

**ALPHA FOUNDATION FOR THE IMPROVEMENT OF MINE SAFETY AND  
HEALTH**

**Final Technical Report**

Grant Number and Title: AFCTG20-98 "Rheumatoid Arthritis in Hard Rock Underground Miners"

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## 1. Executive Summary

“Rheumatoid Arthritis in Hard Rock Underground Miners” had the overarching objective of addressing the important knowledge gaps concerning the magnitude of and risk factors for arthritis in hard rock miners in the Western United States to better inform occupational health practice and policy. Its specific aims built directly on the findings from our Alpha Foundation supported studies of arthritis risk attributable to coal mining work in Appalachia. Specific Study Aims were to estimate the prevalence of rheumatoid arthritis (RA) among hard rock miners in the sample population and secondly, to quantify the relative risk of arthritis associated with such mining, taking into account of mining activities (including coal and quarrying) and other sources of silica (such as construction sand blasting and foundry work). Our underlying research hypotheses, consistent with our previous findings for Appalachian coal miners, were that that hard rock mining also is associated with increased risk of degenerative arthritis but even more strongly associated with increased risk of RA.

We carried out a cross-sectional, random-digit dial (RDD) population-based telephone survey conducted between February and May 2021. The RDD survey was conducted by Davis Research (Calabasas, CA) and included both landline and cellular phones, targeting exchanges likely to be in counties in parts of Utah, New Mexico, and Colorado with historically high silicosis mortality rates. The 26 counties included in the study were adjacent to each other. We limited eligibility for survey participation to men aged 50 and over who spoke English or Spanish and had a history of any past or current labor force participation. A total of 2,000 responded to the survey (11% of contacts made; 25% of contacts excluding the 10,413 known to be ineligible). Our target final number was based on our previous experience surveying coal miners in Appalachia.

Study interviews averaged 18 minutes in length and contained items addressing employment, smoking history, sociodemographics, and arthritis and related diagnoses. The survey ascertained duration and type of mining experience, along with exposure to inhaled dusts in non-coal mining jobs. The health sections queried whether the respondent had ever received a diagnosis from a health professional of arthritis of any kind, with follow-up items specifying rheumatoid arthritis, psoriatic arthritis, or gout. The survey also elicited diagnoses of other autoimmune conditions, including systemic lupus erythematosus, psoriatic arthritis, and systemic sclerosis. Interviewers asked about joint swelling, stiffness, or pain, regardless of reported diagnoses. Finally, the survey included a series of questions about immunosuppressive medications used to treat arthritis. Using multivariable logistic regression analyses, we modeled the risk of RA (defined by glucocorticoid use or specific arthritis drugs) as well as non-RA arthritis associated with underground hard rock, underground coal mining, surface mining and other non-mining silica exposure in comparison to the unexposed group.

The final analytic sample was 1,988. Any underground hard rock mining exposure was reported by 118 (5.9%); underground soft rock (no hard rock) by 62 (3.1%); surface mine work with no underground exposure, 262 (13.2%); silica exposure from non-mining sources only, 348 (17.5%); and no mining or silica exposure, 1198 (60.3%). There were 89 who reported a diagnosis of RA with corticosteroids treatment and 80 with RA drug and treatment. For RA defined by corticosteroid use, there was a greater than 3-fold increased odds of disease associated with underground hard rock mining (odds ratio [OR], 3.21 [95% CI, 1.45-7.10]). Using a definition of disease requiring arthritis drug treatment, the point estimate of the odds of RA was lower (OR, 1.91 [95% CI, 0.71-5.12]).

## 2. Problem Statement and Objective

Our study “Rheumatoid Arthritis in Hard Rock Underground Miners” was solicited and awarded in follow-up to our successful studies of arthritis risk in associated with coal mining in Appalachia. We hypothesized that hard rock underground mining would be associated with increased RA risk. Based on our previous Alpha Foundation supported research, we also anticipated that coal mining and other occupational sources of silica exposure in the study population would also be associated with increased arthritis risk. Our research objective was to study this question, performing a population-based survey of persons living in counties in Colorado, New Mexico, and Utah with mining activity and high rates of silicosis-related mortality. Our study objectives were: 1) To estimate the prevalence of RA among hard rock miners in the sample population. 2) To quantify the relative risk of arthritis associated with such mining, taking into account of mining activities (including coal and quarrying) and other sources of silica (such as construction sand blasting and foundry work).

Respirable silica exposure has been strongly and consistently associated with rheumatoid arthritis (RA) across a variety of occupations.<sup>1,2</sup> Examples of at-risk jobs include foundry work, construction trades, and stone crushing and drilling. We previously observed that underground coal miners from the Appalachian region of the Eastern US had 3-fold or greater odds of RA.<sup>3,4</sup> This risk is presumably due to silica co-exposure from underground coal extraction in which silica-laden dust from beyond the coal seam routinely contaminates the workers’ breathing zones.<sup>5</sup> Coal mining, especially in Great Britain, has long been recognized as a risk factor for RA, often referred to as Caplan syndrome in that context.<sup>6</sup> Beyond coal, underground metal and other hard rock mining also is an important source of silica exposure.<sup>7,8</sup> Despite this exposure, RA risk in hard rock mining has received scant attention by researchers, clinicians, and policy makers. A single 1995 mortality study of South Dakota gold miners<sup>9</sup> identified an increased risk of overall arthritis-related mortality but did not consider RA specifically. A study of RA in South African gold miners was published in the 1980s,<sup>10</sup> whereas a 1979 letter to the editor reported the prevalence of RA among silicotic metal miners from Quebec.<sup>11</sup> These studies appear to constitute the entire published literature on hard rock mining risk for RA.

## 3. Research Approach

Data for this study derive from a cross-sectional, random-digit dial (RDD) population-based telephone survey conducted between February and May 2021. The RDD survey was conducted by Davis Research (Calabasas, CA) and adhered to the guidelines of the American Association for Public Opinion Research. The RDD sample included both landline and cellular phones, targeting exchanges likely to be in counties in parts of Utah, New Mexico, and Colorado with historically high silicosis mortality rates. We identified the targeted areas using data from the National Institute for Occupational Safety and Health (NIOSH).<sup>12</sup> Although not selected on the basis of being geographically contiguous, the 26 counties included in the study were adjacent to each other, as shown below.

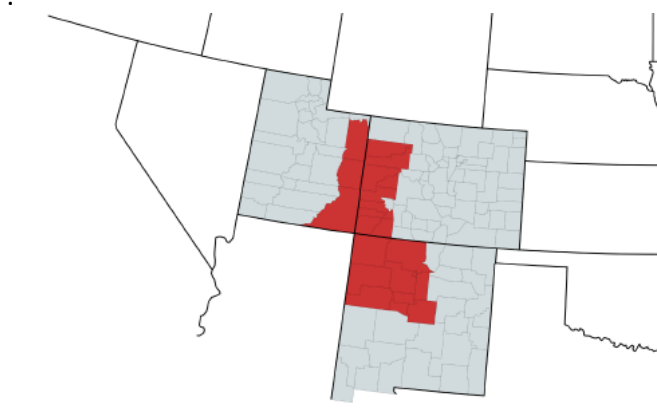


Figure 1. Sampled counties in Colorado (n=10), New Mexico (n=11), and Utah (n=3) based on elevated pneumoconiosis mortality.

We limited eligibility for survey participation to men aged 50 and over who spoke English or Spanish, had a history of any past or current labor force participation, and confirmed current residence in one of the targeted counties. We based both the sampling methodology and the survey interview on our previous research focusing on risk of RA associated with coal mining in the Appalachian region of the US.<sup>3,4</sup> The study was approved by the Institutional Review Board of the University of California, San Francisco; all participants provided verbal consent to proceed with the interview.

