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Evaluating the Effectivesness of Information Sources regarding HIV Among Gold Miners in Quảng Nam

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SIT Study Abroad

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Abstract

Young migrant males in strenuous manual labor environments represent a high-risk population for the transmission of HIV/AIDS. In Vietnam, gold miners are representative of this high-risk population. Phước Sơn district, Quảng Nam province is home to much of Vietnam's mining activity and has a comparatively high rate of HIV. Previous studies have been done on HIV/AIDS prevalence in Quảng Nam as well as related knowledge and practices. This analysis of a 2014 questionnaire examines the effects of varying information sources on HIV/AIDS knowledge.

The sample of workers was mostly male and between 25 and 49 years old. Migrants made up half of the workers sampled. In total, the high-risk population of young male migrant workers represented a little more than one-third of miners polled. The proportion of workers with correct transmission knowledge was 36.38%, correct prevention knowledge was 24.38%, and correct general knowledge was 21.12%. General education, reading books, or consulting a healthcare professional as a source for HIV/AIDS information increased the chances of correct knowledge for otherwise similar individuals.

Gold mine workers in Quảng Nam who use books or healthcare professionals as a source of information have significantly greater probability of having correct knowledge of HIV/AIDS. Increasing access to healthcare professionals and literature would be most effective towards improving knowledge.

Keywords: Public Health, Occupational Health and Safety, Health Education

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Definition of Terms

AIDS – Acquired immunodeficiency syndrome is the final stage of the HIV disease resulting in a damaged immune system and vulnerability to infections and opportunistic illness (Centers for Disease Control and Prevention, 2014).

Confounding variable – A variable that correlates with both the independent and dependent variable and therefore can influence results in outwardly unapparent ways.

Dependent variable – A variable that represents the outcome or affect of a series of independent variables.

Dichotomous variable – A variable that has two levels or categories for response. Also referred to as a binary variable.

HIV – Human immunodeficiency virus is the virus that can lead to AIDS and is transmitted through bodily fluids (Centers for Disease Control and Prevention, 2014).

Independent variable – A variable that represents inputs or causes for a dependent variable or event.

Nominal variable – A variable that has two or more categories for response, but no intrinsic order to the categories.

Null hypothesis – The default assumption that there is no relationship between two measured variables. Statistically significant results work to reject the null hypothesis (i.e. say that there *is* a relationship between two measured variables).

Odds ratio – Odds are defined as the probability of success (p) divided by the probability of failure (q). An odds ratio is the odds of one scenario divided by the odds of another. For example, the probability of a fair coin landing on heads is 50% (p = 0.5) and the probability of tails is 50% (q = 0.5). The odds of the coin landing heads are $\frac{p}{q} = \frac{0.5}{0.5} = 1$ or 1:1. The probability of an unfair coin landing on heads is 75% (p = 0.75) and landing on tails is 25% (q = 0.25). The odds of the unfair coin landing on heads are $\frac{p}{q} = \frac{0.75}{0.25} = 3$ or 3:1. The odds ratio of getting heads for a unfair coin versus a fair coin are $\frac{0.75/0.25}{0.50/0.50} = \frac{3:1}{1:1} = \frac{3}{1}$ or 3:1, showing that an unfair coin is more likely to land on heads than a fair coin.

Ordinal variable – Variables that have two or more categories for response where the categories can be ordered or ranked.

Introduction

HIV/AIDS is a global pandemic and a defining public health issue of the 21st century. Southeast Asia is the second most afflicted region after sub-Saharan Africa, with an estimated 4 million cases of HIV, representing 12% of the HIV-positive population worldwide (UNAIDS, 2013). According to the most recent estimates and projections from 2014, there are 256,000 people living with HIV in Vietnam, which translates to a prevalence of 0.26% (National Committee for AIDS, Drug, and Prostitution Prevention and Control, 2014).

When examining HIV/AIDS it is important to consider population mobility. Migrant male workers are considered one of many high-risk populations of HIV transmission (Viet Nam Commission for Population, Family and Children, the Ministry of Health, and the Population Reference Bureau, 2006). A 2008 report by the Commission of AIDS in Asia detailed this problem saying:

> In Viet Nam, high levels of injecting drug use and sex work among young male migrant workers (16–26 years of age) underline the need for prevention programmes that reach migrants (Commission on AIDS in Asia, 2008).

Miners are largely typical of this high-risk population. Previous studies in South Africa and Zambia have shown that miners represent a "unique risk in respect to HIV transmission" (International Finance Corporation, 2004). These risks are elevated due to the labor-intensive work, young male population, constant prospect of mutilation or fatal accidents,

conducive environment for establishing new or casual sexual relationships, and rampant intravenous drug use.

Quảng Nam province, located on the South Central Coast region of Vietnam is home to two of largest gold mines in Vietnam. There are two major legal mining operations as well as a variety of illegal and private operations that employ tens of thousands of workers (Diêm, 2014). Phước Sơn district, a rural district near the Laos border, is home to much of the mining activity and has the highest rate of HIV/AIDS in Quảng Nam.

