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The Association of Substance Use and Depression Among TB Infected Persons Incarcerated in Haitian Prisons

By

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Master of Public Health

Global Epidemiology

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Anne Spaulding, MD, MPH
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The Association of Substance Use and Depression Among TB Infected Persons Incarcerated in Haitian Prisons

By

Lovette Ekwebelem

B.A., Cornell University, 2018

Thesis Committee Chair: Anne Spaulding, MD, MPH

An abstract of
a thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements of the degree of
Master of Public Health in
Global Epidemiology
2022

Abstract

The Association of Substance Use and Depression Among TB Infected Persons Incarcerated in Haitian Prisons
By Lovette Ekwebelem

Background: Persons in low- and middle-income countries experience depression, but less attention is paid to mental health than in higher income countries. Incarcerated persons have high prevalence of mental illness, but little attention has been paid to psychiatric epidemiology in the prisons of low resource nations. Haiti, considered one of the lowest-income countries in the Western hemisphere, has been affected by multiple natural disasters within the past decade, which could predict new sets of both somatic as well as mental health consequences. To surveil for depression, we need to use tools that are ethnoculturally appropriate.

Objective: This cross-sectional analysis assessed the shape and strength of associations with depression measured by the Zanmi-Lasante Depression Symptom Inventory (ZLDSI) scale and its possible markers during a trial to improve TB adherence to TB treatment in a prison.

Methods: We calculated the Cronbach alpha for the scale and then generated binary logistic models to study for association of depression that are associated with cigarette use, marijuana use, and alcohol, accounting for first incidence of incarceration, age, household income, and prison site. This cross-sectional study in 6 prisons across Haiti undergoing a TB treatment study included 50 adults who were aged 18 to 59 years.

Results: Fifty subjects were recruited; age ranged from 18-59 years. The Cronbach alpha score for the ZLDSI scale in this population was 0.77. The overall mean depression score among subjects on the ZLDSI scale was 13.9 (threshold score for depression of 13). Univariate associations were seen between cigarette use, marijuana use, and alcohol consumption with depression. Multivariate analysis showed an association between education and alcohol use, controlling for age.

Conclusion: Our findings suggest an association between substance use and depression; however, our small sample size precluded a significant model that could show a strong association. More research should be conducted to look at the effects of substance use as a proxy for mental disorders on medication adherence.

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Acknowledgements

First, I would like to thank my family and friends for the multiple hours of zoom study sessions, brain breaks, advice, and support that kept me encouraged throughout my time here at Rollins. I want to thank Dr. Spaulding for fostering my admiration for the field of public health through the three classes I have taken by her, and the continued support and guidance she has given me as my thesis advisor. I want to thank Grady's Ponce de Leon Center and the Centers for Disease Control and Prevention (CDC) for collectively providing opportunities to learn numerous technical and interpersonal skills that have been a compliment to my studies while at Rollins. Lastly, I would like to thank my aunts, uncles, and cousins back home in Nigeria who have been cheering me on throughout the years. They are my motivation for studying global health and health disparities.

TABLE OF CONTENTS

Introduction

Tuberculosis Burden

According to the World Health Organization, nearly 10 million people suffer from tuberculosis (TB) – a curable and preventable disease – worldwide, with 98% of those cases reported in low- and middle-income countries (LMICs) (2021). This airborne respiratory infection is spread from person to person. Active TB disease may represent either new infection or reactivation of previously - acquired latent infection.

Prisons represent a dangerous location due to several factors. The congregate nature of prison facilities not just facilitates transmission of airborne organisms, but it also creates the most ideal environment for a maximum likelihood of transmission. Populations in prison are composed of persons who tend to be low-income (Rich et al., 2016). Those who cannot afford adequate legal representation are more likely to not have adequate health care before confinement. This makes them more likely to live with untreated acquired TB. Incarcerated persons are more likely to have TB reactivated either due to co-morbid medical conditions such as HIV, or newly acquired factors such as malnutrition. This holds especially true in lower income countries.

Prison Health in Low- and Middle-Income Countries

Nearly 70% of the world's total prison population is incarcerated in LMICs (Walmsley, 2016). With overcrowding, whereby confined spaces are filled beyond designed capacity, these prisons often having limited space for social distancing. Adding to high population density, poorly designed facilities may have poor to no ventilation. It is no surprise that TB prevalence is up to 20 times higher in LMICs versus high income countries (HIC) (WHO, 2015). This same

association is prevalent within LMIC prisons with these prisons experiencing an 8-fold increase in higher TB incidence compared to HIC prisons (Vinkeles Melchers et al., 2013).

Access to laboratories in LMIC prisons is often inadequate or nonexistent, which delays those who are in prison from obtaining TB test results in a timely manner (Vinkeles Melchers et al., 2013). A lag in diagnosing active disease also places everyone in the facility at risk of contracting an infectious pathogen. With a high prevalence of inadequate frequency of testing, often under-supervised and understaffed prison health services, , and inadequate healthcare infrastructure and resources LMIC prisons witness a higher prevalence of infectious diseases among those who are incarcerated. While treatment is cheap and available due to the national health services, there lies a challenge in getting medications into patients. Additionally, LMIC prisons, especially in a country like Haiti, are often in remote areas of the country, which exacerbates the problems because of shortages of adequately trained health care workers in these parts of the country. According to data from a non-governmental organization working in the prisons of Haiti, TB is a leading cause of death among incarcerated persons (Health through Walls, 2021).

Issues of Adherence to TB Medications in (Haitian) Prisons

Standard treatment for drug-susceptible, active TB requires two months of a four-drug therapy - isoniazid, rifampin, ethambutol, and pyrazinamide - followed by four additional months of the first two agents. Adherence to such a long regimen is challenging to patients everywhere (WHO, 2021). Worldwide, only about half of patients initially complete prescribed treatment for active disease (Brown & Bussell, 2011). Interventions put in place to increase adherence need to focus both on system level and interpersonal/individual level factors.

Munro et al. (2007) conducted a systematic review of the qualitative literature on factors associated with adherence to TB therapy. They can be categorized by what level they affect an individual's health:

Laws and Public Policy:

(1) On a public policy level, the nation's public policy will dictate whether an individual can access treatment. For example, in a country like Haiti, the national TB policy provides medications for all infected persons. In some countries, laws can incentivize completion of either active or preventive treatment.

Financial burden:

(2) On a community level, is there an organizational structure promoting a TB program for the community in question and is funding adequate to make treatment affordable?

Institution:

(3) Even if community factors are addressed, do the institutions within the community support distribution of medications?

Interpersonal factors

(4) Relationship factors which can facilitate or impede adherence to treatment include: healthcare workers, family, and other social support (which could include officers in a correctional setting) for the patient. Important issues such as peer influence, stigma, providing for family, family support, and marriage, to name a few.

Individual factors, which include

(5) Personal characteristics and adherence behavior where important issues were: "Substance abuse (i.e., drugs and alcohol), mental illness (including depression),

ethnic characteristics, residential mobility, religion, personal motivation, gender, difficult cases, structured environment, and personal agency"

(6) Interpretations of illness and wellness

(7) Knowledge attitude and belief—this includes: "Limited understanding of treatment, duration, and consequences of default, beliefs about treatment efficacy, denial and difficulty accepting diagnosis, use of other medication, and treatment requirements"

(8) Side effects of medication

Monro et al. found that there were four main factors that collectively affect adherence to TB treatment: "structural factors, including poverty and gender discrimination; the social context; health service factors; and personal factors" (2007). Some factors identified are not an issue in an adequately resourced prison, such as the organizational structure to treatment and care, and the funding for treatment. Other factors may be problematic everywhere such as interpersonal relationships among those in prison populations. Additionally, substance use exacerbates the problem of adherence. In research from Ahmad Seyed Alinaghi et al., it was found that negative staff experiences, bad reactions with drugs, and other psychosocial and health problems were the most common barriers to health (2016)

Once structural levels were addressed, interpersonal and individual levels could affect adherence to treatment. A survey was conducted among intervention participants and controls to determine if remaining factors that could impact adherence differed. In both the intervention and control prisons, actual adherence to treatment reached 100%, although not all doses of VDOT were recorded electronically. Interpersonal and individual level factors did not appear to play a

role. Nonetheless, we have data on the instruments used in the survey and will observe the validity and reliability of these.

While there are numerous factors influencing a person remaining adherent to their medications, the situation can look slightly different in a prison setting. Medication adherence can be site-dependent in that some sites require all infected persons in a prison population take medications, while other sites may allow people to opt in or out of care. When looking at adherence, it is more of a structural association versus a personal one, which justifies more research needed for understanding the factors associated with continuity of care after a person is incarcerated.

Video Directly Observed Therapy

The current study stems from an examination of TB treatment adherence in the prisons of Haiti, the country with the lowest GDP in the western hemisphere. In Haiti, the national TB program covers medication for all citizens with TB, including those in prison. Nonetheless, prisons often have inadequate staffing to ensure all medication dosing is directly observed by healthcare workers. To address this shortage, Health through Walls (HtW), a non-governmental organization working in Haitian prisons to bring the level of correctional healthcare up to national levels, (*Health Through Walls*, 2021) instituted an intervention of Video Directly Observed Therapy (VDOT).

HtW implemented Video Directly Observed Therapy (VDOT) in prisons that have seen a shortage in prison healthcare staff. VDOT allows for healthcare workers to observe people take their regular medications through a video screen without the need to be physically present. This allows for accountability and increased adherence to medications. Before VDOT, the standard of

care in prisons was Directly Observed Therapy (DOT), where healthcare workers physically watched people take their medications. HtW utilized the asynchronous SureAdhere platform, an application that can be used on a smartphone or tablet. The platform has been utilized in another study to investigate its effectiveness in improving adherence to TB therapy and they reported accurate and significant results (Sekandi et al., 2020).

Mental Health in Prisons

Much of all research pertaining to prevalence of mental illness and suicide risks in prison originates in HICs, further masking the burden of these illnesses on the population. Some struggles that are more pertinent in LMIC prisons versus HIC prisons are the high need for quality treatment and low resources prevalent in most of the prisons (Hill et al., 2022). The health infrastructure in LMICs does not often include mental health in clinical care to communities. In a disaster-stricken area such as Haiti, mental disorders are even more prevalent, causing many people to have trouble with normal daily functions (*Scale up of mhGAP across a Disaster-Affected Region in the Philippines*, 2014).

In LMICs, nearly half of the population who need mental health treatments do not have any access to them (Thornicroft et al., 2017). Worldwide, it is known that those living with mental illnesses are incarcerated at a faster rate than those who do not live with mental illnesses (Lovett et al., 2019). A recent systematic review examined studies from 1966 to 2010 regarding prevalence of psychotic illnesses and major depression in those who were incarcerated (Fazel & Seewald, 2012). They found that a higher presence of mental illness within prison systems compared to the communities in which they reside (Fazel & Seewald, 2012).This serves as more evidence of the critical need for frequent mental health assessments and mental health care workers inside prisons.