#### Study Sample

From 83,014 call attempts, we made 18,180 contacts with potential participants. There were 5,841 individuals who declined to participate, the majority before eligibility could be established. There were a further 10,413 who were ineligible due to age, sex, language (non-English/Spanish), lack of employment history, or current residence outside the catchment area. A total of 2,000 responded to the survey (11% of contacts made; 25% of contacts excluding the 10,413 known to be ineligible). Our target final number was based on our previous experience surveying coal miners in Appalachia.<sup>3,4</sup>

Study interviews averaged 18 minutes in length and contained items addressing employment, smoking history, sociodemographics, and arthritis and related diagnoses. The survey ascertained duration and type of mining experience, along with exposure to inhaled dusts in non-mining jobs. The health sections queried whether the respondent had ever received a diagnosis from a health professional of arthritis of any kind, with follow-up items specifying RA, psoriatic arthritis, or gout. Interviewers asked about joint swelling, stiffness, or pain, regardless of reported diagnoses. Finally, the survey included a series of questions about immunosuppressive medications used to treat arthritis.

We defined mining exposure based on survey-reported occupational history. We asked about any underground hard rock mining employment, with a follow-up list eliciting the specific minerals mined. Respondents who did not endorse any of these (silver, gold, copper, molybdenum, zircon, uranium), had an open-ended option to identify their hard rock mining exposure. Other mining named in these responses that were likely to involve silica exposure were considered hard rock exposures. Those reporting underground shale oil mining or gilsonite, however, were combined with underground coal mining, ascertained in a separate series of questionnaire items directed at underground (and surface) coal mining. Those who identified other mining activities with negligible silica (i.e., trona) and those who reported no specific exposure were not classified as exposed. Additional survey items inquired about open-pit mining, ore processing, and quarry work. Other silica dust exposure (not from coal mining) was defined by affirmative responses to any of a list of specific job tasks including: work with silica, sand, or concrete dust; sandblasting; foundry work; concrete finishing, cutting, or drilling; or masonry work or tip-pointing. For each type of exposure, the survey included a follow-up question about the number of years spent doing that work. We did not elicit global occupational histories and thus did not apply a job exposure matrix to generate an alternate exposure measure.

We created a hierarchical, mutually exclusive classification of silica exposure (e.g., someone with both underground hard rock and surface exposure would be classified as the former, regardless of duration). Any specifically identified underground hard rock mining constituted the first category, taking precedence over all other reported sources of silica exposure. Any underground soft rock mining constituted the next category and included coal, shale oil, and gilsonite, followed by any surface mining, ore refining, or quarrying. Silica exposure exclusively from non-mining sources comprised the final category. We also created an aggregate classification of any mining exposure and any non-mining exposure. For both exposure variables, those with all other types of current or past employment constituted the unexposed group. We defined arthritis by an affirmative response to the primary stem question about receiving a health care clinician's diagnosis of arthritis. We defined RA based on a follow-up item about type of arthritis, restricted to those reporting having received oral or injected glucocorticoids for joint symptoms. We also created a more restricted glucocorticoid definition based on prolonged use, defined as at least three times per week for at least three months' duration.

A more specific definition for RA required a diagnosis of RA and report of receiving at least one of a standard list of disease modifying anti-rheumatic drugs (DMARDs) including conventional synthetic DMARDs (methotrexate, sulfasalazine, hydroxychloroquine, azathioprine, leflunomide) or biologics or targeted small molecules approved for the treatment of RA (etanercept, adalimumab, infliximab, golimumab, certolizumab, tocilizumab, abatacept, rituximab, tofacitinib, upadacitinib, or baricitinib). We also created an alternative definition including those reporting RA and either glucocorticoid or DMARD use. We categorized non-RA arthritis by a positive response to the initial arthritis question without meeting the main study criteria for RA. This category is likely to be predominantly degenerative arthritis (osteoarthritis) but includes reported RA without glucocorticoid use or DMARDs as well as infrequent reports of other autoimmune or crystalline arthritis. Cigarette smoking exposure assessment included age started, number of years smoked, and average number of cigarettes per day. We categorized participants as current, former, or never smokers. Respondents who had quit smoking fewer than three years prior to interview were considered recent smokers and included in the same category as current smokers. Using multivariable logistic regression analyses, we modeled the risk of RA (defined by glucocorticoid use or by DMARDs) and non-RA arthritis associated with underground hard rock, underground coal mining, surface mining and other non-mining silica exposure in comparison to the unexposed group. The models adjusted for age, race/ethnicity (white non-Hispanic vs. all others), and smoking status (current, former, never). Respondents who did not answer the smoking status questions (n=5) were excluded from these analyses. We also excluded respondents whose only reported underground exposure was trona, as well as those who did not report any specific work history that would allow for categorization as hard rock or coal/shale exposure (n=7), resulting in a final analytic sample of 1,988. There were no other key variables with missing data.

We tested the aggregate classification of any mining exposure to silica and non-mining silica exposure in a series of models in which the dependent variables were the multiple definitions of RA we applied: a) requiring glucocorticoid use, b) requiring DMARDs, c) requiring long-term glucocorticoids, or d) either glucocorticoid or DMARDs. Using the maximum likelihood estimates from this last set of regression models, we calculated the population attributable fraction (PAF) of RA prevalence to estimate the proportion of prevalent cases among men that could be attributed to mining or other silica exposure. We re-evaluated the main multivariable models using generalized estimating equations (GEE) which is comparable to the logistic regression but accounts for the state from which the counties were drawn and thus achieves estimates that are more precise in the face of potential similarities by region (which would in turn relate to mining types). To reduce misclassification bias, all models of RA (any definition) or non-RA arthritis excluded subjects who reported arthritis but did not meet the criteria for the diagnosis under consideration. For example, models of RA with glucocorticoids excluded subjects who reported arthritis but not RA or who reported RA but not glucocorticoids. Thus, the reference population in each model is comprised only of individuals without arthritis by any definition. Statistical analyses were carried out in SAS v9.4 and Stata v15.

#### **4. Research Findings and Accomplishments**

We analyzed responses for 1988 survey participants all of whom by study eligibility criteria were males, 50 years of age or older, and with a history of labor force participation. Table 1 (next page) presents socio-demographics and cigarette smoking status for the study cohort. Altogether, more than one in five (22%) reported underground or surface mining experience. Those with underground hard rock mining accounted for 118 of 442 with such exposures. The duration of mining employment for hard rock mining was relatively brief (median, two years; 75th percentile, 10 years), whereas for soft rock mining the median was six years and the 75th percentile, 22 years. Other occupational exposures likely to involve silica were nearly as common as the mining industry (17.5% of the study respondents).

