummy: This is a measure of natural versus external causes of death for each individual—”external causes” and other labor-related ailments (cause of death codes 1, 4, 8, 13, 17, 0), “natural causes” (cause of death codes 2, 3 5, 6, 7, 9, 10, 11, 12, 14, 15).

Homemaker: Homemaker (occupational code 914) was excluded in the Cox Proportional Hazards Model as the comparison group for the other management and labor occupation variables.

**RESULTS**

**HYPOTHESIS 1 RESULTS: CROSS-TABULATIONS**

First, I used simple cross-tabulation to look at the first hypothesis regarding occupational type and cause of death. To restate, the first hypothesis specifically states:

Hypothesis 1: Individuals with more production/labor intensive jobs will have causes of death more closely associated with “external causes” and other labor-related ailments, while individuals with managerial, administrative, and service occupations will have causes of death more closely associated with more natural causes, such as cancer, diabetes, and heart disease.

Table 2 below shows the results of the cross-tabulation of an individual’s cause of death by their occupational type (with occupations grouped into one of three categories—(1) management/administrative/service industry occupations, (2) production/labor occupations, and (3) homemaker).

**Figure 2**

Table 2: Cross-tabulation of Cause of Death Dummy\* by Occupational Type\*\*

Cause of Death	Man/Admin/Serv	Prod/Labor	Homemaker	Total
Natural Causes	1,962 85.3%	222 84.7%	29,417 87.3%	31,601 87.1%
External Causes	337 14.7%	40 15.3%	4,294 12.7%	4,671 12.9%
Total	2,299 100%	262 100%	33,711 100%	36,272 100%

Pearson chi2(2) = 8.4211 Pr = 0.015  
 Likelihood-ratio chi2(2) = 8.1201 Pr = 0.017  
 \*1= "external causes" and other labor-related ailments (cod 1, 4, 8, 13, 17, 0=natural causes (cod codes 2, 3 5, 6, 7, 9, 10, 11, 12, 14, 15)  
 \*\*occupation80 codes 0-469=Man/Admin/Serv, 473-889=Prod/Labor, 914=Homemaker

As can be seen, the significant Pearson chi-squared and likelihood ratio tests (p<.05) indicates that there is a

significant difference between the different occupations and the associated causes of death. While most cases were homemakers (who primarily died of natural causes—only 12.7% due to external causes), there was a slight increase in the prevalence of “external causes” of death when the individual leaves the home to work in a management/administrative/service occupation (14.7% of deaths due to external causes), and another small jump when the individual engages in a production/labor occupation (15.3% of deaths due to external causes). This tentatively supports hypothesis 1.

**HYPOTHESIS 2 RESULTS: SURVIVAL CURVES**

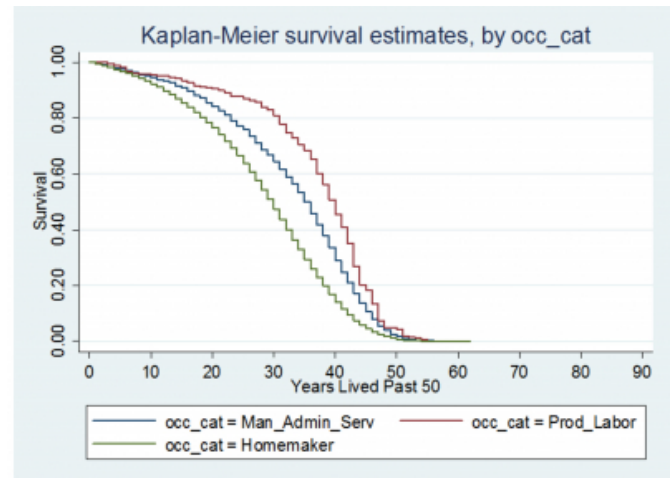
Next, I generated a survival curve to look at the first second hypothesis regarding occupational type and life expectancy. To restate, the second hypothesis specifically states:

Hypothesis 2: Individuals with more production/labor intensive jobs will experience shorter life spans, while individuals with managerial, administrative, and service occupations will experience longer life spans. Additionally, housewives will experience longer life spans than women who work outside the home.

Figure 1 below shows 3 survival curves for each of the three occupational categories outlined previously. One can see that individuals with more production/labor intensive jobs actually experience longer life spans than women in management, administration, or service occupations, while homemakers experience the shortest lifespan (Log-Rank Test  $\chi^2=474.09$ ,  $P<.001$ ). Relate results in the Cox Proportional Hazards model will be discussed further in that section. This finding is at odds with the original hypothesis that those in production/labor occupations would experience a greater risk of mortality than either management/administrative/service jobs or homemakers.