Studies have looked at the association between medication adherence and mental health. Mayston et al. conducted an extensive systematic review looking at papers from 2005 and younger that addressed the effect of mental disorders on the treatment of, and/or adherence to, anti-retroviral therapy (ART) for the human immunodeficiency virus (HIV) (2012). The review found moderately strong evidence that mental health and alcohol consumption was associated with lower levels of medication adherence (Mayston et al., 2012). Another study conducted in South Africa found that HIV-positive patients displaying less adherence to medication were three times more likely to have moderate to severe depression compared to those who were more adherent to their medication (Passchier et al., 2018). With infectious disease having such a robust prevention platform in many countries, including LMICs, this could be used as leverage for increased mental health care through combining infectious disease control with mental health therapy and targeting both measures at once (McBain et al., 2021). With a possible opportunity for developing a more effective method of care for infectious disease, more investigation needs to be done into this area of research.

Substance Use

A recent study found that mental health and substance use disorders were the leading cause of disability worldwide (Whiteford et al., 2013). Research on drug and substance abuse is especially important in the Caribbean, as this location is considered a bridge between North and South America in terms of the transportation of drugs (Angulo-Arreola et al., 2011). As a result, a myriad of drugs find their way into this region from all parts of South America.

In Haiti, the most common drugs and substances used are alcohol, marijuana, cocaine, and, to a milder degree, heroin (Angulo-Arreola et al., 2011). Due to their increasing popularity among young people, there is concern of a possible drug epidemic occurring in the Caribbeans,

but it may not reach the same level of concern as in North America (Angulo-Arreola et al., 2011). The paper did acknowledge, however, that the landscape of drug use in Haiti may have changed in recent years due to the area being affected by natural disasters. One study found an indirect relationship between hurricane exposure and increased smoking relapse through a rise in post-traumatic stress disorder (PTSD) and symptoms congruent with depression (Alexander, Ward, Forde, & Stockton, 2019).

Studies have discovered higher rates of mental health problems, including increased alcohol consumption, among survivors of the Haiti earthquake in 2010 (Cénat et al., 2020). The same study also found that one in three people were reported to have experienced severe depression. There are drug rehabilitation services in Haiti working to lower the incidence of drug and substance abuse in the country; The Association for the Prevention of Alcoholism and other Chemical Addictions reported that the major types of addictions they treated between 2000 and 2006 were alcohol, marijuana, and crack cocaine (Section 3 Key Issues, 2008).

There is a higher prevalence of substance use among those incarcerated in LMICs compared to HICs (Hill et al., 2022). However, there is no research on the associations of substance use and incarceration in Haitian prisons. With a higher prevalence of depression among incarcerated populations (Yi et al., 2016) and numerous mental stressors occurring in Haiti, more research is needed about the associations of substance use and depression within Haitian prisons (mhGAP program WHO, 2021).

Assessing Mental Health in Cross-Cultural Contexts

After the 2010 earthquake in Haiti, there was renewed interest in understanding the ways that various global contexts express mental distress, especially in LMICs. With nearly 8 in 10 people living in LMICs affected by mental disorders, there is a high need for more attention and access to mental health in these areas (Jacob & Patel, 2014). Another study found a 76.3% to 91.9% treatment gap for depression and 94.9 to 97.2% treatment gap for alcohol use disorders in LMICs (Rathod et al., 2016).

Many researchers recognize the inadequacies of a standardized, Western-originated mental health assessment in evaluating mental health in other global health contexts. As a results, numerous tools have been formulated since then: the UCLA Child Post-Traumatic Stress Disorder-Reaction Index (PTSD-RI) for Zambia (Murray et al., 2011), Mental Health Assessment Inventory (MHAI) for Ukraine (Doty et al., 2018), and the Peradeniya Depression Scale (PDS) for Sri Lanka (Abeyasinghe et al., 2012) are to name a few. Assessing mental health in cross-cultural contexts requires understanding the culture contexts of expressions of thoughts and feelings. It involves a deep appreciation for each country's unique history behind the adaptations for the language of their health. Consequentially, this understanding must be reflected in new mental health assessments through the inclusion of idiomatic expressions of emotional distress (Keys et al., 2012).

There are multiple idioms used to describe mental distress in various global contexts. In Haiti, many notions regarding mental illness revolve around traditional healers and religious leaders (Kaiser et al., 2013). In research from Lichtenberg et al.'s paper looking at expression of mental distress in Haitian contexts, the study found major themes of poverty, ruminative

thinking, Vodou and Christian influences, and behaviors of "crazy people" behavior, or *moun fou* in Haitian Creole, persistent across the idioms used for distress (2021). This research displays the importance of tailoring community interventions and clinical assessments around cultural and traditional contexts. Without this cultural competence, any level of intervention would be futile and inappropriate because it would not fully encapsulate the way a community views disease and illness.

Depending on the context, certain diseases hold more stigma associated with its contraction compared to others. In Haiti, diseases such as HIV and Hepatitis C (Hep C) are highly stigmatized due to the scarcity of information regarding these subjects and the actions that are associated with people who are at higher risk of contraction (Angulo-Arreola et al., 2011). TB over the years has continued to be a highly stigmatized disease due to its associations with discrimination, poverty, and HIV co-infection (Coreil et al., 2010). People experiencing stigma not only develop mental illnesses from the social pressures, but this can also manifest into physical ailments. A study found that stigma may be more associated with functional impairment than actual symptoms which can affect a person's daily life (Kaiser et al., 2013). Research on stigma is not very robust, and additional research is needed to understand more about the relationship between stigma and infectious disease.

Zanmi-Lasante Depression Symptom Inventory

Partners in Health, one of the organizations working to bring quality care in Haiti, recognized the lack in assessments that can include culturally bound idioms created with Haitians in mind. The Zanmi-Lasante Depression Symptom Inventory (ZLDSI) is a 13-item screening tool developed in the Haitian Creole language and was specifically designed for

Haitian communities. In collaboration with Haitian psychologists, medical professionals, traditional healers, community elders, and religious leaders, this tool is a brief depression screening measure utilizing culturally bound idioms to evaluate depression severity and monitor improvement (Partners in Health Curriculum Toolkit, 2016). The screening scores range from 0 to 39 and are scored by adding the item responses. Each item on the screening tool has four levels to choose from: "not at all" (*Di tou*), "for a few days" (*Pandan k*èk *jou*), "more than one week" (*Plis pase yon semèn*), and "almost every day" (*Preske chak jou*).

In terms of the scale's effectiveness and reliability, a study was conducted where depression was assessed using the ZLDSI scale among 120 young people between the ages of 18 to 22 years old (Legha et al., 2020). Researchers included the standard mental health assessments for comparison: the modified Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID) for current Major Depressive Episode (MDE); The Center for Epidemiologic Studies Depression Scale; and portions of the Global School-Based Health Survey mental health module.

The study found that the ZLDSI scale had good overall accuracy in its ability to identify major depressive episodes (MDE) among this study population (Area under the curve = 0.92, 95% CI = 0.86, 0.98, $p<0.001$) (Legha et al., 2020). The study also found that the optimal cut-off for mild depression was a score of 12 or greater on the ZLDSI scale (sensitivity=100%, specificity=73.9%) (Legha et al., 2020). Another study found that participants who were depressed ($M=21.43$, $SD=8.31$) scored higher than participants who were not depressed ($M=14.05$, $SD=9.60$; $t(103) = 4.17$, $p<.001$) . The study also found that a score of 13 was selected as the most accurate value for screening depression on the ZLDSI scale (sensitivity =

85.4%, specificity = 50.9%) (Rasmussen et al., 2014). In the same study, researchers found a significant difference between the scores of depressed and not depressed participants. In this study, we use the cut-off score of 13 for depression.

With only 3.7% of people in LMICs holding any access to treatment for depression, any increased amount of mental health treatment in these settings would drastically influence the prevalence of mental disorders (Rose et al., 2021). A very recent research study measured depression in a community in Haiti using the ZLDSI scale and found an association between depression treatment and a participant's depression score: the more treatments a patient attended, the lower their depression score over time (Rose et al., 2021). Additionally, the patients who started with more severe levels of depression based on the ZLDSI scale saw larger improvements with increased therapy. This research could translate from depression treatment to infectious disease treatment. Additional research showing support for an association between depression treatment and infectious disease treatment would strengthen their connection and ultimately pave a path towards including mental health in standard infectious disease treatment.

Cronbach alpha

The Cronbach alpha value, a statistic that measures internal reliability, can be used to assess the goodness of fit for an instrument. It asks whether the instrument reliably measures the trait it purports to measure. In literature, it was found that the Cronbach alpha value for the ZLDSI scale was 0.89, which signifies high internal validity among the items in the questionnaire (Rasmussen et al., 2014). When observing the Cronbach alpha value in literature for the stigma scale, it was found to be >0.80, which also meant that the instrument held high internal validity for the study in which it was use (Coreil et al., 2010). It is important to note that

alpha is a property of the scores on a test from a specific sample of testees. Therefore, investigators should not rely on published alpha estimates and should measure alpha each time the test is administered (Tavakol & Dennick, 2011). We calculated Cronbach alpha values in these analyses to observe whether these instruments were good measures for our study.

Methods

Data Collection

This is a secondary analysis of data from the TB Reach Study in Haitian prisons, a study comparing adherence to TB treatment in prisons that used VDOT versus those utilizing DOT (Kehus et al., 2021). Details of the method used to assess depression in the study have been previously reported (Kehus et al., 2021) and were comparable with the methods used in prior studies for other Haitian populations (Rasmussen et al., 2014) (Legha et al., 2020). The original study was approved by the Emory IRB and the Haitian Committee on Bioethics. All participants provided written informed consent.

Data was collected from 50 TB-positive participants ages 18 to 59 years old from 6 Haitian prisons: 5 sites utilizing VDOT (Mirebalais, Petit Goave, Jacmel, Carrefour, and Gonaives) and 1 site utilizing DOT (Croix de Bouquet) for TB medication adherence. A questionnaire (written in Haitian Creole) was conducted at all sites, and answers were recorded by a researcher on the study team. After data collection, all data was transcribed into RedCap.

Data Analysis

Descriptive analyses were conducted to observe the overall means and standard deviations (SD) for continuous variables, and totals (n) and percentages (%) for categorical variables. Selected characteristics of the study participants were compared to the probability of a score on the ZLDSI depression scale of 13 or greater, the score used as the cut-off for depression. Simple linear regression was performed to study any significant correlations between depression (as a continuous variable) and variables in the study. Bivariate logistic regression was used to analyze any associations between marijuana use, smoking use, alcohol use, age, education, financial income, first incidence of incarceration, number of dependents, number of hours worked per week prior to incarceration, and stigma with depression. Variables with P-values of 0.05 and greater were used in binomial logistic regressions controlling for certain demographic variables. Adjusted odds ratios and 95% confidence intervals were estimated and reported. Variables with $P < 0.05$, were comprised into successive multivariate regression models. Additional variables found in the literature to be significantly associated with the outcome were also kept in the model.