The most recent report on the state of HIV/AIDS in Vietnam admits, "people's knowledge and practices relating to HIV AIDS prevention are still limited" (National Committee for AIDS, Drug, and Prostitution Prevention and Control, 2014). The Vietnamese government has made many efforts to increase HIV/AIDS knowledge among high-risk populations as well as the general public. Most notably, the Information, Education, and Behavior Change Communication has implemented a variety of programs to enhance related knowledge. A 2012 Vietnam AIDS response progress report stated that, "magazines, television programmes, newspapers, bulletins, posters, banners leaflets and campaigns featuring HIV campaign messages have been delivered to key populations at higher risk as well as the general population" (National Committee for AIDS, Drug and Prostitution Prevention and Control , 2012). Considering the investment made in distributing information through a variety of mediums, it is essential to better understand which methods of conveying information are most effective in informing correct HIV/AIDS knowledge.

In 2014, Ms. Nguyễn Thị Ngọc Diễm conducted a survey of gold miners in Quảng Nam province, Phước Sơn district related to demographics, sources of information,

knowledge, and practices related to HIV/AIDS. From this survey, Diễm analyzed the association between "correct" knowledge and "correct" practices. This paper will analyze the association between sources of HIV/AIDS information and "correct" knowledge, using data collected from Diễm's survey. By looking at sources of information, we can better understand the effectiveness of different mediums for transmitting public health information related to HIV/AIDS for this population.

Methodology

Sampling

Ms. Diễm and her fellow researchers at the School of Public Health developed the survey used for collecting the data related to HIV/AIDS knowledge and practices in Quảng Nam. The target population for this study was gold miners working in gold mines in Phước Sơn district, Quảng Nam province. The target sample size for statistical significance was determined to be n = 760 (Diễm, 2014).

A cluster sampling method was used to determine the sample for survey distribution. From a list of the 15 gold mine sites in Phước Sơn, four were randomly selected. From those four randomly selected locations, the survey was successfully distributed to 767 workers. Participation in the survey was voluntary and workers were not compensated in any form. Participants were excluded if they were determined to be unable to read and write. Of the 767 workers, selected to receive the survey, all of them responded (Diêm, 2014).

Questionnaire

The questionnaire as distributed consisted of 35 questions, with both free form and multiple-choice responses. A translated version of the questionnaire is attached in the appendix (**Appendix – A2**). The questions were divided into four sections consisting of social characteristics (seven questions), sources of information (six questions), knowledge of HIV/AIDS (ten questions), and practices related to HIV/AIDS (twelve questions). The wording and design of survey was developed and determined in conjunction with researchers from the School of Public Health. After a successful pilot study of 30

respondents, Ms. Diễm and a team of trained supervisors administered the questionnaire over two weeks.

Data Use Ethics

I submitted a formal request to use the data to Ms. Diễm and the School of Public Health. Ms. Diễm included a letter of approval for use of the data with the stipulation that I not redistribute the data to any colleagues or institutions, I not modify any original documentation prepared for the initial study, and the data is only used for the purpose of the study as proposed. I received the data set in raw CSV format from Mr. Tuấn and Ms. Diễm. With regard to ethics, the data set that I was provided included no personal identifiers. I proceeded to code all of the variables and appropriate responses and label all of the data for processing. STATA13 and Excel were used for all data analysis work.

Data Processing

From the social characteristics questions, variables were created describing various demographics. Age was coded as a continuous variable calculated by subtracting the birthdate from the current year, 2014. Age was also coded into an ordinal variable splitting the workers into three groups: 15-24 years old, 25-49 years old, and >= 50 years old. Sex was coded as a dichotomous variable with choices “male” or “female.” Race was coded as a dichotomous variable with “Vietnamese or “other.” Home province was coded as a series of nominal variables for each province with one or more respondent. This data was coded into a dichotomous variable denoting migrant status for those not from Quảng Nam. Education was coded as an ordinal variable with choices for “literate” and four consecutively increasing levels of education: grades 1-5, grades 6-9, grades 10-12, and

education beyond high school. Marital status was coded as an ordinal variable with choices for never married, married, separated/divorced, living with a partner as a couple, and widowed. Time working in the gold mines was recorded as a nominal variable describing the years working at the time of the administering of the questionnaire. An ordinal variable was created describing the years worked in four categories: <1 year, 1-2 years, 3-5 years, and > 5 years.

From questions regarding sources of information, variables were created to describe where gold miners received HIV/AIDS information. Weather or not the workers had heard of HIV/AIDS was coded as a dichotomous variable with choices "yes" or "no." Sources of knowledge were defined for miners both before working in the gold mine and while working in the gold mine. Each source of information was coded as "yes" or "no" if it was used as a source or not. Sources of information included television; internet; books and newspapers; banners, posters, or billboards; radio; healthcare workers; relatives; friends; peers; or other.

