

Title Page

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Project director and sponsors:

Linda Fredericks PhD, NIOSH

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List of Terms and Abbreviations

NIOSH = National Institute of Occupational Safety and Health

NORA = National Occupational Research Agenda

NCHS = National Center for Health Statistics

NHIS = National Health Interview Survey

SEM = Structural Equation Modeling

Abstract

Race-ethnicity and socio-economic status health disparities in occupational health have not been extensively investigated. Although significantly under-reported, occupational disease and injury, and mortality represent a significant health impact on US workers and their families. However, the risks for this occupational mortality and morbidity are not evenly distributed. It appears that these risks disproportionately affect US workers from race-ethnicity subpopulations and from lower socio-economic class.

The University of Miami Research Group has used their existing Study Database derived from the National Health Interview Survey (NHIS), a representative sample of the entire US civilian workforce, to explore issues of health disparities among US workers based on differences between race-ethnic and socio-economic classes. The augmented NHIS database of a representative sample of over 600,000 US workers allowed the exploration of morbidity and mortality differences between and within occupations by various race ethnic subpopulations and by socio-economic class. Based on their previous work, the Investigators used more sophisticated theoretical models and structural equation modeling to evaluate pathways of occupational risk, and morbidity and mortality between and within occupational subgroups. The use of these models allowed the Investigators to assess the relationship between occupation, indicators of morbidity, and the risk of mortality. In addition, the Investigators propose to use NHIS data and the additional statistical modeling to explore the issue of health disparities among US workers based on different socio-economic and race-ethnicity subpopulations. Finally, in addition to numerous peer reviewed publications, the Investigators produced an additional interactive Monograph on Health Disparities and Occupation in US Workers made available through the expanded Study Website (www.rsmas.miami.edu/groups/niehs/niosh/).

Among other findings, the Investigators published manuscripts on a range of occupational health disparities issues: leisure-time physical activity, risky and healthy behaviors, dental care access, and injury and lung cancer mortality, various cancer screening issues, and second hand smoking in the workplace. The investigators have presented these results extensively at the NIOSH 2006 and 2008 NORA Conferences, APHA annually, and elsewhere. The Research Group also received the NCHS Award for their work on *The NHIS, Health Disparities and US Workers* at the NCHS 50th Anniversary Conference in Washington DC (June 2007);

This study proposal satisfied at least 3 of 7 NORA Coordinated Emphasis Areas designed to augment the Sector Program: Surveillance, Occupational Health Disparities, and Economics (<http://www.cdc.gov/niosh/programs/>).

Highlights/Significant Findings

Since 2002, the other University of Miami Research Team Investigators have created the NHIS Study Database of working adults (≥ 18 years) from the NHIS database and Supplements from 1986-2006, and performed the linkage with Mortality Follow Up through 2002. As described below, the Investigators have been very productive, using the NHIS to address not only the original Specific Aims, but also additional issues relevant to the NHIS database and to the US worker morbidity and mortality experience including issues of health disparities and occupational segregation.

The Research Team Investigators have addressed several methodologic issues including: proxy reporting of health indicators, possible confounding (by age, tobacco and ethanol use), and the healthy worker effect. For example, we created databases of tobacco and ethanol use from various 1986-1996 NHIS Supplements. With tobacco use, we were able to create a "Smoking Use" variable for approximately 31% of the Study Database participants; we have used these data to explore tobacco use in the US workers with several published manuscripts, as well as make these data available to other researchers at the NIOSH NHIS Study Website (www.rsmas.miami.edu/groups/niehs/niosh/). The Investigators have also addressed some aspects of the healthy worker effect by exploring concordance issues for longest held job compared to current job using data from NHIS occupational supplements.

We have explored hypothesis-driven examples of morbidity and mortality of particular occupational subpopulations (i.e., farmers and pesticide applicators). We performed a study of obesity among US workers to demonstrate the use of the old and the redesigned NHIS databases to look at annual trends for US workers from 1986-2002 as well as leisure time activity by subpopulation and occupation. Relevant to the current proposal, with regards to the elderly US worker, we have demonstrated that less than 5% of the US workers 65+ report healthy behaviors (ie. no smoking or risky drinking, and adequate leisure-time physical activity), and that they are more likely to report smoking compared to elderly non workers.

