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Examining the association between disease burden of mental health and development assistance on mental health

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Abstract

Examining the association between disease burden of mental health and development assistance on mental health

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Introduction: Currently mental health in developing countries do not attract due attention in the field of global health, despite the importance and high disease burden of mental disorders. In fact, mental disorders account for 30% of non-fatal disease burden worldwide and the WHO reports that 75% of people with mental disorders live in developing countries and the majority do not have access to any kind of care. In this situation international aid groups have sponsored dozens of interventions for mental health, but studies about foreign aid spent on mental health are still insufficient and have been neglected. Thus, there is need to investigate the current status of development assistance for mental health in developing country to fill the knowledge gap.

The aim of this study is to investigate if DAMH has an association with the burden of mental illness in developing countries by gender. The study

characterized the association between the tracked and categorized projects on mental health and the burden of mental illness using disability-adjusted life years (DALYs), a metric of mental health outcomes.

Methods : To investigate the potential relationship between foreign aid on mental health and burden of mental health in developing countries, a panel data regression (the fixed-effects model) using STATA 15.1 was performed. Total burden of mental illness was collected from the IHME between 2007 and 2016. Burden of mental illness included ten specific mental disorders(i.e.,alcohol disorders, schizophrenia opioid disorders, cocaine use disorders, amphetamine use disorders, cannabis use disorders, other drug use disorders, major depressive disorders, dysthymia, bipolar disorder, anxiety disorder). In addition, burden of mental illness was classified with three dependent indicators: total burden of mental illness (both sexes), burden of mental illness (males), and burden of mental illness (females).

Each time period of DAMH is used as a primary independent variable from 2005 to 2014. Variables measuring professionals working in mental health are included to control for the availability of health services in developing countries. Socioeconomic variables, used as control variables included contributing family workers, government expenditure on health as a percentage of GDP, population density, school enrollment, secondary (gross) gender parity index (GPI), violence against women, alcohol consumption, prevalence of smoking, labor force participation rate, and annual drug use of general population of men.

Results : According to the results of panel regression, although there are small estimate coefficients between dependent variable and independent variables, domestic government health expenditure(β=0.005, p-value=0.011), population density(β=0.00035, p-value=0.000), and alcohol consumption(β =0.0028, p-value=0.011) are positively associated with male's burden of mental disorders at the significance level of 0.05. Conversely, smoking

rate and labor force participation are negatively associated with the male's burden of mental illness. With one-unit increases in smoking rate and labor force participation, male's burden of mental illness is expected to decrease by 0.0019 units (β=0.00094 p-value=0.046) and 0.0033 units (β =0.0010, p-value=0.002), respectively.

Female's burden of mental disorders is positively associated with social workers, population density, violence against women, and labor force participation rate at the significance level of 0.05. With one-unit increases in social workers, population density, violence against women, and labor force participation rate, female's burden of mental illness is expected to increase by 0.0178 units (β=0.0048, p-value=0.000), 0.0012 units (β=0.00027, p-value=0.008), 1.796 units (β=0.152, p-value=0.000), and 0.0017 units (β=0.111, p-value=0.006). While, tobacco use(β=0.00286 p-value=0.011) is negatively associated with female's burden of mental disorders.

The total burden of mental illness(both sexes) is positively associated with domestic government health expenditure(β=0.0054, p-value=0.005), population density(β=0.00038, p-value=0.001), and alcohol consumption(β =0.0029, p-value=0.001) at the significance level of 0.05. On the other hand, with one-unit increases in contributing family workers and tobacco consumption rate, total disease burden of mental health is expected to decrease by 0.0032 units (β=0.0012, p-value=0.008) and 0.0058 units (β =0.0012, p-value=0.000).

Overall, the associations between DAMH and each dependent variable were not statistically significant (p-value= 0.16, 0.072, 0.14) to reject the null hypothesis that DAMH is associated with a decreased burden of mental illness in developing countries. The association between DAMH and mental health burden was insignificant due to the characteristics of DAMH; that is, there were very few projects supporting mental health

with a small amount of funding.

Conclusion : The findings from panel regression results identifying association between DAMH and mental health burden (DALYs) revealed three observations: First, other independent variables (e.g., contributing family workers, domestic government health expenditure, population density, social workers, violence against women, labor force participation, alcohol consumption, and tobacco use rate) have associations with male's and female's burden of mental illness and the total burden of mental illness (both sexes) at the 5% significance level.

Second, tobacco use is negatively associated with the burden of mental illness(p-value=0.046, 0.011, 0.008). Regarding the results, some studies argue that smoking among people facing social and economic deprivation may be used as a self-medicating method of coping with stress(Chang et al., 2011). However, this result is somewhat different from the previous studies that smoking is associated with an increased risk of major depression and that smoking rates among adults with depression are twice as high as those among adults without depression (Ash, 2016).

Third, more social workers working in mental health (β=0.0048, p-value=0.000) has a positive association with the burden of female mental illness at the significance level of 0.01. One possible explanation is that the increase in the number of trained professionals working in mental health plays an important role in managing the burden of female mental illness by making females recognize their mental disorders, such as depression and anxiety disorders.

This study, therefore, suggests that to manage burden of mental illness, the need for specified mental health-related funding should be further advocated by raising awareness of the burden of mental illness, its socioeconomic impact, and the lack of funding for mental health to guide

future research and policymaking. Moreover, based on the result that social workers working in mental health have an association with the burden of female mental illness, it is assumed that an increase in the number of trained professionals working in mental health will make a positive impact on managing the burden of female mental illness.

In addition, this study also suggests that partnerships between professional human resources in high-income countries and health-related institutions in developing countries should be encouraged to build capacity. The result of these partnerships is expected to be sustainable to educate health professionals in developing countries. Research capabilities will be an essential educational component to make policies and to ensure outcome measurements of training for professionals working in mental health.

Key words : mental health, Official Development Assistance(ODA), panel data analysis, burden of diseases, foreign aid

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Chapter 1.Introduction

1-1.Background

Currently, mental health in developing countries does not attract attention in the field of global health despite the importance and high disease burden of mental disorders. In fact, mental disorders account for 30% of the non-fatal disease burden worldwide and account for a large proportion of used primary health services (Mackenzie, 2016).

The provision of mental health services remains very limited and far from equitable globally. The World Health Organization (WHO) reports that 75% of people with mental disorders live in low- or middle-income countries (LMICs) and that the majority do not have access to any kind of care (Gilbert, 2015).

In terms of foreign aid in general, it is widely believed to improve health outcomes in developing countries. However, the question on the effectiveness of foreign aid remains largely unresolved. Most of the literature has focused on the macroeconomic impact of foreign aid and growth. Mixed results have been reported, and there search methodologies of papers that have identified significant positive effects have faced heavy criticism. Additionally, even though recent attention has been geared toward promoting health in developing countries, there has been much less empirical evidence on how overall aid affects health or how disaggregated components of aid affect health. Only recently has there been a change in focus to delve into whether aid flows have a positive impact on health outcomes.

In this situation, international donor groups and agencies have

sponsored dozens of interventions for mental disorders, such as anxiety and depression, in developing countries. Examples include training mental health social workers in Liberia in the wake of the Ebola outbreak and the civil war (Semrau et al., 2015) and setting up screening and treatment services for women in Rwanda victimized by sexual or gender-based abuse (Charlson, 20176).

However, studies about foreign aid spent on mental health and its effects on developing countries are still insufficient and are not well known (Semrau et al., 2015). Only a few literature reviews have tried to identify the current status of mental health and development assistance to improve mental health in developing countries in spite of the voluminous academic literature on developed countries.

Therefore, there is need to examine the association between Development Assistance for Mental Health (DAMH) and the burden of mental illness. The study investigates the hypothesis that foreign aid for mental health reduced the burden of mental illness in 97 developing countries from 2007 to 2016. This study also focuses on a key explanatory variable, DAMH, and other control variables. The results show that foreign aid for mental health is not significantly associated with the burden of mental illness. Other main findings are that tobacco use is negatively associated with the burden of mental illness and that more social workers working in mental health has a positive association with the burden of female mental illness, One possible explanation is that an increase in the number of trained professionals working in mental health plays an important role in managing the burden of female mental illness by making females recognize their mental disorders, such as depression and anxiety disorders.

The rest of the study proceeds as follows. Chapter 2 presents the data description, research methods, and an analysis of the burden of mental disorders and DAMH. Chapter 3 shows the results of the analysis of the association between DAMH and the burden of mental illness. Finally, Chapter 4 presents the discussion and conclusion.

This study will contribute to filling the research gap through findings from the panel data regression on DAMH and the burden of mental illness. These findings will guide the direction of future research and provide evidence to make policies on mental health in developing countries.

1-2.Purpose

The aim of this study was to investigate if DAMH has an association with the burden of mental illness in developing countries by gender using the statistical software, STATA 15.1. The study characterized the association between the tracked and categorized projects on mental health and the burden of mental illness using disability-adjusted life years (DALYs), a metric of mental health outcomes. The econometric technique of panel data regression was used.

1-3.Hypothesis

The primary hypothesis of this study was that DAMH is associated with a decrease in the burden of mental illness in developing countries. This hypothesis was further motivated by two features of foreign aid for health. First, foreign aid to the health sector is related to increasing the population's health. The exploration of the

relationship between health aid and health improvements provides consistent evidence supporting the position that health aid has played a role in the extension of life expectancy and the reduction of under-5 mortality, especially since 2000 (Bendavid et al., 2014). Second, regarding foreign aid to improve children's mental health, there is a negative correlation between a disease's burden and the amount of aid for child health (Bavinger, 2017).

1-4. Literature Review

In the literature review, Firstly, the study focuses on development assistance on mental health though systematic search. Next, the study concentrates on burden of mental illness, reviewing evidence from previous studies. Thirdly, social determinants of mental disorders is examined and Finally, effectiveness of foreign aid is discussed.

1-4-1. DAMH

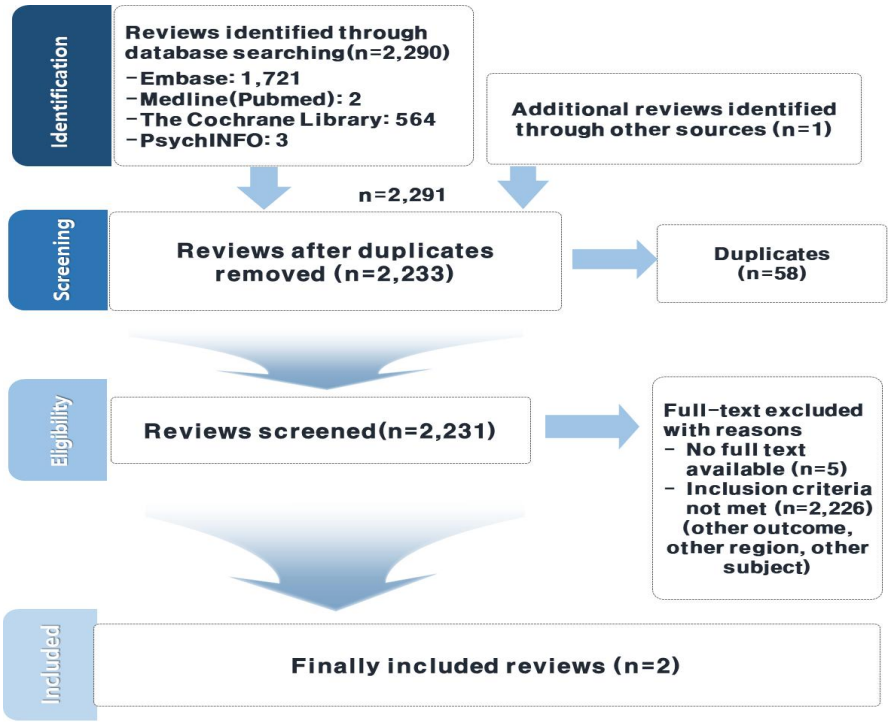
A brief and systematic search of electronic databases was conducted to look at trends in aid for mental health in developing countries from 1970 to 2018 in more depth using a scientific method. By looking at not only the available literature but also theses/dissertations, abstracts/conference proceedings, and other grey literature sources, the systematic review sought to be all-encompassing in showing results on DAMH in developing countries, a topic that has been dealt with in very few scientific research studies.

Studies were eligible if they included mental health-related foreign aid projects in developing countries from 1970 to 2018 and were published in the English language. In this study, electronic databases

were used, and the reference lists of all articles were manually checked. Four electronic databases were searched: MEDLINE (PubMed), EMBASE, PsycINFO, and Cochrane. Each database was searched from January 1, 1970 to October 31, 2018. Search terms used keywords, truncation, and MeSH terms as appropriate forms for each database's indexing reference.

The search was stratified into three categories of "PICO" (Participants or Population, Interventions, Comparators, Outcomes). "Participants" were developing countries defined by the Development Assistance Committee (DAC). "Interventions" were foreign aid projects to improve mental health that focused on a specific mental health disorder, such as depression, anxiety, and substance misuse. "Outcomes" were the promotion of mental health. Mental illness terms were defined referring to Gilbert's study, and they were included in search strings. The decision was taken to restrict this study's inclusion and exclusion criteria. The search string used in the systematic search is attached in Appendix.

As a result, a total of 2,291 titles and abstracts were reviewed (1,721 from EMBASE; 2 from MEDLINE; 564 from Cochrane; 3 from PsycINFO; and 1 from a manual search). After the removal of duplicates (n=58), 2,233 titles and abstracts remained. Of these, 2,231 titles and abstracts were irrelevant, and they were excluded. Finally, only two articles were selected, including one article added after the manual search. Therefore, a total of two articles were selected, and they were mainly in support of further research on mental health and mental health projects in developing countries. Figure1 presents the whole flow of the systematic search on foreign aid for mental health in developing countries. The study characteristics are detailed in Table 1 below.