Questions related to HIV/AIDS knowledge were also coded into a series of variables for analysis. Knowledge of HIV was coded as a dichotomous variable equal to "yes" if the respondent identified HIV as a "virus that weakens the human immune system," and "no" otherwise. Knowledge of AIDS was coded as a dichotomous variable equal to "yes" if the person surveyed identified AIDS as "an acquired immunodeficiency syndrome caused by HIV," and "no" otherwise. Knowledge of HIV transmission was coded as a dichotomous variable equal to "yes" if the respondent correctly demonstrated knowledge that HIV can be transmitted from person to person, and "no" otherwise. Modes of HIV transmission was coded as a series of dichotomous variables for each method of transmission listed in the

questionnaire. Correct transmission knowledge was created as a dichotomous variable coded to "yes" if the respondent correctly identified blood, sex, mother-to-child, and sharing needles as modes of HIV transmission and no other incorrect modes, and "no" otherwise. Outwardly health people having HIV was coded as a dichotomous variable equal to "yes" if the respondent correctly answered that an outwardly healthy looking person can have HIV, and "no" otherwise. Who can have HIV was coded as a dichotomous variable equal to "yes" if the respondent identified that "anyone can be infected by HIV," and "no" if otherwise. Can HIV be prevented was coded as a series of dichotomous variables for each method of prevention listed in the questionnaire. Correct prevention knowledge was created as a dichotomous variable coded to "yes" if the respondent identified condom use during sex, not sharing needles, blood safety, and not giving birth if infected with HIV as methods of prevention and no other incorrect methods, and "no" otherwise. Mother-to-child transmission is as a dichotomous variable coded as "yes" if the respondent identified that if a mother infected with HIV gives birth to a child, "the child may be infected with HIV," and "no" if otherwise. How to tell if a person is infected with HIV is a dichotomous variable coded as "yes" if the respondent selected the correct response, "only an HIV test can determine if someone has HIV," and "no" otherwise. Cure for AIDS is the final knowledge related variable and is coded as "yes" if the respondent correctly identified that "there is no cure for AIDS," and "no" otherwise.

Twelve questions on practices related to HIV/AIDS were asked to all questionnaire recipients. Although the variables related to these questions were coded for use in future analysis, I will not detail them here because they were not used in this study.

Defining HIV/AIDS Knowledge

For my analysis, I created a dichotomous variable called *correct knowledge*. The methodology for creating this variable came from an understanding of previous definitions of "correct" HIV/AIDS knowledge. Other studies have defined "correct" knowledge as eight out of ten correct responses to questions related to HIV/AIDS (Diễm, 2014). Although this approach is useful for its simplicity, it provides even weight to a series of questions, some of which are more important in the understanding of HIV/AIDS. For example, a person not knowing that HIV is transmitted by sex and that healthy looking people have HIV can still be determined to have "correct" knowledge using the eight out of ten criteria, even though they have exhibited an important lack of knowledge about HIV/AIDS.

For the purpose of this study, I defined "correct" knowledge related to HIV/AIDS through a combined knowledge of transmission and prevention. The respondent must show knowledge in these two categories in order to be determined to have "correct" knowledge. For transmission, the respondent must identify the four modes of HIV transmission in the questionnaire (question **C4**) and must not select an incorrect mode. For prevention, the respondent must identify the four modes of HIV prevention in the questionnaire (question **C7**) and must not select an incorrect mode. This definition is no doubt more strict than previous definitions of correct knowledge because it adheres to a correct comprehension of HIV transmission and prevention without allowances for misunderstanding.

Logistic Regression

For the purpose of analysis, I used logistic regression to address the question of which sources of information were most influential in determining correct knowledge of

HIV/AIDS. Logistic regression is a probabilistic statistical classification model that measures the relationship between a dichotomous dependent variable and one or more independent variables. The dependent variable is *correct knowledge* (0 if not correct knowledge, 1 if correct) and the independent variables included a mix of demographic information and the sources of information.

The first iteration of my analysis was completed through building a full model that included independent demographic variables of *age*, *sex*, *migrant status*, *ethnicity*, *education, marital status, years worked* as well as all sources of information for HIV/AIDS while working in the gold mine. By including demographic variables, logistic regression is able to control for any potential confounders.

For the second iteration of my model, I removed factors that seemed to have little impact (high p-values) on the accuracy of the model. Upon each successive iteration of my model, I ran a likelihood-ratio test of the null hypothesis that the coefficients left out of the model have no effect. Using this diagnostic test, I removed *marital status* ($p = 0.238$), *tv_during* ($p = 0.077$), *internet_during* ($p = 0.993$), *radio_during* ($p = 0.590$), *posters_during* ($p = 0.199$), *relatives_during* ($p = 0.371$), *friends_during* ($p = 0.184$), and *peers_during* ($p = 0.128$). After running a likelihood-ratio test for each new model, I ensured that no significant factors were being removed at each step.

The final iteration of my model included relevant demographic predictors of age, sex, migrant status, and education, as well as books, and physicians as sources of information. The final model insured statistical significance for nearly all included variables as well as a statistically significant likelihood ratio chi-squared value ($p < 0.05$), indicating that the model result is significant.

Results

Demographics (See Appendix, Table 1)

The sample of 767 gold miners yielded a variety of demographic results. 93.35% of the sample was male and 72.75% of participants were between 25 and 49 years old. There was a large overlap between these two categories with 67.93% of the sample being males between the ages of 25 and 49. The majority of those sampled were Vietnamese (80.18%) and the home province of workers was split evenly between Quảng Nam and other provinces (49.54% and 50.46% respectively). Of the 387 individuals labeled as migrants, 287 were between the ages of 25 and 49 years old, making up 74.16% of that subgroup.