Finally, we have created a Study Website (www.rsmas.miami.edu/groups/niehs/niosh/) to document the work of the NIOSH NHIS Research Team. Links to this website have been established on the CDC NIOSH website. In addition to study documentation and links to published manuscripts, the Study Website also provides Monographs (on Mortality, Morbidity, and Health Disparities) with interactive data for interested researchers to pursue their own analyses of NHIS database concerning the health of US workers.

The investigators have been extremely productive over the past 5 years with 25 published papers in the peer reviewed literature, and 2 submitted (on topics ranging from visual impairment to health insurance among US workers), 3 interactive Monographs on a Study Website, and over 60 presentations at national scientific meetings including receiving a Best Study Award from the NCHS for work on Health Disparities and US Workers using the NHIS Database (June 2007). In addition, the Research Team were invited to present to the NIOSH Intramural Programs on the NORA Coordinated Emphasis Areas of Surveillance and Health Disparities (October 2007), participate in the Advisory Committee of a NIOSH NORA Conference on Health Disparities in April 2008 where the Research Team will also present their research, and have been invited by the NIOSH Surveillance Branch to produce Monographs of Morbidity and Mortality of US workers by NORA Industrial Sector to serve as Baseline Surveillance Data for the new NIOSH NORA Industrial Sector Initiative.

Translation of Findings

Our research has focused on health disparities among US workers, particularly lower socio-economic class and race-ethnic minority groups. We have demonstrated the following issues which are relevant to all US workers and workplaces:

- Obesity is a rapidly increasing health issue among US workers, particularly Black women and Blue Collar workers

- Leisure time physical activity is particularly low among Blue Collar workers
- Tobacco use has fallen substantially among all US workers over the past 2 decades but remains relatively high among Blue collar workers (such as construction) who may be at risk from occupational exposure to other lung carcinogens
- Workers 65 years and older are the most rapidly increasing segment of the US workforce, and they appear to be at increased risk for risky behaviors (such as tobacco use, risky drinking and relatively little leisure time physical activity)
- These elderly workers are increased risk for sensory impairment (poor vision and hearing)
- Poor, minority, blue collar women workers are at greatest risk for reporting increased morbidity
- Occupational segregation actually impacts the self reported health of US workers, even more for White workers than Black workers; self reported health is an important predictor of morbidity and mortality
- US workers, particularly Hispanic workers, have falling medical insurance rates over the past decades as well as poor dental care access
- Among workers with access to healthcare, particularly Hispanic workers are poorly screened for cancer and smoking workers are inadequately counseled around smoking cessation

Since 38% of all US deaths in year 2000 were attributed to smoking, poor diet, physical inactivity, and unhealthy alcohol consumption patterns, these results suggest that employers should be aware of the age, socio-economic and race-ethnic distribution of their workforce, since these worker attributes may be associated with increased health risks in the workplace. Furthermore, preventive health workplace interventions such as smoking cessation or obesity counseling may provide long term benefits to both workers and their employers.

Outcomes/Relevance/Impact

Our research is an example of occupational surveillance research which is essential to the mission and objectives of NIOSH, including the new National Occupation Research Agenda (NORA). Using our national databases, we are able to evaluate occupational injury and morbidity in all US workers, and the occupational/industry and personal behavioral characteristics associated with these injuries, currently and in trends over time. While we are not able to extensively study workplace characteristics which may place older workers at increased risk for illness and injury, we can describe the characteristics of this emerging workforce which will necessitate workplace accommodations (e.g., sensory, musculoskeletal impairments). *Furthermore, our research also directly addresses at least 3 of 7 NORA Coordinated Emphasis Areas designed to augment the Sector Program: Surveillance, Occupational Health Disparities, and Economics* (<http://www.cdc.gov/niosh/programs/>). Finally, it should be noted that the success of workplace health and safety legislation over the past 100 years has lowered morbidity and mortality so dramatically that it is considered to be one of the top ten public health achievements of the 20th century. Because of this success, attributable risk estimates for occupationally implicated cancer deaths are likely close to the lower bound of the previously published attributable risk estimates of 3%-17%. Peto (Nature, 2001) has recently estimated that the removal of known occupational carcinogens would result in only a 0.4% reduction in cancer mortality in the US. In contrast, 38% of all US deaths in year 2000 were attributed to smoking, poor diet, physical inactivity, and unhealthy alcohol consumption patterns. *Thus, further substantial improvements of the health of the US workforce will absolutely require reductions in worker health behavior and risk factor profiles, as well as continued improvements in workplace safety.*