[Figure 1] Flow diagram

[Table 1] Descriptive information for the two included studies

Authors (year of study)	Study design; duration	Population	Mental health descriptor
Barnabas J. Gilbert (2015)	Tracking ODA projects and aid activities from the database ;2007-2013	All recipient countries in OECD CRS	Mental health literacy through mental health first aid training, Mental health knowledge and confidence program
F. J. Charlson (2016)	Calculating a standardized measure across health focus areas	LMIC (Low-and Middle Income Countries)	Scale up package of Mental and Substance use disorders, investment in mental health, scaling up

	-development assistance for health per DALY; 1995-2015		effective treatment coverage for depression and anxiety disorders

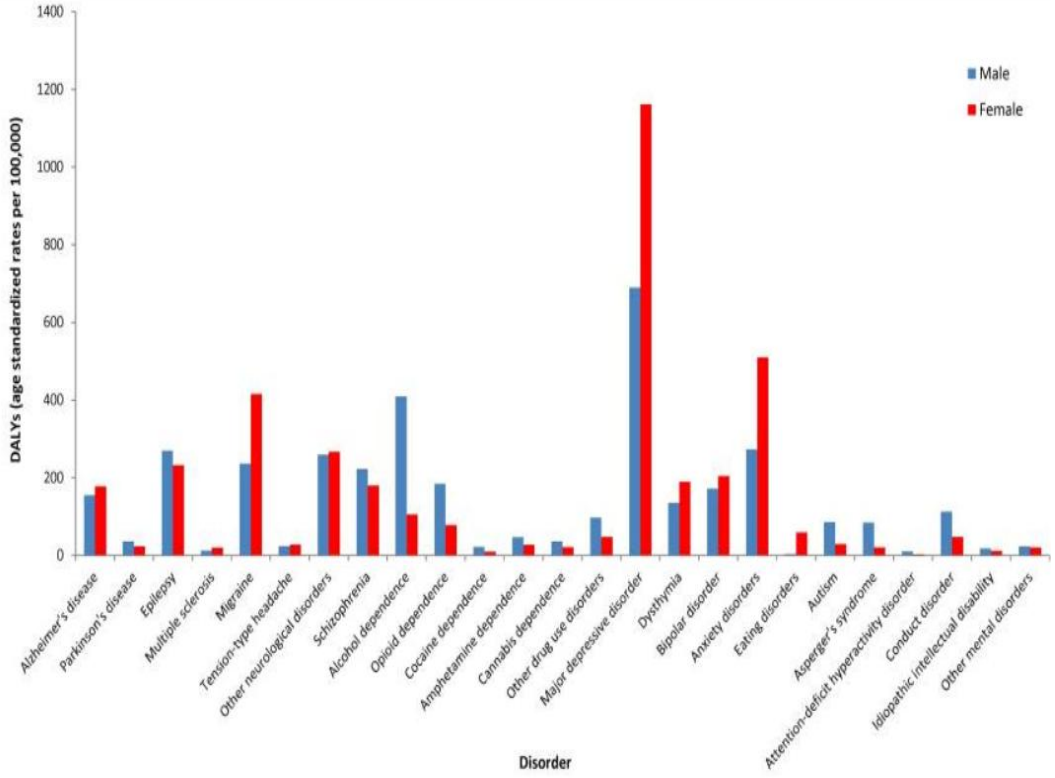
The two articles that were finally selected were published between 2015 and 2016. Gilbert's article summarized current trends in foreign aid for mental health in developing countries, while Charlson contrasted DAMH with other disease categories, such as HIV, maternal and child health, malaria, tuberculosis, other infectious diseases, and non-communicable diseases. In Charlson's article, the main aim of the study was to align the health system with the needs of populations by assisting policymakers and to estimate the disease burden and development assistance for health to enable a realignment of resource allocation.

Findings from the articles indicated the importance of increasing attention to mental health programs in developing countries. In addition, both studies pointed out that the need for specified mental health funding should be clearly advocated to aid agencies by raising awareness of the burden of mental illness. Moreover, both studies noted that for progress in global health and global mental health, the amount of DAMH should be increased from governmental, multilateral, and nongovernmental agencies. The studies also emphasized that action for mental health promotion in developing countries was needed to encourage investment by donor agencies and governments of developing countries.

1-4-2.Burden of Mental Disorders

Regarding the current status of the burden of mental disorders, mental illness has an impact on notonly mortality but also quality of life. Major depressive disorder ranks among the top ten causes of DALYs. Mental, neurological, and substance use disorders account for 10.4% of global DALYs, 2.3% of global Years of life lost(YLLs), and 28.5%of global Years lived with disability(YLDs), respectively. Mental disorders accounted for the largest proportion of DALYs (56.7%), followed by neurological disorders (28.6%) and substance use disorders (14.7%) in 2010. The anticipated economic loss due to mental illness worldwide will amount to USD 16.3 million between 2011 and 2030 (USD 7.3 million in LMICs) with a dramatic impact on productivity and quality of life. Mental health issues tend to be strongly related to other factors affecting quality of life, including poverty, socioeconomic status, education, domestic violence, wars, violent conflict, and sexual violence (HEART, 2014).

Gender is a critical determinant of mental health and mental illness. Females account for more DALYs in all mental and neurological disorders, except for mental disorders occurring in childhood, schizophrenia, substance use disorders, Parkinson's disease, and epilepsy, where males account for more DALYs(Whiteford et al., 2015).



[Figure 2] Age-Standardized DALY Rates Attributable to Individual Mental, Neurological, and Substance Use Disorders, by Gender, 2010

Source: Harvey A. Whiteford et al. The global burden of mental, neurological and substance use disorders: An analysis from the global burden of disease study 2010. PLoS One. 2015; 10(2): e0116820.

Detecting and treating mental illness in women and girls requires a multisectoral approach and the mainstreaming of mental health issues within women's health and child and adolescent health policies, health programs, and research agendas. The WHO maintains that effective strategies cannot be gender neutral, as the risk factors themselves are gender specific. Improvements in women's status are likely to bring about improvements in women's mental health. Multi-level dialogue and local - global partnership are essential to facilitate an inclusive and locality-sensitive approach to tackling mental health issues (HEART, 2014).

1-4-3.Social Determinants of Mental Disorders

The WHO Mental Health Atlas 2017 generated a wealth of valuable data, using standardized surveys, on the prevalence of mental disorders and each country's mental health-related policies. Evidence from the surveys showed that while mental disorders are common in all countries, there is considerable variation in the prevalence of these disorders. The most plausible explanation for the wide variation is that social factors are major determinants of mental disorders. Key social determinants recognized as risk factors for mental disorders include income level, education, alcohol/tobacco/drug use, gender inequality, and demographic factors.

Poverty is consistently associated with an increased prevalence of common adult mental disorders, such as depression and anxiety disorders, in low-, middle-, and high-income countries, although the effects of specific aspects of poverty vary. A lower economic status, diminished wealth, and unemployment are associated with suicidal ideation and suicidal behavior in LMICs, and poverty is associated with an increased prevalence of dementia in India and China. Employment is an important protective factor against mental disorders, and it is associated with better social functioning, less severe symptoms, higher quality of life, and improved self-esteem in people living with schizophrenia and bipolar disorder (Lund, 2018).

Lower levels of education and literacy are strongly linked to the development of dementia, although higher levels of education can be associated with a faster disease progression. Education is believed to affect the brain (for example, by increasing synapse numbers or vascularization), creating cognitive reserve and resilience against

dementia (Lund, 2018).

Gender is another important determinant that influences the burden of mental illness. There is established evidence linking domestic violence with an adverse impact on female's mental health in developed and developing countries. Gender roles and violence against women also serve to explain why depression and anxiety are much more common in females than males in most developing countries. Another major factor affecting global mental disorders is services and financial resources for mental health. At a national level, a lack of governmental support for mental healthcare services has been associated with an increased risk of depression, anxiety, suicide, and alcohol abuse, mainly through effects on employment, income, security, and social networks (Lund, 2018).

This literature review forms the basis of this study, which focuses on DAMH and identifying its association with mental health outcomes. In addition, the variables used in this study are selected based on the literature review.

1-4-4.Effectiveness of Foreign Aid

Recently, a number of studies have incorporated the cross-sectional dimension of aid effectiveness on health outcomes. Easterly (2006) reveals that foreign aid contributed significantly to the reduction of infant mortality despite his skepticism about foreign aid in general. In her study of developing countries, Williamson (2008) finds that foreign aid for health is ineffective in addressing health issues. She employs the fixed-effect methodology and corrects for possible endogeneity using lagged aid as an instrument. Both fixed-effect and instrumental variable

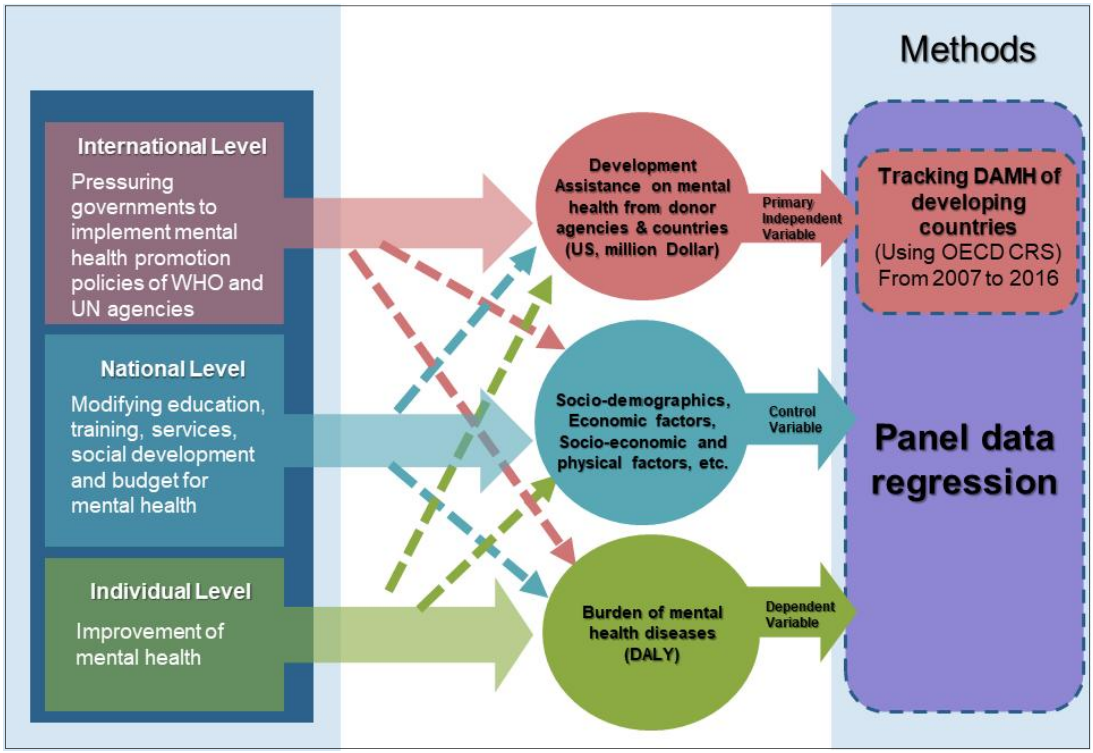
estimation show that health-targeted aid is ineffective.

Two recent studies on the impact of aid on infant mortality include Gebhard et al.(2008) and Mishra at al.(2009). The former study concentrates on 118 countries for the period from 1973 to 2004, and it stresses that a 100% increase in per capita health aid is associated with a 2% reduction in the infant mortality rate. The authors of the latter paper examine the relationship between health-targeted aid, infant mortality, and life expectancy in recipient countries. They find that, on average, aid does not lead to improvements in health outcomes, and when it does, it happens under conditions of good governance, which include democracy, sanitation, and transparency.

Chapter 2. Methods

2-1. Study design

The study was designed to identify an association between foreign aid for mental health in developing countries and burden of mental health (DALYs). Figure 3 shows the framework of the study influenced by Sabir's (2006) study



[Figure 3]. Framework of the study

According to Sabir's article (2006), at the international level, international organizations, such as the United Nations and WHO, could be a force to promote mental health as one of the most significant issues affecting human rights and equity. Other donor agencies could link the improvement of mental health to assistance provided to developing countries. At the national level, governments in developing countries are expected to encourage the development of national policies, guidelines, and legislations that reflect international organizations' guidelines. Collaboration between international organizations and governments in developing countries directly and indirectly influences health sectors by modifying education, service training, and social and economic development for mental health promotion. The incorporation of indicators for mental health in the national health management system could lead to the proper allocation

of mental health resources.

Based on this, for the impact of actions at the international and national levels, the total amount of DAMH was estimated in this study. Tracking DAMH using the Organization for Economic Cooperation and Development's (OECD) Creditor Reporting System (CRS) was the first step to examine the association between DAMH and mental health outcomes in developing countries suffering from a lack of resources. Socioeconomic and economic factors, such as labor force participation and contributing family workers (males, females), were included as control variables in the statistical analysis. The data were collected between 2007 and 2016, while DAMH, as the primary independent variable, was tracked and collected from 2005 to 2014, since the value of mental health outcomes may depend on at least two years' values of DAMH rather than the current value.

To examine the improvement of mental health, burden of mental illness was used as a dependent variable to identify mental health outcomes using DALYs as a metric. It was expected that activities for the promotion of mental disorders in developing countries would lead governments and international organizations to form strong mental health services based on aid projects and to decrease the burden of mental illness.

2-2.Data Sources

2-2-1.Dependent Variable

In this study, total burden of mental illness (both sexes, expressed in DALYs) is used as a dependent variable. Total burden of mental

illness (both sexes) was collected from the IHME between 2007 and 2016. Burden of mental illness included ten specific mental disorders(i.e.,alcohol disorders, schizophrenia opioid disorders, cocaine use disorders, amphetamine use disorders, cannabis use disorders, other drug use disorders, major depressive disorders, dysthymia, bipolar disorder, anxiety disorder). In addition, burden of mental illness was classified with three dependent indicators: total burden of mental illness (both sexes), burden of mental illness (males), and burden of mental illness (females).

2-2-2. DAMH, the Primary Independent Variable

DAMH for all projects focused on mental health between 2005 and 2014 was identified from the OECD CRS database in the study. The data from the OECD CRS were obtained in September 2018 with projects funded by 40 donor agencies and implemented in 97 recipient countries. The CRS is publicly accessible and provides information on foreign aid activities and projects reported by the governments of members of the DAC.

In the CRS, donors are classified as bilateral and multilateral. Bilateral aid usually refers to the assistance that comes from a country's government, while multilateral aid refers to assistance from international organizations. It provides project-level data with descriptive and financial information linked to each project (e.g., a project's title, donors, recipients, implementation year, annual commitments and disbursements, purpose). Each project is assigned to one of 36 sectors, such as health, education, and agriculture, based on its purpose. It also updates its website every three months to release newly revised data. For this reason, the CRS is usually considered one of the most comprehensive data sources on foreign aid projects.