Table 1. Respondent characteristics (n=1988)	
Characteristic	n (%) unless specified
<b>Sociodemographics</b>	
State of residence	
Colorado	1124 (56.5%)
New Mexico	515 (25.9%)
Utah	349 (17.6%)
Age (years), mean±sd	68.6 ± 10.1
<b>Race/ethnicity</b>	
White	1643 (82.7%)
Hispanic	208 (10.5%)
Native American	56 (2.8%)
Asian	12 (0.6%)
Black	13 (0.7%)
Other/unknown	56 (2.8%)
Currently employed	758 (38.1%)
<b>Cigarette Smoking</b>	
Never smoked	1006 (50.6%)
Former smoker	780 (39.2%)
Current/recent smoker	202 (10.2%)
<b>Exposure source (mutually exclusive categories)</b>	
Silica exposure from mining sources	
Any underground hard rock mining exposure	118 (5.9%)
Underground soft rock (no hard rock)	62 (3.1%)
Surface work (no underground)	262 (13.2%)
Silica exposure from non-mining sources only	
No mining or silica exposure	1198 (60.3%)
<b>Arthritis type and frequency</b>	
No diagnosis of arthritis reported	1073 (54.0%)
Any arthritis reported	
Arthritis, exclusive of RA	683 (34.4%)
Any RA reported	
RA with DMARD or corticosteroids	118 (5.9%)
RA, with corticosteroids	89 (4.5%)
RA, with long-term corticosteroids	49 (2.5%)
RA, with DMARD	80 (4.0%)
<p>DMARD = disease modifying anti-rheumatic drugs; see Methods for included medications  Long-term corticosteroids = ≥3 times per week for ≥3 months. This is a subset of any steroid use.  All respondents were male, age 50 years or older, with a history of previous labor force participation. Recent smokers include those who stopped in past 3 years.  Soft rock mining includes coal (n=49), shale oil (n=6), and gilsonite (n=7)</p>	

Altogether, more than one in five (22%) reported underground or surface mining experience. Those with underground hard rock mining accounted for 118 of 442 with such exposures. The duration of mining employment for hard rock mining was relatively brief (median, two years; 75th percentile, 10 years), whereas for soft rock mining the median was six years and the 75th percentile, 22 years. Other occupational exposures likely to involve silica were nearly as common as the mining industry (17.5% of the study respondents). Table 1 (previous page) also presents the frequencies of arthritis for differing definitions of disease. There were 89 respondents who reported a diagnosis of RA from a health care clinician and treatment of joint pain with corticosteroids,, whereas 80 reported RA and treatment with a DMARD. The two definitions overlapped in part: 51 reported treatment with both corticosteroids and a DMARD, while 38 reported a corticosteroid only and 29 a DMARD only.

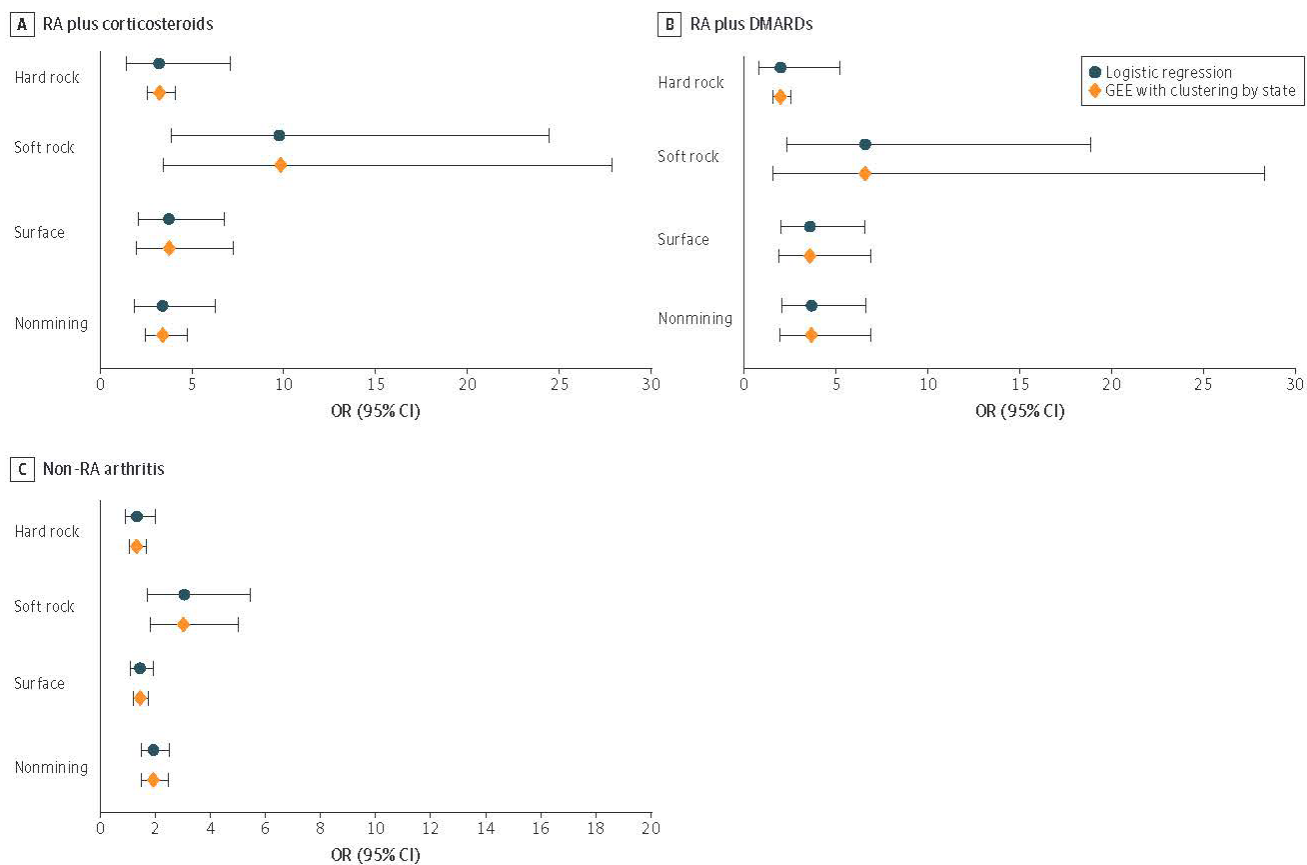
The risks of arthritis by source of silica exposure are presented in Table 2. For RA defined by corticosteroid use, there was a greater than three-fold increased odds of disease associated with underground hard rock mining, surface mining, and silica from other sources, while the odds associated with coal mining were increased greater than nine-fold. Using a definition of disease requiring DMARD treatment, the point estimate of the odds of RA was lower for underground mining and was not statistically significant. In these analyses neither current nor past smoking was statistically associated with RA. Arthritis other than RA was statistically associated with underground mining other than hard rock, surface mining, and processing, and other silica exposure jobs, but in all cases with lower point estimates of risk compared to RA.

Table 2. Arthritis Conditions Associated With Silica Exposure

Models unadjusted for other covariates	RA+ corticosteroids*, excluding non-RA (model n=1162)		RA+ DMARDs**, excluding non-RA (model n=1153)		Other arthritis ( excluding RA; n=1870)	
	# with illness	OR (95%CI)	# with illness	OR (95%CI)	# with illness	OR (95%CI)
Silica exposures						
Any underground hard rock mining (n=118)	9	3.41 (1.55, 7.48)	5	2.02 (0.76, 5.40)	50	1.38 (0.93, 2.05)
Underground soft rock, no hard rock mining (n=62)	8	9.41 (3.83, 23.11)	5	6.27 (2.19, 17.93)	34	2.92 (1.65, 5.19)
Surface mining, no underground (n=262)	21	3.70 (2.07, 6.61)	19	3.57 (1.95, 6.53)	108	1.39 (1.05, 1.84)
Silica only from non-mining sources (n=348)	19	2.78 (1.53, 5.03)	21	3.27 (1.82, 5.87)	167	1.78 (1.39, 2.29)
No exposure (n=1198)	32	Referent	30	Referent	438	Referent
Multivariable logistic regression models						
Silica exposure sources (referent = no exposure)	Adjusted OR (95% CI)					
Any underground hard rock mining	3.21 (1.45, 7.10)		1.91 (0.71, 5.12)		1.32 (0.89, 1.97)	
Underground soft rock mining, no hard rock	9.74 (3.89, 24.42)		6.52 (2.26, 18.80)		3.04 (1.71, 5.42)	
Surface mining, no underground	3.74 (2.07, 6.75)		3.51 (1.90, 6.48)		1.43 (1.07, 1.90)	
Silica only from non-mining sources	3.40 (1.84, 6.27)		3.59 (1.97, 6.54)		1.92 (1.48, 2.48)	
Smoke exposure (referent = never smoked)						
Former smoker	1.12 (0.69, 1.82)		0.98 (0.59, 1.64)		1.40 (1.14, 1.71)	
Current/recent smoker	1.05 (0.50, 2.21)		1.15 (0.56, 2.35)		0.92 (0.67, 1.28)	
White non-Hispanic (referent=all others)	0.77 (0.44, 1.34)		0.70 (0.40, 1.22)		1.18 (0.92, 1.52)	
Age (OR expressed per year of age )	1.04 (1.02, 1.07)		1.03 (1.002, 1.05)		1.02 (1.01, 1.03)	

Model n's above vary reflecting the exclusion of other categories but retaining the n=1198 referents.

