**Title: The Impact of Ghana’s National Health Insurance on Psychological Distress**

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 **The Impact of Ghana’s National Health Insurance on Psychological Distress**

**Abstract**

**Background and Objective**

Poor mental health is among the growing non-communicable diseases in low- and middle-income countries. Despite mental ill-health accounting for an already considerable, growing burden of disease in many low- and middle-income countries, policy action to confront the challenge has been limited, at both the international and national levels. Recently, several low- and middle-income countries have embarked on the journey towards universal health coverage by expanding their public health insurance provision, with the ultimate objective of improving population health, in addition to other health system objectives. While mental ill-health interventions typically may not have been specifically covered in the publicly funded benefit package, this raises the question as to whether, and if so, by how much the expansion of public health insurance may have contributed – directly or indirectly – to improved mental health. In this paper, we assess the impact of Ghana’s implementation of national health insurance on psychological distress.

**Methods**

The study uses the first wave of the 2009/2010 Ghana Social Economic Panel survey, covering 10,007 respondents. We employ instrumental variable and propensity score matching methods to estimate the causal impact of health insurance on psychological distress, measured by the Kessler Psychological Distress Scale (K10). Higher K10 values indicate higher psychological distress.

**Results**

The median K10 score in Ghana is 16 (*P*<0.001), with a minimum of 10 (*P*<0.001) and a maximum of 45 (*P* <0.001). The results from the instrumental variable estimations, without matching, indicate that the K10 score for the insured is 11.8% lower (*P*<0.001) than that of the uninsured. After running the instrumental variable regression on the matched sample, we find that the insured have a K10 score that is 10.6% (*P*<0.001) lower than that of the uninsured. Similarly, the estimates based on propensity score matching indicate that the insured have a lower K10 score (-0.023*P*<0.05). Furthermore, the beneficial impact of health insurance on psychological distress is larger for wealthier than poorer insurance members, and it varies across regions in Ghana. The findings are robust to the various estimation methods.

**Conclusion**

This study suggests that having health insurance is associated with reduced psychological distress and hence improved mental health, even though mental illness treatment or prevention were at best partially covered by the NHIS public health insurance scheme in Ghana.

**1 Introduction**

The burden of psychological distress is concentrated in low- and middle-income countries (LMICs)[5], where it is estimated that four out of five individuals suffer from mental health problems [7]. Psychological distress has been shown to be associated with an increased risk of poverty, poor education outcomes [9] and an increased risk of chronic diseases [11]. Globally, the economic consequences of mental ill-health conditions are profound: between the years 2010 and 2030, almost USD16.0 trillion worth of economic output is estimated to be lost due to psychiatric disorders [14]. Despite psychiatric disorders accounting for an already considerable, growing burden of disease in many LMICs, policy action to confront the challenge has been limited at both international and national levels [15].

Recently, several LMICs have embarked on the journey towards universal health coverage by expanding their public health insurance provision, with the ultimate objective of improving population health, in addition to other health system objectives [16, 17]. Without health insurance, people are exposed to more stressful conditions, which in turn may trigger psychological distress [18]. Evidence from high-income countries shows that lack of health insurance is one of the key determinants of psychological distress [19-21, 18].

Health insurance might affect psychological distress in several ways [22]. This may include the psychological effect, for a given individual, of knowing that they would be protected against some of the adverse consequences of living with ill health whilst being covered by health insurance. This effect may also be a result of direct coverage of psychiatric health treatment from health facilities [18]. While there is growing interest in understanding the socioeconomic determinants of mental health in LMICs [24-27], the contribution of health insurance to psychological distress has not been fully examined in an LMIC context, except for one study in China that focused on depression [28]. Our paper is different from the Chinese study in terms of context, methods, and national representativeness in terms of sampling and uses a different measure of mental health.