Education levels of workers were more evenly distributed, with 32.20% of workers graduating elementary school and 38.33% graduating middle school. Only 23.1% of those sampled have a high school or greater level of education. Migrant workers showed significantly lower levels of education with 47.54% of migrants with an education level of middle school or greater; where as 71.84% of non-migrants had an education level of middle school or greater. The difference in these two percentages was statistically significant ($z = 7.40$, $p = 0.000$).

Marital status was varied with 55.80% of those sampled currently married, and 33.12% unmarried. The majority of workers have worked in the gold mine for one to five years (82.66%) and only 11.47% have been working more than five years.

Knowledge (See Appendix, Table 2)

Sex was the most commonly attributed method of HIV transmission (89.53%) followed by blood (82.54%) and needles (71.71%). Insects and sharing food were the two most commonly incorrectly attributed methods of transmission at 16.30% and 14.47%

respectively. 279 individuals (36.38%) correctly identified all four correct sources of transmission with no false positives (**Table 2.1**).

Wearing condoms during sex was the most commonly cited correct method of prevention at 83.57%, followed by not sharing needles (78.49%) and blood safety (61.93%). Washing genitals after sex was the most commonly cited incorrect method of prevention, with 34.68% of respondents identifying it as such. 187 individuals (24.38%) correctly identified all four correct sources of prevention with no false positives (**Table 2.2**).

General knowledge of HIV was more varied. The majority of those sampled knew that HIV was transmissible between humans (92.18%) and that it causes immunodeficiency in humans (84.88%). Less commonly identified general knowledge included that AIDS has no cure (55.80%) and that HIV can be transmitted from mother-to-child (35.85%)

Correct knowledge has been defined as correct transmission knowledge paired with correct prevention knowledge. 162 of the 767 respondents (21.12%) were identified to have correct knowledge while 605 (78.88%) did not have correct knowledge (**Table 2.3**).

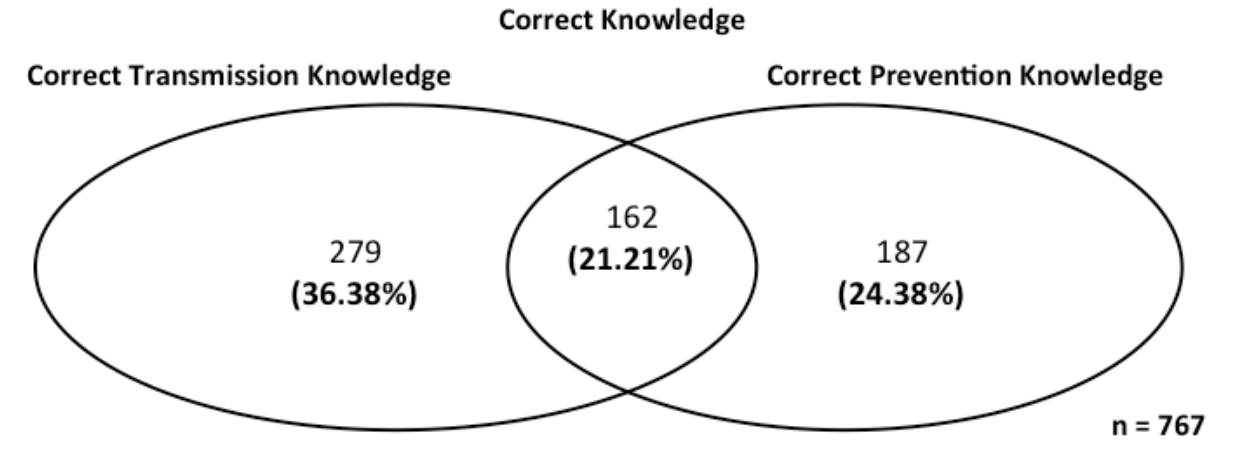

Figure 1 – Venn diagram representing the overlap between those with correct transmission knowledge and correct prevention knowledge

Regression

Using STATA, I built a multi-vitiate logistic regression model the general equation (where p is the probability of correct HIV/AIDS knowledge): $\text{logistic}(p) = p/(1-p) = \beta 0 + \beta 1*x1 + \beta 2*x2 + \ldots + \beta n*xn$.

After settling upon the final model, my logistic regression model used the equation: $\text{logistic}(p) = p/(1-p) = \beta 0 + \beta 1*$**age_cat** $+ \beta 2*$**sex** $+ \beta 3*$**migrant** $+ \beta 4*$**edu_level1** $+ \beta 5*$**edu_level2** $+ \beta 6*$**edu_level3** $+ \beta 7*$**edu_level4** $+ \beta 8*$**books_during** $+ \beta 9*$**physician_during**.

```
. logistic correct_knowledge age male migrant i.education books_during physician_during

Logistic regression                                     Number of obs   =        632
                                                        LR chi2(9)      =     155.76
                                                        Prob > chi2     =     0.0000
Log likelihood = -249.93841                             Pseudo R2       =     0.2376

------------------------------------------------------------------------------
correct_knowledge | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------+-----------------------------------------------------------
          age_cat |   .9919279   .0110565    -0.73   0.467     .9704925    1.013837
             male |   1.750833   .7970669     1.23   0.219      .717357    4.273211
          migrant |   2.668346    .699133     3.75   0.000     1.596684    4.459286
                  |
        education |
 Elementary level |   .7511978    .501667    -0.43   0.668     .2029096    2.781033
Middle school level |  2.229684   1.428933     1.25   0.211     .6349442    7.829808
  High school level |  15.69168   10.18427     4.24   0.000     4.397643    55.99111
Beyond high schoo.. |  15.89414    12.6177     3.48   0.000     3.353535    75.33053
                  |
      books_during |   2.040932   .6119791     2.38   0.017     1.133949    3.673362
  physician_during |   3.066803    1.01487     3.39   0.001     1.603265    5.866329
             _cons |   191277.3    4195468     0.55   0.579     4.09e-14    8.95e+23
------------------------------------------------------------------------------
```

Figure 2 – Output from STATA13 logistic regression model for correct knowledge. Coefficients with P>|z| values < 0.05 were determined to be statistically significant.

