A. COVER PAGE

Project Title: Mortality from Chronic Illnesses in Poultry and Non-Poultry Workers - Resubmission	
Grant Number: 5R03OH012121-02	**Project/Grant Period:** 09/30/2021 - 09/29/2023
Reporting Period: 09/30/2022 - 09/29/2023	**Requested Budget Period:** 09/30/2022 - 09/29/2023
Report Term Frequency: Final	**Date Submitted:** 03/05/2024
Program Director/Principal Investigator Information: BENJAMIN C AMICK , PHD BS **Phone Number:** 501-526-4620 **Email:** bcamick@uams.edu	**Recipient Organization:** UNIV OF ARKANSAS FOR MED SCIS UNIVERSITY OF ARKANSAS Medical Sciences 4301 W MARKHAM ST, Slot 812 LITTLE ROCK, AR 722057101 **DUNS:** 122452563 **UEI:** VDFYLZPJEAV6 **EIN:** 1716046242A1 **RECIPIENT ID:**
Change of Contact PD/PI: NA	
Administrative Official: SUZANNE ALSTADT 4301 W MARKHAM ST SLOT 812 BIO-MED BLDG 1 STE 102 LITTLE ROCK, AR 722057101 **Phone number:** 501-686-5502 **Email:** sealstadt@uams.edu	**Signing Official:** SUZANNE ALSTADT 4301 W MARKHAM ST SLOT 812 BIO-MED BLDG 1 STE 102 LITTLE ROCK, AR 722057101 **Phone number:** 501-686-5502 **Email:** sealstadt@uams.edu
Human Subjects: NA	**Vertebrate Animals:** NA
hESC: No	**Inventions/Patents:** No

B. ACCOMPLISHMENTS

B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

Specific Aim 1: Identify new deaths of a) non-malignant deaths such as
cardiovascular diseases, neurological diseases, psychiatric disorders and b)
malignant deaths in workers in poultry and non-poultry industries. We have merged and managed files obtained from the National Death Index. These files have information on all causes of deaths occurred in our cohorts until December 31, 2018. Aim 1 is completed. The process was delayed with the changing of PIs and ambiguity in the data linkage. This has now been validated. Following IRB approval we updated the cohort numbers replicating prior analyses as a quality check.
2. Specific Aim 2: Calculate Standardized Mortality Ratios (SMRs) and Proportionate Mortality Ratios (PMR) for deaths of non-malignant and malignant illnesses occurred from 1950 (start of the follow up) to the end of 2018. We determined analyses could be done in either R or STATA. We have completed multiple analyses. The challenge has been identifying comparison numbers to calculate expected deaths. The challenge is having numbers back in the 1950s and 1960s. We had to redo calculations. We have become a little humble about the data. But our numbers are clear and accurate..

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File Uploaded : Poultry final report for NIOSH flat.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

For this reporting period, is there one or more Revision/Supplement associated with this award for which reporting is required?

No

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File Uploaded : Final NIOSH Grant Training flat.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Not Applicable

Final Project Report

Key Contributors: Jaimi Allen, Ben Amick, Mark Ball

The project has resulted in two products: an abstract and a poster presentation at Student Research Day using only the data from Arkansas. This poster was submitted and accepted through a peer review process. The student leading the effort was Mark Ball. Mark is an MPH epidemiology student. Then we conducted a cohort-wide evaluation in preparation for a manuscript submission. As the abstract just below shows we have now finalized all analyses and are writing the paper for submission.

Cohort-wide abstract for manuscript in preparation for submission to AJIM with Post Doc Jaimi Allen as lead author

Increased Mortality Rates Among Poultry and Non-Poultry Factory Workers Compared to National Mortality Rates: A Cohort Study of United States Union Members from 1950 to 2020.

Objective: To study the association between factory-related exposures and cause-specific mortality rates among poultry and non-poultry factory workers. A priori hypothesis that an increased rate of malignancy-related deaths among poultry factory workers due to prolonged exposures associated with the occupational environment, such as zoonotic viruses and fumes released from plastic-wrapping machines.

Study design: Cohort study. 46,816 participants enrolled in a union and employed in factory settings between 1950 and 2010 were recruited across 15 states. Follow-up of 30,411 poultry factory workers and 16,405 non-poultry factory workers began in 1950 and ended in 2020.

Methods: Standardized mortality ratios (SMR) and proportionate mortality ratios (PMR) were calculated using cause-specific mortality rates of poultry and non-poultry factory workers compared to national death rates retrieved from the Center for Disease Control and Prevention’s National Center for Health Statistics database.

Results: All-cause mortality of cohort participants was significantly elevated (SMR 37.43; 95% confidence interval (CI) 36.89 – 37.98). Analysis of proportional mortality revealed neoplasms (PMR 25.64) and diseases of the circulatory system (PMR 32.75) were the leading causes of death among all cohort members.