The existing evaluations of public health insurance reforms in LMICs have focused on the impact on *physical* health (with mixed and sometimes counter-intuitive results) [29, 30]. In this paper, we seek to fill the evidence gap for LMICs by evaluating the impact of the public health insurance scheme in Ghana, one of the first countries in Africa to have introduced national health insurance (NHIS) [31, 32] (more information about the insurance scheme is provided in Box 1, in the next page). Previous evaluations of the Ghana NHIS have focused on the effect of the NHIS on out-of-pocket payments (OOP), catastrophic health expenditure (CHE) [33, 34] and health care utilisation [35], concluding that the NHIS has increased the latter and reduced OOP. Other studies have found that health insurance is associated with reduced neonatal mortality rates and improved maternal and child health outcomes [36-39]. One study from Ghana that is perhaps closest to our focus – but does remain very much at a descriptive level and is limited to a very small sample – has shown that having health insurance is associated with less anxiety in 89 male and 11 female prison inmates [40].

Of the 26.1 million people in Ghana, 650,000 are affected by severe mental disorders, and 2,166,000 suffer from moderate to mild mental disorders [41]. Ghana represents an interesting case study of the impact of health insurance on psychological distress in that the cost burden associated with mental healthcare utilisation has been shown to be high. According to Addo et al. [42], households seeking mental health care incur costs of USD60.3 per month, out of a monthly household income of USD184.5. To the extent that health insurance reduces some of the private costs of such health care use, psychological health benefits may arise. However, the extent to which psychiatric health care services are included in the benefit package appears limited, as, for instance, psychotic medicines are only covered if prescribed in general practice [43]. This may suggest that if health insurance has a positive impact on psychological distress, then this may have to operate via channels other than increased mental health care utilisation.

This study contributes to the literature by, first, using more robust methodologies than existing studies – an instrumental variable (IV) technique and matching methods separately, as well as a combination of the two – to assess the effect of health insurance on psychological distress. Second, it provides evidence on the impact of health insurance on psychological distress in an African context. We examine psychological distress measured using the Kessler 10 (K10) instrument, which has been widely used by the WHO and by other researchers in previous mental health research [44, 45, 27, 46].

**Box 1: Ghana National Health Insurance**

Ghana’s health care system uses a “cash and carry” approach, where people pay user fees at the point of use. User fees were introduced in the 1980s, as prescribed by the structural adjustment programs (SAP) of the IMF and World Bank [1, 2]. The reason for the introduction was to raise finance for health. After the implementation of user fee policy, the health care seeking costs were associated with large inequalities in health care access and excluded the poor from accessing health care services [3]. Eventually, many poor people resorted to other hardship coping mechanisms, such as reduction of consumption, borrowing and selling of essential asserts in order to finance health care utilisation [2] The NHIS was established by the National Health Insurance Act of 2003 (Act 650), in the interest of improving equity in access to health care[4].

The NHIS operates in a decentralised structure where every district has its own insurance fund financed through central-level transfers and individual premiums [6]. Although membership in the NHIS is supposed to be mandatory, in essence, it is voluntary [8]. No penalties exist for those who do not have NHIS in Ghana [10]. Enrolment has been relatively low but considerably higher than that in most existing health insurance schemes in the West African region. Enrolment can be performed at the individual or household level [6]. Membership in the NHIS is valid for one year. Inequalities in enrolment have also been reported, where the richer are more likely to enrol than the poor [12, 13]. The enrolment problem has also been coupled with mixed negative attitudes towards the price of the NHIS and provider attitude [13]. People under the age of 18, above 70, pensioners, pregnant women or those deemed to be indigent are exempted from premium payments.

In terms of financing, the NHIS has a hybrid financing mechanism. This includes taxes (2.5% value-added on goods and services, excluding the ones defined as goods and services consumed by the poor) [13, 4], payroll deduction from formal workers (2.5% of the Social Security and National Insurance Trust), annual allocation from the central government and premiums from the adults who work in the informal sector. At the time of the study, the districts were charging approximately USD8 per person, and people paid no deductibles or co-payment [6]. Currently, the premium varies within districts and is graduated based on income levels. The premium range is from 7.20 Ghanaian cedis (GH¢) (USD1.62) to GH¢48.00 (USD10.83) [23]. The operation of the NHIS is regulated by the National Health Insurance Agency (NHIA). Within the NHIS, there is a predefined benefit package that covers almost 95% of all health care services.