Collinearity was assessed, and backward elimination was utilized to remove factors that did not influence the results. Interaction terms were utilized in each multivariate regression model to assess the association between substance use and depression. The likelihood ratio test and Wald test were utilized to help build the model. The precise number of responses per question were largely varied due to varying length times and environments of the interview. Missing data was omitted from the multivariate logistic analyses. Analyses were conducted using

SAS Enterprise Guide Version 9.4 and R Software (R Prairie Trillium); figures were produced using the package ggplot2 (Wickham, 2009).

Results

Baseline Characteristics of Participants by VDOT and DOT Sites

Descriptive statistics of the study population were summarized in *Table 1*. Out of all 50 participants in the study, 39 (78%) were in sites utilizing the VDOT intervention, and 11 (22%) were in sies using the standard of treatment, DOT. Because all research was conducted in male Haitian prisons, all participants in this study were male. The average age in the VDOT sites was 31.03 years (SD=8.95) compared to 30.2 (SD=6.44) in DOT sites. In the VDOT sites, 23 (58.97%) participants had attended at least one year of school and the average number of years completed in school was roughly 4 years (SD=3.73). This contrasts with 9 (81.82%)and 6.7 (SD=4.35) in DOT sites, respectively. 39 participants overall said that this was their first time being incarcerated, with 31 (79.5%) coming from VDOT sites and 8 (72.73%) coming from DOT sites. As for household income, most participants from both sites make more than 5000 Gourdes Haitian (the official Haitian currency).

As for substance abuse among the overall study population, more participants in total reported alcohol consumption (28[56%]) compared to cigarette use (21[42%]) or marijuana use (11[22%]). Baseline characteristics of those who reported substance and alcohol use are in *Table 5*. As for the ZLDSI depression scale, the average score for those in VDOT sites was a 13.85 (SD=8.1) with 25 (64.10%) of participants considered depressed due to a score greater than 13. The average score was a 14.27 (SD=8.74) among DOT sites, and 8 (72.73%) of participants were considered depressed.

Table 1: *Study Characteristics*

Variable	**VDOT sites (Intervention)** (n = 39)	**DOT sites (Control)** (n = 11)	**Overall** (n = 50)
Gender, Male (n[%[)	39 (100)	11 (100)	50 (100)
Age, years (mean [SD])	31.03 (9)	30.2 (6.4)	30.8 (8.4)
Attended School (n[%])	23 (59)	9 (81.8)	32 (64)
Average Years of Schooling (mean[SD])	3.9 (3.7)	6.7 (4.4)	4.60 (4)
*Missing (n[%])***	*9 (23.1)*	*1 (9.1)*	*10 (20)*
First Time Incarcerated (n[%])	31 (79.5)	8 (72.7)	19 (78)
Missing	*1 (2.6)*	*1 (9.1)*	*2 (4)*
Household Income (n[%])			
<499 Gourdes Haitian	6 (15.4)	0 (0)	6 (12)
500 – 2499 Gourdes Haitian	14 (35.9)	1 (9.1)	15 (30)
2500 – 4999 Gourdes Haitian	7 (18)	1 (9.1)	8 (16)
>5000 Gourdes Haitian	9 (23.1)	6 (54.6)	15 (30)
Missing	*3 (7.7)*	*3 (27.3)*	*6 (12)*
Average Number Dependents (mean[SD])	3.58 (2.9)	4.0 (3.7)	3.66 (3)
Substance Use			
Number who Smoke Cigarettes (n[%])	16 (41.0)	5 (45.5)	21 (42)
Number who Smoke Marijuana (n[%])	8 (20.5)	3 (27.3)	11 (22)
Missing	*0 (0)*	*1 (9.1)*	*1 (2.0)*
Number of Hours worked prior to Incarceration (median [IQR])	22.5 (8-48)	10.0 (4-78)	11.0 (4-78)
Missing	*3 (27.3)*	*5 (12.8)*	*8 (16)*
Alcohol Use			
Number who Use Alcohol (n[%])	21 (53.85)	7 (63.64)	28 (56)
Number who Drink Alcohol *Daily* (n[%])	10 (47.62)	4 (57.14)	14(50)
ZLDSI Depression Scale			
Average Score, mean (SD)	13.85 (8.1)	14.27 (8.74)	13.9 (8.17)
Considered Depressed * (n[%])	25(64.10)	8(72.73)	33 (66)
Stigma Score			
Internal Perceptions and Emotions	1.67 (2.30)	1.73 (1.49)	1.68 (2.13)
Disclosure	3.44 (4.36)	4.00 (2.53)	3.56 (4.01)
External Perceptions	2.00 (3.16)	2.91 (3.21)	2.20 (3.16)
External Actions	2.33 (3.52)	3.27 (3.07)	2.54 (3.42)
Courtesy Stigma	0.26 (0.82)	0.27 (0.91)	0.26 (0.83)
Total (mean[SD])	*9.69 (12.4)*	*12.2 (7.41)*	*10.2 (11.4)*

* Cut-off score for depression on the ZLDSI scale was a score of 13 or higher.

** Missing data due to participants leaving questions unanswered or reporting "Don't Know" on survey.

Results from the Cronbach's alpha assessment were recorded in *Table 6*. The inter-item reliability for this scale was high (13 items; $\alpha = 0.78$), signifying that no single item on the scale could be taken out to increase validity. The Cronbach's alpha for the stigma scale was 0.68 (15 items), which does not show significant internal validity among the items for this study population.

Linear Regression Analyses

A linear regression was performed to observe the correlations between depression (as a continuous variable) and any variables in our analyses. Significant associations were found between depression and other variables. When looking at the association between stigma and depression, those who scored higher on the ZLDSI depression scale were also more likely to experience more stigma compared to those with lower ZLDSI depression scores, R=0.48, p <0.001, 95% CI [0.16, 0.52] (*Figure 1*). Additionally, a significantly moderate positive correlation was found between ZLDSI depression score and the number of hours worked per week prior to incarceration (R=0.33, p=0.035, 95% CI [0.02, 0.30]) (*Figure 2)*.

Higher ZLDSI depression scores were positively correlated with more years of education; however, this finding was not significant (R=0.21, p=0.19) *(Figure 3)*. A slightly negative association was found between age and depression in that those with higher ZLDSI depression scores were younger in this cohort compared to those with lower ZLDSI depression scores (R=-0.12, CI% [-0.40, 0.18]), however this finding was also not significant (p=0.44) *(Figure 4)*. A slight positive association between ZLDSI depression score and number of dependents trended towards significance (R=0.25, p=0.08) *(Figure 5)*.

Table 2: *Simple Linear Regression Results Looking at Associations of Variables with Depression*

	P-value	Pearson's Chi-square value	95% CI	R Value
Stigma	**<0.001**	0.34	(0.16, 0.52)	0.48
Age	0.44	-0.116	(-0.40, 0.18)	-0.12
Years of Education	0.19	0.35	(-0.18, 0.89)	0.21
Financial Income	-	-	-	0.01
<499 Gourdes Haitian	0.20	-6.17	(-15.62, 3.29)	-
500 – 2499 Gourdes Haitian	0.93	-0.33	(-8.24, 7.57)	-
2500 – 4999 Gourdes Haitian	0.80	1.13	(-7.72, 9.97)	-
>5000 Gourdes Haitian	0.61	2.00	(-5.91, 9.91)	-
Number of Dependents	0.09	0.67	(-0.11,1.45)	0.25
Number of Hours Employed Prior to Incarceration	**0.035**	0.16	(0.02, 0.30)	0.33

Univariate and Multivariate Analysis for Depression

Table 3 shows the results from the univariate and bivariate analyses between demographic variables and depression. Depression was coded as a binary variable for this part of the analysis, where a score of 13 or higher on the ZLDSI score signified the manifestation of depression. Those who reported marijuana use were significantly associated with depression compared to those who did not report smoking marijuana (OR=6.52, $p < 0.01$, 95% CI [1.08,126.01]). The same association was found among those who reported smoking cigarettes (OR=5.60, $p < 0.02$, 95% CI [1.49,27.73]) and drinking alcohol (OR=5.52, $p < 0.01$, 95% CI [1.61, 21.51]). In this analysis, smoking marijuana seemed to have the largest association with depression. However, when controlling for covariates, most of the variables lost significance. The unadjusted logistic regressions showed no significant associations except with the following

variables: marijuana use, cigarette use, and alcohol use. Age, education level, stigma score, and first incidence of incarceration trended towards significance. After adjusting for other covariates, age was the only variable found to be significantly associated with depression (OR 0.12, $p < 0.05$, 95% CI [0.01, 0.81]).

An area of interest was looking at potential interactions of other variables for the associations found between substance use (cigarette smoking, marijuana use, and alcohol consumption) and depression. After conducting backwards elimination using the likelihood ratio test, we found that only 2 variables remained in the model: alcohol use and education level (comparing some education to no education). Based on previous literature, we kept age in the model. After assessing for collinearity and maintaining the assumptions of independence and homoscedasticity, we found a significant interaction term between education and alcohol use, controlling for age (χ^2[df=1] = 5.68, $p < 0.02$). Results are stratified based on participants with some or no education in *Table 5*. This model was not robust enough for us to draw more significant conclusions regarding the associations between substance use and depression.

Alcohol Use

When looking at a binomial logistic regression of alcohol use as the dependent variable, cigarette smoking was significantly associated with alcohol use. Those who smoked marijuana were 29.28 times more likely to drink alcohol, controlling for depression, age, financial income, and education (95% CI 2.54-337.68). Using the likelihood ratio test to compare the original model with the fixed effect to a model without marijuana use, the model including marijuana use was a better fit: X^2(df=1) = 11.04 , $p < 0.001$. There were no significant

associations found between depression and marijuana use with alcohol use, controlling for age, financial income, and education level.