The output from logistic regression is described in terms of odds ratios (explained in my definition of terms section). Standard errors are associated with coefficients and are calculated by testing weather the parameter is significantly different from 0. P-values are calculated probabilities testing the null hypothesis that the coefficient is equal to 0 (i.e. there is no relationship). Each p-value is compared to a preselected threshold of significance called alpha (α). For the purpose of this study α was selected to be equal to 0.05, indicating a significant result if there was less than a 5% chance of a type-I error in which we incorrectly reject the null hypothesis. A result would be determined to be statistically significant if $p < 0.05$.

Migrant status was a significant factor with migrants exhibiting an expected 2.67 increase in odds over their otherwise similar non-migrant counterparts. The education gap from middle school to high school level was significant as well with an odds ratio of 15.69 (95% confidence: 4.40, 56.00). The education gap from high school to beyond high was also significant with an odds ratio of 15.89 (95% confidence: 3.35, 75.33). Both of these coefficients have high standard errors of 10.18 and 12.61 respectively, producing a large range for the 95% confidence intervals for the true odds ratio values.

In terms of sources of information, the two mediums that proved to be statistically significant were obtaining HIV/AIDS information from books or physicians. Those who received HIV/AIDS information from a book while working in the gold mine had an expected 2.04 increase (95% confidence: 1.13, 3.67) in the odds of correct knowledge when compared with their otherwise similar non-book counterparts. Similarly those who received information from a physician had an expected 3.06 increase (95% confidence: 1.60, 5.68) in the odds of correct knowledge.

Discussion

Demographics

Gold miners were selected as a sample for their high-risk characteristics. In terms of the demographics results from the data, the sample represents many indicators of a high-risk population. The overwhelming majority of the sample was male. In Vietnam, men are twice as likely to have HIV than women (Viet Nam Commission for Population, Family and Children, the Ministry of Health, and the Population Reference Bureau, 2006). The majority of the sample was also within the range of 25-49 years old, which is the age range in which 97% of all HIV cases were reported in Vietnam in 2005 (Viet Nam Commission for Population, Family and Children, the Ministry of Health, and the Population Reference Bureau, 2006).

Migrant's, which are recognized as a high-risk HIV population, represented a little more than half of the sample. The generally low education level (majority of the sample did not have more than a middle school education) is typical of a mining population. Because the work is labor intensive more than intellectually demanding, the type of worker suited for the job usually does not need an advanced education. Finally, the fact that 82.66% of workers have worked between 1-5 years in the mine is indicative of the harsh labor conditions. As recently as January of 2014, the collapsing of illegal gold mines in Phước Son "continued to be a problem" with 12 deaths since April of 2014 (Việt Nam News, 2014). These harsh labor conditions can push workers (especially young ones) towards risky behaviors (International Finance Corporation, 2004).

Knowledge

Knowledge of HIV/AIDS (21.12%) was low in comparison to Ms. Diễm's study, in which she observed 29.6% of the sample with correct general knowledge. A two-sample test of proportions indicated that the difference between the two definitions of correct knowledge was significant ($p = 0.00$). This result was also low in comparison to a 2011 study of garment workers in Deng and a 2010 study of food industry workers in Pham Duc Long. This is likely due to the more stringent definition of "correct" knowledge used in this study.

Regression

The multi-vitiate logistic regression model yielded a variety of results. The key aspect of regression is that it controls for any potentially confounding variables. By including age, sex, migrant status, and education in the model, the coefficients for the remaining independent variables in the model are able to account for these demographic discrepancies. The coefficient outputs in are therefore listed as odds ratios comparing otherwise similar individuals with respect to their potentially varied demographic backgrounds. For example the 2.67 odds ratio coefficient for migrant status can be interpreted in a variety of ways. At its core, it is understood as a 2.67 increase in odds for migrants as compared to their otherwise similar non-migrant counterparts. Using the **prtab** command from the "spostsup" package for STATA, we can view these odds using predicted probabilities with all other model inputs held at their mean.

Predicted Probability of Correct Knowledge *(Actual probability = 21.21 %)*		
Sex		**Probability**
	Male	15.10%
	Female	23.22%
Age Category		
	15 - 24 years old	18.62%
	25 - 49 years old	16.25%
	>= 50 years old	16.25%
Home Province		
	Quảng Nam	9.72% ◆
	Other	23.01% ◆
Education Level		
	Literate	1.79%
	Elementary	6.22%
	Middle school	19.44%
	High school	46.75% ◆
	Beyond high school	76.15% ◆
Books as a source of information		
	Don't use books	14.16% ◆
	Use books	24.17% ◆
Healthcare professional as a source of information		
	Don't use healthcare professional	14.13% ◆
	Use healthcare professional	33.30% ◆

Figure 3 – Predicted probabilities of "correct" knowledge using the final logistic regression model. Statistically significant results denoted with a "◆".