**2 Methods**

**2.1 Data**

This paper draws upon data from a study conducted by the Economic Growth Centre (EGC) at Yale University in the United States of America and the Institute of Statistical, Social, and Economic Research (ISSER) at the University of Ghana, Legon [47]. We use the first wave of the Ghana Socioeconomic Panel Survey of 2009-2010, which includes the only data currently available for public use. The data can be downloaded from the World Bank website[[1]](#footnote-1). A two-stage stratified sample was used in the survey design during the data collection process. First, enumeration areas (EA) were selected, followed by a random selection of 15 households from each EA across the ten regions. In total, data were collected from 5009 households in the 334 EAs. The survey non-response rate is below one percent. Only individuals aged 12 years and older were included in the study [47].

**2.2 Dependent Variable**

Our variable of interest is psychological distress and is measured using the K10, which is a tool developed by Kessler and Mroczeck [48]. The WHO has adopted the K10 for assessing mental health in various contexts [49, 50, 45]. In Ghana, the K10 has been used to measure psychological distress among prison inmates [40] as well as in the general population [51]. In the K10 questionnaire, respondents are asked 10 questions about the frequency with which they have experienced specific feelings in the previous four weeks. The answers are calibrated on a 5-point scale, ranging from a minimum of 1 to a maximum of 5 (where 1. None of the time, 2. A little of the time, 3. Some of the time 4. Most of the time, and 5. All of the time). The K10 index is calculated as a sum of the 10 questions over the 5-point scale, and this gives a minimum of 10 to a maximum score of 50. Thus, higher scores denote higher psychological distress. Our analysis uses a continuous (log of) K10 score, which is more appropriate to reflect psychological distress than a categorical scale [18].

**2.3 Explanatory Variables**

The choice of the independent variables is based on previous studies that have assessed socioeconomic determinants of psychological distress and, in particular, predictors of health insurance uptake in Ghana and other countries [9, 18, 52, 40, 42, 51]. Among others, the variables include sex, age, self-reported health, geographical location, education, and income. All the variables we use are described in Table 1.

**2.4 Data Analysis**

The main analysis uses an IV approach to address endogeneity. Endogeneity occurs when a covariate is correlated with the unobserved error term of the regression. Our IV approach is motivated by concerns around selection into health insurance, which can potentially cause endogeneity. Previous studies report that the probability of enrolling in the NHIS in Ghana – which is in practice a voluntary individual decision – increases with health risk [52, 53, 37]. Indeed, most insured individuals in our sample report poor self-assessed health, which suggests that the described sources of endogeneity may be an issue for our analyses.

Assuming that the relationship between health insurance and psychological distress is linear, the effect of the NHIS on psychological distress can be estimated as:

$Y\_{i}=∝\_{0}+θNHIS\_{i}+X\_{i}^{'}β+ε\_{i}$ (1)

where $Y\_{i}$ is log of K10, $NHIS\_{i}$ health insurance for individual, $X\_{i}^{'}$ is a vector of controls and $ε\_{i}$ is the error term. If endogeneity is a problem, it means that $E( NHIS\_{i}|ε\_{i}\ne 0)$. The implication of endogeneity is that the OLS coefficient $(θ)$ is biased and inconsistent and can no longer be given a causal interpretation [54]; thus, there is a need to address endogeneity using an IV.