The results from GEE modeling taking into account potential clustering by geographic sample (Utah, Colorado, or New Mexico) compared to multivariable models are shown in Figure 2., below. Although the point estimates for the ORs are very similar from both approaches, for underground hard rock mining the 95% confidence intervals in the GEE model for DMARD-defined arthritis and for non-RA arthritis were narrower and excluded 1.0 (Panels B and C).



In the analyses shown in Table 3 (following page), the highest PAF associated with mining exposures was estimated for RA defined by long-term steroid use (42%; 95% CI 26-48%). In the same model, other silica exposure contributed 16% to the PAF. For RA with DMARD treatment, the PAF for mining was 25% (95% CI 19-31%).



Table 3. Silica exposure and rheumatoid arthritis: risks associated with differing definitions of disease.

Definitions of RA	n cases/total	Any mining exposure		Silica only from non-mining sources	
		OR (95% CI)	PAF (95% CI)	OR (95% CI)	PAF (95% CI)
RA+corticosteroids	89/1162	4.12 (2.49, 6.81)	32% (27%, 37%)	3.39 (1.84, 6.25)	15% (11%, 19%)
RA+long-term corticosteroids	49/1122	6.08 (3.08, 12.02)	42% (36%, 48%)	4.20 (1.78, 9.88)	16% (11%, 20%)
RA+DMARDs	80/1153	3.30 (1.93, 5.66)	25% (19%, 31%)	3.56 (1.96, 6.49)	19% (14%, 23%)
RA+DMARDs or corticosteroids	118/1191	3.46 (2.21, 5.40)	27% (22%, 32%)	3.38 (2.01, 5.67)	17% (13%, 20%)

Meeting our timeline and work plan for the population-based survey, we successfully: designed, refined and field-tested our survey instrument; carried out the survey as proposed; achieved our targeted participation numbers; and carried out the analyses we had proposed. Thus, we met our primary study aims. Moreover, our results were highly consistent with our previous studies focused on the Appalachian coal mining region.

### 5.0 Publication Record and Dissemination Efforts

Our findings were presented initially at the 2022 regional meeting of the Western Society for Clinical Investigation (Blanc P, Trupin L, Schmajuk G, Yelin E, Rheumatoid arthritis among miners in New Mexico, Utah, and Colorado. *J Investig Med* 2022; 70:321-2.)<sup>13</sup> We followed with the development of a full manuscript which has been accepted for publication and is In Press with JAMA Open Access (Blanc PD, Trupin L, Yelin EH, Schmajuk G. Assessment of risk of rheumatoid arthritis among underground hard rock and other mining industry workers in Colorado, New Mexico, and Utah. *JAMA Netw Open*. 2022 Oct 3;5:e2236738).<sup>14</sup> This high profile publication is likely to lead to wide dissemination of these findings.

### 6.0 Conclusions and Impact Assessment

In summary, our population-based survey data show that hard rock mining work, soft rock mining, and other occupational silica exposure sources are associated with more than three-fold odds of RA, findings that are consistent with our previous study of Appalachian coal miners. Study limitations, however, should be kept in view. The duration of exposure among hard rock miners was relatively brief, although many had additional sources of silica exposure. High intensity relatively short duration silica exposure can be associated with adverse outcomes although this has not been studied specifically in terms of RA. Further, because the definition of exposure that we used was hierarchical someone with soft rock exposure and hard rock exposure would have been treated in the modeling as hard rock exposed. Also we did not differentiate among surface mining by type, because silica-containing over-rock exposure is likely to overlap for such activities. Our exposure and disease outcome numbers were relatively small, accounting for wide confidence intervals, and were especially so for soft rock mining (but nonetheless did exclude 1.0; e.g., were statistically significant). We studied person 50 or older (largely retired rather than active miners) and thus our findings may not be generalizable to younger miners and RA risk. Similarly, we cannot assume that our observations from three U.S. states can be generalized to other regions of the U.S. or internationally.

### 7.0 Recommendations for Future Work

The survey approach that we utilized in this research project serves as a useful methodologic model to approach other questions. We are currently initiating a new study in the Appalachian region parallel methods to study the prevalence of depression, anxiety, and post-traumatic stress disorder among coal miners compared to others.

## 8.0. References

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**9. Appendix UCSF Alpha Hardrock Survey**

**- Screening Questions -**

Hello, my name is \_\_\_\_\_, and I am calling from Davis Research, an independent public opinion research organization. We are conducting an important survey for one of the nation's leading schools of medicine about some work and health-related issues. This is a legitimate public opinion survey – we are not selling anything.

- S1. We are only conducting this survey in certain states and counties in the U.S. In what state do you live?
- COLORADO.....1
  - NEW MEXICO .....2
  - UTAH.....3
  - ALL OTHER STATES...4→END
  - REFUSED ..... REF →END

S2. And, in what county do you live?

<u>IF COLORADO</u>	<u>IF UTAH</u>	<u>IF NEW MEXICO</u>
DELTA ..... 01	GRAND ..... 01	BERNALILLO.....01
DOLORES ..... 02	SAN JUAN..... 02	CIBOLA.....02
GARFIELD ..... 03	UINTAH ..... 03	LOS ALAMOS.....03
LA PLATA..... 04	ALL OTHER..... 04	MCKINLEY .....04
MESA ..... 05	REFUSED ..... .REF	RIO ARRIBA .....05
MONTEZUMA..... 06		SAN JUAN.....06
MONTROSE..... 07		SANDOVAL.....07
RIO BLANCO ..... 08		SANTA FE .....08
SAN JUAN..... 09		TAOS .....09
SAN MIGUEL..... 10		TORRANCE..... 10
ALL OTHER..... 11		VALENCIA ..... 11
REFUSED ..... . REF		ALL OTHER ..... 12
		REFUSED ..... . REF

**IF S2=OTHER OR REFUSED, ASK:**

<p>S2b. What is your zip code?                  (CODE TO COUNTY: IF MATCHES CONTINUE. OTHERWISE                  END)</p>	<p>_____</p> <p>DK/REFUSED ..... REF →END</p>
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- S3. **RECORD GENDER:** (INTERVIEWER: IF YOU HAVE ANY DOUBT AS TO RESPONDENT'S GENDER, SAY: Because it is sometimes difficult to determine over the phone, I am asked to confirm whether you are male or female.)
- MALE .....1
  - FEMALE .....2

**LANDLINE SAMPLE**

**IF MAN IS ON THE TELEPHONE, SAY:**

S4a. For this interview I need to speak to a male age 50 or older. Does a male age 50 or older live in your household? (IF YES, ASK) Is that you or someone else? (IF SOMEONE ELSE, ASK TO SPEAK TO THAT PERSON) (IF MORE THAN 1 MALE AGE 50 OR OLDER LIVING IN HOUSEHOLD, SAY: I'd like speak with the youngest male age 50 or older who is at home now.)