Migrant status, now seen through the lens of predicted probability, shows a 9.72% predicted probability of correct knowledge for non-migrants and a 23.01% predicted probability of correct knowledge for migrants. The 23.01% predicted probability is not significantly above the mean actual probability of correct knowledge of 21.12%, but the result is significant in demonstrating that non-migrants demonstrate significantly less knowledge. This result in particular is surprising because many suggest that migrants

represent a high-risk population. An explanation for the result might be the migrants are more aware of HIV/AIDS because of their heightened risk.

Education level shows an extreme impact through predicted probabilities for those with a high school education and beyond high school education, exhibiting 46.75% correct knowledge and 76.15% correct knowledge respectively. These two results, although significant, must be taken with context considering the very high standard error and large 95% confidence interval for the true odds ratios. This large error margin is likely due to small sample size, as only a quarter of the sample fall into these two levels of education.

For the two significant sources of information, those who read books while working in the gold mine had a predicted probability of correct knowledge of 24.17% while their otherwise similar counterparts who did not list books as a source of information had a 14.16% probability. Those receiving information from healthcare professionals had a predicted probability of correct knowledge of 33.30% while their otherwise similar counterparts who did not list healthcare professionals as a source of information had a 14.13% probability.

Both of these results were determined to be significant, although there is the question of confirmation bias in both of these cases. Those receiving information about HIV/AIDS from a book, or especially through a healthcare worker might be seeking the information for a specific purpose. The underlying motivation or happenstance in which the information is distributed is potentially confounding.

From these results, the most impactful recommendation that can be made in terms of shaping future policy related to increasing HIV/AIDS knowledge is to provide general education as well as access to healthcare professionals and appropriate literature. There is

clearly demand for accurate information, with 76.92% of workers surveyed saying that they would like more information related to HIV/AIDS (**B6**).

Education, especially beyond the high school level, was the most impactful factor in terms of improving the predicted probability of correct knowledge. Encouraging and increasing access to general education obviously has many benefits, but one of the major potential unforeseen benefits would be an increase in knowledge about HIV/AIDS and potential reductions in HIV rates.

Literature, in the form of short, targeted books are relatively inexpensive method of communication that has shown to be an effective source of information. An example of this type of book can be seen in informational materials produced by the Ministry of Construction and Leonito Vietnam for construction workers and truck drivers working on a power plant in Son La province (International Organization for Migration, 2009). Construction workers and truck drivers, like gold miners, represent a high-risk population for HIV transmission. These informational booklets can be distributed free of charge to a specific target group, and contain basic facts and figures related to HIV/AIDS.

Increasing access to healthcare professionals, weather through physicians or trained community members is also an effective source of information for effecting HIV/AIDS knowledge. The rural environment of Phước Son poses many difficulties for healthcare professionals. The lack of infrastructure makes accessibility difficult, especially for illegal miners working at hidden or hard to discover mining locations. By allowing more access for gold miners to consult healthcare workers, general knowledge can be improved.

Limitations

Although the sample size was determined to be statistically sufficient to draw conclusions from, having a larger sample would help in lowering the error margin for categorical variables with less data. Additionally, due to the sensitive nature of the topic of HIV/AIDS, as well as certain questions that might be highly personal, it is possible that respondents were not truthful in their responses. There also may be additional confounding factors not accounted for in the model or in the questionnaire.

Conclusions

The demographics of the gold miners sampled showed characteristics of a high-risk population. The proportion of workers with correct HIV/AIDS knowledge was 21.12%. Migrants, although typically a high-risk population, had higher predicted probabilities of correct knowledge than their otherwise similar non-migrant counterparts. Education played a large role in effecting correct knowledge with a predicted probability of correct knowledge of 46.75% for those who completed high school, and 76.15% for those who completed education beyond high school.

The sources of information that most impacted knowledge were books and healthcare professionals. Those who used books as a source of information had 1.93 greater odds of correct knowledge than otherwise similar counterparts who did not. Those who used healthcare professionals as a source of information had 3.03 greater odds than otherwise similar counterparts who did not.

Through an understanding of the effectiveness of various sources of information, we can conclude that investment in targeted literature or improving access to healthcare professionals will have the most impact on correct HIV/AIDS knowledge.