Our research directly informs federal, state, and employer-based policies for minimizing health and safety risks in the workplace. Over the past five years, we have had great success working with the NHIS database to look at the health disparities of the morbidity and mortality of US workers (www.rsmas.miami.edu/groups/niehs/niosh/). Although these data were not collected to examine occupational factors, *we have nevertheless been able to conduct and publish research on occupational safety and health issues applicable to all US workers.* For example, We were able to examine the mortality from lung cancer for all US workers controlling for tobacco use, and thus identify new occupations with an increased risk for lung cancer unrelated to tobacco use and previously unidentified in the literature (Lee et al 2006). Also, our

Interactive Monographs on 1) Morbidity, 2) Mortality, and 3) Health Disparities have been recognized by the NIOSH Intramural Surveillance and Health Disparities Program as important sources of national baseline and trend information for them, and for other policy and research groups in occupational health and safety; and we were invited to participate and present in a NIOSH Conference on Health Disparities in the Workplace to present our data in April 2008; and we are currently providing Monographs of additional occupational surveillance data for the NIOSH intramural Programs to serve as baseline surveillance data for the new NORA Industry Sector Groups.

Our research findings have served to establish important baselines and emerging trends for the entire US worker population as well as specific worker subpopulations. For example, we were the first to demonstrate that US workers were experiencing an epidemic of obesity, particularly among blue collar workers who also reported less leisure time physical activity (Caban Martinez et al 2005; Caban Martinez et al 2007). Because of this research, we were contacted by NBC and People Magazine (who are doing a series on obese Americans) to identify the worker groups at highest obesity risk; based on our research, we identified private household workers, cooks, nurses & aides, and bus/cab drivers for women workers, and law enforcement, bus & truck drivers, and clergy for men workers. With regards to emerging trends, recently we have shown the high numbers of older US workers with visual and/or hearing impairment (38%) with particular increases among Farm operators, Mechanics and repairers, and Motor vehicle operators (Davila et al in press). *Since the NHIS is a nationally representative database, it can provide a unique picture of the health not only of all US workers, but also of specific worker subgroups.* For example, using the NHIS, Fleming et al (2003) and Gomez Marin et al (2004) characterized the morbidity and mortality experience of all US Agricultural workers and Pesticide Applicators finding increased risk of accidental death in both groups, but findings higher morbidity levels in pesticide applicators, but not farmers.

In many of our peer reviewed publications and Monographs, we have examined the potential confounding biases of the underlying health and health behaviors of all US workers. In order to understand and correctly identify occupational health and safety risks of US workers, it is essential to understand the underlying health and health behaviors of these workers. For example, Lee et al (2007) have demonstrated that workers who use tobacco, particularly blue collar workers with lower education, are less likely to report smoking cessation counseling by their physician, even when they have health insurance and have seen a healthcare provider in the past year. *In our research, we have explored new and innovative ways of evaluating the health of US workers.* For example, in a recent publication, we have applied the concept of residential segregation to the workplace by evaluating the possible effects of occupational segregation and its effect on the morbidity of US workers. In addition, we have used the innovative statistical analysis technique, structural equation modeling (SEM), to evaluate the relationship between depression and morbidity in older US workers (Christ et al 2007).

Finally, our data have also been used to evaluate the implementation of public health policy. For example, Arheart et al (in press) have demonstrated the decrease in serum cotinine levels (a marker of tobacco smoke exposure) in non-smoking US workers associated with the growing penetration of workplace smoking bans; however, once again the blue collar workers have lagged significantly behind the professional and more educated workers in experiencing this dramatic decrease in second hand smoke exposure. *Therefore, we believe that our proposal and all of our research to date have and will continue to serve a valuable role in the protection of all US workers.*

Scientific Report. Competing Renewal Specific Aims

Specific Aim 1: Abstract new data from the 1995-2002 NHIS surveys and link with the upcoming Mortality Follow Up through 2001 to augment the current Master Study Database of 1986-1994. These additional data will be used to estimate annual rates and 16 year trends, and perform hypothesis-driven analyses (after adjusting for variables such as age, gender, race/ethnicity, socio-economic status, smoking/ethanol, and geographic region).