An IV is a variable $\left(Z\right)$ that is correlated with having insurance but is not correlated with the error term ($ v\_{i}$) in equation (1). To be a suitable instrument, the variable must satisfy two important conditions, namely, being relevant (informative) and exogenous (valid) [55]. Instrument relevance means that the instrument $\left(Z\right)$ is highly correlated with the endogenous explanatory variable, i.e., [$Cov\left(Z\_{i },NHIS\_{i} \right)\ne 0$] [55]. Instrument validity means that the instrument is not correlated with the error term, i.e., [$Cov\left(Z\_{i },ε\_{i}|X\_{i}^{}\right)=0$]. Having identified such an instrument, the effect of$ NHIS\_{i}$ on $Y\_{i}$ in equation (1) is estimated in two steps using two-stage least squares (2SLS). First, we regress health insurance uptake on the instrument and the regressors:

$NHIS\_{i}=π\_{0}+π\_{i}Z\_{i}+X\_{i}^{'}∅+v\_{i}$ (2)

where $Y\_{i}$ is the log of K10, $NHIS\_{i}$ is health insurance, $Z\_{i}$ is an instrument, $X\_{i}^{'}$ is a vector of controls, $∅$ is a vector of coefficients, $π\_{0}$ is a constant, and $v\_{i}$ is an error term. To assess the strength of the instrument, we utilise the “rule of thumb” of whether the $F-$statistic in the first stage (equation 1) is greater than 10 [56]. Exogeneity of the instrument is tested using the Hausman test [57]. This test assesses whether there are systematic differences between estimates obtained using ordinary least squares (OLS) and the IV estimator.

Second, from equation 2, we obtain the predicted values of the $NHIS$ variable used to run equation 3:

$Y\_{i}=∝\_{0}+τ \hat{NHIS}\_{i}+X\_{i}^{'}β+ε\_{i}$ (3)

where $Y\_{i}$ is the log of K10, $ \hat{NHIS}\_{i}$ is the predicted value of health insurance, $X\_{i}^{'}$ are controls with a vector of coefficients$ β$, $∝\_{0}$ is a constant, and $ε\_{i}$ is an error term. The coefficient $(τ)$ measures the effect of health insurance on psychological distress. We perform robustness checks by using different estimation samples (excluding those under age 18 and comparing rural-urban samples); changing the functional form (using naïve Poisson, naïve square root transformation, instrumented generalized method of moments (GMM) and control function); and imputing missing values by assigning the lowest and highest K10 scores to the 29 missing observations (0.29% of the data) on the dependent variable.

**2.4.1 Instruments, Relevance, and Weak Instruments**

In any IV strategy, the challenge is to obtain a valid instrument [55]. The most common instrument used in the related literature has been membership in microfinance or other social support organisations [58]. Variations in community- or state-level enrolment rates have also been used as instruments to proxy for insurance penetration. Such instruments have been applied to estimate the effect of community-based health insurance on child health in Rwanda [59].

In addition to the above-mentioned studies, community enrolment as an instrument has also been extensively used in China [60-62], Colombia [63], Mexico [64, 65] and Ecuador [66]. The suggested instrument has also been recently used in Ghana in the evaluation of the NHIS with respect to OOP, CHE and health care utilisation [33]. However, the difference with our own approach is that our instrument is constructed as an aggregate, excluding the household in which an individual is observed. This is based on the assumption that the higher the enrolment rate in the community is, the more attractive the insurance, thus increasing the odds of an individual enrolling. The instrument captures aggregated decisions for the other households to join the NHIS, and thus, it should not be directly correlated with the specific (excluded) household's mental health. The various public recruitment campaigns in communities [4, 67] can be seen as one of the major contributors to higher community enrolment and are dependent on each NHIS district administrators’ abilities to convince communities to join the NHIS. Given that the community decision to join a health insurance scheme also depends on aggregate decisions [68, 69], then this should be exogenous to the decision at the household level.