Table 3: *Results of Binary Logistic Regression Analysis for Associations with Depression* [a]

	P-Value	Unadjusted OR	95% CI	P-Value	Adjusted OR	95% CI
Marijuana Use	**<0.01**	6.52	(1.08, 126.01)	0.410	3.29	(0.24, 45.21)
Cigarette Use	**<0.02**	5.60	(1.49, 27.73)	0.830	3.05	(0.42, 21.54)
Alcohol Consumption	**<0.01**	5.52	(1.61, 21.51)	0.404	4.19	(0.52, 34.04)
Age						
Below 30	-	1.00	-	-	1.00	-
Above 30	0.209	0.44	(0.11, 1.54)	**0.039**	0.12	(0.01, 0.81)
Education						
No education	-	1.00	-	-	1.00	-
Some level of education	0.078	3.00	(0.89,10.54)	0.328	1.04	(0.04, 14.82)
<5 Years of education	-	1.00	-	-	1.00	-
5 Years of education or more	0.504	1.69	(0.39, 8.97)	0.235	2.12	(0.24, 2.49)
Financial income [c]						
< 500 Gourdes Haitian	-	1.00	-	-	1.00	-
500 – 2499 Gourdes Haitian	0.454	0.40	(0.02, 3.49)	0.995	15.24	(0.35, 97.50)
2500 – 4999 Gourdes Haitian	0.709	0.60	(0.02, 8.25)	0.995	43.93	(0.39, 86.53)
>5000 Gourdes Haitian	0.630	0.55	(0.02, 5.08)	0.995	4.96	(0.12, 22.67)
First time incarcerated	0.746	1.6	(0.06, 42.54)	0.998	0.88	(0.04, 8.48)
Site						
DOT sites	-	1.00	-	-	1.00	-
VOT sites	0.595	0.67	(0.13, 2.75)	0.975		(0.00, 93.51)
Stigma [b]						
Less than score of 10	-	1.00	-	-	1.00	-
Score of 10 or higher	0.064	3.26	(0.97, 12.27)	0.983		(0.001, 24.52)
Number of Dependents						
Less than 3	-	1.00	-	-	1.00	-
3 or greater	0.739	1.23	(0.35, 4.21)	0.627	2.44	(0.01,8.97)
Number of hours worked prior to incarceration						
Less than 10	-	1.00	-	-	1.00	-
10 or more	0.113	2.91	(0.80, 11.65)	0.456	4.66	(8.12, 26.8)

[a] Depression is denoted by a score of 13 or higher on the ZLDSI depression scale
[b] The Courtesy Stigma level was omitted due to only having one question.

Cigarette Use

When looking at binomial logistic regression of cigarette use as the dependent variable, neither depression score nor marijuana use was found to be associated with cigarette use, controlling for age, financial income, and education level. When looking at the association between alcohol use and cigarette use, a statistically significant relationship was found where people who drank alcohol were nearly 32 times more likely to smoke cigarettes, controlling for depression, age, financial income, and education level (95% CI 2.75-382.31). With such a large confidence interval, the results were imprecise. Using the likelihood ratio test to compare the original model with the fixed effect to a model without alcohol use, the model including alcohol use was a better fit: X^2(df=1) = 11.80 , p <0.001.

Marijuana Use

When looking at binomial logistic regression of marijuana use as the dependent variable, alcohol use was significantly associated with marijuana use (OR 15.83, 95% CI 1.10-227.84), controlling for age, financial income, first time incarcerated, and education level. Using the likelihood ratio test to compare the original model with the fixed effect to a model without alcohol use, the model including alcohol use was a better fit: X^2(df=1) = 5.74 , p <0.02. Additionally, keeping first incidence of incarceration in the model also was a better fit: X^2(df=1) = 5.55 , p <0.02. No significant associations were found between neither cigarette use nor depression with marijuana use, controlling for age, financial income, first incidence of incarceration, and education level.

Discussion

This cross-sectional study examined the associations of substance use - cigarette use, marijuana use, and alcohol consumption - with depression. For our group, we used a cut-off score of 13, which was shown in the literature to be the most accurate score for screening depression on the ZLDSI scale. The study population mainly consisted of participants from VDOT sites (78%) as there was only 1 DOT site who participated. Due to limited resources and minimal oversight, Croix de Bouquet) was the only DOT site that could participate. While site was not found to be a significant factor contributing to depression, the literature has shown that treatment of prison populations can be highly variable and site-specific in that some sites may experience more violence within their prisons compared to others (Cooley, 2019). We examined these associations in all-male prisons. It would be interesting to look at these results found in all-male prisons compared to coed prisons to see if there are any association based on sex.

Cigarette use was more prevalent in this population (42%) compared to marijuana use (21%). This can be attributed to the fact that possession, production, and sale of marijuana is illegal in Haiti. As a result, marijuana is available only for those who have the means to obtain it. As mentioned in the background, the majority of those who are incarcerated come from low-income households (Walmsley, 2016), though in this specific population we saw roughly equal amounts of people coming from low-income and high-income households. Out of the 11 people who smoke marijuana in this population, 7 (64%) made more than 5000 Gourdes Haitian a month, showing that higher income people tend to smoke more marijuana compared to lower income people (*Table 5*).

Alcohol abuse was highly prevalent in this population with over 50% of participants reporting that they drank alcohol (54% in VOT prisons and 64% in DOT prisons). In history, Haiti has been known as one of the top liquor-producing countries in the world. They are known for making their traditional rum, clairin, a drink that is hard to come by in other parts of the world (*Get Ready to Fall in Love with Haiti's One-of-a-Kind Rum*, 2021). With its production has come a very rich culture around drinking alcohol in Haiti, and this could also contribute to alcohol use being one of the biggest substances of concern in the country (Angulo-Arreola et al., 2011).

For the ZLDSI depression scale, scores for both VDOT and DOT prison sites, 13.85 and 14.27 respectively, were greater than the depression cut-off score of 13, signifying that most of the TB- positive people incarcerated in these prisons were depressed. This analysis sought to find associations of substance use with depression among this population. As seen in our study, we found significant associations within the bivariate analyses between marijuana use, cigarette use, and alcohol use, with marijuana use having the largest association with depression (*Table* 4). However, we also found that age was significantly associated with depression after controlling for financial income, site, stigma, first incidence of incarceration, number of hours worked prior to incarceration, and number of dependents. Previous research has shown significant associations between substance use and depression (Feingold & Weinstein, 2020), but these studies included a much larger study population that was not incarcerated or made up of people who were positive with TB.

After controlling for alcohol use, financial income, first incidence of incarceration, and years of education, there was a significant negative association between age and depression.

When conducting the likelihood ratio test, results showed age to not be significant, but it was kept in the multivariate analysis due to previous literature on the subject. A significant association was found between education and alcohol use, which has been found in literature, but a consistent association remains under debate (Bray et al., 2017).

In multivariate analysis, we found that among those with some level of education, depression was associated with those who were ages 30 years and older. Those who were aged 30 years and older experienced less depression compared to those who were younger than 30 years old. We observed that those who drank alcohol within the population who did not have any years of education experienced significantly higher levels of depression compared to those who did not drink alcohol (*Table 4)*. Stigma and number of dependents were variables that trended towards significance during this analysis.

Many of these associations yielded very large confidence intervals. This could signify an instability problem where there may not have been complete separation of all participants who were significantly different from null values. Additionally, there was a significant percentage of missing values within this dataset which further decreased the number of interviews that could be used for different analyses. Along with missing values were many values that were 0, further contributing to the "complete separation" problem.

When observing alcohol use as a dependent variable, we found that cigarette use was significantly associated with alcohol use, controlling for depression, age, financial income, and education, however the findings were not very precise with such a wide confidence interval (95% CI 2.54-337.68). When observing marijuana use as a dependent variable, alcohol was significantly associated with marijuana use, controlling for age, financial income, first time

incarcerated, and education level. Like the findings between alcohol and cigarettes, this finding was not very precise due to a large confidence interval (95% CI 1.10 - 227.84).

Our analyses also showed a significant weak positive association between the number of hours worked and depression. Past studies have observed a similar relationship between perceived stress and depression in substance use treatment (McHugh et al., 2020). We also observed a significant negative association between age and depression based on the Pearson correlation (*Table 3*).

The ZLDSI scale held internal consistency in our study with a Cronbach alpha value of $\alpha = 0.77$ (*Table 6)*. When analyzing the Cronbach alpha value for the stigma scale, we found that our value was slightly different and did not hold as much internal validity as that in the literature. With the Cronbach alpha value of the stigma scale overall as 0.68 for this study, we found that the stigma scale may not be the best fit for this study. This was a significant difference from the greater than 0.8 value found in literature (Coreil et. al., 2010). We used 15 of the 22 items (68%) from the original stigma scale used in Haitian communities (Coreil et. al., 2010). This could be due to omission of some stigma questions and changes in language to better fit the context of a prison population (*Figures 8 – 10*). These changes were done to better fit to our study population. This could have compromised the internal validity of our scale, leading to lower alpha values.

Limitations

This study held several limitations. It may have been a while since the time that people have experienced these behaviors, so self-reported measures may not be as accurate. Cross-sectional analysis diminishes our ability of establishing temporality in this analysis. With a longitudinal analysis, more information could be collected on the temporality of depression and substance use onset while also considering other factors such as site, age, education level, household income, number of visitors (as a proxy for social support), and number of dependents.

With a larger pool of participants, more significant results can be found that would better explain the associations among the variables. Since there were small population sizes from each site, we needed to study the data altogether. More data needs to look at the effect of VDOT versus DOT on substance use, depression, and continuity of care. Due to the research staff's limited ability to reach each site, the number of surveys attained was limited. More research is needed to assess the accuracy of the ZLDSI scale within not only adults, but people in Haiti's incarceration system.

Researchers had intended to hold focus groups; however, it was not possible due to limited spacing at the sites. Oversight of the study was not as imagined in the prisons. VOT was implemented to remote areas of Haiti that are unattainable for healthcare workers and other important care workers. Consequentially, it was hard for researchers and other individuals to reach the Haitian prisons for routine check-ins. Additionally, there is a need for more clarity in terms of the way that the surveys needed to be conducted.

The COVID-19 pandemic initiated more health concerns within Haiti's prisons, which affected the integrity of the VOT and DOT interventions as many facilities worked to mitigate the spread of the novel virus. While this study was being conducted, political unrest was prevalent throughout Haiti. With no present-functioning Haitian legislature and increased crime rates in the country, the future of mental health in Haiti remains unclear. It is uncertain of whether prisons will remain diligent with the interventions in place for TB therapy. Additionally, this added to the difficulty of researchers to physically reach the facilities.

Conclusion

Substance use is associated with depression; however more analyses need to be performed to establish a stronger significance for this relationship. Education was seen as a significant modifier of the association between alcohol consumption and depression. The ZLDSI scale showed good internal validity for this study population. This research would be very helpful in providing basis for partnerships with organizations focused on providing mental health care to resource-poor areas. Additionally, more research is needed to observe the effects of substance use and mental health on continuity of care after a person is released from incarceration.

Next Steps/Future Research

Our research sought to find if an association between substance use and depression, demonstrated in US populations, was also present in the Haitian prison population. In this setting, where a diagnosis of depression is rare, we wanted to observe whether substance use could be used as a proxy for depression. If that association were to be established, prison providers might screen persons with substance abuse more carefully for mental health issues, and channel those with a depression diagnosis into care. It would also be interesting to continue research on the association of substance use and mental health with adherence to treatment for infectious disease. Due to the limited research on tuberculosis treatment post release from prisons in low-income countries, an examination of how substance use, and depression might be a barrier to continuity of care could be warranted.

As it stands today, there is no one instrument for diagnosing depression (or for any mental illness) that is appropriate across cultures. . With mental health illness an issue on a global scale, more research needs to be done on creating culturally appropriate and community-inclusive scales such as the ZLDSI scale for Haiti. It is known that there are certain kinds of depression that are more common in certain age levels versus others (*Depression and Older Adults*, 2021). It would be interesting to look at clinic depression diagnosis and stratify results based on the outcome. It is unknown which kind of depression is being tested with the ZLDSI scale. Also in our analysis, we found a significant positive correlation between depression and the number of hours worked prior to incarceration. While we did not delve deeper into this relationship, future studies could look more at the relationship between number of hours worked and perceived stress to see if one factor could be a proxy for the other.