2-2-3.Other Independent Variables

The primary explanatory variable was DAMH. For the controlled variables, health indicators and socioeconomic indicators reported from several publicly available databases, such as the WHO and World Bank (WB), were used. The study also referred to the WHO-AIMS' human resource domain, which provides a comprehensive summary of each country's mental health human resources, to assess the size of the current workforce devoted to mental healthcare from 2007 to 2016. The WHO-AIMS includes 155 indicators covering six domains: policy and legislative framework, mental health services, mental health in primary care, human resources, public education, and monitoring and research.

2-3.Measures

2-3-1.Measures of DAMH

The primary explanatory variable, DAMH, was tracked in recipient countries by members of the DAC, multilateral organizations, global health initiatives, and private donors.

In order to trace DAMH, it was defined as aid from donor agencies spent on projects whose primary purpose was promoting mental health or preventing or treating mental and substance use disorders. Compiled keywords in 11 languages (English, French, German, Spanish, Danish, Finnish, Italian, Dutch, Norwegian, Portuguese, and Swedish) were based on the diagnoses for mental and behavioral disorders listed in the Tenth Revision of the International Classification of Diseases (ICD-10) and

applied to the OECD CRS, which has three variables (project title, short description of a project, and long description of a project), to identify mental health-related projects. The keywords in English are listed in Table 2.

[Table 2] English keywords used to search mental health projects in OECD CRS

Addiction	Cognitive impairment	Hallucination	Psychia-
Affective	Delirium	Hyperactivity	Psycho-
Alcohol	Delusion	Hypochondriasis	Schizo-
Antidepressant	Dementia	Insomnia	Self-harm
Antipsychotic	Dependency	Learning disability	Sleep disorder
Anxiety	Depress	Mania	Somatoform
Anxiolytic	Dyslexia	Mental	Trauma
Autism	Eating disorder	Mood	Substance abuse
Behavioural therapy	Electroconvulsive therapy	Personality disorder	
Bipolar	Family therapy	Phobia	

This study followed several steps to ensure the best results and examined the most relevant mental health projects in developing countries. The following steps were taken to identify and track DAMH.

First, keywords were compiled in 11 languages based on the diagnoses for mental and behavioral disorders listed in the ICD-10 and applied to the OECD CRS.

Second, when collecting specific information on mental health projects, actual disbursements(grants) were used rather than commitments to estimate donors' contributions to the projects. The data on mental health

projects included financial information linked to each project, such as a project's title, donors, recipients, implementation year, annual commitments and disbursements, and purpose. Each project was assigned to one of 36 project sectors based on its purpose. If a project's title contained one or more of these keywords, the project was included in mental health projects.

Third, yearly disbursements for all identified mental health projects were collected. Each country's received DAMH in sectors was added from 2005 to 2014 by year. In the case of Belize, for example, its total DAMH in all sectors in 2014 was the sum of 2014 DAMH of the health sector and 2014 DAMH of the education sector.

Fourth, trends of the projects by donors, recipients, sectors, and channels of delivery were tracked. In the case of country-unspecified funding, it was excluded.

Fifth, public sector and non-public sector in the channels of DAMH were identified. Public sector in the CRS included disbursements going to a donor government, recipient government, third-country government, or public - private partnership. Non-public sector was defined as disbursements to the nonpublic sector, such as national and international NGOs and international organizations, as listed in Table 3.

[Table 3] Channels in public and non-public sectors

	Channel code	Channel name
Public	10000	Public sector (donor, recipient, other)
	11000	Donor government
	12000	Recipient government
	13000	Third Country Government (Delegated co-operation)
	30000	Public-Private Partnership

Non-public	20000	Non-governmental Organizations (NGOs) and Civil Society
	21000	International NGOs
	21016	International Committee of the Red Cross
	21018	International Federation of Red Cross and Red Crescent Societies
	21029	Doctors Without Borders
	22000	National NGOs
	23000	Local/Regional NGOs
	40000	Multilateral institutions
	41000	United Nations Agencies, Funds and Commissions
	41114	United Nations Development Programme
	41119	United Nations Population Fund
	41121	United Nations Office of the United Nations High Commissioner for Refugees
	41122	Contribution to implementing the recommendations of the UNICEF study on gender-based violence
	41126	United Nations Mine Action Service
	41128	United Nations Office on Drugs and Crime
	41130	United Nations Relief and Works Agency for Palestine Refugees in the Near East
	41140	World Food Programme
	41143	World Health Organisation - core voluntary contributions account
	41301	Food and Agricultural Organisation
	41305	United Nations
	41307	World Health Organisation - assessed contributions
	42000	European Union Institutions
	42001	European Commission - Development Share of Budget
	47000	Other Multilateral Institutions
	47046	International Organisation of the Francophonie
	47066	International Organisation for Migration
	47083	Pan-American Health Organisation
	50000	Other
	51000	University, college or other teaching institution, research institute or think-tank

Source: OECD CRS website

Finally, projects' names, codes of purpose, and channels of delivery were identified under the five most relevant sectors of mental health projects: health sector, education sector, government and civil society sector, humanitarian aid sector, and other social infrastructure and services sector (Table 4).

[Table 4] DAMH related CRS Purpose codes by category

DAC code		CRS code	Description
110: Education, Total	111:Education, Level unspecified, total	11110	Education policy
		11120	Education facilities and training
		11130	Teacher training
		11182	Educational research
	112:Basic Education	11220	Primary education
		11230	Basic life skills for youth and adults
		11240	Early childhood education
	113:Secondary education	11320	Secondary education
		11330	Vocational training
	114:Post-secondary education	11420	Higher education
		11430	Advanced technical and managerial training
120:Health, Total	121:Health, General	12110	Health policy and administrative management
		12181	Medical education/training
		12182	Medical research
		12191	Medical services
	122: Basic Health Care	12220	Basic health care
		12230	Basic health infrastructure
		12240	Basic nutrition
		12250	Infectious disease control
		12261	Health education
		12262	Malaria control
		12263	Tuberculosis control
		12281	Health personnel development
150: Government & Civil Society	151:Government and civil society,	15110	Public sector policy and administrative

	genera		management
		15111	Public finance management
		15112	Decentralisation and support to subnational government
		15113	Anti-corruption organisations and institutions
		15114	Domestic revenue mobilisation
		15130	Legal and judicial development
		15150	Democratic participation and civil society
		15151	Elections
		15152	Legislatures and political parties
		15153	Media and free flow of information
		15160	Human rights
		15170	Women's equality organisations and institutions
	152: Conflict prevention and resolution, peace and security	15210	Security system management and reform
		15220	Civilian peace-building, conflict prevention and resolution
		15230	Participation in international peacekeeping operations
		15240	Reintegration and SALW control
		15250	Removal of land mines and explosive remnants of war
		15261	Child soldiers (Prevention and demobilisation)
160: Other social infrastructure and services		16010	Social/ welfare services
		16020	Employment policy and administrative management
		16030	Housing policy and administrative management
		16040	Low-cost housing
		16050	Multisector aid for basic social services

		16061	Culture and recreation
		16062	Statistical capacity building
		16063	Narcotics control
		16064	Social mitigation of HIV/AIDS
700:Humanitarian Aid	720: Emergency Response	72010	Material relief assistance and services
		72040	Emergency food aid
		72050	Relief co-ordination; protection and support services
	730:Reconstruction relief and rehabilitation	73010	Reconstruction relief and rehabilitation
	740: Disaster prevention and preparedness	74010	Disaster prevention and preparedness

Source: OECD CRS website

2-3-2.Measures of Statistical Analysis

For the main objective, identifying the association between DAMH and the burden of mental disorders, panel data regression to identify the association between total amount of foreign aid for mental health and DALYs of mental illness was performed using STATA software version 15.1.

To investigate the potential relationship between DAMH and DALYs on mental illness in developing countries, a panel data model was estimated using the following empirical specification:

$$Y_{it} = (a_i + u_{it}) + \beta_1 X_{1it}$$

where y is the dependent variable, x is the independent variable, α_i is individual effects, captures effects of the i-th individual-specific variables that are constant over time, respectively. and β is vector of

coefficients, i and t are indices for individuals and time. u_{it} is the error term, independently and identically distributed with zero mean.

Using panel data has several advantages in general. First , it is effective for detecting and measuring effects that cannot be observed. Second, it helps to minimize the effects of aggregation bias from aggregating individuals into broad groups (Patel et al., 2016). Therefore, the panel data method was considered to be the most useful and appropriate statistical model for this study, which uses cross-country data that span both time and individuals in a cross-section that are more informative to give more efficient estimates. The use of panel data also allows empirical tests of a wide range of hypotheses.

Panel data analysis usually has three independent approaches: random-effects models, fixed-effects models, and pooled panels. The selection between these methods depends on the objective of the analysis and the exogeneity of the explanatory variables (Vijayamohanan, 2016). To test random effects, a Breusch - Pagan Lagrange multiplier (LM) was run, as it helps one decide between a random-effects regression and a simple Ordinary Least Squares(OLS) regression. TThe null hypothesis in the LM test is that the variance across entities is zero and there is no significant difference across units. To examine the differences between burden of mental illness by gender, the LM test was performed with different dependent variables: burden of mental illness in males, burden of mental illness in females, and total burden of mental illness (both sexes). The results of the LM test are presented in Table 5. The P-value of 0.000 is less than the significance level of 0.05, thus rejecting the null hypothesis that the random-effects model is not appropriate. This indicates that there are no significant differences across countries .

[Table 5] Results of Breusch and Pagan Lagrangian multiplier test for random effects

Dependent variable	(1) DALYs_Male		(2) DALYs_Female		(3)DALYs_Both sexes	
	var	sd=sqrt (Var)	var	sd=sqrt (Var)	var	sd=sqrt (Var)
DALYs _Male	0.079155	0.281442	DALYs _Female	0.050541	0.224814	DALYs _both sexes	0.04736	0.217636
e	0.001304	0.036117	e	0.001139	0.033759	e	0.001131	0.033629
u	0.059186	0.224281	u	0.031263	0.176813	u	0.034296	0.169616
	chibar2(01) = 3630.03 Prob > chibar2 = 0.0000			chibar2(01) = 3519.40 Prob > chibar2 = 0.0000			chibar2(01) = 3505.59 Prob > chibar2 = 0.0000	

To decide between fixed- and random-effects models, the Hausman test was run. The null hypothesis was that the preferred model was the random-effects model, while the alternative was the fixed-effects model. It tested whether unique errors (Ui) were correlated with the regressors; the null hypothesis was that they were not(Reyna,2007).

According to the results of the Hausman test of burden of male mental illness (p-value=0.000), burden of female mental illness (p-value=0.000), and burden of mental illness of both sexes (p-value=0.000), the null hypothesis was rejected. Thus, the fixed-effects model was used to identify an association between DAMH and burden of mental health in this study.

[Table 6] Results of Hausman test

Coefficient / Variables	(1) DALYs_Male		(2)DALYs_Female		(3)DALYs_ Both sexes	
	(b) FE	(B) RE	(b) FE	(B) RE	(b) FE	(B) RE
$DAMH_{t-2}$ (million)	2.66e-09	3.30e-09	5.91e-09	6.96e-09	2.40e-09	3.07e-09
Psychiatrists (per 100,000 population)	8.44e-06	3.88e-06	-0.001301	-0.0030657	-0.000012	-0.000012
Psychologists (per 100,000 population)	0.0003221	0.0003907	0.0006338	0.0006841	0.0004371	0.000602
Social workers (per 100,000 population)	-0.007027	-0.0062714	0.0178607	0.0182163	-0.002854	-0.00085
Contributing family workers(males) (%)	-0.003194	-0.0034585	.	.	.	.
Contributing family workers(females) (%)	.	.	-0.000056	-0.000240	.	.
Contributing family workers(total) (%)	.	.	.	.	-0.0031302	-0.003687
Domestic government health expenditure(%)	0.0123499	0.0147344	0.0028394	0.0047874	0.015463	0.019182
Population density	0.0013401	0.0008779	0.001192	0.0007143	0.0013804	0.000811
School enrollment, secondary (gross), gender parity index (GPI)	0.0232647	0.0422091	-0.03284	-0.028839	0.020595	0.045744
Violence against women	.	.	1.795821	1.798673	.	.
Alcohol consumption	0.0073179	0.007882	0.0006403	0.0008293	0.010375	0.010272
Tobacco smoking_Male(%)	-0.001939	-0.0017725	.	.	.	.
Tobacco smoking_Female(%)	.	.	-0.00739	-0.006507.	.	.
Tobacco smoking_both sexes(%)	.	.	.	.	-0.005829	-0.00554
Labor force participation_Male(%)	-0.003313	-0.0036425	.	.	.	.
Labor force participation_Female(%)	.	.	0.0017376	0.0018088	.	.
Labor force participation_both sexes(%)	.	.	.	.	0.0005702	0.000137
Annual drug use of general population of men (%)	0.1446657	-0.0147324	.	.	.	.
	Prob>chi2 = 0.000		Prob>chi2 = 0.000		Prob>chi2 = 0.000	

2-4. Analysis

Panel data regression was conducted by using STATA software version 15.1. To determine the association between foreign aid for mental health and mental health outcomes, a descriptive analysis was performed. In addition, panel data regression was performed in this study for the systematic statistical analysis.

2-4-1. Dependent Variable

Total Disease Burden of Mental Illness(DALYs)

Mental health outcomes were evaluated by DALYs as rate per 100,000 population from the IHME. According to Vos' article (2000), DALYs for a disease are the sum of the years of life lost because of premature mortality in the population and the years lost due to disability for incident cases of the health condition. Moreover, the sum of DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation. Thus, the burden of mental illness (DALYs) was used as a proxy for mental health status in this study.

Total burden of mental illness (both sexes) in this study was classified with ten specific mental disorders (i.e., alcohol disorders, schizophrenia opioid disorders, cocaine use disorders, amphetamine use disorders, cannabis use disorders, other drug use disorders, major depressive disorders, dysthymia, bipolar disorder, anxiety disorder). For the statistical analysis, DALYs of each mental disorder were summed up in the indicator, burden of mental illness, and classified with three indicators– total burden of mental illness (both sexes), burden of mental illness

(males), and burden of mental illness (females)—to identify gender differences in mental disorders.