Study Database and logistics: During the first 3 years of funding, Dr LeBlanc created a Master Database of all employed adults from the 1986-1994 NHIS surveys as well as the linkage with the 1986-1997 Mortality Followup. Dr LeBlanc created a database of all the NHIS code books, documentation and supplements for the 1986-1994 study period (as well as any relevant documents for the mortality follow up). Dr LeBlanc compiled lists of variable definitions in collaboration with the other Investigators. He assists in the continual updating of the Study Website in terms of the appropriate postings of this information. The appropriate hardware and software to accomplish these activities have also been obtained and maintained.

Since then, Dr Blanc has augmented the current Study Database of NHIS participant adult workers from 1986-1994 with mortality follow up through 1997. The NCHS has additional data to include a mortality follow up through 2002 of all NHIS participants from 1986-2000. This mortality linkage has been completed by the NCHS, but the NCHS announced at the 2004 Data Users' Conference in July 2004 that these new data will no longer be directly released to investigators (resulting from apparent confidentiality concerns). Rather, the mortality analyses using the new linkage can only be completed through the NCHS Research Data Center (RDC). Our application for accessing these data was approved by the RDC, and we have been working successfully with the RDC to complete these new mortality analyses including having installed 2 computers dedicated to our studies at the RDC.

This new data access issue has several implications for our current Competitive Renewal Study. First, we now need to submit to the RDC the exact program language to perform the statistical analyses of interest; the RDC then gives us back the tabular results, but not the individual level data. Therefore, as we anticipated, this requires increased "front end" time planning our analyses by us and our Statistical Consultant colleagues. We have purchased and installed with appropriate software a dedicated NIOSH NHIS PC to the RDC to perform our analysis to hopefully increase the timeliness of data processing. Dr LeBlanc has also created a randomized anonymous dataset based on the NHIS database on which to test statistical analysis programs prior to sending to the RDC. Based on his work and our discussions with the NCHS, the NCHS has created a perturbed mortality database which is available on the internet for use by all investigators for initial analyses of mortality; once the analysis is complete using the perturbed data, the researchers then submit to the same analysis to the RDC to finalize the results with the real NHIS data. Finally, the investigators are involved in ongoing discussions with both RDC and NCHS personnel giving feedback concerning the impact of this new data analysis process.

Of note, this new NCHS policy affects the Mortality analyses we proposed, but NOT the Morbidity analyses ongoing in our Competitive Renewal Proposal although the NCHS is now restricting other data to the RDC (e.g. specific occupational coding after 1997). The data from the Morbidity analyses are publicly available data and we have already augmented our existing Study Database with all available NHIS morbidity and other data through 2006, and to perform the analyses by ourselves. We anticipate adding the 2007 NHIS data after its release sometime during the fall of 2008 as well as a new additional mortality follow up linkage with NDI.

Specific Aim 2: Evaluate the direct and indirect associations and differences between morbidity and mortality both between and within occupations using the NHIS data from 1986-1996 and 1997-2002 with the linked mortality follow up through 2001. The additional data will increase the sample size within the occupational subgroups, allowing for more detailed analyses of possible health disparities between race-ethnicity and socio-economic status subgroups

Data Analyses: We have used the expanded dataset to look at a range of behavioral, morbidity and mortality issues by occupation, age, gender, race-ethnic group, and education. We have published manuscripts on a range of occupational health disparities issues: leisure-time physical activity, risky and healthy behaviors, dental care access, and injury and lung cancer mortality, various cancer screening issues, and second hand smoking in the workplace; we have submitted a paper on medical insurance. We have also presented extensively at the NIOSH 2006 and 2008 NORA Conferences, APHA annually, and elsewhere.

Dr Katherine Chung joined our Research Group in 2006. In addition to health disparities, with a small NIOSH Minority Research Supplement, Dr Chung was interested in occupational segregation and its effect on the

morbidity and mortality of US workers and their families. Dr Chung was also being mentored by Dr Carles Muntaner, an expert in social epidemiology from the University of Maryland. Initial analyses have demonstrated that African American occupational segregation indexes were associated with self rated health, and this association may vary based on the race of the individual US worker. After taking other available socioeconomic factors into account, as occupational segregation increased, the likelihood that the minority worker will report fair or poor health increased significantly. Therefore, there is a need to examine the relationship between occupational segregation, and morbidity and mortality outcomes present in older minority workers. A paper on occupational segregation and self rated health has been accepted for publication in Am J Ind Medicine; we are currently working on an analysis of mortality and occupational segregation. Unfortunately after receiving a NIOSH K Award to pursue this research, Dr Chung decided in 2007 to return to her clinical medical practice and she stopped her NIOSH K Award; we hope to continue to collaborating with her in the future.