**Figure 3**

Figure 1: Survival Curves, by Occupational Category\*



Log-rank test for equality of survivor functions:

Events Occupational Cat.	Events	
	observed	expected
Man/Admin/Serv	2299	3241.94
Prod/Labor	262	485.76
Homemaker	33711	32544.30
Total	36272	36272.00
$\chi^2(2) =$	474.09	$Pr>\chi^2 = 0.0000$

\*occupation80 codes 0-469=Man/Admin/Serv, 473-889=Prod/Labor, 914=Homemaker

**HYPOTHESIS 3 RESULTS: SURVIVAL CURVES**

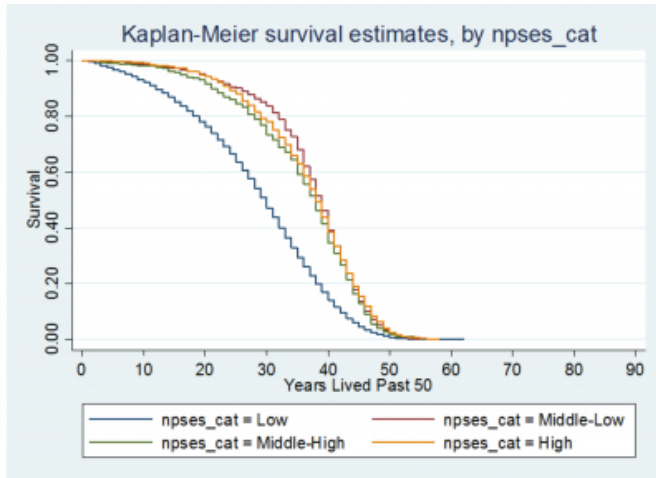
Next, I generated a survival curve to look at the first second hypothesis regarding occupational and socioeconomic status and life expectancy. To restate, the third hypothesis specifically states:

Hypothesis 3: Individuals in occupations with higher Nan-Powers score (index of occupation and socioeconomic status) and occupational prestige will experience longer life spans.

Figures 2 and 3 below show 4 survival curves for four categories of occupational prestige and socio-economic status (low, middle-low, middle-high, and high), for both the women and her husband. Whether looking at a woman’s socioeconomic status or that of her husband, both Figure 2 and Figure 3 show that individuals in occupations with higher Nan-Powers scores are more likely to reach the late 80’s and early 90’s than others (Log-Rank Test  $\chi^2=209.24$ ,  $P<.001$ ). Additionally, there is a clear divide between those with the lowest NanPowers scores and the top three categories, with survival rates of those in the lowest groups plummeting much more quickly after the age of 50. Relate results in the Cox Proportional Hazards model will be discussed further in that section. These results support the initial hypothesis that the greater one’s occupational and socio-economic status, the greater one’s life expectancy.

Figure 4

Figure 2: Survival Curves, by Individual's SES Score Categories\*



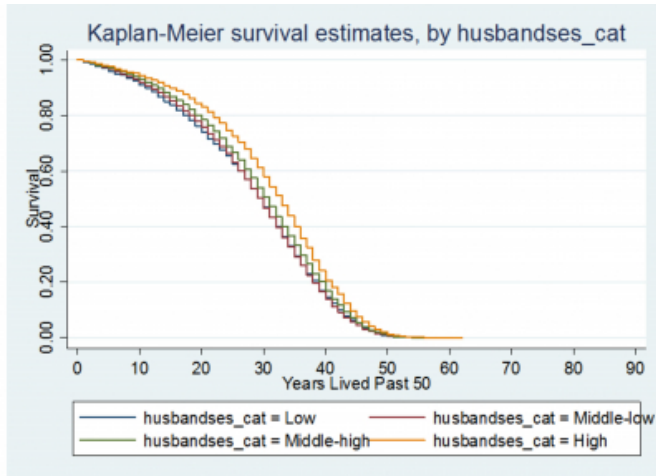
Log-rank test for equality of survivor functions:

NanPowers Score Cat.	Events observed	Events expected
Low	34601	33395.82
Middle-Low	492	868.45
Middle-High	390	633.30
High	789	1374.43
Total	36272	36272.00
chi2(3) =	623.70	Pr>chi2 = 0.0000

\*npses codes 0-25=Low, 26-50=Middle-Low, 51-75=Middle-High, and 76-100=High

Figure 5

Figure 3: Survival Curves, by Husband SES Score Categories



Log-rank test for equality of survivor functions:

NanPowers Score Cat.	Events observed	Events expected
Low	2431	2346.61
Middle-Low	2482	2353.99
Middle-High	598	6267.23
High	3411	4144.16
Total	36272	36272.00
chi2(3) =	209.24	Pr>chi2 = 0.0000

\*husbandses codes 0-25=Low, 26-50=Middle-Low, 51-75=Middle-High, and 76-100=High

**RESULTS: COX PROPORTIONAL HAZARDS MODEL**

Finally, I generated a Cox Proportional Hazards Model to

further look at the second and third hypotheses, controlling for other factors. Table 3 shows the model specifications and results.