**2.5 Matching Estimator**

Following Cheung, Padieu [61], Wirtz et al. [64], and Trujillo et al. [63], we also undertook propensity score matching (PSM). As a final check, we run our IV regressions using only the (propensity score) matched sample [59]. The PSM estimator has been widely used in programme impact evaluation [70, 55, 71, 72]. The propensity score is the probability of being assigned to a treatment group (in this case, having NHIS), conditional on the observed covariates. Thus, PSM enables estimation of the treatment effect of having NHIS. In the model using PSM, let $NHIS\_{i}=1$ represent a person with health insurance and $NHIS\_{i}=0$ represent an individual with no health insurance. The effect of the treatment is then represented by $TE\_{i}$ for each individual as:

$TE\_{i}=Y\_{i}(1)-Y\_{i}(0)$ (4)

where $Y\_{i}(1)$ represents the log of the K10 score if a person has health insurance, and $Y\_{i}(0)$  represents the log of the K10 score if a person does not have health insurance. The average treatment effect on the treated$ (ATET)$ can be estimated as follows:

 $ATET=E\left(NHI\_{i}=1, X\_{i}\right)=E\left(NHI\_{i}=1, X\_{i}\right)-E\left(NHI\_{i}=1, X\_{i}\right)$ (5)

The propensity score is estimated using the same covariates used in the main regression (regions, household size, location, marital status, education, sex, income, and status of being household head or not). Other strategies, namely, nearest neighbour matching and regression adjustments (RA), were also utilised for sensitivity analysis of the choice of estimators. These are a form of doubly robust methods (combination of propensity score (exposure equation and outcome regression)) employed as part of a sensitivity analysis. All the approaches allow for robust standard errors [73]. All the analyses were performed in Stata 15.1.

**3 Results**

**3.1 Descriptive Statistics**

In Table 1, the median K10-score is 16, with a minimum of 10 and a maximum of 45. Approximately 34% of the respondents have health insurance, 49% are household heads, and 13% have secondary school or higher education qualifications. The mean age of respondents is approximately 39, most of the respondents are married, and 45% are male. The average household size is approximately 5, and 73% of the respondents report being in good health. The mean income per month is estimated at GH¢435 and ranges from GH¢60.00 to GH¢ 2668.00.

**Table 1: Social and demographic statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Description** | **Mean** | **Med** | **Min** | **Max** |
| K10-score | Kessler 10 Score  | 17.37 | 16 | 10 | 45 |
| Health Insurance(NHIS) | 1 if respondent has national health insurance and zero otherwise | 34% | 0 | 0 | 1 |
| Household head | 1 if respondent is a household head and 0 otherwise | 49% | 0 | 0 | 1 |
| Age of respondent | This is the age of the respondent at the time of the interview and is captured as continuous | 39.13 | 36 | 12 | 109 |
| Household size | Number of people who live in the household | 4.51 | 4 | 1 | 20 |
| Income (GH₵) | Total household per capita expenditure (Ghana Cedi) | 435.34 | 314 | 60 | 2268 |
| Urban | Location of residence of respondent. 1 if urban, 0 if rural | 35% | 0 | 0 | 1 |
| Very healthy | Self-assessed health; 1 if healthy, 0 otherwise | 73% | 1 | 0 | 1 |
| Somewhat healthy | Self-assessed health; 1 if somewhat healthy, 0 otherwise | 18% | 0 | 0 | 1 |
| Somewhat unhealthy | Self-assessed health; 1 if somewhat unhealthy, 0 otherwise | 7% | 0 | 0 | 1 |
| Unhealthy | Self-assessed health; 1 if unhealthy, 0 otherwise | 2% | 0 | 0 | 1 |
| No qualification | Takes 1 if respondent has no education and 0 otherwise | 62% | 1 | 0 | 1 |
| MSLC/BECE/Vocational | Takes 1 if responded has MSLC/BECE/Vocational qualification and 0 otherwise | 26% | 0 | 0 | 1 |
| Secondary/SSS/SHS and higher | Takes value of 1 if respondent has secondary/SSS/SHS and higher qualification and 0 otherwise | 13% | 0 | 0 | 1 |
| Male | Captures gender of respondent and is 1 if male, 0 if female | 45% | 0 | 0 | 1 |
| Married | Marital status of the respondent; 1 if married and zero otherwise | 51% | 1 | 0 | 1 |
| Western region | 1 if Western region and 0 otherwise | 9% | 0 | 0 | 1 |
| Central region | 1 if Central region and 0 otherwise | 7% | 0 | 0 | 1 |
| Greater Accra region | 1 if Greater Accra region and 0 otherwise | 10% | 0 | 0 | 1 |
| Volta region | 1 if Volta region and 0 otherwise | 10% | 0 | 0 | 1 |
| Eastern region | 1 if Eastern region and 0 otherwise | 12% | 0 | 0 | 1 |
| Ashanti region | 1 if Ashanti region and 0 otherwise | 18% | 0 | 0 | 1 |
| Brong Ahafo region | 1 Brong Ahafo region and 0 otherwise | 10% | 0 | 0 | 1 |
| Northern region | 1 if Northern region and 0 otherwise | 14% | 0 | 0 | 1 |
| Upper East region | 1 if Upper East region and 0 otherwise | 6% | 0 | 0 | 1 |
| Upper West region | 1 if Upper West region and 0 otherwise | 4% | 0 | 0 | 1 |
| *N* |  | 10007 |  |  |  |