We have been collaborating with Dr Ken Ferraro (Purdue University) and Ms Sharon Christ (Odum Institute of UNC Chapel Hill) to apply structural equation modeling (SEM) to investigate the connection between occupation, a range of socio-economic variables, morbidity and mortality for US workers. As a first step in assessing the new modeling capabilities of the Mplus statistical package, in a complex sample survey environment, we examined associations between morbidity and depressive symptoms (modeled as latent variables) in older workers and non-workers 65 years of age and older in a simplified model. As expected, we found that older workers had less morbidity relative to non-working older people (as evidenced by the negative path coefficients for the four employment categories). These negative associations confirmed the existence of the healthy worker effect, commonly noted in younger worker populations. It is interesting to note, however, that the strength of these inverse associations did vary across occupational category, and were weakest in farm workers (-0.24) and strongest in white collar workers (-0.40), providing some indirect evidence of the effects of occupational prestige. The model also showed no strong association between working and depressive symptomatology, suggesting that with respect to this important health outcome, among older workers, working does not pose a risk nor does it appear to be protective. We have the opportunity to add other pathways to the model to determine if alternative models provide a better 'fit' to the data. For example, models which do and do not include a path between occupation and health behaviors (e.g., smoking status, exercise) can be compared to help assess whether these behaviors are also important correlates of depressive symptoms. This work was published in Gerontology: Social Sciences; additional analyses to evaluate the relationship with mortality are planned. Furthermore, Dr Lee and Ms Christ have successfully applied a 12-month time interval to the NHIS data in order to model associations between visual impairment and mortality in adults which has been accepted for publication in Archives Ophthalmology.

Specific Aim 3. Create an interactive Monograph on Health Disparities and Occupation in US Workers that will be made available through our Study Website (www.rsmas.miami.edu/groups/niehs/niosh/) and expand the documentation and links of this Study Website for outreach and education purposes.

With regards to the Monograph on Health Disparities, we evaluated: Self reported health endpoints (Hypertension, Cardiac, Stroke, Emphysema, Asthma, Cancer, and Diabetes) and 3 health status (work days, bed days, health) by total, gender, age (18-64, 65+), education (3), race (3), ethnicity (2), insurance (2 y/n) for each occupation by n (%) overall annual prevalence and trends over the 7 year period. The Health Disparities Monograph has been made available through our Study Website (www.rsmas.miami.edu/groups/niehs/niosh/) in both pdf and interactive excel spreadsheets.

Therefore, after receiving the competing renewal funds in September 2005, the Investigators have addressed all of the projected activities as per the Competitive Renewal Time Line and have been highly productive.