References

Abeyasinghe, D., Tennakoon, S., & Rajapakse, T. (2012). The development and validation of the Peradeniya Depression Scale (PDS)—A culturally relevant tool for screening of depression in Sri Lanka. *Journal of Affective Disorders*, *142*(1–3), 143–149. https://doi.org/10.1016/j.jad.2012.04.019

Ahmad Seyed Alinaghi, S., Farhoudi, B., Mohraz, M., Alipour, A., Golrokhy, R., Hosseini, M., & Miri, J. (2016). Adherence to Antiretroviral Therapy and Tuberculosis Treatment in a Prison of Tehran, Iran. *Infectious Disorders - Drug Targets*, *16*(3), 199–203. https://doi.org/10.2174/1871526516666160616111308

Alexander, A. C., Ward, K. D., Forde, D. R., & Stockton, M. (2019). Are posttraumatic stress and depressive symptoms pathways to smoking relapse after a natural disaster? *Drug and Alcohol Dependence*, *195*, 178–185. https://doi.org/10.1016/j.drugalcdep.2018.09.025

Alexander, A. C., Ward, K. D., Forde, D. R., Stockton, M., & Read, M. C. (2019). Do current smokers use more cigarettes and become more dependent on nicotine because of psychological distress after a natural disaster? *Addictive Behaviors*, *93*, 129–134. https://doi.org/10.1016/j.addbeh.2019.01.030

Angulo-Arreola, I. A., Bastos, F. I., & Strathdee, S. A. (2011). Substance Abuse and HIV/AIDS in the Caribbean. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, *16*(1), 56–74. https://doi.org/10.1177/1545109711417408

Bray, J. W., Hinde, J. M., & Aldridge, A. P. (2017). Alcohol use and the wage returns to education and work experience. *Health Economics*, *27*(2), e87–e100. https://doi.org/10.1002/hec.3565

Brown, M. T., & Bussell, J. K. (2011). Medication Adherence: WHO Cares? *Mayo Clinic Proceedings*, *86*(4), 304–314. https://doi.org/10.4065/mcp.2010.0575

Cénat, J. M., McIntee, S. E., & Blais-Rochette, C. (2020). Symptoms of posttraumatic stress disorder, depression, anxiety and other mental health problems following the 2010 earthquake in Haiti: A systematic review and meta-analysis. *Journal of Affective Disorders*, *273*, 55–85. https://doi.org/10.1016/j.jad.2020.04.046

Cooley, C. (2019). Escaping the Prison of Mind: Meditation as Violence Prevention for the Incarcerated. *Health Promotion Practice*, *20*(6), 798–800. https://doi.org/10.1177/1524839919869924

Coreil, J., Mayard, G., Simpson, K. M., Lauzardo, M., Zhu, Y., & Weiss, M. (2010). Structural forces and the production of TB-related stigma among Haitians in two contexts. *Social Science & Medicine*, *71*(8), 1409–1417. https://doi.org/10.1016/j.socscimed.2010.07.017

Dara, M., Acosta, C. D., Melchers, N. V. V., Al-Darraji, H. A., Chorgoliani, D., Reyes, H., Centis, R., Sotgiu, G., D'Ambrosio, L., Chadha, S. S., & Migliori, G. B. (2015). Tuberculosis control in prisons: current situation and research gaps. *International Journal of Infectious Diseases*, *32*, 111–117. https://doi.org/10.1016/j.ijid.2014.12.029

Depression and Older Adults. (2021). National Institute on Aging. https://www.nia.nih.gov/health/depression-and-older-adults

Doty, S. B., Haroz, E. E., Singh, N. S., Bogdanov, S., Bass, J. K., Murray, L. K., Bolton, P. A. (2018). Adaptation and testing of an assessment for mental health and alcohol use problems among conflict-affected adults in Ukraine. Conflict and Health, 12(1). doi:10.1186/s13031-018-0169-6

Fazel, S., & Seewald, K. (2012). Severe mental illness in 33 588 prisoners worldwide: systematic review and meta-regression analysis. *British Journal of Psychiatry*, *200*(5), 364–373. https://doi.org/10.1192/bjp.bp.111.096370

Feingold, D., & Weinstein, A. (2020). Cannabis and Depression. *Cannabinoids and Neuropsychiatric Disorders*, 67–80. https://doi.org/10.1007/978-3-030-57369-0_5
Get Ready to Fall in Love with Haiti's One-of-a-Kind Rum. (2021, January 25). Liquor. https://www.liquor.com/articles/clairin-rum/

Health Through Walls. (2021). Health Through Walls. https://www.healththroughwalls.org/haiti.htm

Hill, K., Wainwright, V., Stevenson, C., Senior, J., Robinson, C., & Shaw, J. (2022). Prevalence of mental health and suicide risk in prisons in low- and middle-income countries: a rapid review. *The Journal of Forensic Psychiatry & Psychology*, *33*(1), 37–52. https://doi.org/10.1080/14789949.2021.2016891

Kaiser, B. N., Kohrt, B. A., Keys, H. M., Khoury, N. M., & Brewster, A. R. T. (2013). Strategies for assessing mental health in Haiti: Local instrument development and transcultural translation. *Transcultural Psychiatry*, *50*(4), 532–558. https://doi.org/10.1177/1363461513502697

Kehus H. Bury M. Prophete E. Dirks L. Spaulding A. Who Fails To Complete Tuberculosis Treatment in Haiti's National Prison, and What Innovations Might Improve Success? Advancing Corrections 2021. 12:174-186.

Keys, H. M., Kaiser, B. N., Kohrt, B. A., Khoury, N. M., Brewster, A. R. (2012) Idioms of distress, ethnopsychology, and the clinical encounter in Haiti's Central Plateau. Social Science & Medicine 75(3): 555–564.

Lichtenberg, A. A., Shi, M., Joseph, K., Kaiser, B. N., & Katz, C. L. (2021). Understanding mental distress in Arcahaie, Haiti: Heterogeneous uses of idioms of distress in communicating psychological suffering. *Transcultural Psychiatry*, 136346152110005. https://doi.org/10.1177/13634615211000543

Lovett, A., Kwon, H. R., Kidia, K., Machando, D., Crooks, M., Fricchione, G., Thornicroft, G., & Jack, H. E. (2019). Mental health of people detained within the justice system in Africa: systematic review and meta-analysis. *International Journal of Mental Health Systems*, *13*(1). https://doi.org/10.1186/s13033-019-0273-z

Mayston, R., Kinyanda, E., Chishinga, N., Prince, M., & Patel, V. (2012). Mental disorder and the outcome of HIV/AIDS in low-income and middle-income countries. *AIDS*, *26*(Supplement 2), S117–S135. https://doi.org/10.1097/qad.0b013e32835bde0f

McBain, R. K., Mwale, O., Ruderman, T., Kayira, W., Connolly, E., Chalamanda, M., Kachimanga, C., Khongo, B. D., Wilson, J., Wroe, E., Raviola, G., Smith, S., Coleman, S., Kelly, K., Houde, A., Tebeka, M. G., Watson, S., Kulisewa, K., Udedi, M., & Wagner, G. (2021). Stepped care for depression at integrated chronic care centers (IC3) in Malawi: study protocol for a stepped-wedge cluster randomized controlled trial. *Trials*, *22*(1). https://doi.org/10.1186/s13063-021-05601-1

McHugh, R. K., Sugarman, D. E., Meyer, L., Fitzmaurice, G. M., & Greenfield, S. F. (2020). The relationship between perceived stress and depression in substance use disorder treatment. *Drug and Alcohol Dependence*, *207*, 107819. https://doi.org/10.1016/j.drugalcdep.2019.107819

Mental Health Gap Action Programme. (2021). World Health Organization. https://www.who.int/teams/mental-health-and-substance-use/treatment-care/mental-health-gap-action-programme

Munro, S. A., Lewin, S. A., Smith, H. J., Engel, M. E., Fretheim, A., & Volmink, J. (2007). Patient Adherence to Tuberculosis Treatment: A Systematic Review of Qualitative Research. *PLoS Medicine*, *4*(7), e238. https://doi.org/10.1371/journal.pmed.0040238

Murray, L. K., Bass, J., Chomba, E., Imasiku, M., Thea, D., Semrau, K., Bolton, P. (2011). Validation of the UCLA Child Post traumatic stress disorder-reaction index in Zambia. International Journal of Mental Health Systems, 5(1), 24. doi:10.1186/1752-4458-5-24

Partners in Health Curriculum Toolkit (2016) Mental Health Innovation Network. Available at http://www.mhinnovation.net/resources/partners-health-curriculum-toolkit (Accessed 23 January 2022).

Passchier, R. V., Abas, M. A., Ebuenyi, I. D., & Pariante, C. M. (2018). Effectiveness of depression interventions for people living with HIV in Sub-Saharan Africa: A systematic review & meta-analysis of psychological & immunological outcomes. *Brain, Behavior, and Immunity*, *73*, 261–273. https://doi.org/10.1016/j.bbi.2018.05.010

Rasmussen, A., Eustache, E., Raviola, G., Kaiser, B., Grelotti, D. J., & Belkin, G. S. (2014). Development and validation of a Haitian Creole screening instrument for depression. *Transcultural Psychiatry*, *52*(1), 33–57. https://doi.org/10.1177/1363461514543546

Rathod, S. D., de Silva, M. J., Ssebunnya, J., Breuer, E., Murhar, V., Luitel, N. P., Medhin, G., Kigozi, F., Shidhaye, R., Fekadu, A., Jordans, M., Patel, V., Tomlinson, M., & Lund, C. (2016). Treatment Contact Coverage for Probable Depressive and Probable Alcohol Use Disorders in Four Low- and Middle-Income Country Districts: The PRIME Cross-Sectional Community Surveys. *PLOS ONE*, *11*(9), e0162038. https://doi.org/10.1371/journal.pone.0162038

Rich, J. D., Beckwith, C. G., Macmadu, A., Marshall, B. D. L., Brinkley-Rubinstein, L., Amon, J. J., Milloy, M. J., King, M. R. F., Sanchez, J., Atwoli, L., & Altice, F. L. (2016). Clinical care of incarcerated people with HIV, viral hepatitis, or tuberculosis. The Lancet, 388(10049), 1103–1114. https://doi.org/10.1016/s0140-6736(16)30379-8

Rose, A. L., McBain, R., Wilson, J., Coleman, S. F., Mathieu, E., Fils-Aimé, J. R., Affricot, E., Thérosmé, T., Dubuisson, W., Eustache, E., Smith, S. L., & Raviola, G. (2021). Evaluating clinical outcomes of routinely delivered task-shared care for depression in rural Haiti. *Global Mental Health*, *8*. https://doi.org/10.1017/gmh.2021.17

Scale up of mhGAP across a disaster-affected region in the Philippines. (2014, February 17). World Health Organization. https://www.who.int/news-room/feature-stories/detail/mhgap-philippines

Section 3 Key issues. In: The global state of harm reduction 2008: Mapping the response to drug-related HIV and Hepatitis C Epidemics. London, UK: International Harm Reduction Association; 2008. (cited January 20, 2009). http://www.mamacoca.org/docs_ de_base/Consumo/IHRA_Global_%20HR_Report_2008.pdf.