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Appendix – A1 Tables

Table 1

Demographics (n = 767)			
Sex		**Amount**	**Percent**
	Male	716	93.35%
	Female	51	6.65%
Age Category			
	15 - 24 years old	195	25.42%
	25 - 49 years old	558	72.75%
	>= 50 years old	14	1.83%
Ethnicity			
	Vietnamese	615	80.18%
	Other	152	19.82%
Home Province			
	Quảng Nam	380	49.54%
	Other	387	50.46%
Education Level			
	Literate	48	6.26%
	Elementary	247	32.20%
	Middle school	294	38.33%
	High school	148	19.30%
	Beyond high school	30	3.91%
Marital Status			
	Unmarried	254	33.12%
	Married	428	55.80%
	Separated/Divorce	51	6.65%
	Living with a partner as a couple	25	3.26%
	Widowed	9	1.17%
Years Worked			
	< 1 year	45	5.87%
	1 - 2 years	342	44.59%
	3 - 5 years	292	38.07%
	> 5 years	88	11.47%

Table 2

Knowledge of Transmission (n = 767)		
Transmission Source	**Amount**	**Percent**
Sex [Correct]	689	89.83%
Blood [Correct]	633	82.53%
Needles [Correct]	550	71.71%
Mother-to-child [Correct]	499	65.06%
Insects [Incorrect]	125	16.30%
Food [Incorrect]	111	14.47%
Contact [Incorrect]	99	12.91%
Bathroom [Incorrect]	53	6.91%
Unknown	22	2.87%
Knowledge of Prevention (n = 767)		
Prevention Method	**Amount**	**Percent**
Condoms during sex [Correct]	641	83.57%
Not sharing needles [Correct]	602	78.49%
Blood safety [Correct]	475	61.93%
Not having children with HIV [Correct]	473	61.67%
Wash genitals after sex [Incorrect]	266	34.68%
Not eating with people with HIV [Incorrect]	138	17.99%
Avoiding mosquito bites [Incorrect]	115	14.99%
Can't be prevented	53	6.91%
General Knowledge (n = 767)		
Correct knowledge	**Amount**	**Percent**
HIV can be transmitted from one person to another	707	92.18%
HIV is a virus that causes immunodeficiency in humans	651	84.88%
AIDS is an immunodeficiency syndrome caused by HIV	575	74.97%
Outwardly healthy looking people can get HIV	570	74.32%
Anyone can be infected by HIV	550	71.71%
Only an HIV test can determine an infection	534	69.62%
There is no cure for AIDS	428	55.80%
Mother-to-child transmission	275	35.85%

Table 2.1

Transmission Knowledge (n = 767)		
	Amount	**Percent**
Correct transmission knowledge	279	36.38%
Incorrect transmission knowledge	488	63.62%

Table 2.2

Prevention Knowledge (n = 767)		
	Amount	**Percent**
Correct prevention knowledge	187	24.38%
Incorrect prevention knowledge	580	75.62%

Table 2.3

Correct Knowledge (n = 767)		
	Amount	**Percent**
Correct knowledge	162	21.21%
Incorrect knowledge	605	78.88%

Table 3

Correct Knowledge (n = 767)		
Sex		**Predicted Probability of Correct Knowledge**
	Male	15.10%
	Female	23.22%
Age Category		
	15 - 24 years old	18.62%
	25 - 49 years old	16.25%
	>= 50 years old	16.25%
Home Province		
	Quảng Nam	9.72%
	Other	23.01%
Education Level		
	Literate	1.79%
	Elementary	6.22%
	Middle school	19.44%
	High school	46.75%
	Beyond high school	76.15%
Books as a source of information		
	Don't use books	14.16%
	Use books	24.17%
Healthcare professional as a source of information		
	Don't use healthcare professional	14.13%
	Use healthcare professional	33.30%

APPENDIX – A2 TRANSLATED QUESTIONNAIRE

INTERVIEW QUESTIONAIRE

KNOWLEDGE OF HIV/AIDS AMONG GOLD MINE WORKERS

IN PHUOC SON DISTRICT, QUANG NAM PROVINCE

Date of completion: ...../...../2014.

Hello!

In order to serve the goals of improving health care for everyone, we are conducting a survey of knowledge and practices on HIV/AIDS of gold miners in Phuoc Son district, Quang Nam province. Results of the survey will be the basis for planning communications, health education, policies related to health services, and contributing to better health of the people.

We declare that all information you provide will be kept **completely confidential** and **will only be used for the purpose of research**. To achieve significance in this survey, **we ask for your full participation and honesty while answering these questions**.

You may choose not to answer by marking the (X) in the appropriate choice.

Code	Question	Answer	Notes
A. BACKGROUND INFORMATION			
A1	Year of birth	.....	*Specify*
A2	Sex	[ ] 1. Male [ ] 2. Female	
A3	Ethnicity	[ ] 1. Vietnamese [ ] 2. Other	
A4	Home country	.....	*Specify*
A5	Education level	[ ] 1. Ability to read and write [ ] 2. Level I [ ] 3. Level II [ ] 4. Level III [ ] 5. Greater than level III	
A6	Marital status	[ ] 1. Never married [ ] 2. Married [ ] 3. Separated/divorced [ ] 4. Living with a partner as a couple [ ] 5. Widowed	
A7	How long have you worked at the gold mine?	.....Years If less than 1 year, please specify the number of months worked .....Month(s)	*Specify*
B. SOURCES OF INFORMATION			
B1	Before working in the gold mine, had you heard of HIV/AIDS?	[ ] 1. Yes [ ] 2. No	*If you select **2** move to **B3***
B2	Before working in the gold mine, what sources of information did you hear about HIV/AIDS?	[ ] 1. Television [ ] 2. Internet [ ] 3. Books [ ] 4. Radio [ ] 5. Employee Health [ ] 6. Posters, leaflets, billboards [ ] 7. Relatives [ ] 8. Friends [ ] 9. Peers [ ] 10. Other (specify).....	*It is possible to select multiple answers*