Publications

1. Fleming LE, Gómez-Marín O, Zheng D, Ma F, Lee D. **National Health Interview Survey (NHIS) Mortality among US Farmers and Pesticide Applicators.** Am J Ind Med, 2003;43(2):227-233.
2. Lee DJ, LeBlanc W, Fleming LE, Gómez-Marín O, Pitman T. **Trends in US Smoking Rates in Occupational Groups: The National Health Interview Survey 1987-1994.** J Occ Env Med 2004;46:538-548.
3. Lee D, Fleming L, Gomez O, Leblanc W. **Risk of Hospitalization among Firefighters: The National Health Interview Survey 1986-1994.** Am J Pub Health 2004;94:1938-39.
4. Gómez-Marín O, Fleming LE, Lee DJ, LeBlanc W, Zheng D, Ma F, Jane D, Pitman T, Caban A. **Acute and Chronic Disability among US Farmers and Pesticide Applicators: The National Health Interview Survey (NHIS).** J Agricultural Safety Health 2004;10:285-293
5. Gómez-Marín O, Fleming LE, Caban A, LeBlanc W, Lee D, Pitman T. **Longest Held Job in US Occupational Groups: The National Health Interview Survey.** J Occ Env Med 2005;47:79-90.
6. Caban A, Fleming LE, Lee D, Gómez-Marín O, LeBlanc W, Pitman T. **Obesity in U.S. Workers: The National Health Interview Survey 1986 – 2002** Am J Public Health 2005;95:1614-1622.
7. Lee DJ, Fleming LE, Gomez Marin O, LeBlanc W, Arheart K, Chung-Bridges K, Christ SL, Pitman T, Caban A. **Morbidity ranking of US workers employed in 206 occupations: The National Health Interview Survey (NHIS) 1986-1994.** JOEM 2006;48:117-134.
8. Lee DJ, Fleming LE, LeBlanc WG, Arheart KL, Chung Bridges K, Christ SL, Caban AJ, Pitman T. **Occupation and Lung Cancer Mortality in a Nationally Representative US Cohort: The National Health Interview Survey (NHIS).** JOEM 2006;48:823-32.
9. Lee DJ, Fleming LE, Arheart KL, LeBlanc WG, Caban AJ, Chung Bridges K, Christ SL, McCollister K, Pitman J. **Smoking rate trends in US occupational groups: The 1987-2004 National Health Interview Survey (NHIS).** JOEM 2007;49(1):75-81.
10. Fleming LE, Lee DJ, Caban AJ, LeBlanc WG, Bridges Chung K, Christ SL, Arheart KL, McCollister K, Pitman T. **The Health Behaviors of the Older US Worker: The National Health Interview Survey.** Am J Ind Med 2007;50(6):427-437.
11. Caban-Martinez AJ, Lee DJ, Fleming LE, LeBlanc WG, Gomez-Marin O, Chung-Bridges K, Christ SL, Arheart K, Pitman T. **Leisure-time physical activity levels of the US workforce.** Prev Med May 2007; 44(5):432-6.
12. Caban-Martinez AJ, Lee DJ, Fleming LE, LeBlanc WG, Arheart KL, Chung-Bridges K, Christ K, Pitman T. **Dental care access and unmet dental needs of US workers: The National Health Interview Survey 1997 to 2003.** J American Dental Association 2007;138(2):227-230.
13. Christ SL, Lee D, Fleming LE, LeBlanc WG, Arheart K, Chung-Bridges K, Caban A, McCollister KE. **Employment and Occupation effects on depressive symptoms in older Americans: does working past age 65 protect against depression?** J Gerontology: Social Sciences 2007;62(6):S399-403.
14. Lee D, Fleming LE, Christ SL, Arheart K, Chung-Bridges K, LeBlanc W, McCollister K, Caban A, Pitman T. **Healthcare provider smoking cessation advice among US worker groups.** Tobacco Control 2007;16:325-328.
15. Chung Bridges K, Fleming LE. **WHO/ILO Employment Conditions Knowledge Network: United States.** In: **Employment Conditions and Health Inequalities for the WHO/ILO.** Benach J, Muntaner C, Santana V, Editors. Employment Conditions and Knowledge Network, <http://www.emconet.org/EMCONETREPORT.pdf> 2007
16. LeBlanc WG, Vidal L, Kirsner RS, Lee DJ, Caban Martinez AJ, McCollister KE, Arheart KL, Chung Bridges K, Christ S, Clark J, Lewis J, Davila EP, Rouhani P, Fleming LE. **Reported Skin Cancer Screening of US Adult Workers.** Journal American Academy of Dermatology 2008;59:55-63.