**3.2 Econometric results**

Having presented the descriptive results, we move on to present the results from the main IV model. First, we interpret the first stage as shown in Appendix A.4. There seems to be a strong relationship between the instrument and NHIS uptake, which is significant at *P* <0.001. In terms of exogeneity, the post-estimation test indicates a Durbin-Wu-Hausman (DWH) statistic of 29.60 (*P*<0.001), thus leading to strong rejection of the exogeneity of health insurance. Regarding instrument relevance, the  $F$-statistic (( $F$(1, 9954) = 1372.8; *P*<0.001) is greater than 10, suggesting that the instrument is not weak [56]. The first-stage test is attached in Appendix A.5.

In Table 2, the OLS results are in the top panel, and the IV model is in the bottom panel. In all estimations, we exclude and include different variables, as indicated in the table, to see whether the results are robust to change of controls. The main results are in column (5), where the self-assessed health variable is excluded because it may be correlated with mental health. The results are robust to excluding the self-assessed health indicator.

**Table 2: Results of the effect of health insurance on psychological distress (naïve OLS and IV)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (1) | (2) | (3) | (4) | (5) |
|  |  **Variables Dependent variable is the log of K10** |
|  | Health Insurance (NHIS) | -0.015\*\* | -0.024\*\*\* | -0.024\*\*\* | -0.024\*\*\* | -0.022\*\*\* |
| OLS |  | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
|  | Health Insurance (NHIS) | -0.110\*\*\* | -0.120\*\*\* | -0.132\*\*\* | -0.116\*\*\* | -0.118\*\*\* |
| IV |  | (0.019) | (0.019) | (0.019) | (0.019) | (0.019) |
|  | Household head | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Household size | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Controls | Urban | *Yes* | *Yes* | *No* | *Yes* | *Yes* |
|  | Education | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Male | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Marital Status | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Log Income | *Yes* | *No* | *Yes* | *Yes* | *Yes* |
|  | Province | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Age of respondent | *No* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Self-assessed health | *No* | *No* | *No* | *Yes* | *No* |
| N |  | 9978 | 9975 | 9975 | 9939 | 9975 |

**Note:** Standard error in parentheses, \* p<0.10, \*\* p<0.05, \*\*\* p<0.01; It is important to note that there were 68 missing observations in the analytic sample; for various variables, the reported sample sizes in the regression output may vary depending on the combination of the covariates used.

The results in Table 2 show that the health insurance coefficient for both OLS and IV is negative. For the OLS (-0.022; $P<0.01$), the results are robust to changes in the controls. In the IV model, given that the variable is in logarithm, the coefficient of -0.118 ($P<0.01$) may be interpreted as a semi elasticity. Exponentiation of the NHIS coefficient produces an estimate that implies that the K10 score is 11.8% lower for the insured, on average, than that of the uninsured. The estimated NIHS effects are statistically significant ($P<0.01$) across all IV models and consistently indicate that the K10 score for the insured is lower than that for the uninsured.