SPEAKING TO ELIGIBLE MALE.....1**CONTINUE WITH S5A**  
 ELIGIBLE MALE COMES TO PHONE.....2**REPEAT INTRO, THEN CONTINUE WITH S5A**  
 ELIGIBLE MALE NOT AVAILABLE NOW.....3**CALLBACK**  
 NO MALES AGE 50+ IN HOUSEHOLD..4**END**  
 REFUSED.....REF**END**

**IF WOMAN IS ON THE TELEPHONE, SAY:**

S4b. For this interview I need to speak to a male age 50 or older. Does a male age 50 or older live in your household? (ASK TO SPEAK TO THAT PERSON) (IF MORE THAN 1 MALE AGE 50 OR OLDER LIVING IN HOUSEHOLD, SAY: I'd like to speak with the youngest male age 50 or older who is at home now.)

ELIGIBLE MALE COMES TO PHONE..... 1**REPEAT INTRO, THEN CONTINUE WITH S5A**  
 ELIGIBLE MALE IS NOT AVAILABLE NOW ...2**CALLBACK**  
 NO MALES AGE 50+ IN HOUSEHOLD 3**END**  
 REFUSED..... REF**END**

S5a. What is your age?

**IF AGE 50+, GO TO S6A**  
 IF UNDER AGE 50 ..... X → **END**  
 REFUSED ..... REF → **ASK S5B**

**IF REFUSED, ASK:**

S5b. I don't need to know exactly, but can you tell me if you are under age 50, age 50-54, 55-59, 60-64, 65-69, 70-74 or 75 or older?

UNDER AGE 50.....	1 → <b>END</b>
50-54.....	2 <b>CONTINUE</b>
55-59.....	3 <b>CONTINUE</b>
60-64.....	4 <b>CONTINUE</b>
65-69.....	5 <b>CONTINUE</b>
70-74.....	6 <b>CONTINUE</b>
75 OR OLDER.....	7 <b>CONTINUE</b>
REFUSED.....	REF → <b>END</b>

S6a. Did you ever work for pay or profit for one year or longer, including civilian and military duties? (IF NECESSARY, PROMPT) This includes civilian or military duties and any job that you worked at for one year or longer, even when self-employed?

YES.....1 **GO TO S10**  
 NO .....2 **ASK S6B**  
 NO ANSWER/REFUSED .....REF **ASK S6B**

**IF NO OR REFUSED, ASK:**

S6b. Did you ever work without salary or pay on a farm or family business for one year or more?

YES.....	1 <b>GO TO S10</b>
NO .....	2 <b>END</b>
NO ANSWER/REFUSED .....	REF <b>END</b>

**CELL PHONE SAMPLE**

• **IF MALE FROM S3, GO TO S8A; IF FEMALE FROM S3, END**

S8a. What is your age?

**IF AGE 50+, GO TO S9A**

IF UNDER AGE 50.....X →END

REFUSED ..... REF →ASK S8b

**IF REFUSED, ASK:**

S8b. I don't need to know exactly, but can you tell me if you are under age 50, age 50-54, 55-59, 60-64, 65-69, 70-74 or 75 or older?

UNDER AGE 50 ..... 1 →END

50-54.....2 CONTINUE

55-59.....3 CONTINUE

60-64.....4 CONTINUE

65-69.....5 CONTINUE

70-74.....6 CONTINUE

75 OR OLDER.....7 CONTINUE

REFUSED ..... REF →END

S9a. Did you ever work for pay or profit for one year or longer, including civilian and military duties? **(IF NECESSARY, PROMPT)** This includes civilian or military duties and any job that you worked at for one year or longer, even when self-employed?

YES.....1 GO TO S10

NO .....2 ASK Q9B

NO ANSWER/REFUSED .....REF ASK Q9B

**IF NO OR REFUSED, ASK:**

S9b. Did you ever work without salary or pay on a farm or family business for one year or more?

YES.....1 GO TO S10

NO .....2 END

NO ANSWER/REFUSED .....REF END

**IF ELIGIBLE FROM S6 OR S9, SAY**

S10. You are eligible to participate in an important study about the impact of work on health. Upon completing the survey, we will send you a \$5 gift card to Amazon or Starbucks or we can mail you a check . . . . It will not take long, only about 15-20 minutes for most people . . . . It is completely voluntary and you can stop at any point. . . . The study's principal investigator is Dr. Paul Blanc at the University of California, School of Medicine. Would you like to participate?

YES, PROCEED ..... 1 → CONTINUE

YES, BUT CALL BACK LATER ..... 2 → ARRANGE CALLBACK

UNSURE/HAS QUESTIONS ..... 3 → READ TEXT BELOW

NO, REFUSED .....REF →END

**(IF UNSURE OR HAS QUESTIONS, SAY)** If you have any questions, we can give you the telephone number of Dr. Blanc's office or for the Office of Research Affairs at the University. **(IF REQUESTED)** Dr. Blanc's research office telephone number is 415-476-7377. The University Office of Research Affairs telephone number is 415-476-1814.

**IF CELL PHONE LISTING, ASK**

S11. For your safety, are you currently driving a motor vehicle, operating heavy equipment or in a place that is unsafe to do the survey?

YES,.....1→ ARRANGE CALLBACK

NO.....2→ CONTINUE

**IF CALLBACK FROM S10 OR S11, ASK:**

S12a. When would be a good time for us to call back?

**RECORD DAY AND TIME OF CALLBACK**

S12b. So our interviewer can ask for you to speak to (that person) (you) by name, what is (his) (your) first name?

**RECORD FIRST NAME FOR CALLBACK**

## Main Survey

Before we begin, I need to tell you that my supervisor sometimes monitors these interviews to ensure quality and courtesy.

The first questions concern work and employment.

1. Are you currently employed for pay or profit either full or part time? YES.....1 (ASK Q1A)  
 NO.....2 (SKIP TO Q2)  
 NO ANSWER/REFUSED...DK (SKIP TO Q2)

**IF Q1=YES, ASK:**

- |   |   |
|---|---|
| 1a. Do you currently work in underground hardrock mining? | YES.....1 (SKIP TO Q3)<br>NO.....2 (ASK Q2)<br>NO ANSWER/REFUSED .DK (ASK Q2) |
|---|---|

**IF Q1=NO OR DK OR Q1A=NO OR DK, ASK:**

- |  |   |
|--|---|
| 2. Did you ever work in underground hardrock mining? | YES ..... 1 (ASK Q3)<br>NO.....2 (SKIP TO Q11)<br>NO ANSWER/REFUSED...DK (SKIP TO Q11 ) |
|--|---|

3. For how many years altogether did you do this work? \_\_\_\_ (years) DK/REF. . . .DK

4. Which of the following underground hardrock mining have you done: **(READ ITEMS IN RANDOM ORDER, ASKING)**  
 Have you done mining for **(ITEM)** ?