17. Arheart KL, Lee DJ, Dietz NA, Wilkinson JD, Clark JD, LeBlanc WG, Serdar B, Fleming LE. **Declining Trends in Serum Cotinine Levels in US Worker Groups: The Power of Policy.** JOEM 2008;50(1):57-63.
 18. Clark JD, Wilkinson JD, LeBlanc WG, Diets NA, Arheart KL, *Fleming LE*, Lee DJ. **Inflammatory markers and secondhand tobacco smoke exposure among US workers.** Am J Ind Med in press.
 19. Lam BL, Christ SL, Lee DL, Zheng DD, Arheart KL. **Reported Visual Impairment and Risk of Suicide: The 1986-1996 National Health Interview Survey.** Archives Ophthalmology in press.
 20. Fleming LE, Levis S, LeBlanc WG, Dietz NA, Arheart KL, Wilkinson JD, Clark J, Serdar B, Davila EP, Lee DJ. **Earlier Age at Menopause, Work and Tobacco Smoke Exposure Menopause in press.**
 21. Christ SL, Lee DJ, Lam BL, Zheng DD, Arheart KL. **Assessment of the effect of visual impairment on mortality through multiple health pathways using structural equation modeling.** Invasive Ophthalmology & Visual Science in press.
 22. Vidal L, LeBlanc WG, McCollister KE, Arheart KL, Chung Bridges K, Christ S, Caban Martinez AJ, Lewis J, Lee DJ, Clark J, Davila E, Fleming LE. **Cancer Screening in US Workers.** Am J Pub Health in press
 23. Chung-Bridges K, Muntaner C, Fleming LE, Lee D, Arheart KL, LeBlanc WG, Caban Martinez A, Christ SL, McCollister KE, Pitman T. **Poor health for all: occupational segregation by race and worker health disparities.** Am J Ind Medicine. in press
 24. Arheart KL, Lee DJ, Fleming LE, LeBlanc WG, Dietz NA, McCollister KE, Wilkinson JD, Lewis JE, Clark JD, Davila E, Bandiera FC. **Accuracy of self-reported smoking and secondhand smoke exposure in the US workforce: the National Health and Nutrition Examination Surveys.** JOEM in press
 25. Davila EP, Caban Martinez AJ, Muennig P, Lee DJ, Fleming LE, Ferraro KF, LeBlanc WG, Lam BL, Arheart KL, McCollister KE, Zheng D, Christ SL. **Sensory impairment in older US workers.** APHA in press
- Fleming LE, Pitman T, LeBlanc W, Lee D, Gómez-Marín O. **Interactive Monograph of Occupation, Disability, and Self-reported Health in the National Health Interview Survey (1986-1994)** available at Study Website (www.rsmas.miami.edu/groups/niehs/niosh/).
 - Fleming LE, Pitman T, LeBlanc W, Lee D, Caban A, Gómez-Marín O **Interactive Monograph of Occupation and Mortality in the National Health Interview Survey (1986-1994)** available at Study Website (www.rsmas.miami.edu/groups/niehs/niosh/).
 - Fleming LE, Pitman T, LeBlanc W, Lee D, Caban A, Chung Bridges K, Christ SL, Arheart K, McCollister K, Ferraro K. **Interactive Monograph of Occupation and Health Disparities in the National Health Interview Survey (1997-2004)** available at Study Website (www.rsmas.miami.edu/groups/niehs/niosh/).
 - **Study Website:** <http://www.rsmas.miami.edu/groups/niehs/niosh/>.

Targeted/Planned Enrollment Table

This report format should NOT be used for data collection from study participants.

Study Title: 1986-1994 NHIS All Employed Adults

Total Planned

Enrollment:

TARGETED/PLANNED ENROLLMENT: Number of Subjects			
Ethnic Category	Sex/Gender		
	Females	Males	Total
Hispanic or Latino	14,336	19,142	33,478
Not Hispanic or Latino	196,000	222,419	418,419
Ethnic Category: Total of All Subjects *	210,336	241,561	451,857
Racial Categories			
American Indian/Alaska Native	1,477	1,726	3,203
Asian	5,664	6,234	11,898
Other	3,286	4,757	8,043
Black or African American	29,866	24,595	54,461
White	170,043	204,249	374,292
Racial Categories: Total of All Subjects *	210,336	241,561	451,897

* The "Ethnic Category: Total of All Subjects" must be equal to the "Racial Categories: Total of All Subjects."

Updated Targeted/Planned Enrollment Table

This report format should NOT be used for data collection from study participants.

Study Title: 1997-2005 NHIS All Employed Adults

Total Planned

Enrollment:

TARGETED/PLANNED ENROLLMENT: Number of Subjects			
Ethnic Category	Sex/Gender		
	Females	Males	Total
Hispanic or Latino	13,382	15,642	29,024
Not Hispanic or Latino	72,988	69,065	142,053
Ethnic Category: Total of All Subjects *	86,370	84,707	171,077
Racial Categories			
American Indian/Alaska Native	543	533	1,076
Asian	2,058	2,264	4,322
Other	4,259	4,879	9,138
Black or African American	13,516	9,170	22,686
White	65,994	67,861	133,855
Racial Categories: Total of All Subjects *	86,370	84,707	171,077

* The "Ethnic Category: Total of All Subjects" must be equal to the "Racial Categories: Total of All Subjects."