2-4-2.Independent Variable

DAMH

DAMH was tracked and collected from the OECD CRS using the systematic data-selection steps discussed above. Projects on mental health promotion from 2005 to 2014 in 97 developing countries were finally constructed in a database with 4,455 projects to support mental health. Among 150 recipient countries, only 122 countries were included as developing countries defined by the DAC, and 97 countries with full information on DAMH were finally selected. To examine mental health outcomes, each period of DAMH from 2005 to 2014 was used as an independent variable. In Rankin (2017)'s study, DAMH lagged one period was used as a primary independent variable to examine the association between DAMH and health outcomes. Thus, in the study, DAMH lagged two-year period based on Rankin's study.

2-4-3.Other independent Variables

1)Mental health resources

Mental health resources are classified into three types of human resources working in mental health: psychiatrists, psychologists, and social workers working in mental health, including professionals working in private and public mental health facilities.

Variables measuring professionals working in mental health, such as psychiatrists, psychologists, and social workers, were introduced to

control for the availability of health services in developing countries. The variables were presumed to be related to mental health outcomes, and a negative coefficient estimate was expected.

2)Socioeconomic Variables

Socioeconomic variables, under the category of controlled variables in this study, included contributing family workers, government expenditure on health as a percentage of GDP, population density, school enrollment, secondary (gross) gender parity index (GPI), violence against women, alcohol consumption, prevalence of smoking, labor force participation rate, and annual drug use of general population of men.

To control for socioeconomic structures that may affect mental health outcomes in developing countries, the study included various demographic, social, and economic variables. In particular , government expenditure on health as a percentage of GDP was expected to be positively related to mental health outcomes. GPI for gross school enrollment in primary education is the ratio of girls to boys enrolled at the primary level in public and private schools. The index was also expected to be positively associated with dependent variable.

The details of the study subjects and model are presented below.

- Total population: 97 developing countries
- Period: 2007 - 2016 (DAMH: two-year time lag: 2005 - 2014)
- $Y_{it} = (a_i + u_{it}) + \beta_1 X_{1it}$

[Table 7] Description of variables

Type of variables	Variables		Description	Measurement Unit	Source
Dependent variable	Total Disease Burden on Mental Illness (DALY)	DALY on alcohol use disorders: (male, female, both sexes)	Disability-Adjusted Life Years	Rate (per 100,000 Population)	IHME
		DALY on Schizophrenia, opioid disorders: (male, female, both sexes)			
		DALY on cocaine use disorders: (male, female, both sexes)			
		DALY on Amphetamine use disorders: (male, female, both sexes)			
		DALY on Cannabis use disorders: (male, female, both sexes)			
		DALY on Other drug use disorders: (male, female, both sexes)			
		DALY on Major depressive disorder: (male, female, both sexes)			
		DALY on Dysthymia: (male, female, both sexes)			

		DALY on bipolar disorder: (male, female, both sexes)			
		DALY on anxiety disorder: (male, female, both sexes)			
Independent variable	**Development Assistance on Mental Health (DAMH)** ***DAMH with two- year time lag (2005-2014)**		Data are collected on individual projects and programmes. Focus is on financial data but some descriptive information is also made available.	2016 US Dollar (million)	OECD CRS
Control variables	Mental Health resources	Psychiatrists working in mental health	Psychiatrists working in mental health per 100,000 population	Rate (per 100,000)	WHO
		Psychologists working in mental health	Psychologists working in mental health per 100,000 population	Rate (per 100,000)	WHO
		Social workers working in mental health	Social workers working in mental health (per 100,000 population), including professionals working in private and public mental health facilities as well as private practice	Rate (per 100,000)	WHO
	Contributing family workers, Male		Contributing family workers are those workers who hold "self-employment jobs" as own-account workers in a market-oriented establishment operated by a related person living in the same household	Percentage of male's total employment (%)	World Bank
			Contributing family workers are those		

	Contributing family workers, Female	workers who hold "self-employment jobs" as own-account workers in a market-oriented establishment operated by a related person living in the same household	Percentage of female's total employment (%)	World Bank
	Contributing family workers, total	Contributing family workers are those workers who hold "self-employment jobs" as own-account workers in a market-oriented establishment operated by a related person living in the same household	Percentage of total employment (%)	World Bank
	Domestic government health expenditure	Share of general government expenditures on health from domestic sources of GDP	Percentage of GDP (%)	WHO
	School enrollment, primary (gross), gender parity index (GPI)	Gender parity index for gross enrollment ratio in primary education is the ratio of girls to boys enrolled at primary level in public and private schools.	Ratio of girls to boys in primary, secondary and tertiary education	World Bank
	Population density	Midyear population divided by land area in square kilometers	people per sq. km of land area	World Bank
	Violence against women	Violence against women ever experienced intimate partner	Percentage of female population ages over 15 (%)	UNDP
	Alcohol, recorded per capita (15+) consumption	In liters of pure alcohol	In liters of pure alcohol	WHO
	Prevalence of smoking any tobacco product among persons aged over 15 years (Male)	Prevalence of smoking any tobacco product	Prevalence of smoking any tobacco product	World Bank

	Prevalence of smoking any tobacco product among persons aged over 15 years (Female)	Prevalence of smoking any tobacco product	Prevalence of smoking any tobacco product	World Bank
	Prevalence of smoking any tobacco product among persons aged over 15 years (Both sexes)	Prevalence of smoking any tobacco product	Prevalence of smoking any tobacco product	World Bank
	Labour force participation rate (Male)	Percentage of a country's working-age population (ages 15 and older) that engages in the labour market, either by working or actively looking for work, expressed as a percentage of the working-age population	Percentage of male population ages over 15+ (modeled ILO estimate) (%)	UNDP
	Labour force participation rate (Female)	Percentage of a country's working-age population (ages 15 and older) that engages in the labour market, either by working or actively looking for work, expressed as a percentage of the working-age population	Percentage of female population ages over 15+ (modeled ILO estimate) (%)	UNDP
	Labour force participation rate (Both sexes)	Percentage of a country's working-age population (ages 15 and older) that engages in the labour market, either by working or actively looking for work, expressed as a percentage of the working-age population	Percentage of total population ages over 15+ (modeled ILO estimate) (%)	UNDP
	Annual drug use of general population of men	Annual Prevalence of drug use as a percentage of the population aged 15-64 (unless otherwise indicated)	Percentage of the population aged 15-64	UNODC

Chapter3. Results

In this part, this study examined the association between DAMH and burden of mental health between 2007 and 2016. A total of 97 developing countries in the OECD CRS were included.

To decide between fixed- and random-effects models, the Hausman test, where the null hypothesis is that the preferred model is the random-effects model, was performed. According to the results of the test, the fixed-effects model was used for the study.

The fixed effects model was included in the model:

$$Y_{it}=(a_i+u_{it})+\beta_1 X_{it}+e_{it}$$

The "i" is indexed as countries or other representative groups and "t" is indexed as year. In this study, "y_i" is dependent variable(DALYs of mental health), "i" is year, "x_i" is independent variables. "β1" is the coefficient for that independent variables. "α_i" (i=1……n) is the unknown intercept for each entity (n entity-specific intercepts), and "uit" is the error term. the data description of the association between DAMH and disease burden of mental illness is presented in Table 8.

[Table 8] Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Mental health DALYs_Male (% of total global DALYs)	970	0.763328	0.2813457	0.3962857	2.213566
Mental health DALYs_Female (% of total global DALYs)	970	0.952797	0.2248143	0.5950734	1.901043

Mental health DALYs[a],Total (% of total global DALYs)	970	0.865243	0.2176236	0.5324729	1.850823
DAMH $_{t-2}$[b](million)	970	5765.958	136037.9	0	4236000
Psychiatrists (per 100,000 population)	970	1.429703	2.013462	0	9.8
Psychologists (per 100,000 population)	970	1.774693	10.38403	0	108.8
Social workers (per 100,000 population)	970	0.477121	1.263621	0	12.2
Contributing family workers(Female) (%)	970	20.10668	17.54586	0.047	66.024
Contributing family workers(Male) (%)	970	9.33454	8.421241	0.06	45.878
Contributing family workers(total) (%)	970	13.32142	11.38188	0.054	49.024
Domestic government health expenditure(%)[c]	970	2.396598	1.361417	0	6.7
Population density (pop/sq.km)	970	114.4301	160.0493	1.668214	1251.837
School enrollment, primary (gross), gender parity index (GPI)	970	0.964301	0.1587655	0.37418	1.40918
Violence against women	970	0.619584	0.1235397	0.294	0.822
Alcohol consumption	970	3.380526	2.856678	0	14.54
Tobacco consumption rate(Male) (%)	970	33.95276	16.19581	4.1	92.6
Tobacco consumption rate(Female) (%)	970	7.571196	8.709562	0.2	50.4
Tobacco consumption rate(total) (%)	970	20.2036	10.261113	2	60.9
Labor force participation rate (Male) (%)	970	74.70371	9.017957	39	91.1
Labor force participation rate (Female) (%)	970	50.67031	17.57867	6.1	88
Labor force participation rate (total) (%)	970	62.53381	11.25009	31.6	89.1
Annual drug use of general population of men (%)	970	0.395433	0.3689167	0.01	1.73

[a] Reported in hundreds of thousands of disability adjusted life-years per 1,000 population (2016 data). Source: IHME
[b] Development Assistance on Mental health and it was two year lagged (2005-2014)
[c] Share of general government expenditures on health from. Source: WHO

In this study, the burden of mental and substance use disorders was measured using DALYs, an index of the burden of disease. DALYs was the dependent variable, and DAMH was the primary predictor in the panel regression model. According to the results of the Hausman test and the characteristics of the fixed-effects model that there may be country-specific factors influencing avoidable mortality, a fixed-effects model was applied to estimate whether total aid for mental health has an impact on burden of mental illness. The fixed-effects model controlled for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects model could not be biased because of omitted time-invariant characteristics such as culture, religion, gender, and race.

A Pearson's correlation matrix determines the magnitude of the correlation between the explanatory variables. The results are presented in Table 9, and in order to detect multicollinearity in collected data, the correlation matrix was used. Although there are no fixed rules for assigning strength of association to particular values, some general guidelines are provided by Hinkle (2003).

[Table 9] Rule of thumb for interpreting the size of a correlation coefficient

Size of Correlation	Interpretation
0.90 to 1.00 (−0.90 to −1.00)	Very high positive (negative) correlation
0.70 to 0.90 (−0.70 to −0.90)	High positive (negative) correlation
0.50 to 0.70 (−0.50 to −0.70)	Moderate positive (negative) correlation
0.30 to 0.50 (−0.30 to −0.50)	Low positive (negative) correlation
0.00 to 0.30 (0.00 to −0.30)	Negligible correlation

Source: Hinkle DE et al. Applied Statistics for the Behavioral Sciences. 5th ed. Boston: Houghton Mifflin; 2003.

As can be seen in Table 10, the output reflects that there is a negative correlation between violence against women and domestic government health expenditure at the significance level of 0.05. Violence against women is positively related with school enrollment primary GPI (p-value=0.000). Similarly, positive correlations exist between female's prevalence of tobacco smoking (p-value=0.000), domestic government health expenditure (p-value=0.000), and male's prevalence of tobacco smoking and violence against women (p-value=0.000). Alcohol consumption is negatively related with female contributing family workers (p-value=0.003).

The results show that there are weak positive and negative correlations among contributing family workers, domestic government health expenditure, school enrollment primary GPI, prevalence of male's and female's tobacco smoking, and alcohol consumption.

[Table 10] Pearson's correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. DAMH	1.0000															
2. Psychiatrists	-0.0080	1.0000														
3. Psychiatrists	-0.0063	0.0162	1.0000													
4. Social workers	-0.0058	0.00714*	0.8819*	1.0000												
5. Contributing family workers _F	0.0527	-0.0672*	-0.138*	-0.1663*	1.0000											
6. Contributing family workers _M	0.0556	-0.0632*	-0.1366*	-0.197*	0.7629*	1.0000										
7. Gov. health expenditure	-0.0181	0.0828*	0.1629*	0.2198*	-0.4394*	-0.3994*	1.0000									
8. Pop. density	-0.0028	-0.0272	-0.069*	-0.077*	0.0466	-0.1162*	-0.193*	1.0000								
9.School enrollment	-0.0142	0.0231	0.1097*	0.1481*	-0.4006*	-0.4026*	0.3990*	0.1404*	1.000							
10. Violence _women	-0.0113	0.1100*	0.1991*	0.3001*	-0.3889*	-0.4980*	0.5084*	-0.016	0.5012*	1.000						
11. Alcohol consumption	-0.0150	0.0812*	0.1731*	0.1978*	-0.4514*	-0.3129*	0.2142*	-0.114*	0.2478*	0.2424*	1.0000					
12. tobacco_M	-0.0288	0.0622	-0.022	0.0315	0.1159*	-0.0373	0.0888*	0.0312	0.1287*	0.3247*	-0.144*	1.0000				
13. Tobacco_F	-0.0202	0.2519*	0.1701*	0.211*	-0.1446*	-0.1852*	0.3685*	-0.099*	-0.027	0.2942*	0.0734*	0.3321*	1.000			
14. Labor_M	-0.0201	-0.1256*	0.0025	-0.054	0.2096*	0.1797*	-0.112*	0.0802*	-0.053	-0.1384*	-0.144*	-0.203*	-0.293*	1.000		
15. Labor_F	0.0195	-0.0318	-0.031	-0.104*	0.0413	0.2379*	-0.102*	-0.136*	-0.062	-0.3320*	0.2199*	-0.202*	-0.195*	0.359*	1.000	
16. Annual drug use of general population of men	-0.0092	0.1434*	0.2531*	0.2604*	-0.3945*	-0.2291*	0.3038	-0.0527	0.1360	0.1133*	0.2122*	-0.2658*	0.0468	-0.019	0.0245	1.000

Statistical significance: *<0.05

In Table 11, the coefficient estimates of some variables are highly significant, which implies that there are relationships between burden of mental health and the independent variables .

[Table 11] Fixed effect model analysis of DAMH and total burden of mental illness with control variables.