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Silver .....	1	2	DK
b. Gold .....	1	2	DK
c. Copper .....	1	2	DK
d. Uranium or Zircon .....	1	2	DK
e. Molybdenum (mah-LIB-duh-num) .....	1	2	DK

**IF Q4A-E ALL =NO OR DK, ASK:**

- |  |   |   |    |
|--|---|---|----|
| f. Another mineral (other than coal)? <b>(IF NECESSARY)</b> We will be asking you a little later about coal..... | 1 | 2 | DK |
|--|---|---|----|

**IF YES: What was that?** \_\_\_\_\_ DK/REF. . . .DK

5. Did you work for a period as a hardrock mining apprentice or nipper? YES.....1 (ASK Q5a)  
 NO .....2 (SKIP TO Q6)  
 NO ANSWER/REF.....DK (SKIP TO Q6)

**IF Q5=YES, ASK:**

- |  |   |
|--|---|
| 5a. For how many years did you do this work? | _____ YEARS<br>NO ANSWER/REFUSED ..... DK |
|--|---|

6. Did you work as a stope development miner? YES..... 1 (ASK Q6a)  
 NO .....2 (SKIP TO Q7)  
 NO ANSWER/REF .....DK (SKIP TO Q7)

**IF Q6=YES, ASK:**

6a. For how many years did you do this work?	_____ YEARS NO ANSWER/REF .....DK
6b. Did you do your own mucking?	YES.....1 NO.....2 NO ANSWER/REF..DK

7. Did your underground hardrock work include any blasting jobs? YES..... 1 (ASK Q7a)  
 NO .....2 (SKIP TO Q8)  
 NO ANSWER/REF .....DK (SKIP TO Q8)

**IF Q7=YES, ASK:**

7b. Specifically, did you work as a <u>ITEM</u> ? (READ IN ORDER UNTIL 1ST "YES", THEN SKIP TO Q7C)				
		<b>YES</b>	<b>NO</b>	<b>DK/REF</b>
(1).	Blaster or blaster helper .....	1	2	DK
(7).	High-raise blaster.....	1	2	DK
(3).	Powderman or shotman.....	1	2	DK
(4).	Bench blaster .....	1	2	DK
(5).	Chute blaster.....	1	2	DK
(6).	Hang-up blaster .....	1	2	DK
(2).	Shooter or shooter helper .....	1	2	DK

**IF Q7b (1)-(7) ALL = NO OR DK, ASK:**

viii. Did you work in any other blasting jobs? .....	1	2	DK
<b>IF YES: What was that?</b> _____		DK/REF. . . .DK	

7c. For how many years did your hardrock mining career include blasting jobs?	_____ YEARS NO ANSWER/REFUSED DK
---	-------------------------------------

8. Did your underground hardrock work include any drilling or cutting jobs? YES..... 1 (ASK Q8A)  
 NO ..... 2 (SKIP TO Q9)  
 NO ANSWER/REF .....DK (SKIP TO Q9)

**IF Q8=YES, ASK:**

8a. Specifically, did you work as a (ITEM)? (READ IN ORDER UNTIL 1ST "YES", THEN SKIP TO Q8d, OTHERWISE ASK Q8B)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(1). Drift driller or drift miner .....	1	2	DK
(3). Long-hole driller .....	1	2	DK
(4). Block holer.....	1	2	DK
(2). Blast hole driller.....	1	2	DK
(5). Rock bolter .....	1	2	DK
(6). Diamond driller or drill runner.....	1	2	DK
(7). In the hole driller.....	1	2	DK
(8). Stoper driller .....	1	2	DK

8b. Did you work as an operator of a (ITEM)? (READ IN ORDER UNTIL 1ST "YES", THEN SKIP TO Q8d)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(1). Bolter .....	1	2	DK
(2). Core-drill.....	1	2	DK
(3). Raise driller or boring machine.....	1	2	DK
(4). Ring drill .....	1	2	DK
(5). Road header .....	1	2	DK
(6). In-hole drill.....	1	2	DK
(7). Jack leg drill .....	1	2	DK
(8). Jumbo drill.....	1	2	DK
(9). Wagon drill .....	1	2	DK
(10). Undercutter .....	1	2	DK

**IF Q8a(1)-(8) AND Q8b (1)-(10) ALL = NO OR DK, ASK:**

8c. Did you work in any other driller or drill machine operator job?..... 1 .....2.....D

IF YES: What was that? \_\_\_\_\_ DK/REF. . . .DK

8d. For how many years did your hard rock mining career include drilling jobs? \_\_\_\_\_ YEARS  
NO ANSWER/REFUSED DK

8e. For how much of the time did this drilling work use water to control dust – almost none of the time, sometimes, most of the time, or almost always?

ALMOST NONE OF THE TIME.....	1
SOMETIMES.....	2
MOST OF THE TIME .....	3
ALMOST ALWAYS.....	4
NO ANSWER/REF.....	DK

9. Did your underground hardrock work include any mined material handling, loading or hauling jobs? YES ..... 1 (ASK Q9a)  
NO .....2 (SKIP TO Q11)  
NO ANSWER/REF ...DK (SKIP TO Q11)



**IF Q9=YES, ASK:**

9a. Specifically, did you work as a (ITEM)? (READ IN ORDER UNTIL 1ST "YES", THEN SKIP TO Q9d, OTHERWISE ASK Q9b)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(3). Diesel loader .....	1	2	DK
(1). Cager .....	1	2	DK
(2). Downhole loader .....	1	2	DK

9b. Did you work as an operator of a (ITEM)? (READ IN ORDER UNTIL 1ST "YES", THEN SKIP TO Q9d)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(7). Loading machine .....	1	2	DK
(1). Grader .....	1	2	DK
(2). Crusher .....	1	2	DK
(3). Grizzly .....	1	2	DK
(4). Dozer or jammer .....	1	2	DK
(5). Front-end loader .....	1	2	DK
(6). Load-haul dump .....	1	2	DK
(8). Slusher .....	1	2	DK
(9). Mucker or mucker machine .....	1	2	DK
(10). Production loader .....	1	2	DK
(11). Scoop or scoop tram .....	1	2	DK
(12). Locomotive .....	1	2	DK
(13). Haul truck .....	1	2	DK

**IF Q9a (1)-(4) AND Q9b (1)- (13) ALL = NO OR DK, ASK:**

9c. Did you work in any other loading, handling or hauling jobs?..... 1 .....2.....DK

IF YES: What was that? \_\_\_\_\_ DK/REF. . . .DK

9d. For how many years did your hardrock career include mined material handling, loading or hauling? \_\_\_\_\_ YEARS  
NO ANSWER/REFUSED DK

**NOTE: Q10 AND Q10A HAVE BEEN DELETED**

11. Did you work in open-pit hardrock mining? YES .....1 (ASK Q11a)  
NO .....2 (SKIP TO Q12)  
NO ANSWER/REF.....DK (SKIP TO Q12)

**IF Q11=YES, ASK:**

11a. Considering all open pit hardrock mining, for how many years in total did you do this work? \_\_\_\_\_ YEARS  
NO ANSWER/REF ..... DK

12. Did you work in ore processing or metal refining? YES..... 1 (ASK Q12a)  
NO .....2 (SKIP TO Q13)  
NO ANSWER/REF ...DK (SKIP TO Q13)

**IF Q12=YES, ASK:**

12a. Considering all hardrock mining, for how many years in total did you do this processing or refining work? \_\_\_\_\_ YEARS  
NO ANSWER/REF ..... DK

13. Have you ever worked in a quarry or sand pit? YES.....1 (ASK Q13a and b)  
NO .....2 (SKIP TO Q14)  
NO ANSWER/REF .... DK (SKIP TO Q14)

**IF Q13=YES, ASK:**

13a.	Did this include granite, quartz, sandstone or sand?	YES ..... 1 NO..... 2 DON'T KNOW/REFUSED ..... DK
13b.	Considering all quarrying or sand pit work, for how many years did you do this work?	_____ YEARS NO ANSWER/REF.....DK

14. Have you ever worked in coal mining? YES ..... 1 (ASK Q15)  
NO..... 2 (SKIP TO Q17)  
NO ANSWER/REF..... DK (SKIP TO Q17)

**IF Q14=YES, ASK:**

15.	Did this include underground coal mining?	YES ..... 1 (ASK Q15a) NO..... 2 (SKIP TO Q16) NO ANSWER/REF... DK (SKIP TO Q16)
-----	---	--