Sekandi, J. N., Buregyeya, E., Zalwango, S., Dobbin, K. K., Atuyambe, L., Nakkonde, D., Turinawe, J., Tucker, E. G., Olowookere, S., Turyahabwe, S., & Garfein, R. S. (2020). Video directly observed therapy for supporting and monitoring adherence to tuberculosis treatment in Uganda: a pilot cohort study. *ERJ Open Research*, *6*(1), 00175–02019. https://doi.org/10.1183/23120541.00175-2019

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Thornicroft, G., Chatterji, S., Evans-Lacko, S., Gruber, M., Sampson, N., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Andrade, L., Borges, G., Bruffaerts, R., Bunting, B., de Almeida, J. M. C., Florescu, S., de Girolamo, G., Gureje, O., Haro, J. M., He, Y., Hinkov, H., . . . Kessler, R. C. (2017). Undertreatment of people with major depressive disorder in 21 countries. *British Journal of Psychiatry*, *210*(2), 119–124. https://doi.org/10.1192/bjp.bp.116.188078

Vinkeles Melchers, N. V. S., van Elsland, S. L., Lange, J. M. A., Borgdorff, M. W., & van den Hombergh, J. (2013). State of Affairs of Tuberculosis in Prison Facilities: A Systematic Review of Screening Practices and Recommendations for Best TB Control. *PLoS ONE*, *8*(1), e53644. https://doi.org/10.1371/journal.pone.0053644

Walmsley, R. (2016). *World Prison Population List*. Prison Studies. https://www.prisonstudies.org/sites/default/files/resources/downloads/world_prison_population_list_11th_edition_0.pdf

WHO . Global tuberculosis report 2015. Geneva: World Health Organization; 2015.

Wickham, H. (2009) *ggplot2: elegant graphics for data analysis*. Springer New York.

World Health Organization. (2021 October 14). *Tuberculosis*. https://www.who.int/news-room/fact-sheets/detail/tuberculosis

Yi, Y., Turney, K., & Wildeman, C. (2016). Mental Health Among Jail and Prison Inmates. *American Journal of Men's Health*, *11*(4), 900–909. https://doi.org/10.1177/1557988316681339

Appendix

Table 4: *Multivariate Analysis of the Association with Depression for Individuals with Some or No Education Level*

Variable	**Some Education**			**No Education**		
	P-Value	Odds Ratio	95% CI	P-Value	Odds Ratio	95% CI
Marijuana Use	0.468	2.33	(0.32, 48.25)	0.995	NA	NA
Cigarette Use	0.418	1.97	(0.39, 11.44)	0.995	NA	NA
Alcohol Consumption	0.535	1.67	(0.32, 8.75)	**0.006**	64	(5.19, 256.09)
Age						
Below 30	-	Ref	-	-	Ref	-
Above 30	**0.047**	0.10	(0.01, 0.71)	0.309	3	(0.38, 30.47)
Financial income [c]						
< 500 Gourdes Haitian	-	Ref	-	-	Ref	-
500 – 2499 Gourdes Haitian	0.996	0.1	(0.00 , 21.32)	0.122	0.08	(0.01, 1.45)
2500 – 4999 Gourdes Haitian	0.995	0.1	(0.00 , 95.25)	0.810	0.67	(0.02, 24.38)
>5000 Gourdes Haitian	0.995	0.1	(0.00, 17.40)	0.998	NA	NA
First time incarcerated	0.995	0.00	(0.00, 28.92)	0.998	NA	NA
Site						
DOT sites	-	Ref	-	-	Ref	-
VOT sites	0.821	0.81	(0.10,4.61)	1.000	1.00	(0.03, 28.35)
Stigma [b]						
Less than score of 10	-	Ref	-	-	Ref	-
Score of 10 or higher	0.535	1.67	(0.32, 8.75)	0.139	6.40	(0.69, 146.29)
Number of Dependents						
Less than 3 dependents	-	Ref	-	-	Ref	-
3 or more dependents	1.000	1.000	(0.19, 5.24)	0.223	4.80	(0.46, 113.38)
Number of hours worked prior to incarceration						
Less than 10	-	Ref	-	-	Ref	-
10 or more	0.718	0.73	(0.12, 3.86)	0.997	NA	NA

Table 5: *Study Characteristics of Participants with Substance Use*

	Marijuana Use	**Cigarettes Use**	**Alcohol Consumption**
All participants (n[%])	11 (100)	21 (100)	28 (100)
Age (mean[SD])	27.3 (4.9)	30.4 (8.8)	30.2 (8.6)
1 or more years of education	7 (63.6)	16 (76.2)	19 (67.9)
Average years of Education	3.50 (4.1)	5.16 (4.3)	4.56 (4.3)
Financial Income n[%]			
<499 Gourdes Haitian	1(0)	0 (0)	2 (7.1)
500 – 2499 Gourdes Haitian	2 (18.2)	5 (23.8)	6 (21.4)
2500 – 4999 Gourdes Haitian	2 (18.2)	5 (23.8)	5 (17.9)
>5000 Gourdes Haitian	7 (63.6)	11 (52.4)	12 (42.9)
Average Depression (mean[SD])	16.2 (4.4)	17.3 (6.5)	16.1 (6)
Depressed (13+ score)	10 (90.9)	18 (85.7)	23 (82.1)
Stigma, Total (mean[SD])	10.5 (10.8)	11.4 (12.9)	10.2 (10.9)
Internal Perceptions and Emotions	1.73 (2)	1.86 (2.3)	1.57 (2.03)
Disclosure	3.00 (3.2)	3.33 (4)	3.43 (3.8)
External Perceptions	2.55 (3.3)	2.67 (3.2)	2.18 (2.9)
External Actions	2.73 (3.3)	2.95 (3.8)	2.64 (3.3)
Courtesy Stigma	0.55 (1.2)	0.62 (1.2)	0.36 (1)
First time incarcerated (n[%])	9 (81.8)	15 (71.4)	20 (71.4)
Smoke Marijuana (n[%])	-	9 (42.9)	10 (35.7)
Smoke Cigarettes (n[%])	9 (81.8)	-	19 (67.9)
Drink Alcohol (n[%])	10 (90.9)	19 (90.5)	-

Table 6: *Cronbach Alpha for Stigma Scale and ZLDSI Depression Scale*

Cronbach Alpha Value							
Instrument Name	**Description**	**Interpretation**	**Items**	**n**	**Literature alpha**	**Observed alpha**	**Response Range**
ZLDSI Depression Scale	Measures participant's level of depression	A higher score indicates more mental distress congruent with depression Instrument range: (0-3)	13	50	0.89*	0.77	(0-35)
Stigma Scale	Measures the level of stigma that a participant is experiencing	A higher score indicates that a participant is experiencing higher levels of stigma Instrument range: (0-4)	20 in Haitian Stigma Scale ** (15 were used for this analysis)	50	> 0.80 **	0.68	(0-35)

* Rasmussen et al. (2014)
** Coreil et al. (2010)

Table 7: *Baseline Characteristics for Sites utilizing TB Directly Observed Therapy (DOT) and Video Directly Observed Therapy (VDOT)*

	DOT Site	**VDOT Sites**					
Variables	Croix de Bouquet (n=11)	Carrefour (n =2)	Delmas 83 (n=1)	Gonaives (n=4)	Jacmel (n=10)	Mirebalais (n=8)	Petit Goave (n=14)
Gender, Male (n[%])	11 (100)	2(100)	1(100)	4(100)	10(100)	8(100)	14(100)
Age, years (mean [SD])	30.2(6.4)	40(14.1)	32 (-)	32.5 (17.9)	30.7 (8.5)	29.5 (5.4)	30.2 (7.7)
Attended School (n[%])	9 (90)	1 (50)	1 (100)	4 (100)	5 (50)	6 (75)	6 (42.9)
Average Years of Schooling (mean[SD])	6.70 (4.4)	2.00 (NA)	12.0 (NA)	5.25 (2.6)	4.00 (4)	3.13 (3.6)	3.13 (3.6)
*Missing (n[%])***	0 (0)	1 (50)	0 (0)	0 (0)	2 (20)	0 (0)	6 (42.9)
First Time Incarcerated (n[%])	8 (80)	2 (100)	1 (100)	3 (75)	7 (70)	6 (75)	12 (85.7)
Missing	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (12.5)	0 (0)
Household Income (n[%])							
<499 Gourdes Haitian	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	5 (35.7)
500 – 2499 Gourdes Haitian	6 (60)	1 (50)	1 (100)	0 (0)	2 (20)	5 (63)	0 (0)
2500 – 4999 Gourdes Haitian	1 (10.0)	0 (0)	0 (0)	2 (50)	3 (30.0)	0 (0)	2 (14.3)
>5000 Gourdes Haitian	1 (10.0)	0 (0)	0 (0)	2 (50)	5 (50)	2 (25)	5 (35.7)
Missing	2 (20.0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (12.5)	2 (14.3)

	DOT Site	VDOT Sites					
Variables	Croix de Bouquet (n=10)	Carrefour (n =2)	Delmas 83 (n=1)	Gonaives (n=4)	Jacmel (n=10)	Mirebalais (n=8)	Petit Goave (n=14)
Average Number Dependents(mean[SD])	4.00 (3.7)	2.00 (2.8)	1.00 (NA)	5.50 (4.8)	3.67 (2.7)	4.75 (2.9)	2.71 (2.4)
Substance Use	1 (10)	0 (0)	0 (0)	0 (0)	1 (10)	0 (0)	0 (0)
Number who Smoke Cigarettes (n[%])	5 (50)	1 (50)	1 (100)	3 (75)	5 (50)	5 (63)	1 (7.1)
Number who Smoke Marijuana (n[%])	3 (30)	1 (50)	1 (100)	0 (0)	4 (40)	2 (25)	0 (0)
Missing							
Alcohol Use							
Number who Use Alcohol (n[%])	7 (70)	1 (50)	1 (100)	2 (50)	8 (80)	4 (50)	5 (35.7)
Alcohol Daily	4 (40)	0 (0)	1 (100)	1 (25)	4 (40)	3 (38)	1 (7.1)
ZLDSI Depression Scale							
Average Score, mean (SD)	15.7 (7.8)	7.50 (2.1)	17.0 (NA)	15.5 (4)	15.4 (5.1)	19.3 (8)	9.86 (9.6)
Considered Depressed (n[%])	8 (80)	0 (0)	1 (100)	3 (75)	8 (80)	7 (87)	6 (42.9)