Our results suggest that the IV estimation coefficient is higher than that of the (naïve) OLS analysis in Appendix A.3. After checking for inclusion and exclusion of various variables in the specification, the K10 score ranges from 11.2% to 12.8% lower than the score for people without health insurance. After implementing matching and performing an IV on the matched sample, the results are similar to those in Table 2. We find that the health insurance coefficient is negative, suggesting that the K10 score for the insured is 10.6% lower than that of the uninsured. See Table 3 column 5. The full results are in Appendix A.6 column 5.

**Table 3: Results of the effect of health insurance on psychological distress (IV on matched sample)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (1) |  (2) | (3) |  (4)  |  (5) |
| **Variables** |  | **Dependent variable is the log of K10** |
|   | Health Insurance (NHIS) | -0.112\*\*\* | -0.123\*\*\* | -0.141\*\*\* | -0.093\*\*\* | -0.106\*\*\* |
|  |  | (0.019) | (0.020) | (0.019) | (0.020) | (0.020) |
|  | Household head | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Household size | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Controls | Urban | *Yes* | *Yes* | *No* | *Yes* | *Yes* |
|  | Education | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Male | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Marital Status | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Log Income | *Yes* | *No* | *Yes* | *Yes* | *Yes* |
|  | Province | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Age of respondent | *No* | *Yes* | *Yes* | *Yes* | *Yes* |
|  | Self-assessed health | *No* | *No* | *No* | *Yes* | *No* |
| N |  | 6764 | 6758 | 6758 | 6722 | 6758 |

In addition to the analyses discussed, we check for heterogeneity at different levels of income and across regions. The health insurance variable is interacted with income and regional variables. In Tables A.10 and A.11 in the appendix, the plotted marginal effects indicate that there is a heterogeneous impact of health insurance across income levels. We notice that the beneficial impact of health insurance on psychological distress increases with income (that is, after the interaction of the income and health insurance variables). Across regions, we also find that there is heterogeneity and that the impact of health insurance varies by region. It is much lower in the capital city of Ghana Greater Accra and higher in the Ashanti regions.

**3.3 Results for Matching**

**3.3.1 Matching quality**

First, we checked for common support in the propensity scores. Figure 1 shows the common support (overlap) for the people with NHIS (treatment) and without NHIS (control). As can be seen, there is an overlap in the distribution of the propensity scores between the treatment and control groups. To estimate the treatment effects, the propensity score approach assumes the non-existence of differences between treated and non-treated individuals after matching is performed. Any indication of differences thus calls for balancing the treatment and control groups. Covariates are said to be balanced if the standardised differences in the matched data are close to zero and the variance ratios are close to one [74, 75]. Figure A.1 and Table A.2 show that the treatment and control groups are successfully matched (provided as supplementary material 1 and 2).



**Figure 1:** Distribution of propensity scores across treatment and comparison groups

Table 4 shows the results for the various matching algorithms we employ (average treatment effect on the treated). The PSM results show that the K10 score for the insured is -0.023 ($P<0.01$) lower than that for the uninsured. The result is consistent with the nearest neighbour matching (NN-match; see Caliendo, Kopeinig [76]) and the regression adjustment (RA) estimates.

**Table 4:** Results for matching estimators

|  |  |  |  |
| --- | --- | --- | --- |
|  | Propensity Score Matching | Nearest Neighbour-Match | Regression Adjustment |
| Average Treatment Effects on the Treated | -0.023\*\* | -0.023\*\* | -0.030\*\*\* |
|  | (0.009) | (0.008) | (0.007) |

**Note:** Robust standard errors in parenthesis, \* $P$ <0.10, \*\* $P$ <0.05, \*\*\* $P$ <0.01

**4 Discussion and conclusion**

This paper adds to the existing literature that assesses the effect of health insurance on health outcomes by investigating the impact of having health insurance on psychological distress in Ghana. To the best of our knowledge, this is the first paper that assesses the relationship using nationally representative data from Ghana, a country where such evaluations do not exist, but the need for such research is high. Using the IV and propensity score matching techniques, we find that people with health insurance are less likely to have psychological distress. Our main results are estimated using an IV approach. The results are robust to a series of estimation methods we implemented.