**IF Q15=YES, ASK:**

15a.	Were you ever a coal mine roof bolter?	YES ..... 1 NO ..... 2 NO ANSWER/REFUSED ..... DK
15b.	Did you ever work in underground coal mine construction or development?	YES ..... 1 (ASK Q15b) NO ..... 2 (GO TO Q15c) NO ANSWER/REFUSED ..... DK (GO TO Q15c)

**IF Q15b = YES, ASK:**

15b(1).	Did you cut through rock, for example in coal mine slope or shaft construction?	YES..... 1 NO ..... 2 NO ANSWER/REFUSED.....DK
---------	---	--

15c.	Considering all underground coal mining, for how many years in total did you do this work?	_____ YEARS NO ANSWER/REFUSED ..... DK
15d.	What percentage of these years did you work at the coal face?	_____ PERCENT (0%-100%) NO ANSWER/REFUSED ..... DK

16. Did your coal mining work ever include surface or strip mining? YES.....1 (GO TO Q16a)  
 NO .....2 (GO TO Q17)  
 NO ANSWER/REFUSED.....DK (GO TO Q17)

**IF Q16=YES, ASK:**

16a. In this work did you operate a bulldozer, dragline, or scraper? YES..... 1  
 NO .....2  
 NO ANSWER/REFUSED..... DK

16b Were you a high wall or auger operator or helper? YES..... 1  
 NO .....2  
 NO ANSWER/REFUSED..... DK

16c. Considering all surface or strip coal mining, for how many years in total did you do this work? \_\_\_\_\_ YEARS  
 NO ANSWER/REFUSED.....DK

17. Has a medical doctor ever told you that you have pneumoconiosis, silicosis or black lung? YES.....1  
 NO.....2  
 NO ANSWER/REF.....DK

18. Thinking about all of the types of work other than hardrock or coal mining that you have done for one year or more during your career, did any non-mining job involve regular exposure to breathing dusty air? YES .....1 (GO TO Q18a)  
 NO.....2 (GO TO Q19)  
 NO ANSWER/REF ...DK (GO TO Q19)

**IF Q18=YES, ASK:**

18a. For how many years did any non-mining job regularly expose you to breathing dusty air? \_\_\_\_\_ YEARS  
 NO ANSWER/REFUSED.....DK

18b. Did you ever have regular contact on a non-mining job with any of the following? (READ ITEMS ONE AT A TIME IN RANDOM ORDER)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(1). Silica, sand, or concrete dust.....	1	2	DK
(2). Sandblasting .....	1	2	DK
(3). Explosives or blasting fumes .....	1	2	DK
(4). Foundry work .....	1	2	DK
(5). Concrete finishing, cutting, or drilling .....	1	2	DK
(6). Masonry work or tip-pointing.....	1	2	DK
(7). Metal grinding or polishing .....	1	2	DK
(8). Construction dust.....	1	2	DK
(9). Soil or agricultural dust.....	1	2	DK

19. Thinking about all of the types of work that you have done for five years or longer during your career...  
 Did this include (ITEM) on an almost daily basis? (READ ITEMS ONE AT A TIME IN RANDOM ORDER)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(1) lifting, carrying, bending, stooping, pulling or pushing .....	1	2	DK
(2) bending, kneeling, squatting, treadle work or extensive standing or walking .....	1	2	DK
(3) using vibrating, pneumatic (noo-mat-ik) or hand tools .....	1	2	DK
(4) working with your arms overhead or reaching, or your neck twisted or bent .....	1	2	DK
(5) gripping, bending or pinching work with your hands .....	1	2	DK

Now, some questions about your health.

20. In general, would you say your health is excellent, very good, good, fair, or poor?
- |                            |    |
|----------------------------|----|
| EXCELLENT .....            | 1  |
| VERY GOOD .....            | 2  |
| GOOD .....                 | 3  |
| FAIR .....                 | 4  |
| POOR .....                 | 5  |
| NO ANSWER/DON'T KNOW ..... | DK |
21. Are you limited in any way in any activities because of a long-term physical condition? (**DO NOT COUNT RETIREMENT AS A LONG-TERM HEALTH PROBLEM**)
- |                          |    |
|--------------------------|----|
| YES .....                | 1  |
| NO .....                 | 2  |
| DON'T KNOW/REFUSED ..... | DK |
22. Has a doctor, nurse, or other health professional EVER told you that you have arthritis?
- |                  |                |
|------------------|----------------|
| YES .....        | 1 (ASK Q22A-E) |
| NO .....         | 2 (GO TO Q23)  |
| NO ANS/REF ..... | DK (GO TO Q23) |

(IF Q22 = YES, ASK:)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Was this osteoarthritis (os-tee-oh-arth-right-us) or degenerative arthritis? .....	1	2	DK
b. Was this rheumatoid (rue-ma-toyed) arthritis? .....	1	2	DK
c. Was this arthritis due to psoriasis (sor-eye-ah-sis)? .....	1	2	DK
d. Was this arthritis due to gout? .....	1	2	DK
e. At what age did your arthritis first start? AGE: _____			
	NO ANSWER/REFUSED..		DK

23. Has a doctor, nurse or other health professional EVER told you that you have any of the following medical conditions? (READ IN RANDOM ORDER)

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Lupus (LOOP-us) or SLE? .....	1	2	DK
b. Scleroderma (sklare-oh-DERM-ah)? .....	1	2	DK

24. Does pain, swelling, stiffness or aching regularly affect your (READ IN RANDOM ORDER)?

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Hands or wrists? .....	1	2	DK
b. Hips? .....	1	2	DK
c. Knees? .....	1	2	DK
d. Back? .....	1	2	DK
e. Neck? .....	1	2	DK
f. Ankles or feet? .....	1	2	DK

**(IF YES TO ANY Q25A-F, ASK:)**

25. For the pain, swelling or stiffness you just identified, have you ever been given . . . ?

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Prednisone (PRED-nuh-zone) or steroid pills? .....	1	2	DK

**IF Q25=YES, ASK:**

a(1). Was this at least 3 times a week for 3 months or more?	YES .....	1
	NO .....	2
	NO ANSWER/REFUSED .....	DK

b. Steroid injections into your muscles or joints? ..... 1 ..... 2 ..... DK

**(IF Q22B-C OR Q23A-B OR (Q22= YES AND Q25A OR Q25B=YES), ASK Q26A-F AND Q27A:)**

26. Have you ever been given any of the following medicines... (READ ALL ITEMS IN RANDOM ORDER)?

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
a. Methotrexate (meth-oh-TREX-ate), Rheumatrex (ROOM-ah-trex), Trexall (Trex-all), Otrexup (oh-TREX-up), or Rasuvo (rah-SOOV-oh) .....	1	2	DK
b. Sulfasalazine (sulf-ah-SAL-uh-zeen) or Azulfidine (ay-ZUL-fih-deen)....	1	2	DK
c. Plaquenil (PLA-kwen-ill) or Hydroxychloroquine (hi-drox-ee-KLOR-oh-kwin) .....	1	2	DK
d. Azathioprine (AY-zah-THIGH-oh-prin), Imuran (IM-your-an), or Azasan (AY-zah-sahn) .....	1	2	DK
e. Arava (uh-RAVE-uh) or Leflunomide (leh-FLOON-oh-mide) .....	1	2	DK
f. Xeljanz (ZEL-janz) or Tofacitinib (TOE-fah-SIT-in-ib) .....	1	2	DK
g. Rinvoq (RIN-vok) or Upadacitinib (up-ada-CIT-in-ib) .....	1	2	DK
h. Olumiant (OL-um-eh-ant).....	1	2	DK

27a. (IF Q25b=YES, ADD: Other than the steroid injections you mentioned earlier) have you ever been treated with any injectable medications for arthritis or autoimmune disease? ..... 1 ..... 2 ..... DK

**(IF Q27a = YES, ASK:)**

27b. Has this included . . . (READ IN ORDER UNTIL 1ST“YES”, THEN SKIP TO Q28)?