	DOT Site	VDOT Sites					
Variables	Croix de Bouquet (n=10)	Carrefour (n =2)	Delmas 83 (n=1)	Gonaives (n=4)	Jacmel (n=10)	Mirebalais (n=8)	Petit Goave (n=14)
Stigma Score, Total (mean[SD])	13.4 (6.6)	0 (0)	25 (0)	0(0)	0(0)	23.0 (11.1)	12.1 (11.4)
Internal Perceptions and Emotions	1.90 (1.5)	0 (0)	3.00 (NA)	0 (0)	0 (0)	4.38 (2.2)	1.93 (2.2)
Disclosure	4.40 (2.3)	0 (0)	8.00 (NA)	0 (0)	0 (0)	6.50 (4.4)	5.29 (4.4)
External Perceptions	3.20 (3.2)	0 (0)	8.00 (NA)	0 (0)	0 (0)	5.13 (3.9)	2.07 (2.7)
External Actions	3.60 (3)	0 (0)	6.00 (NA)	0 (0)	0 (0)	5.88 (3.9)	2.71 (3.5)
Courtesy Stigma	0.30 (1)	0 (0)	0 (NA)	0 (0)	0 (0)	1.13 (1.6)	0.07 (0.3)

Figure 1: *Pearson Correlation between Stigma and ZLDSI Depression Score*

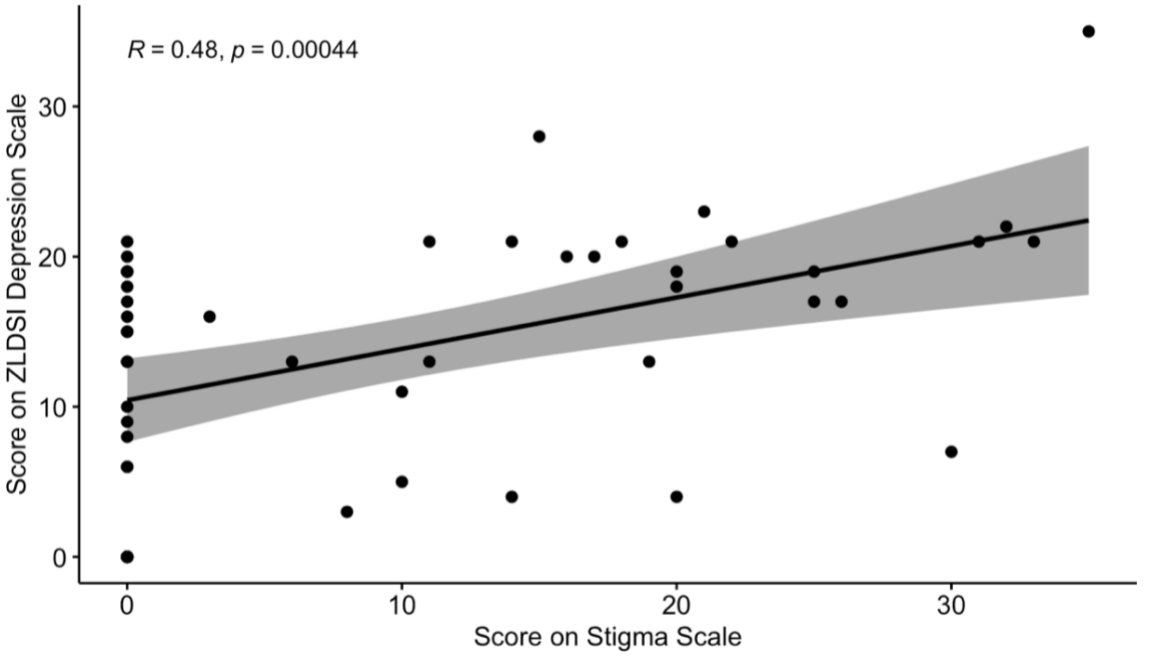

Figure 2: *Pearson Correlation between Hours Worked Prior to Incarceration and ZLDSI Depression Score*

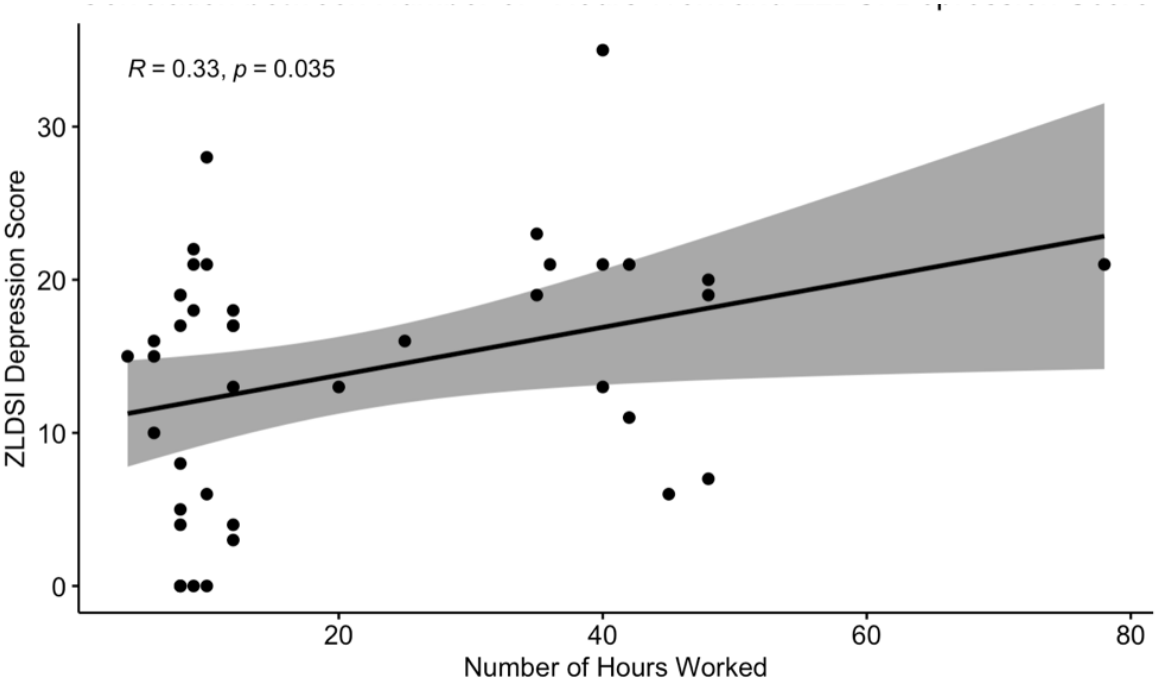

Figure 3: *Pearson Correlation between Years of Education and ZLDSI Depression Score*

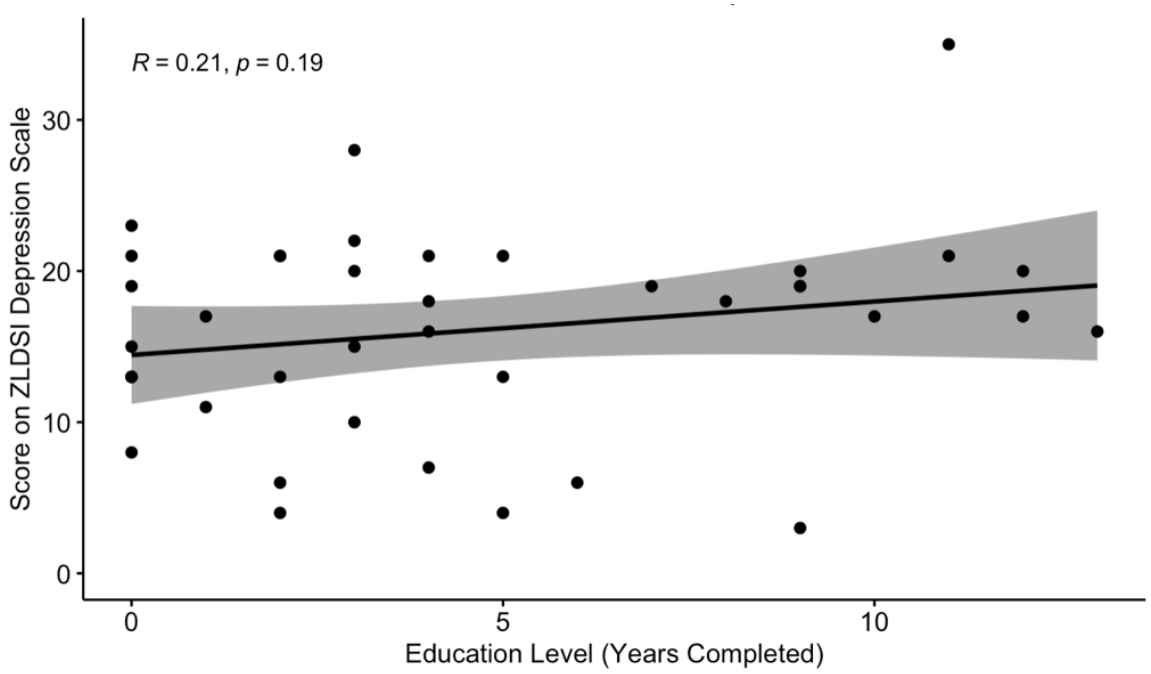

Figure 4: *Pearson Correlation between Age and ZLDSI Depression Score*

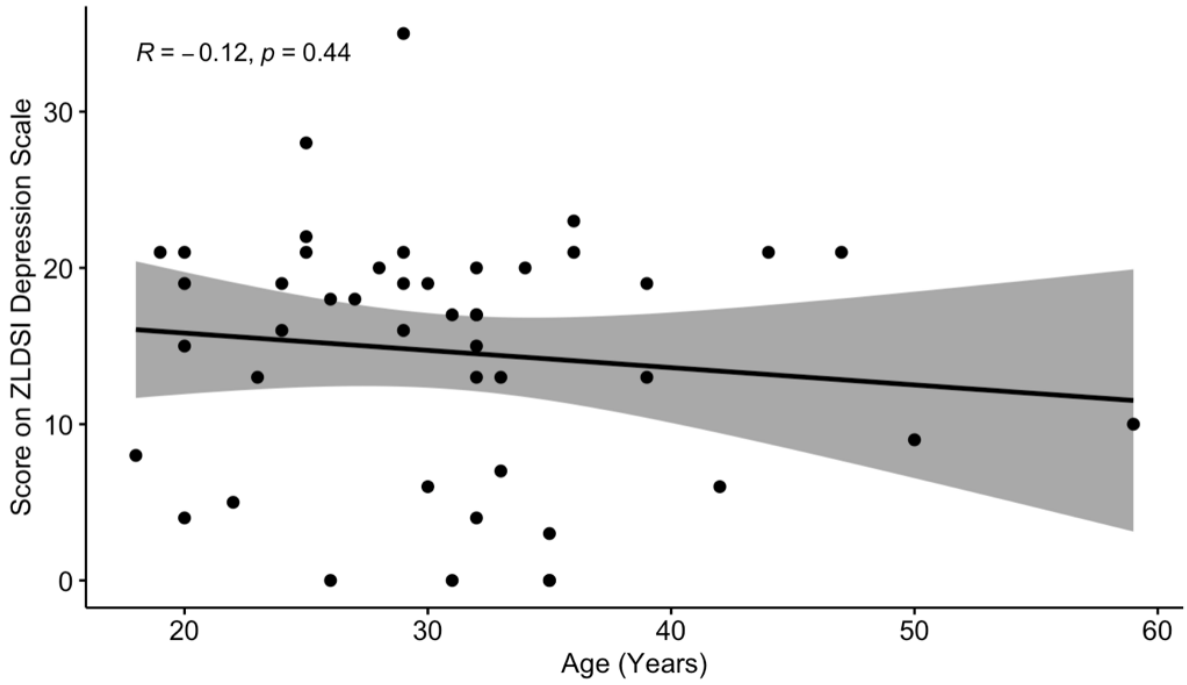

Figure 5: *Pearson Correlation between Number of Dependents and ZLDSI Depression Score*