We find that having health insurance is associated with a K10 score approximately 11.8% lower than that of the uninsured. In a related study of the impact of health insurance on mental health, Baicker et al. [77] find that health insurance was associated with a reduction in undiagnosed depression by 50%, which is also in line with the conclusion in another study that indicates that health insurance is associated with a 30.5% reduction in depression [78]. Results from the IV-based estimates indicate a considerably higher positive impact of health insurance on psychological distress than the naïve models and the matching estimator results. This suggests that estimation without taking into account endogeneity biases the health insurance effect downwards.

The finding that having health insurance is associated with low psychological distress is consistent with Ibrahim et al. [40], who find that prison inmates who have health insurance are less likely to have anxiety in Ghana. Furthermore, this is in line with what is reported in the context of the USA, showing that having public health insurance via Medicare is associated with having a lower K10 score, compared to not having Medicare [22]. Likewise, Finkelstein et al. [79], in the Oregon health insurance experiment, report that people with health insurance are likely to have better mental health. This finding also confirms Tian et al. [28] in China, who indicate that poor mental health is higher among people without health insurance. Nevertheless, the results contrast with Jacobs et al. [18] in the USA, who find that public health insurance has no effect on psychological distress.

As mentioned in the introduction, there are potential mechanisms through which health insurance can reduce psychological distress that may explain our results. First, health insurance may have enabled the insured access to treating physical health problems. Improving physical health may in turn reduce stress, anxiety and depression, which may have appeared as comorbidities to the physical health problem [80, 18]. Second, the insured are more likely to be protected from catastrophic health expenditures [34]. The likelihood that health insurance has reduced OOP may have broad household welfare effects on productivity and labour supply, which in turn may further reduce psychological distress.

In addition to the above, the result may be because mental health is at least partially covered via the NHIS [42], hence facilitating access for patients when the services are required. In addition, the positive impact of health insurance may be due to the availability of community mental health workers [81], who are government employees, especially in rural areas where the health services are provided (they provide services to all people, but the non-insured are still required to pay for the medicine not covered by the NHIS). Last, we cannot rule out the “peace of mind effect” [18] as one potential explanation for the observed negative relationship between health insurance and psychological distress that we find here: those with health insurance may see their worries and stress levels reduced by the very existence of the insurance. Supporting this argument, McMorrow et al. [22] in USA suggest that having health insurance provides mental health benefits that surpass actual care. This may be true in Ghana given that the provision of mental health care services as part of the NHIS has received less attention [82].

The results found in this paper can be generalisable to other countries with similar backgrounds to Ghana. The countries may be those with similar cultural practices, health systems and characteristics. Our results are not without limitations. First, the measure of psychological distress is self-reported, and as such, it may suffer from the same problems that are associated with other self-reported health outcomes. However, because it is a validated, widely used measure, it is a very good proxy for the actual mental health that is available in the data. The results have important implications for further research. As a way forward, there is a need to conduct further research using clinically diagnosed measures of mental health to substantiate the relationship between health insurance and mental health. Furthermore, future research may consider incorporating the availability of mental health facilities vis-à-vis health insurance. It may also be important to go beyond looking at solely *public* health insurance by assessing the effect of having *private* health insurance or the combined effect of having both private health insurance and public health insurance. Our data do not allow for the consideration of such nuances.

The conclusion that can be drawn from the results is that having health insurance improves psychological health in Ghana. This means that in addition to enabling people to have access to physical health care, health insurance may improve mental health. The results have important policy implications: since health insurance is associated with reduced psychological distress, providing health insurance may be one way to help improve mental health. Given that the impact is higher with increasing income levels, there may be a need to provide more health insurance for people with lower income. Last, policymakers may consider increasing the benefit package to cover more psychiatric care.

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