(1) Dependent variable: DALYs _mental health, Male				
	Coefficient	Std. Err.	t	p>|t|
DAMH $_{t-2}$(million)	2.69e-06	9.00e-06	1.42	0.160
Psychiatrists (per 100,000 population)	0.0001676	0.0030596	0.05	0.956
Psychologists (per 100,000 population)	0.0002689	0.0002163	1.24	0.217
Social workers (per 100,000 population)	-0.0073137	0.0086886	-0.84	0.402
Contributing family workers(Male) (%)	-0.0030914	0.0019598	-1.58	0.118
Domestic government health expenditure(%)	0.0130902	0.0050318	2.6	0.011*
Population density	0.0013065	0.0003503	3.73	0.000**
School enrollment, primary (gross), gender parity index (GPI)	0.0224845	0.0370376	0.61	0.545
Alcohol consumption	0.007414	0.002859	2.59	0.011*
Tobacco consumption rate(Male) (%)	-0.0019115	0.0009471	-2.02	0.046*
Labor force participation rate (Male) (%)	-0.0033458	0.0010373	-3.23	0.002**
Annual drug use of general population of men (%)	0.1466226	0.1185029	1.24	0.219
Number of observations	970			
Number of countries	97			
Prob>chi2	0.0000			
R-sq				
within	0.3786			
between	0.0080			
overall	0.0097			
sigma_u (σ_u)	0.34166155			
sigma_e (σ_v)	0.03608386			
rho	0.98896896			

(2) Dependent variable: DALYs _mental health, Female				
	Coefficient	Std. Err.	t	p>|t|
DAMH $_{t-2}$(million)	5.91e-09	1.85e-09	3.19	0.072
Psychiatrists (per 100,000 population)	-0.0013046	0.0034124	-0.38	0.703
Psychologists (per 100,000 population)	0.00063338	0.0003722	1.70	0.092
Social workers (per 100,000 population)	0.0178607	0.0048119	3.71	0.000**
Contributing family workers(Female) (%)	-0.0000564	0.0005769	-0.1	0.922
Domestic government health expenditure(%)	0.0028394	0.005643	0.5	0.616
Population density	0.001192	0.0002641	4.51	0.008**
School enrollment, primary (gross), gender parity index (GPI)	-0.03284	0.0323727	-1.01	0.313
Violence against women	1.795821	0.152269	11.79	0.000**
Alcohol consumption	0.0006403	0.0023314	0.27	0.784
Tobacco consumption rate(Female) (%)	-0.007389	0.0028638	-2.58	0.011*
Labor force participation rate (Female) (%)	0.0017376	0.1109534	-2.82	0.006**
Number of observations	970			
Number of countries	97			
Prob>chi2	0.0000			
R-sq				
within	0.6615			
between	0.1829			
overall	0.1943			
sigma_u (σ_u)	0.27173828			
sigma_e (σ_v)	0.03375939			
rho	0.98480027			
(3) Dependent variable: DALYs _mental health, both sexes				
	Coefficient	Std. Err.	t	p>|t|
DAMH $_{t-2}$(million)	2.41e-09	1.62e-09	1.49	0.140
Psychiatrists (per 100,000 population)	-0.0008903	0.0028948	-0.31	0.759
Psychologists (per 100,000 population)	0.0004507	0.0002692	1.67	0.097
Social workers (per 100,000 population)	-0.0025317	0.0067543	-0.37	0.709
Contributing family workers(total) (%)	-0.0031656	0.0011773	-2.69	0.008**
Domestic government health expenditure(%)	0.0153727	0.0053868	2.85	0.005**
Population density	0.0013651	0.0003824	3.57	0.001**

School enrollment, primary (gross), gender parity index (GPI)	0.0225347	0.0473708	0.48	0.635
Alcohol consumption	0.0103099	0.0029102	3.54	0.001**
Tobacco consumption rate(total) (%)	-0.0058285	0.0012064	-4.83	0.000**
Labor force participation rate (total) (%)	0.000577	0.0009286	0.62	0.536
Number of observations	970			
Number of countries	97			
Prob>chi2	0.0000			
R-sq				
within	0.4967			
between	0.0073			
overall	0.0105			
sigma_u (σ_u)	0.29988174			
sigma_e (σ_v)	0.03362971			
rho	0.98758009			

Statistical significance: *<0.05, **<0.0.1

The results include summary statistics and the estimates of regression coefficients. Three equations are formed from the results for male's burden of mental illness, female's burden of mental illness, total burden of mental illness, and outcomes of foreign aid for mental health from 2007 to 2016. The equations are as follows:

(1) $DALY\_M_{it} = \alpha_i + DAMH_{it-2} + \beta_2 Psychiatrists_{it} + \beta_3 psychologists_{it} - \beta_4 Social\ workers_{it} - \beta_5 Contributing\_M_{it} + \beta_6 DGHE_{it} + \beta_7 Pop_{it} + \beta_8 School_{it} + \beta_9 Alcohol_{it} - \beta_{10} Tobacco\_M_{it} - \beta_{11} Labor\_M_{it} + \beta_{12} drug\_M_{it} + \varepsilon_{it}$

The sigma_u (0.342) and sigma_e (0.036) of male's burden of mental illness are square roots of the variance components for groups and errors, respectively. In addition, the standard error of the estimate (SEE) is displayed under sigma_e. The rho represents the ratio of individual specific error variance to the entire error variance (0.988). It means that

the individual specific error can explain 99% of the entire composite error variance in this fixed-effects model. The within R-square is 37.8%. Therefore, this ratio may be interpreted as “a goodness-of-fit” of the fixed-effects model.

Although there are small estimate coefficients between the independent and dependent variables, domestic government health expenditure, population density, and alcohol consumption are positively associated with burden of mental disorders at the significance level of 0.05. With one-unit increases in domestic government health expenditure, population density, and alcohol consumption, male's burden of mental illness is expected to increase by 0.013 units (β=0.005, p-value=0.011), 0.0013 units (β=0.00035, p-value=0.000), and 0.074 units (β=0.0028, p-value=0.011), respectively. Conversely, smoking rate and labor force participation are negatively associated with the dependent variable. With one-unit increases in smoking rate and labor force participation, male's burden of mental illness is expected to decrease by 0.0019 units (β=0.00094 p-value=0.046) and 0.0033 units (β=0.0010, p-value=0.002), respectively.

It seems that smoking helps to reduce the burden of mental illness, and for smokers with a mental condition, the association between smoking and feeling relaxed is more pronounced. However, in the case of depression, tobacco use is associated with an increased risk of major depression. Smoking rates among adults with depression are twice as high as those among adults without depression (Hamalainen, 2001). Thus, the association between tobacco use and burden of mental illness should be followed up for a longer period to determine the concrete association between them.

(2) $DALY\_F_{it} = \alpha_i + DAMH_{it-2} - \beta_2 Psychiatrists_{it} + \beta_3 psychologists_{it} + \beta_4 Social\ workers_{it} - \beta_5 Contributing\_total_{it} + \beta_6 DGHE_{it} + \beta_7 Pop_{it} - \beta_8 School_{it} + \beta_9 Alcohol_{it} - \beta_{10} Tobacco\_F_{it} + \beta_{11} Labor\_total_{it} + \varepsilon_{it}$.

According to the results, the sigma_u (0.271) and sigma_e (0.034) of female's burden of mental illness are square roots of the variance components for groups and errors, respectively. The ratio of individual specific error variance to the entire error variance is 0.984. It means that the individual specific error can explain approximately 99% of the entire composite error variance in this fixed-effects model. And the within R-square is 66.1%. This ratio may be interpreted as "a goodness-of-fit" of the fixed-effects model.

Social workers, population density, violence against women, and labor force participation rate are positively associated with female's burden of mental disorders at the significance level of 0.05. With one-unit increases in social workers, population density, violence against women, and labor force participation rate, female's burden of mental illness is expected to increase by 0.0178 units (β=0.0048, p-value=0.000), 0.0012 units (β =0.00027, p-value=0.008), 1.796 units (β=0.152, p-value=0.000), and 0.0017 units (β=0.111, p-value=0.006), respectively. While tobacco use is negatively associated with female's burden of mental disorders. With one-unit increases in smoking rate, female's burden of mental illness is expected to decrease by 0.00738 units (β=0.00286 p-value=0.011).

The results show that human resources, such as social workers working in mental health (β=0.0048, p-value=0.000), have an association with burden of female mental illness at the significance level of 0.01. It is assumed that an increase in the number of trained professionals working in mental health would play an important role in managing the burden of female mental illness.

It seems that there may be a realistic explanation for the results. For example, developing countries with higher numbers of social workers working in mental health are more likely to have a high burden of mental illness, while developing countries with lower numbers of social workers are more likely to have a low burden of mental illness. It shows the importance of social workers' role on female's burden of mental illness in spite of the increased burden of mental disorders. Therefore, a follow-up study is needed to examine the relationship between social workers and burden of mental health in developing countries with different lenses focusing on cultural and gender-related factors.

$$(3)\ DALY\_total_{it} = a_i + DAMH_{it-2} - \beta_2 Psychiatrists_{it} + \beta_3 psychologists_{it} - \beta_4 Social\ workers_{it} - \beta_5 Contributing\_M_{it} + \beta_6 DGHE_{it} + \beta_7 Pop_{it} + \beta_8 School_{it} + \beta_9\ Alcohol_{it} - \beta_{10} Tobacco\_M_{it} + \beta_{11}\ Labor\_M_{it} + \beta_{12} drug\_M_{it} + \varepsilon_{it}.$$

The sigma_u (0.299) and sigma_e (0.034) of total burden of mental illness are square roots of the variance components for groups and errors, respectively. Moreover, the ratio of individual specific error variance to the entire error variance is 0.987. It means that the individual specific error can explain approximately 99% of the entire composite error variance in this fixed-effects model, as with the previous models. And the within R-square is 49.7%. Therefore, this ratio may be interpreted as "a goodness-of-fit" of the fixed-effects model.

According to the results, with one-unit increases in domestic government health expenditure, population density, and alcohol consumption, total burden of mental illness (both sexes) is expected to increase by 0.0154 units (β=0.0054, p-value=0.005), 0.0014 units (β =0.00038, p-value=0.001), and 0.0103 units (β=0.0029, p-value=0.001), respectively. On the other hand, with one-unit increases in contributing

family workers and tobacco consumption rate, total disease burden of mental health is expected to decrease by 0.0032 units (β=0.0012, p-value=0.008) and 0.0058 units (β=0.0012, p-value=0.000), respectively.

Overall, the associations between DAMH and each dependent variable were not statistically significant (p-value= 0.16, 0.072, 0.14) to reject the null hypothesis that DAMH is associated with a decreased burden of mental illness in developing countries. The association between DAMH and mental health burden was insignificant due to the characteristics of DAMH; that is, there were very few projects supporting mental health with a small amount of funding.

Based on the results above, each developing country's government should specify funding allocation for mental health to manage the burden of mental illness. In addition, a follow-up study is needed to examine the relationship between social workers and the burden of mental illness in developing countries.

Chapter4. Discussion and Conclusion

The panel regression analysis for examining the relationship between foreign aid for mental health and mental health outcomes was performed by estimating a fixed-effects model over 97 aid recipient countries between 2007 and 2016. As a measure of mental health outcomes, the study used DALYs of mental disorders, and foreign aid for mental health was represented by DAMH (2005 - 2014). To determine how DAMH and mental healthcare influence health outcomes together, this study included control variables. In addition, the study investigated the relationship between DAMH and the dependent variable, the disease burden of mental illness.

Although the study hypothesized that foreign aid for mental health reduces the burden of mental illness, the empirical results did not provide sufficient evidence for this claim. There are a number of possible reasons that foreign aid on mental health is not significantly associated with burden of mental illness. First, foreign aid is complex in itself, and when net DAMH is used as a proxy to capture it, there might be missing projects of mental health. In addition, disbursed DAMH, although lagged by two years, may not yet have the chance to effect substantial change. Finally, there is the current deficit in mental health financing comparing to other health sectors'. The proportion of development assistance on health(DAH) attributed to mental health is less than 1%.

The main findings from this study are as follows. First, other independent variables (e.g., contributing family workers, domestic government health expenditure, population density, social workers, violence against women, labor force participation, alcohol consumption, and tobacco use rate) have associations with male's and female's burden

of mental illness and the total burden of mental illness (both sexes) at the 5% significance level. Second, tobacco use is negatively associated with the burden of mental illness(p-value=0.046, 0.011, 0.008). Regarding the results, some studies argue that the high smoking prevalence among people facing social and economic deprivation suggests that smoking may be used as a self-medicating method of coping with stress(Chang et al., 2011). However, this result is somewhat different from the previous studies that smoking is associated with an increased risk of major depression and that smoking rates among adults with depression are twice as high as those among adults without depression (Ash, 2016). Third, more social workers working in mental health (β=0.0048, p-value=0.000) has a positive association with the burden of female mental illness at the significance level of 0.01. One possible explanation is that the increase in the number of trained professionals working in mental health plays an important role in managing the burden of female mental illness by making females recognize their mental disorders, such as depression and anxiety disorders.

A strength of this study is that it is a country-level time-series cross-sectional data analysis of the relationship between foreign aid for mental health and the burden of mental disorders. Unlike in a cross-sectional study, there is more useful variation across observations, and thus, it has the ability to capture the DAMH and burden of mental disorders trends over the years. Stimson (2012, 916) pointed out that,

> "Pooling data gathered across both units and time points can be an extraordinarily robust research design, allowing the study of causal dynamics across multiple cases, where the potential cause may even appear at different times in different cases. Many of the possible threats to valid inference are specific to either cross-sectional or time-serial design, and many of them can be jointly controlled by incorporating both space and time into the analysis."

The limitation is that there was a difficulty in assessing and measuring DAMH from the CRS. Despite the systematic keyword search with 11 languages, there might have been missing projects on mental health in recipient countries. In addition, among 6,000 projects on mental health, only 4,455 projects were available, and even fewer projects included full information on aid for mental health promotion. Another limitation of the study is that the study did not include other independent variables that may influence the burden of mental illness, such as cultural and religious indices and environmental indices, including the frequency of natural disasters and wars in conflicted countries.

This study, therefore, suggests that a further follow-up study is needed to identify DAMH with more precise search terms to better describe DAMH distribution. This and future work will assist policymakers realize current trends and assess patterns of DAMH. To manage burden of mental illness, the need for specified mental health-related funding should be further advocated by raising awareness of the burden of mental illness, its socioeconomic impact, and the lack of funding for mental health to guide future research and policymaking. Moreover, based on the result that social workers working in mental health have an association with the burden of female mental illness, it is assumed that an increase in the number of trained professionals working in mental health will make a positive impact on managing the burden of female mental illness.

This study also suggests that partnerships between professional human resources in high-income countries and health-related institutions in developing countries should be encouraged to build capacity. The result of these partnerships is expected to be sustainable to educate health professionals in developing countries. Research capabilities will be an essential educational component to make policies and to ensure outcome measurements of training for professionals working in mental health.