	<u>YES</u>	<u>NO</u>	<u>DK/REF</u>
(1). Enbrel (EN-brel) or Etanercept (ee-TAN-er-cept) .....	1	2	DK
(9). Cosentyx (koh-SEN-tix) or Secukinumab (sek-you-KIN-you-mab).....	1	2	DK
(3). Remicade (REM-ih-kaide), Infliximab (in-FLIX-ih-mab), or Inflectra (In – FLECK-trah) .....	1	2	DK
(2). Humira (hugh-MEER-uh) or adalimumab (ah-duh-LIM-you-mab).....	1	2	DK
(4). Rituxan (rih-TUX-an), Rituximab (rih-TUX-ih-mab), or Truxima (truck-ZEEM-ah) .....	1	2	DK
(5). Simponi (sim-POHN-ee) or Golimumab (go-LIM-you-mab) .....	1	2	DK
(6). Cimzia (SIM-zee-ah) or Certulizumab (sert-uh-LIZ-oo-mab) .....	1	2	DK
(7). Actemra (ack-TEM-rah) or Tocilizumab (toe-see-LIZ-oo-mab).....	1	2	DK
(8). Orencia (oh-REN-see-yah) or Abatacept (ab-AT-ah-sept).....	1	2	DK
(10). Stelara (steh-LAH-rah) or Ustekinumab (ooh-steh-KIN-you-mab) .....	1	2	DK

28. Have you smoked at least 100 cigarettes in your entire life? YES ..... 1  
 NO.....2  
 NO ANSWER/REFUSED .....DK

**IF Q.28 = YES, ASK:**

a.	About how old were you when you first started smoking cigarettes?	_____ YEARS OLD NO ANSWER/REFUSED .....DK
b.	Do you now smoke cigarettes every day, some days, or not at all?	EVERY DAY ..... 1 SOME DAYS .....2 NOT AT ALL.....3 NO ANSWER/REFUSED .....DK
c.	On the average, over the years you smoked, about how many cigarettes did you smoke a day?	_____ CIGARETTES NO ANSWER/REFUSED .....DK
d.	Not counting years you may have quit, for how many years altogether (have you smoked) (did you smoke) cigarettes?	_____ YEARS NO ANSWER/REFUSED .....DK

And finally, some questions about yourself for classification purposes.

29. What is the highest level of school that you have completed or the highest degree that you have received?  
**(READ LIST ONLY IF NECESSARY)**
- 4<sup>TH</sup> GRADE OR LESS ..... 1  
 5<sup>TH</sup>-8<sup>TH</sup> GRADE .....2  
 9<sup>TH</sup>-12<sup>TH</sup> GRADE (NO HIGH SCHOOL DEGREE) .....3  
 HIGH SCHOOL GRADUATE.....4  
 SOME COLLEGE / NO DEGREE .....5  
 ASSOC. DEGREE / TRADE OR VOCATIONAL SCHOOL .....6  
 COLLEGE GRADUATE OR HIGHER .....7  
 NO ANSWER/REFUSED .....DK
30. Are you married, separated or divorced, widowed, never been married, or are you a member of an unmarried couple?
- MARRIED ..... 1  
 SEPARATED/DIVORCED .....2  
 WIDOWED .....3  
 NEVER BEEN MARRIED .....4  
 UNMARRIED COUPLE.....5  
 NO ANSWER/REFUSED .....DK
31. How many people, including yourself, live in your household?
- \_\_\_\_\_ DK  
 NO ANSWER/REFUSED .....DK
32. For classification purposes, are you Latino or of Hispanic origin or descent?
- YES ..... 1  
 NO .....2  
 NO ANSWER/REFUSED .....DK

33. What is your racial background? Are you white, black or African-American, Asian or Pacific Islander, Native American or are you a member of another race? (ANSWER CAN BE A MULTIPLE)

WHITE/CAUCASIAN ..... 1  
 BLACK/AFRICAN-AMERICAN.....2  
 ASIAN/PACIFIC ISLANDER .....3  
 LATINO/HISPANIC (VOLUNTEERED) .....4  
 NATIVE AMERICAN .....6  
 OTHER (SPECIFY) .....5  
 NO ANSWER/REFUSED .....DK

34. About how tall are you without shoes?

\_\_\_\_\_ FEET  
 \_\_\_\_\_ INCHES  
 NO ANSWER/REFUSED .....DK

35. About how much do you weigh without shoes?

\_\_\_\_\_ LBS.  
 NO ANSWER/REFUSED .....DK

36. We don't need to know exactly, but just roughly could you tell me if your annual household income from all sources before taxes in 2020 was less than \$20,000, \$20,000 through \$40,000, \$40,000 through \$60,000, \$60,000 through \$80,000, \$80,000 through \$100,000, or \$100,000 or more?

LESS THAN \$20,000 ..... 1  
 \$20,000 – \$39,999 .....2  
 \$40,000 – \$59,999 .....3  
 \$60,000 – \$79,999 .....4  
 \$80,000 -- \$99,999 .....5  
 \$100,000 OR MORE .....6  
 NO ANSWER/REFUSED .....DK

37. Is the telephone that I dialed to reach you a landline phone or a cell phone?

LANDLINE PHONE ..... 1  
 CELL PHONE .....2  
 OTHER.....3  
 DON'T KNOW/REFUSED .....DK

**IF Q37=LANDLINE, OTHER OR DK, ASK:**

37a. Do you make and receive personal calls from a cell phone?	YES ..... 1 NO..... 2 DON'T KNOW/REFUSED ..... DK
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**IF Q37=CELL PHONE, ASK:**

37b. Is there a telephone inside your home that you use to make and receive personal calls that is not a cell phone?	YES ..... 1 NO..... 2 DON'T KNOW/REFUSED ..... DK
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**IF Q37a OR Q37b =YES, ASK:**

37c. Of all the personal telephone calls that you receive, do you get most of them on a landline phone or on a cell phone?	MOST ON LANDLINE PHONE .... 1 MOST ON CELL PHONE ..... 2 ABOUT EQUAL (VOLUNTEERED)3 DON'T KNOW/REFUSED..... DK
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38. These are all the questions I have. To thank you for your participation, we would like to send you a \$5 gift card from Amazon or Starbucks. What email address should we send that to?

PROVIDES EMAIL ADDRESS.....1 (GO TO Q38A)  
 NO EMAIL/REFUSES EMAIL.....2 (GO TO Q38C)  
 REFUSES INCENTIVE.....REF (GO TO END)

**IF Q38=1 (PROVIDES EMAIL), ASK:**

38a. ENTER EMAIL ADDRESS (READ BACK SLOWLY TO CONFIRM)	EMAIL: _____
38b. Which would you prefer, an Amazon or a Starbucks gift card?	AMAZON.....1 (GO TO END) STARBUCKS.....2 (GO TO END) REFUSES INCENTIVE...REF (GO TO END)

**IF Q38= 2 (DOES NOT PROVIDE EMAIL), ASK:**

38c. Then we can mail you your \$5 gift card or a check. Which would you prefer – a \$5 Amazon gift card, a \$5 Starbucks gift card or a check?	AMAZON GIFT CARD..... 1 STARBUCKS GIFT CARD ..... 2 CHECK ..... 3 REFUSES INCENTIVE .....REF (GO TO END)
38d. What is your name and mailing address? (ENTER ADDRESS, READ BACK SLOWLY TO CONFIRM)	
NAME: _____	
ADDRESS: _____	
CITY: _____	(CATI DISPLAYS STATE)
ZIP CODE: _____	(ACCEPT ELIGIBLE ZIP CODES)

Thank you very much for participating in this important survey.