B3	While working in the gold mines, had you heard of HIV/AIDS?	[ ] 1. Yes [ ] 2. No	*If you select **2** move to **B5***
B4	While working in the gold mines, where did you hear about HIV/AIDS from?	[ ] 1. Television [ ] 2. Internet [ ] 3. Books [ ] 4. Radio [ ] 5. Employee Health [ ] 6. Posters, leaflets, billboards [ ] 7. Relatives [ ] 8. Friends [ ] 9. Peers [ ] 10. Other (specify).....	*It is possible to select multiple answers*
B5	Which of these sources of information on HIV/AIDS do you prefer?	[ ] 1. Television [ ] 2. Internet [ ] 3. Books [ ] 4. Radio [ ] 5. Employee Health [ ] 6. Posters, leaflets, billboards [ ] 7. Relatives [ ] 8. Friends [ ] 9. Peers [ ] 10. Other (specify).....	*It is possible to select multiple answers*
B6	Do you desire more information on HIV/AIDS?	[ ] 1. Yes [ ] 2. No	

C. KNOWLEDGE OF HIV/AIDS			
C1	According to you, what is HIV?	[ ] 1. A non-communicable disease [ ] 2. A virus that weakens the human immune system [ ] 3. A cancer [ ] 4. Other (specify)	
C2	According to you, what is AIDS?	[ ] 1. An acquired immune deficiency syndrome caused by HIV [ ] 2. A cancer [ ] 3. A genital disease [ ] 4. Other (specify)	
C3	According to you, can HIV be transmitted from person to person?	[ ] 1. Yes [ ] 2. No [ ] 3. Do not know	
C4	According to you, can HIV be transmitted through the following?	[ ] 1. Blood [ ] 2. Sex [ ] 3. Mosquitos or bug bites [ ] 4. Mother to child transmission [ ] 5. Sharing a bathroom [ ] 6. Sharing needles [ ] 7. Shaking hands or kissing someone with HIV [ ] 8. Eating with someone with HIV [ ] 9. Do not know	*It is possible to select multiple answers*
C5	According to you, can an outwardly healthy looking person have HIV?	[ ] 1. Yes [ ] 2. No [ ] 3. Do not know	
C6	According to you, who may be infected with HIV?	[ ] 1. Only injection drug users [ ] 2. Only people who are sexually active [ ] 3. Only homosexuals [ ] 4. Anyone can be infected with HIV	
C7	According to you, can HIV be prevented in any way?	[ ] 1. Cannot be prevented [ ] 2. Condom use when having sex [ ] 3. Not sharing food with someone with HIV [ ] 4. Not using the same needles [ ] 5. Avoid mosquito bites [ ] 6. Blood transfusion safety	*It is possible to select multiple answers*

		[ ] 7. Washing the genitals after sex [ ] 8. Not giving birth once infected with HIV	
C8	According to you, what will happen if an HIV infected mother gives birth?	[ ] 1. The baby will definitely be infected with HIV [ ] 2. The baby will have deformities or birth defects [ ] 3. The baby may be infected with HIV	
C9	According to you, how do you know a person is infected with HIV?	[ ] 1. Only know through an HIV test [ ] 2. The person will look sickly or emaciated [ ] 3. A person who is HIV positive will have fever, cough, or diarrhea	
C10	According to you, is there currently a cure for AIDS?	[ ] 1. There is a cure [ ] 2. There is no cure [ ] 3. There are partial treatments [ ] 4. Do not know	
D. PRACTICES			
D1	Do you share razors with others?	[ ] 1. Regularly share [ ] 2. Occasionally share [ ] 3. No	
D2	Do you share a toothbrush with others?	[ ] 1. Regularly share [ ] 2. Occasionally share [ ] 3. No	
D3	Do you share nail clippers with others?	[ ] 1. Regularly share [ ] 2. Occasionally share [ ] 3. No	
D4	Have you ever gotten a tattoo?	[ ] 1. Yes [ ] 2. No	

D5	Have you ever injected drugs?	[ ] 1. Yes [ ] 2. No [ ] 3. Choose not to answer	*If you selected **2,3** move to **D7***
D6	Have you used the same needle to prick you?	[ ] 1. Regularly share [ ] 2. Occasionally share [ ] 3. No	
D7	Have you ever had sex outside of marriage with a partner of the opposite sex?	[ ] 1. Yes [ ] 2. No [ ] 3. Choose not to answer	*If you selected **2,3** move to **D9***
D8	Do you use a condom when having sex outside of marriage with a partner of the opposite sex?	[ ] 1. Always use [ ] 2. Occasionally use [ ] 3. No	
D9	Have you had sex with a partner of the same sex?	[ ] 1. Yes [ ] 2. No [ ] 3. Choose not to answer	*If you selected **2,3** move to **D11***
D10	Do you use a condom when having sex with partners of the same sex?	[ ] 1. Always use [ ] 2. Occasionally use [ ] 3. No	
D11	Have you had an HIV test?	[ ] 1. Yes [ ] 2. No [ ] 3. Choose not to answer	
D12	Have you received HIV counseling	[ ] 1. Yes [ ] 2. No [ ] 3. Choose not to answer	*End*

THANK YOU FOR YOUR COOPERATION!