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WHO GHO data (http://apps.who.int/gho/data/node.imr#ndx-M)

WHO AIMS
(http://www.who.int/mental_health/evidence/atlas/profiles-2014/en/)

WHO AIMS_country report
(http://www.who.int/mental_health/who_aims_country_reports/en/)

WHO_mental health atlas
(http://www.who.int/mental_health/evidence/atlasmnh/en/)

Appendix A

Key words used to search for mental health projects in the OECD CRS from 2005-2014

Table1-1. English

Addiction	Cognitive impairment	Hallucination	Psychia-
Affective	Delirium	Hyperactivity	Psycho-
Alcohol	Delusion	Hypochondriasis	Schizo-
Antidepressant	Dementia	Insomnia	Self-harm
Antipsychotic	Dependency	Learning disability	Sleep disorder
Anxiety	Depress	Mania	Somatoform
Anxiolytic	Dyslexia	Mental	Trauma
Autism	Eating disorder	Mood	Substance abuse
Behavioural therapy	Electroconvulsive therapy	Personality disorder	
Bipolar	Family therapy	Phobia	

Table1-2. French

Dépendance	Déficience cognitive	Hallucination	Psychia-
affectif	délire	Hyperactivité	Psycho-
d'alcool	illusion	Hypochondrie	Schizo-
Antidépresseur	démence	insomnie	automutilation
antipsychotique	dépendance	Troubles d'apprentissage	Troubles du sommeil
anxiété	déprimer	La manie	somatoforme
anxiolytique	trouble de l'alimentation	Ambiance	abus de substance
Thérapie comportementale	La thérapie par électrochocs	trouble de la personnalité	
Bipolaire	Thérapie familiale	phobie	

Table1-3. German

Sucht	Kognitive Beeinträchtigung	Halluzination	Psychia-
Affektiv	Delirium	Hyperaktivität	Psycho-
Alkohol	Täuschung	Hypochondriasis	Schizo-
Antidepressivum	Demenz	Schlaflosigkeit	Selbstbeschädigung
Antipsychotisch	Abhängigkeit	Lernschwäche	Schlafstörung
Angst	Niederdrücken	Manie	Somatoform
Anxiolytikum	Dyslexie	Mental	Trauma
Autism	Essstörung	Stimmung	Drogenmissbrauch
Autismus	Elektroschock-Therapie	Persönlichkeitsstörung	
Bipolar	Familientherapie	Phobie	

Table1-4. Spanish

Adiccion	Deterioro cognitivo	Alucinación	Psiquia-
Afectivo	Delirio	Hiperactividad	Psicópata-
Alcohol	Engaño	Hipocondriasis	Esquizofrénico-
Antidepresivo	Demencia	Insomnio	Autolesiones
Antipsicótico	Dependencia	Discapacidad de aprendizaje	Desorden del sueño
Ansiedad	Deprimir	Manía	Somatoforma
Ansiolítico	Dislexia	Mental	Trauma
Autismo	Desorden alimenticio	Estado animico	Abuso de sustancias
Terapia conductual	Terapia electroconvulsiva	Desorden de personalidad	
Bipolar	Terapia familiar	Fobia	

Table1-5. Danish

Addiction	Kognitiv svækkelse	Hallucination	Psychia-
Affektive	Delirium	Hyperaktivitet	psyko-
Alkohol	Vrangforestilling	hypochondriasis	Schizo-
antidepressiv	demens	Søvnløshed	Selvskade
antipsykotisk	Afhængighed	Læringsvanskeligheder	Søvnforstyrrelse
Angst	Tryk	Mania	Somatoform
anxiolytisk	Ordblindhed	Mental	Trauma
Autisme	Spiseforstyrrelse	Humør	Stofmisbrug
Adfærdsterapi	Elektrokonvulsiv terapi	Personlighedsforstyrrelse	
Bipolar	Familie terapi	Phobia	

Table1-6. Finnish

Riippuvuus	Kognitiivinen rajoite	Hallusinaatio	psykiatri
affektiivinen	hourailu	hyperaktiivisuus	psyykkistä
alkoholi	Harhaluulo	hypochondriasis	Schizo-
masennusl狎ke	Dementia	Unettomuus	Itsetuhoisuus
antipsykoottisia	riippuvuus	Oppimisvaikeus	Nukkumishäiriö
levottomuus	Masentaa	Mania	somatoformiset
anksiolyyttiset	Lukihäiriö	henkinen	Trauma
Autismi	Syömishäiriö	Mieliala	Aineiden väärinkäyttö
Käyttäytymishäiriö	Elektrokonvulsiivinen hoito	Persoonallisuushäiriö	
Bipolar	Perhehoito	Fobia	

Table1-7.Italian

Dipendenza	Deterioramento cognitivo	Allucinazione	Psychia-
Affettivo	Delirio	Iperattività	Psicopatico-
Alcool	illusione	ipocondria	Schizo-
Antidepressivo	Demenza	Insonnia	Autolesionismo
antipsicotico	Dipendenza	Difficoltà di apprendimento	Disordine del sonno
Ansia	deprimere	Mania	Somatoform
Ansiolitico	Dislessia	Mentale	Trauma
Autismo	Disordine alimentare	Umore	Abuso di sostanze
Terapia comportamentale	Terapia elettroconvulsiva	Disturbo della personalità	
Bipolare	Terapia familiare	Fobia	

Table1-8.Dutch

verslaving	Cognitieve beperking	Hallucinatie	Psychia-
affectieve	Delirium	Hyperactiviteit	Psycho-
Alcohol	Waan	hypochondrie	Schizo-
Antidepressiva	zwakzinnigheid	Slapeloosheid	Zelf pijniging
antipsychotische	Afhankelijkheid	Leerstoornis	Slaapstoornis
Angst	deprimeren	Manie	somatoforme
anxiolytische	Dyslexie	geestelijk	Trauma
autisme	Eetstoornis	Humeur	Misbruik van drugs
Gedragstherapie	Elektroconvulsietherapie	Persoonlijkheidsstoornis	
bipolaire	Gezinstherapie	Fobie	

Table1-9. Norwegian

Avhengighet	Kognitiv svekkelse	Hallusinasjon	Psychia-
Affective	Delirium	hyperaktivitet	Psykopat-
Alkohol	Delusion	hypokondri	Schizo-
antidepressive	demens	Søvnløshet	Selvskading
antipsykotika	avhengighet	Lærings vansker	Søvnforstyrrel se
Angst	Tråkk	Mania	Somatoform
angstdempende	dysleksi	Mental	Traume
autisme	Spiseforstyrrelse	Humør	Stoffmisbruk
Behandlingstera pi	Elektrokonvulsiv terapi	Personlighetsfors tyrrelse	
Bipolar	Familie terapi	Fobi	

Table1-10. Portuguese

Vício	Comprometimento cognitivo	Alucinação	Psiquiatria
Afetivo	Delírio	Hiperatividade	Psicopata-
Álcool	Ilusão	Hipocondria	Esquizo-
Antidepressivo	Demência	Insônia	Auto-mutilação
Anti-psicótico	Dependência	Dificuldade de aprendizagem	Distúrbio do sono
Ansiedade	Deprimir	Mania	Somatoforme
Ansiolítico	Dyslexia	Mental	Trauma
Autismo	Desordem alimentar	Humor	Abuso de substâncias
Terapia Comportamental	Terapia eletroconvulsiva	Transtorno de personalidade	
Bipolar	Terapia familiar	Fobia	

Table1-11. Swedish

Missbruk	Kognitiv försämring	Hallucination	Psychia-
Affective	Delirium	hyperaktivitet	Psykopat-
Alkohol	Villfarelse	hypokondri	Schizo-
antidepressiv	Demens	Sömnlöshet	Självskada
Antipsykotisk	Dependency	Inlärningssvårigheter	Sömnstörning
Ångest	Sänka	Mani	Somatoform
ångestdämpande	Dyslexi	Mental	Trauma
Autism	Ätstörning	Humör	Drogmissbruk
Beteendeterapi	Elbehandling	Personlighetsstörning	
Bipolär	Familjeterapi	Fobi	

Appendix B

Search Strings for Systematic Review

A. EMBASE - Search Date: 2018.11.07.

		Search words	Results
Population (developing country)	1	'developing countries'/exp OR 'low income countries':ab,ti OR 'low and middle income' OR 'developing countries':ab,ti OR 'middle income countries'/exp OR 'asia' OR 'africa' OR 'south and central america' OR 'azerbaijan' OR 'kazakhstan' OR 'russian federation' OR 'turkmenistan' OR 'uzbekistan' OR 'bolivia' OR 'bolivia' OR 'colombia' OR 'ecuador' OR 'trinidad and tobago' OR 'venezuela' OR 'algeria' OR 'angola' OR 'cameroon' OR 'chad' OR 'congo' OR 'egypt' OR 'equatorial guinea' OR 'gabon' OR 'libya' OR 'nigeria' OR 'sudan' OR 'brunei darussalam' OR 'iran' OR 'bahrain' OR 'iraq' OR 'kuwait' OR 'oman' OR 'qatar' OR 'saudi arabia' OR 'united arab emirates' OR 'yemen' OR 'afghanistan' OR 'benin' OR 'burkina faso' OR 'burundi' OR 'central african republic' OR 'comoros' OR 'democratic republic of the congo' OR 'eritrea' OR 'ethiopia' OR 'gambia' OR 'guinea' OR 'guinea-bissau' OR 'haiti' OR 'dprk' OR 'liberia' OR 'madagascar' OR 'malawi' OR 'mozambique' OR 'nepal' OR 'rwanda' OR 'south sudan' OR 'tanzania' OR 'togo' OR 'uganda' OR 'zimbabwe' OR 'armenia' OR 'bangladesh' OR 'bhutan' OR 'cape verde' OR 'cambodia' OR 'cameroon' OR 'republic of congo' OR 'djibouti' OR 'el salvador' OR 'ghana' OR 'honduras' OR 'india' OR 'indonesia' OR 'kenya' OR 'kiribati' OR 'kosovo' OR 'lao' OR 'china' OR ‘belize’ OR ‘timor-leste’ OR ‘guinea-bissau’ OR ‘antigua and barbuda’ OR ‘belarus’ OR ‘bosnia and herzegovina’ OR ‘saint lucia’ OR ‘saint tome and principle’ OR ‘sierra leone’	5,353,121

Intervention (ODA or Development Assistance)	2	‘official development assistance’ OR ‘ODA’ OR ‘foreign aid’ OR ‘foreign development assistance’ OR ‘development assistance’ OR ‘development aid’ OR ‘international aid’ OR ‘overseas aid’	17,452
Outcome (mental health)	3	'Mental health'/exp OR 'mental health':ab,ti OR PTSD:ab,ti OR 'post traumatic stress disorder' OR trauma/exp OR depression/exp OR depressive disorder/exp OR anxiety/exp OR disorder/exp OR stress:ab,ti OR mental:ab,ti OR insomnia OR cognitive:ab,ti OR 'mood disorder'/exp OR 'sleep disorder'/exp OR posttraumatic/exp OR distress:ab,ti OR psychological:ab,ti OR suicide OR 'psychotic disorders' OR 'DSM-4':ab,ti OR 'DSM-5':ab,ti OR 'ICD-10':ab,ti OR 'behavior disorders'/exp OR 'behaviour disorders'/exp OR ‘addiction’ OR ‘affective’ OR ‘alcohol’ OR ‘antidepressant’ OR ‘antipsychotic’ OR ‘anxiety’ OR ‘autism’ OR ‘behavioural therapy’ OR ‘bipolar’ OR ‘cognitive impairment’ OR ‘delirium’ OR ‘delusion’ OR ‘dementia’ OR ‘dependency’ OR ‘depress’ OR ‘dyslexia’ OR ‘eating disorder’ OR ‘electroconvulsive therapy’ OR ‘family therapy’ OR ‘hallucination’ OR ‘hyperactivity’ OR ‘hypochondriasis’ OR ‘insomnia’ OR ‘learning disability’ OR ‘mania’ OR ‘mental’ OR ‘mood’ OR ‘personality disorder’ OR ‘phobia’ OR ‘psychia’ OR ‘psycho’ OR ‘schizo’ OR ‘self harm’ OR ‘sleep disorder’ OR ‘somatoform’ OR ‘trauma’ OR ‘substance abuse’ OR ‘mental health’	22,691,312
Total		#1 AND #2 AND #3	1,721

B. Medline - Search Date: 2018.11.07.

		Search words	Results
Population (developing country)	1	“developing countries”[MH] OR “low income countries”[TIAB] OR “low and middle income” OR “developing countries”[TIAB] OR “middle income countries”[MH] OR “asia” OR “africa” OR “south and central america” OR “azerbaijan” OR “kazakhstan” OR “russian federation” OR “turkmenistan” OR “uzbekistan” OR “bolivia” OR “bolivia” OR “colombia” OR “ecuador” OR “trinidad and tobago” OR “venezuela” OR “algeria” OR “angola” OR “cameroon” OR “chad” OR “congo” OR “egypt” OR “equatorial guinea” OR “gabon” OR “libya” OR “nigeria” OR “sudan” OR “brunei darussalam” OR “iran” OR “bahrain” OR “iraq” OR “kuwait” OR “oman” OR “qatar” OR “saudi arabia” OR “united arab emirates” OR “yemen” OR “afghanistan” OR “benin” OR “burkina faso” OR “burundi” OR “central african republic” OR “comoros” OR “democratic republic of the congo” OR “eritrea” OR “ethiopia” OR “gambia” OR “guinea” OR “guinea-bissau” OR “haiti” OR “dprk” OR “liberia” OR “madagascar” OR “malawi” OR “mozambique” OR “nepal” OR “rwanda” OR “south sudan” OR “tanzania” OR “togo” OR “uganda” OR “zimbabwe” OR “armenia” OR “bangladesh” OR “bhutan” OR “cape verde” OR “cambodia” OR “cameroon” OR “republic of congo” OR “djibouti” OR “el salvador” OR “ghana” OR “honduras” OR “india” OR “indonesia” OR “kenya” OR “kiribati” OR “kosovo” OR “lao” OR “china” “belize” OR “timor-leste” OR “guinea-bissau” OR “antigua and Barbuda” OR “Belarus” OR “bosnia and Herzegovina” OR “saint lucia” OR “saint tome and principle” OR “sierra leone”	14,471
Intervention (ODA or Development assistance)	2	‘official development assistance’ OR ‘ODA’ OR ‘foreign aid’ OR ‘foreign development assistance’ OR ‘development assistance’ OR ‘development aid’ OR ‘international aid’ OR ‘overseas aid’	89