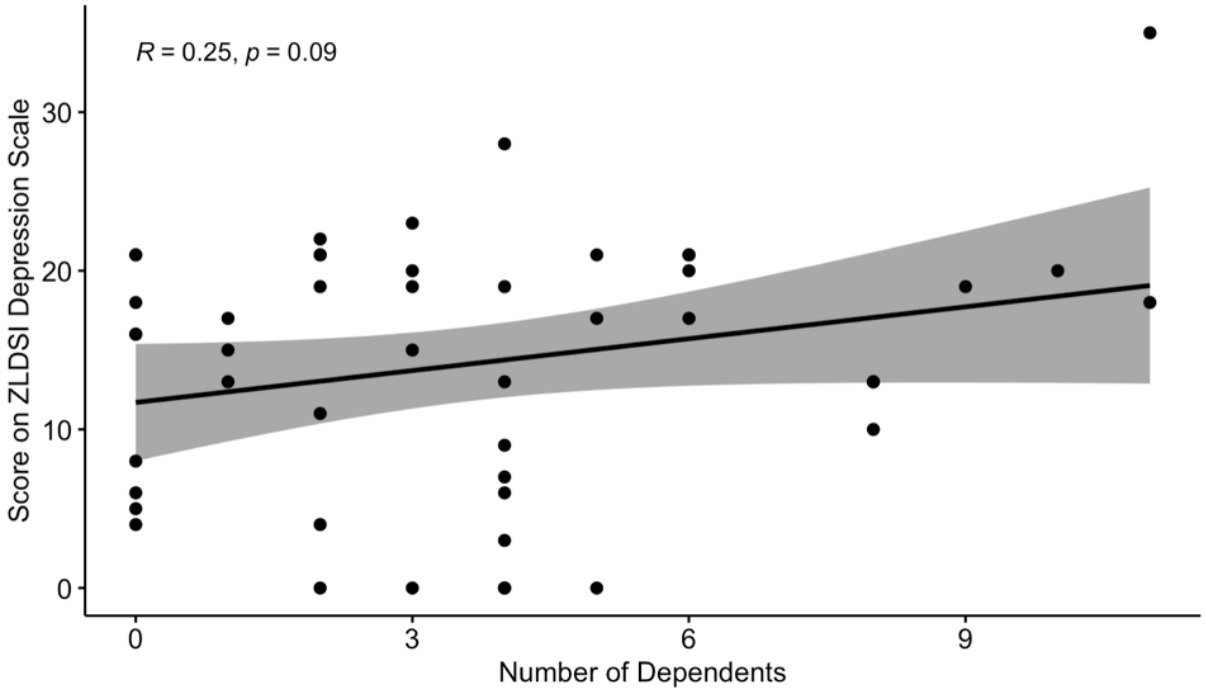

Figure 6: *English translation ZLDSI scale from Rasmussen et al. (2014) paper*

	Item	Depressed mood	Vegetative symptoms
5	Thinking too much	.702	–
14	Feeling down, discouraged or totally hopeless	.682	–
26	Thoughts that you would be better off dead, or of hurting yourself in some way	.682	–
21	Feeling you are a failure or feeling bad about yourself	.666	–
12	Feeling you've lost the taste for doing anything	.653	–
4	Feeling you have a constricted heart	.639	–
19	Having no appetite	.527	.452
10	Crying or feeling like crying	.511	–
18	Feeling tired or having little energy	.477	.508
2	Low energy	.430	.468
24	Moving or speaking so slowly that people have noticed	–	.626
16	Difficulty sleeping without waking early	–	.861
15	Difficulty falling asleep	–	.840

*Exploratory Factor Analysis, Varimax Rotation; $N = 99$.

Figure 7: *Original ZLDSI scale from Partners in Health in Haitian Creole (Partners in Health Curriculum Toolkit, 2016)*

ZANMI LASANTE DEPRESSION SYMPTOM INVENTORY (ZLDSI)

Partners In Health

Date dd/mm/yy

	Pandan 15 jou ki sòt pase la yo, konbyen fwa yon nan pwoblèm sa yo te fatige ou ?	Di tou	Konbyen fwa yon nan pwoblèm sa yo te fatige ou ?	Pandan kèk jou (1–5 jou)	Plis pase yon semèn (6–9 jou)	Preske chak jou (10–15 jou)
1	Santi ou de la la.	0	—	1	2	3
2	Santi kè sere.	0	—	1	2	3
3	Kalkile twòp.	0	—	1	2	3
4	Kriye oubyen anvi kriye	0	—	1	2	3
5	Santi anyen preske pa enterese ou.	0	—	1	2	3
6	Santi ou kagou, dekouraje ak lavi, oubyen pèdi espwa nèt ale.	0	—	1	2	3
7	Gen difikilte pou dòmi pran ou.	0	—	1	2	3
8	Santi ou fatige oubyen ou manke fòs.	0	—	1	2	3
9	Ou pa gen apeti.	0	—	1	2	3
10	Ou santi lavi-w pase mal oubyen ou santi-w pa alèz ak tèt-w.	0	—	1	2	3
11	Fè mouvman oubyen pale tèlman dousman, menm lòt moun wè sa.	0	—	1	2	3
12	Ou di nan tèt ou: Pito-w te mouri, oubyen ou gen lide pou fè tèt-w mal.	0	—	1	2	3
13	Gen difikilte pou rete dòmi jouk li jou.	0	—	1	2	3
			Totals	(+)	(+)	

(=) **ZLDSI Score** _____

Figure 8: *Stigma scale used for this study - A Rendition of Stigma Study found in Coreil et al. (2010) paper*

Internal Perceptions and Emotions
1. Do you think less of yourself? For example, has it reduced your pride or self-respect?
2. Have you ever been made to feel shamed or embarrassed because you have TB?
Disclosure
1. If possible, would you prefer to keep people from knowing that you have TB or have been assigned a cell for people with TB?
2. Have you discussed, or do you plan to discuss with your family that you have TB?
3. Have you discussed, or do you plan to discuss with other people detained here that you have TB?
4. Have you discussed, or do you plan to discuss with guards that you have TB?
External Perceptions
1. Do you think that other persons detained, others in prison or others in your community have less respect for you?
2. Do you think that other persons detained, others in prison or others in your community have less respect for your family?
3. Do you think people are likely to think you have other health problems (even if you don't)?
4. Are you worried that people will assume you have HIV?
External Actions
1. Do you feel others have avoided or might avoid you?
2. Do you think some people refuse to visit your home because of TB even after you have been treated?
3. Have you been asked to stay away from work or social groups?
4. Do you think you might decide on your own to stay away from work or social groups?
Courtesy stigma
1. Do you think contact with you might have any bad effects on others around you, even after you have been treated?

Figure 9: *Original Full stigma scale from Coreil et al. (2010) paper*

Factor Label and Scale Items	Item abbreviation
Internal perceptions and emotions.	
Would Jean think less of himself because he has TB? Might he have less pride or self-respect?	Think less of self
Do you think Jean might feel ashamed or embarrassed because of this problem?	Feel ashamed
Would Jean be worried that he might have to spend time in a TB hospital/sanatorium?	Worry about sanatorium
Disclosure	
Do you think Jean would prefer to keep others from knowing about this problem?	Hide from others
Do you think that Jean would discuss this problem with family members?	Disclose to family
Do you think that Jean would discuss this problem with close friends?	Disclose to friends
Do you think that Jean would discuss this problem with neighbors?	Disclose to neighbors
Do you think that Jean would discuss this problem with church members?	Disclose to church members
Do you think that Jean would discuss this problem with co-workers?	Disclose to co-workers
External perceptions	
If others in the community came to know about it, would they have less respect for Jean?	Loss of respect
Would others believe that Jean is dangerous because of this condition?	Think dangerous
Even if Jean didn't have any other health problems, are people likely to think he does because he has TB?	Assume has other conditions
Would people assume he has HIV?	Assume has HIV
External actions	
Do you think people might say or do anything to hurt Jean because of his illness?	Others hurtful
Do you think others might avoid Jean because of this problem?	Others avoid
Would other people refuse to visit Jean's home because of this condition even after treatment?	Others refuse to visit
Would this condition cause problems for Jean at work if people knew about it?	Problems at work
Do you think that Jean's wife will remain with him and be supportive over the entire course of the treatment?	Wife supportive
If Jean were unmarried, do you feel that even after having received treatment and having been cured, Jean might still have difficulty getting married, as a result of his illness?	Difficulty marrying
Courtesy stigma	
If others in the community came to know about it, would *they* have less respect for Jean's family?	Less respect for family
If he had children, do you think the problem might cause social problems for Jean's children in the community?	Problems for children
Would contact with Jean have bad effects on others around him even after he is treated?	Effects on others
Haitian identity	
Is it more embarrassing for Jean to have TB because he is Haitian than it would be for other people in Florida?	Embarrassing because Haitian
Because Jean is Haitian, will people think worse of him than others with TB?	Think worse because Haitian

Figure 10: *Original stigma scale from Coreil et al. (2010) paper that was formulated for their Haitian community*

Factor	Eigenvalue	Variance Explained	Items	Item-factor loading
1. Disclosure	5.1	.26	Disclose to family	.71
			Disclosure to friends	.81
			Disclosure to neighbors	.74
			Disclosure to co-workers	.83
			Disclosure to church members	.79
2. Internal shame	2.5	.13	Think less of self	.66
			Feel ashamed	.62
			Others hurtful	.62
			Hide from others	.71
			Others refuse to visit	.45
			Worry about sanatorium	.67
3. External problems	1.7	.08	Problems at work	.62
			Difficulty marrying	.61
			Others avoid	.59
			Think dangerous	.71
4. Family reputation	1.5	.08	Loss of respect	.69
			Less respect for family	.83
			Problems for children	.60
5. Other illness	1.4	.07	Assume has other conditions	.83
			Assume has HIV	.87