Figure 6

Table 3: Cox Proportional Hazards Model

failure_d: dyr (Death year—year of individual's death)				
analysis time t: lvsrnt50 (Years lived past the age of 50—integer)				
Cox regression -- Breslow method for ties				
No. of subjects =	36248	Number of obs =	36272	
No. of failures =	36248	LR chi2(10) =	1696.82	
Time at risk =	1046523	Prob > chi2 =	0.000	
Log likelihood =	-345384.99			
Variable	Haz. Rat.	Std. Err.	z	P> z
Man/Admin/Serv Dum*	0.7542	0.0165	-12.90	0.000
Prod/Labor Dummy**	0.5736	0.0357	-8.94	0.000
# Children	1.0058	0.0018	3.18	0.001
LDS	0.9364	0.0108	-5.86	0.000
Death Age of Mom	0.9967	0.0003	-10.45	0.000
Death Age of Dad	0.9965	0.0004	-9.38	0.000
Birth Year	0.9907	0.0004	-25.29	0.000
Husband's NP Score	0.9977	0.0003	-7.38	0.000

\* occupation80 codes 0-469=Man/Admin/Serv=1, 473-889=Prod/Labor=0, 914=Homemaker=0  
 \*\* occupation80 codes , 473-889=Prod/Labor=1, 0-469=Man/Admin/Serv=0, 914=Homemaker=0

In relation to the second hypothesis, the Cox Proportional Hazards Model in Table 3 (net all control variables) shows that, in relation to the omitted homemaker dummy, individuals in management, administrative, and service occupations have a 25.6% lesser risk of mortality than homemakers (P<.001), while individuals in production and labor occupations have a 42.6% lesser risk of mortality (P<.001). This finding is at odds with the original hypothesis that those in production/labor occupations would experience a greater risk of mortality than either management/administrative/service jobs or homemakers.

In relation to the third hypothesis, the Cox Proportional Hazards Model in Table 3 (net all control variables), shows that an individuals' socio-economic status has a small (.23%, P<.001) protective effect on mortality. This supports the initial hypothesis.

**OTHER INTERESTING FINDINGS**

Though not included in the analysis presented here due to space restrictions, there is a clear shift in the prevalence of homemaker status as one's birth year approaches the 20<sup>th</sup> century, with a much larger percentage of women finding occupations outside of the home (increasing from a mere 4.09% for those born prior to 1990, to 11.82% for those born after 1890). Additionally, the Cox Proportional Hazards Model in Table 3 shows that Birth year has a protective effect, with individuals born in later years living longer (1%, P<.001, while the number of each additional child increases the risk of mortality slightly (0.58%). LDS membership has the biggest protective effect on the risk of mortality, at 6.4%.

**CONCLUSION/DISCUSSION**

It has been argued that work is a very important part of our

everyday lives and that the type of work we do, coupled with our socioeconomic standing in society, can have a large impact on our health. Relevant research has been examined to show that there is a real impact of job characteristics on worker health, that there are gender differences in the impacts of job characteristics on worker health, that there is a clear SES/occupational-health link, with job characteristics as mediators of this SES/occupational-health relationship, and that there is a clear SES/occupational-mortality link and gender differences within this relationship.

Additionally, using data from the Utah Population Database to look at occupational differences in the experience of mortality among women born prior to 1900, I compared mortality and its causes by socioeconomic status, while specifically looking at the prevalence of first causes of death by occupational type, and find that there are significant differences in causes of death and survival rates, by occupation and socioeconomic status.

In support of the first hypothesis, I find that individuals with more production/labor intensive jobs will more commonly have causes of death that are related to "external causes" and other labor-related ailments, while individuals with managerial, administrative, and service occupations will have causes of death more closely associated with more natural causes, such as cancer, diabetes, and heart disease.

However, I also find that individuals with more production/labor intensive jobs actually experience longer life spans than women in management, administration, or service occupations, while homemakers experience the shortest lifespan. This finding is at odds with the original hypothesis, based on the contemporary literature, that those in production/labor occupations would experience a greater risk of mortality than either management/administrative/service jobs or homemakers. Thus, this warrants additional investigation to uncover if this anomaly is merely an artifact of the data, or if there is something unique about the conditions of Utah women born prior to the 1900's that would result in them having a shorter life-expectancy than those who worked outside of the home.

Finally, I find that individuals in occupations with higher occupational prestige are more likely to reach the late 80's and early 90's than others. Additionally, there is a clear divide between those in the lowest category of occupational prestige and those in the top three categories, with survival rates of those in the lowest groups plummeting much more quickly after the age of 50. Once more, controlling for all

other variables, an individuals' socio-economic status has a small overall protective effect on mortality. Thus, the greater the individual's socio-economic status, the longer the individual can expect to live. This finding is in line with the ample contemporary research that has examined the link between SES and mortality.

### **FUTURE RESEARCH**

Future research should examine the surprising finding in relation to the second hypothesis. Additionally, future research can look at these same research questions for both men and women born in the 19<sup>th</sup> and 20<sup>th</sup> centuries to look at the influence of occupation and SES on mortality, as well as any possible historical shifts in these relationships.

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