Outcome (mental health)	3	"Mental health"[MH] OR "mental health"[TIAB] OR PTSD[TIAB] OR "post traumatic stress disorder" OR trauma[MH] OR depression[MH] OR depressive disorder[MH] OR anxiety[MH] OR disorder[MH] OR stress[TIAB] OR mental[TIAB] OR insomnia OR cognitive[TIAB] OR "mood disorder"[MH] OR "sleep disorder"[MH] OR posttraumatic[MH] OR distress[TIAB] OR psychological[TIAB] OR suicide OR "psychotic disorders" OR "DSM-4"[TIAB] OR "DSM-5"[TIAB] OR "ICD-10"[TIAB] OR "behavior disorders"[MH] OR "behaviour disorders"[MH] OR "addiction" OR affective[TIAB] OR "alcohol" OR "antidepressant" OR antipsychotic[TIAB] OR "anxiety" OR "autism" OR "behavioural therapy" OR "bipolar" OR "cognitive impairment" OR "delirium" OR "delusion" OR "dementia" OR "dependency" [TIAB] OR "depress" [TIAB] OR "dyslexia" OR "eating disorder" OR "electroconvulsive therapy" OR "family therapy" OR "hallucination" OR "hyperactivity" OR "hypochondriasis" OR "insomnia" OR "learning disability" OR "mania" [TIAB] OR "mental" [TIAB] OR "mood" [TIAB] OR "personality disorder" OR "phobia" OR "psychia" [TIAB] OR "psycho" [TIAB] OR "schizo" [TIAB] OR "self harm" OR "sleep disorder" OR "somatoform" OR "trauma" OR "substance abuse" OR "mental health"	3,398,833
Total		#1 AND #2 AND #3	2

C. Cochrane - Search Date: 2018.11.07.

		Search words	Results
Population (developing country)	1	[mh "developing countries"] OR "low income countries":ti,ab OR [mh "low and middle income"] OR "developing countries":ti,ab OR [mh "middle income countries"] OR "asia" OR "africa" OR "south and central america" OR "azerbaijan" OR "kazakhstan" OR "russian federation" OR "turkmenistan" OR "uzbekistan" OR "bolivia" OR "bolivia" OR "colombia" OR "ecuador" OR "trinidad and tobago" OR "venezuela" OR "algeria" OR "angola" OR "cameroon" OR "chad" OR "congo" OR "egypt" OR "equatorial guinea" OR "gabon" OR "libya" OR "nigeria" OR "sudan" OR "brunei darussalam" OR "iran" OR "bahrain" OR "iraq" OR "kuwait" OR "oman" OR "qatar" OR "saudi arabia" OR "united arab emirates" OR "yemen" OR "afghanistan" OR "benin" OR "burkina faso" OR "burundi" OR "central african republic" OR "comoros" OR "democratic republic of the congo" OR "eritrea" OR "ethiopia" OR "gambia" OR "guinea" OR "guinea-bissau" OR "haiti" OR "dprk" OR "liberia" OR "madagascar" OR "malawi" OR "mozambique" OR "nepal" OR "rwanda" OR "south sudan" OR "tanzania" OR "togo" OR "uganda" OR "zimbabwe" OR "armenia" OR "bangladesh" OR "bhutan" OR "cabo verde" OR "cambodia" OR "cameroon" OR "republic of congo" OR "djibouti" OR "el salvador" OR "ghana" OR "honduras" OR "india" OR "indonesia" OR "kenya" OR "kiribati" OR "kosovo" OR "lao" OR "china" OR 'belize' OR 'timor-leste' OR 'guinea-bissau' OR 'antigua and barbuda' OR 'belarus' OR 'bosnia and herzegovina' OR 'saint lucia' OR 'saint tome and principle' OR 'sierra leone'	106,645
Intervention (ODA)	2	'official development assistance' OR 'ODA' OR 'foreign aid' OR 'foreign development assistance' OR 'development assistance' OR 'development aid' OR 'international aid' OR 'overseas aid'	5,465

Outcome (mental health)	3	[mh "Mental health"] OR "mental health":ti,ab OR PTSD:ab,ti OR "post traumatic stress disorder" OR [mh "trauma"] OR [mh "depression"] OR [mh "depressive disorder"] OR [mh "anxiety"] OR [mh "disorder"] OR "stress":ti,ab OR mental:ti,ab OR insomnia OR cognitive:ti,ab OR [mh "mood disorder"] OR [mh "sleep disorder"] OR [mh "posttraumatic"] OR distress:ti,ab OR psychological:ti,ab OR suicide OR "psychotic disorders" OR "DSM-4":ti,ab OR "DSM-5":ti,ab OR "ICD-10":ti,ab OR [mh "behavior disorders"] OR [mh "addiction"] OR [mh "affective"] OR [mh "alcohol"] OR [mh "antidepressant"] OR [mh "antipsychotic"] OR [mh "anxiety"] OR [mh "autism"] OR [mh "behavioural therapy"] OR [mh "bipolar"] OR [mh "cognitive impairment"] OR [mh "delirium"] OR [mh "delusion"] OR [mh "dementia"] OR [mh "dependency"] OR [mh "depress"] OR [mh "dyslexia"] OR [mh "eating disorder"] OR [mh "electroconvulsive therapy"] OR [mh "family therapy"] OR [mh "hallucination"] OR [mh "hyperactivity"] OR [mh "hypochondriasis"] OR [mh "insomnia"] OR [mh "learning disability"] OR [mh "mania"] OR [mh "mental"] OR [mh "mood"] OR [mh "personality disorder"] OR [mh "phobia"] OR [mh "psychia"] OR [mh "schizo"] OR [mh "self harm"] OR [mh "sleep disorder"] OR [mh "somatoform"] OR [mh "trauma"] OR [mh "substance abuse"] OR [mh "mental health"]	215,725
Total		#1 AND #2 AND #3	564

D. Psyinfo: EBESCOhost - Search Date: 2018.11.07.

		Search words	Results
Population (developing country)	1	'developing countries'/exp OR 'low income countries':ab,ti OR 'low and middle income' OR 'developing countries':ab,ti OR 'middle income countries'/exp OR 'asia' OR 'africa' OR 'south and central america' OR 'azerbaijan' OR 'kazakhstan' OR 'russian federation' OR 'turkmenistan' OR 'uzbekistan' OR 'bolivia' OR 'bolivia' OR 'colombia' OR 'ecuador' OR 'trinidad and tobago' OR 'venezuela' OR 'algeria' OR 'angola' OR 'cameroon' OR 'chad' OR 'congo' OR 'egypt' OR 'equatorial guinea' OR 'gabon' OR 'libya' OR 'nigeria' OR 'sudan' OR 'brunei darussalam' OR 'iran' OR 'bahrain' OR 'iraq' OR 'kuwait' OR 'oman' OR 'qatar' OR 'saudi arabia' OR 'united arab emirates' OR 'yemen' OR 'afghanistan' OR 'benin' OR 'burkina faso' OR 'burundi' OR 'central african republic' OR 'comoros' OR 'democratic republic of the congo' OR 'eritrea' OR 'ethiopia' OR 'gambia' OR 'guinea' OR 'guinea-bissau' OR 'haiti' OR 'dprk' OR 'liberia' OR 'madagascar' OR 'malawi' OR 'mozambique' OR 'nepal' OR 'rwanda' OR 'south sudan' OR 'tanzania' OR 'togo' OR 'uganda' OR 'zimbabwe' OR 'armenia' OR 'bangladesh' OR 'bhutan' OR 'cabo verde' OR 'cambodia' OR 'cameroon' OR 'republic of congo' OR 'djibouti' OR 'el salvador' OR 'ghana' OR 'honduras' OR 'india' OR 'indonesia' OR 'kenya' OR 'kiribati' OR 'kosovo' OR 'lao' OR 'china' OR ‘belize’ OR ‘timor-leste’ OR ‘guinea-bissau’ OR ‘antigua and barbuda’ OR ‘belarus’ OR ‘bosnia and herzegovina’ OR ‘saint lucia’ OR ‘saint tome and principle’ OR ‘sierra leone’	2,907
Intervention (ODA)	2	‘official development assistance’ OR ‘ODA’ OR ‘foreign aid’ OR ‘foreign development assistance’ OR ‘development assistance’ OR ‘development aid’ OR ‘international aid’ OR ‘overseas aid’	2,234

Outcome	3	'Mental health'/exp OR 'mental health':ab,ti OR PTSD:ab,ti OR 'post traumatic stress disorder' OR trauma/exp OR depression/exp OR depressive disorder/exp OR anxiety/exp OR disorder/exp OR stress:ab,ti OR mental:ab,ti OR insomnia OR cognitive:ab,ti OR 'mood disorder'/exp OR 'sleep disorder'/exp OR posttraumatic/exp OR distress:ab,ti OR psychological:ab,ti OR suicide OR 'psychotic disorders' OR 'DSM-4':ab,ti OR 'DSM-5':ab,ti OR 'ICD-10':ab,ti OR 'behavior disorders'/exp OR 'behaviour disorders'/exp OR 'addiction' OR 'affective' OR 'alcohol' OR 'antidepressant' OR 'antipsychotic' OR 'anxiety' OR 'autism' OR 'behavioural therapy' OR 'bipolar' OR 'cognitive impairment' OR 'delirium' OR 'delusion' OR 'dementia' OR 'dependency' OR 'depress' OR 'dyslexia' OR 'eating disorder' OR 'electroconvulsive therapy' OR 'family therapy' OR 'hallucination' OR 'hyperactivity' OR 'hypochondriasis' OR 'insomnia' OR 'learning disability' OR 'mania' OR 'mental' OR 'mood' OR 'personality disorder' OR 'phobia' OR 'psychia' OR 'psycho' OR 'schizo' OR 'self harm' OR 'sleep disorder' OR 'somatoform' OR 'trauma' OR 'substance abuse' OR 'mental health'	4,216
Total		#S1 AND #S2 AND #S3	3

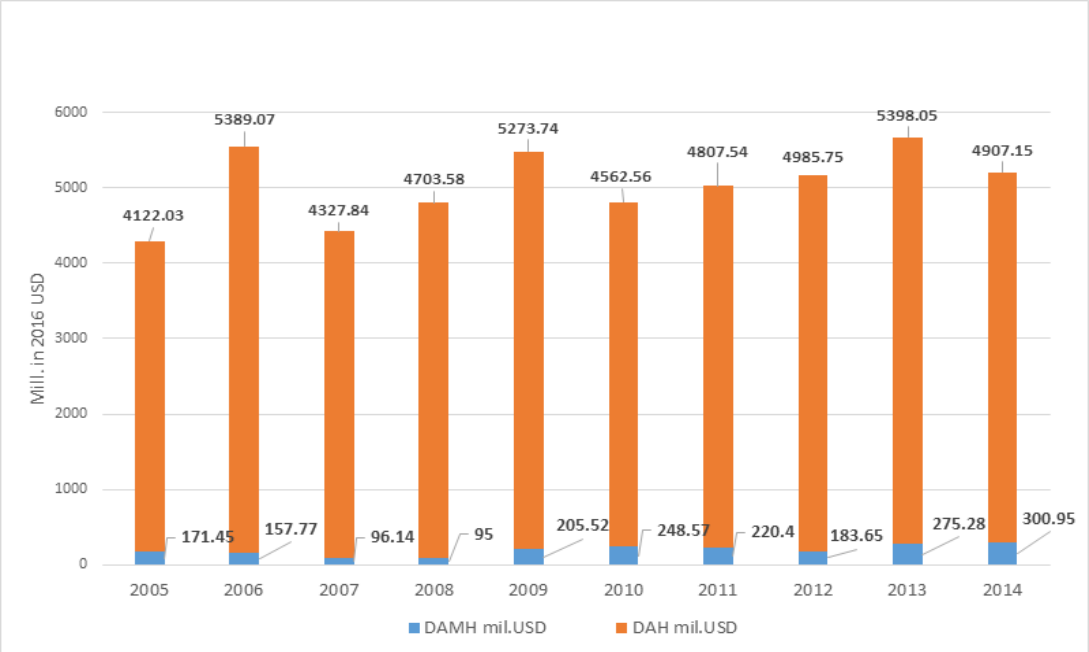
Appendix C

Results of DAMH analysis

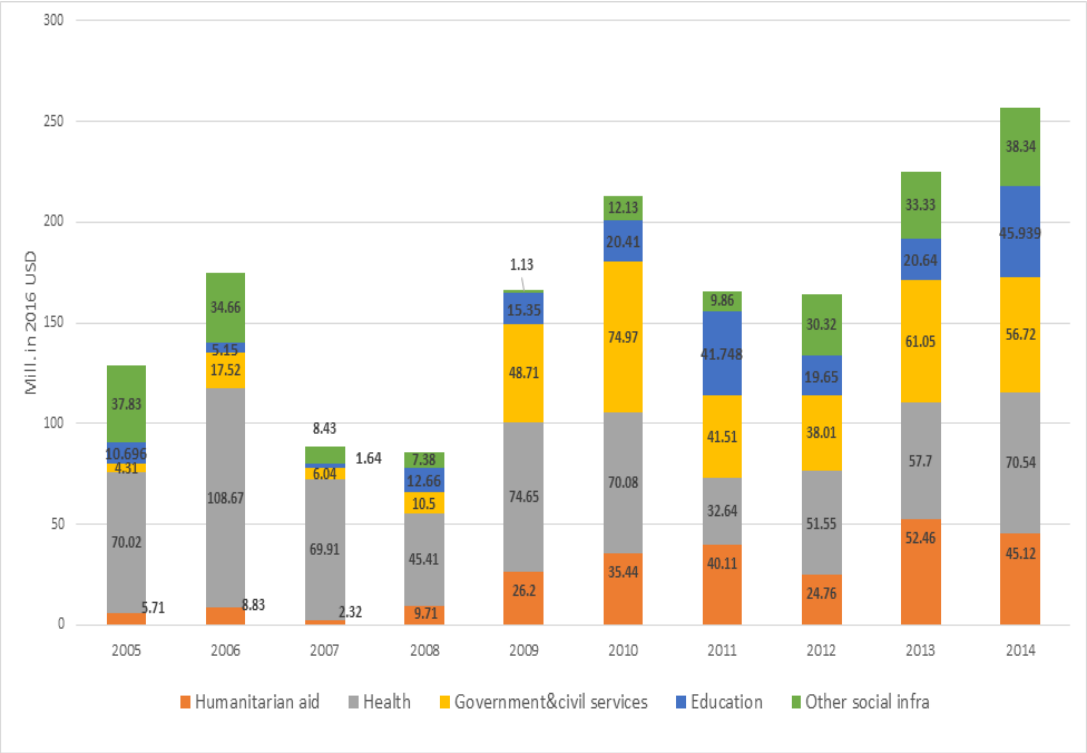
[C. Table 1] Sectors for identified mental health projects (2005-2014)