Conclusions: Deaths among poultry and non-poultry factory workers between 1950 and 2020 were significantly greater than national mortality rates. Additional analysis will investigate cause-specific mortality rates of poultry and non-poultry factory workers compared to state mortality rates reported in the University of Pittsburgh Mortality Information and Research Analytics (MOIRA) database to calculate SMRs and PMRs adjusted for age, race, sex, cause of death, and decade of follow-up.

Poster Abstract for Arkansas Cohort presentation at Student Research day March 5th 2024 by Mark Ball a UAMS MPH student

Objective: To study the association between factory-related exposures and cause-specific mortality rates among Arkansas poultry factory workers. A priori hypothesis that there is an increased rate of malignancy-related deaths among poultry factory workers due to prolonged exposures associated with the occupational environment, such as zoonotic viruses and fumes released from plastic-wrapping machines.

Study design: Cohort study. 13,747 participants enrolled in a union and employed in factory settings between 1972 and 2017 were recruited from various poultry factories in Arkansas.

Methods: All-cause, malignant, and non-malignant mortality rates from the cohort were compared to state mortality rates reported in the University of Pittsburgh Mortality Information and Research Analytics (MOIRA) database to calculate standardized mortality ratios (SMR). SMRs were adjusted for age, race, sex, cause of death, and decade of follow-up.

Results: All-cause unadjusted SMRs were generally close to 1.0, malignant unadjusted SMRs were generally less than 1.0, and non-malignant SMRs were generally slightly greater than 1.0. All-cause and malignant SMRs adjusted for age,

race, and sex showed no significant trend across all time periods. Non-malignant adjusted SMRs were slightly increased across all time periods.

Conclusions: Cancer deaths among Arkansas poultry factory workers were not systematically greater than expected cancer deaths in Arkansas. Elevated non-malignant SMRs indicate that non-malignant diseases or external causes of death likely account for many deaths observed in the cohort. Preliminary analysis has revealed that diseases of the circulatory and respiratory systems were greatly increased among cohort members and will be further investigated in future studies.

Future Work

We have had discussions about future work but at this point the effort would need to focus on newer workers who tend to be more recent immigrants. This is a very hard to reach population. The work would also need to focus on risk factors and exposures in workplaces. We don't have the researchers to do exposure modelling.

B.2 (Poultry final report for NIOSH flat.pdf)

Final Grant Training

This grant supported a post-doctoral fellow, Jaimi 'Mimi' Allen who has been working as a new cancer researcher at UAMS in the College of Public Health. Her fellowship is over. She is transitioning to a faculty position at UAMS. Dr. Amick is her mentor and worked one-on-one with her. She has developed skills n STATA and in occupational epidemiology methods needed to complete the analyses.

Dr. Allen then mentored Mr. Ball. He completed a sub-analysis and had to learn occupational epidemiology methods and data management in R software.

Both Dr. Allen and Mr. Ball grew up in rural Arkansas in relatively poor areas. We consider these two persons skills development as a great use of Federal dollars.

C. PRODUCTS

C.1 PUBLICATIONS

Are there publications or manuscripts accepted for publication in a journal or other publication (e.g., book, one-time publication, monograph) during the reporting period resulting directly from this award?

No

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

NOTHING TO REPORT

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Have inventions, patent applications and/or licenses resulted from the award during the reporting period? No

If yes, has this information been previously provided to the PHS or to the official responsible for patent matters at the grantee organization? No

C.5 OTHER PRODUCTS AND RESOURCE SHARING

NOTHING TO REPORT

D. PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Country	SS
BAMICK	Y	AMICK, Benjamin C	BS,PHD	PD/PI	0.8	0.0	0.0			NA

Glossary of acronyms:
S/K - Senior/Key
Cal - Person Months (Calendar)
Aca - Person Months (Academic)
Sum - Person Months (Summer)
Foreign Org - Foreign Organization Affiliation
SS - Supplement Support
RS - Reentry Supplement
DS - Diversity Supplement
OT - Other
NA - Not Applicable

D.2 PERSONNEL UPDATES

D.2.a Level of Effort

Not Applicable

D.2.b New Senior/Key Personnel

Not Applicable

D.2.c Changes in Other Support

Not Applicable

D.2.d New Other Significant Contributors

Not Applicable

D.2.e Multi-PI (MPI) Leadership Plan

Not Applicable

E. IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

NOTHING TO REPORT

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

Not Applicable

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

NOTHING TO REPORT

G. SPECIAL REPORTING REQUIREMENTS SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

NOTHING TO REPORT

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS

G.4.a Does the project involve human subjects?

Not Applicable

G.4.b Inclusion Enrollment Data

NOTHING TO REPORT

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

NOT APPLICABLE

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT
No foreign component
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

I. OUTCOMES

I.1 What were the outcomes of the award?

There are two outcomes.

1. An abstract and poster prepared by a student, Mark Ball, being presented at Student Research Day, March 5 2024
2. A manuscript being led by Dr. Allen, still being finalized to be submitted to AJIM.