	Frequency and Percentage of total Projects (n=4,455)	Project description
Education (n=460)		
Education, level unspecified	72 (1.62 %)	Educational program for Psycho-social support/ Improving the quality of life (mental and physical)
Basic Education	261 (5.86 %)	Implementaion of Transcultural Psychosocial Organsiation (TPO)/Mental health services in 13 kindergardens in the Gaza
Secondary Education	50 (1.12 %)	Psychological support for Sri Lanka's tsunami survivors
Post-secondary Education	77 (1.73 %)	Psychology cooperation program/Community Psychology Masters Program at Birzeit University
Health (n=1,629)		
Health, General	652 (14.64 %)	Help for psychologically ill people/ construct Trauma and Acute Pain Centre
Basic Health	614 (13.78 %)	Support to Improve the Sexual and Psycho-social Health of Women/ Medical and psyco-social work with persons exposed to sexual abuse
Population and Reproductive Health	363 (8.15 %)	Regional Psychosocial Support Initiative
Government and Civil Services (n=869)		
Government and Civil Society	681 (15.29 %)	Integrated mental health services model and community-based for alcoholics and drug addicts

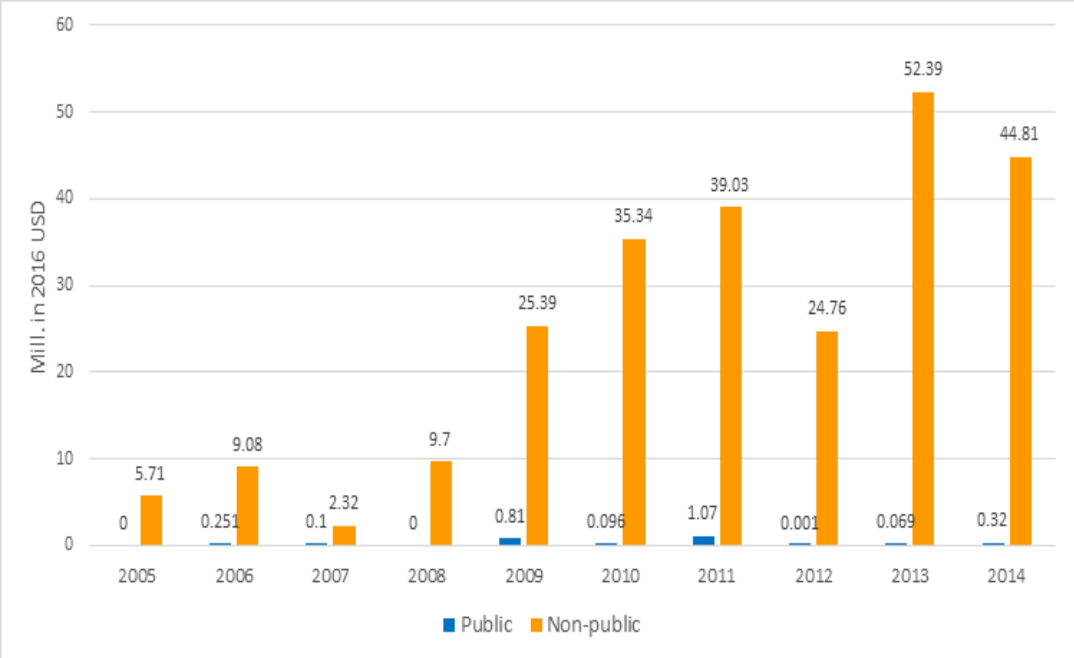
Conflict, Peace, and Security	188 (4.22%)	Project of psychosocial accompaniment
Other Social Infrastructure and Services (n=512)		
Other Social Infrastructure and Services	512 (11.48%)	Improvement of the educational psychological and healthy conditions for women and girls
Humanitarian aid (n=803)		
Emergency Response	732 (16.43%)	Psychosocial Assistance for Refugees/ Comprehensive Mental Health and Psychosocial Services for Vulnerable Refugees
Reconstruction Relief and Rehabilitation	49 (1.1 %)	Care of traumatized children and youth by child-protecting and psychosocial measures in refugee camps
Disaster Prevention and Preparedness	22 (0.49 %)	Intervention for the psycho-social recovery of childhood victims of the armed conflict and protection of children rights
Unspecified	182 (4.09 %)	



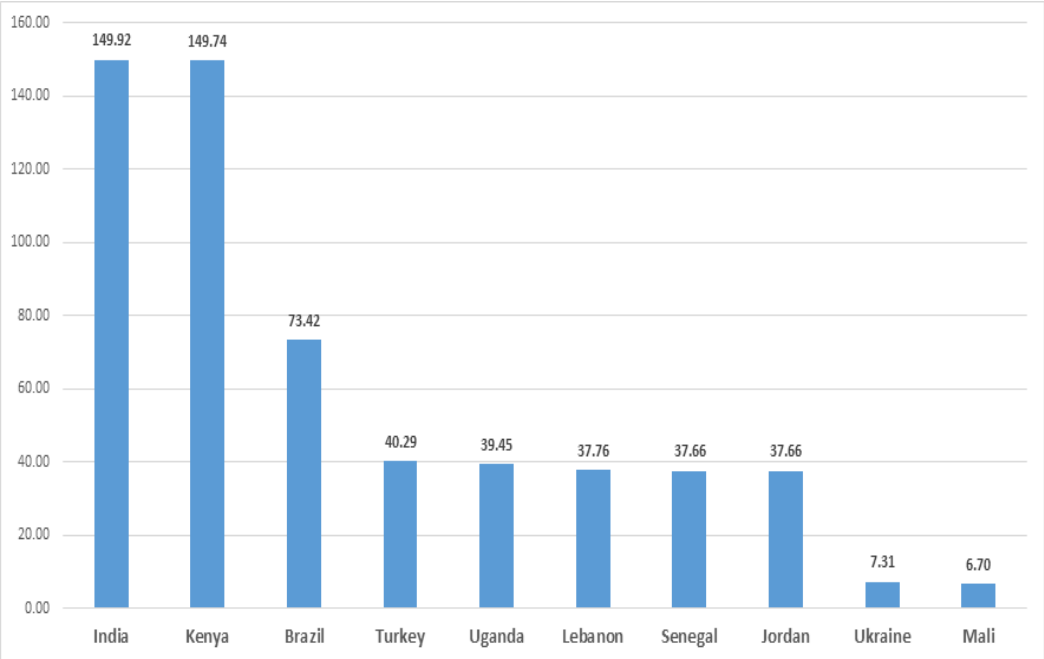
[C. Figure 1] Trends of annual DAMH and DAMH in DAH (2005-2014)



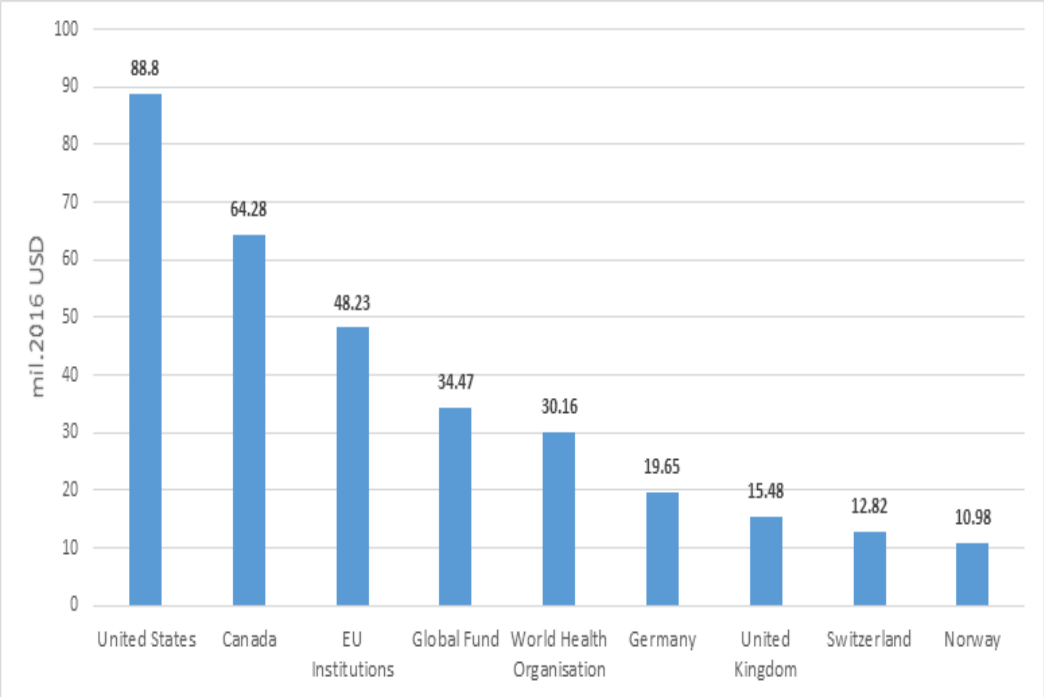
[C. Figure 2] Annual DAMH by sectors (2005-2014)



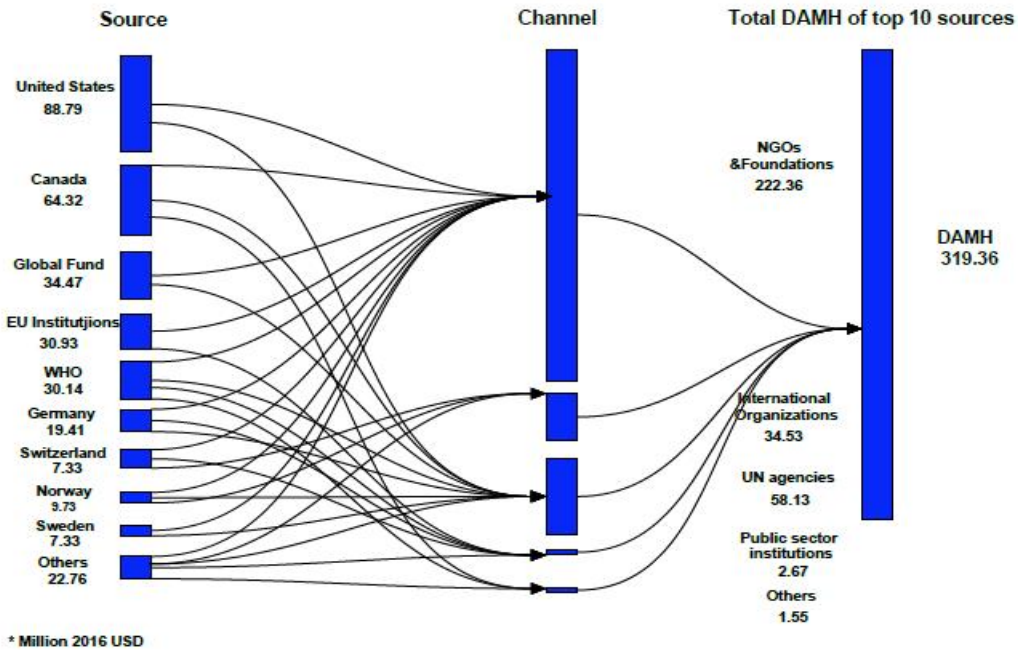
[C. Figure 3] Annual DAMH by Channels of delivery (2005-2014)



[C. Figure 4] Top 10 recipient countries with largest cumulative DAMH (2005-2014)



[C. Figure 5] Top 10 donor agencies for cumulative DAMH (2005-2014)



[C. Figure 6] Flow of DAMH by source and channel (2005-2014)

AppendixD

97 developing countries in the study

Afghanistan	Comoros	Indonesia	Montenegro	South Africa
Albania	Congo, republic of	Iran	Morocco	Sri Lanka
Angola	Costa Rica	Iraq	Mozambique	Suriname
Argentina	Cote D'Ivoire	Jameica	Namibia	Thailand
Armenia	Domenican republic	Jordan	Nicaragua	Timor-Leste
Azerbaizan	Ecuador	Kazahstan	Niger	Togo
Bangladesh	Egypt	Kenya	Nigeria	Tonga
Belarus	El salvador	Kyrgyzstan	Pakistan	Tunisia
Belize	Equatorial Guinea	LAO PDR	Panama	Turkey
Benin	Fiji	Lebanon	Papua New Guinea	Uganda
Bolivia	Gabon	Lesotho	Paraguay	Ukraine
Bosnia and Herzegovina	Gambia	Liberia	Peru	Vanuatu
Botswana	Georgia	Madagascar	Philippines	Venezuela
Brazil	Ghana	Malawi	Rwanda	Vietnam
Burkina Faso	Guatemala	Malaysia	Samoa	Yemen
Burundi	Guinea	Mali	Sao Tome and Principe	Zambia
Cambodia	Guinea Bissau	Mauritania	Senegal	Zimbabwe
Cape Verde	Guyana	Mauritius	Serbia	
China	Honduras	Mexico	Sierra leone	
Colombia	India	Mongolia	solomon Island	

국문초록

개발도상국의 정신건강질병부담과 정신건강분야 공적개발원조의 관계 분석

하 솔 잎
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보건학과 보건정책관리 전공

배경 및 목적 : 최근 국제사회에서 개발도상국 대상의 정신건강연구는 그 중요성에도 불구하고 크게 주목받지 못하였다. 실제로 정신건강문제는 전 세계적으로 질병부담이 큰 질환으로 인식되고 있으며 WHO 보고서에 따르면 개발도상국에 거주하는 사람들의 75%가 정신질환 관리 의료기관에 접근하지 못하고 있다. 이러한 사실에 근거하여 많은 원조 기관들은 정신건강 증진을 위한 다양한 원조 사업들을 수행하고 있으며 주로 정신건강 분야에 종사하는 전문가들 대상 교육제공 및 약물중독과 자연재해에 따른 정신건강 서비스를 제공하고 있다. 그러나 여전히 개발도상국에서의 정신건강 및 정신건강분야 원조에 영향을 미치는 요인에 관한 분석 연구는 부족한 실정이다. 따라서 본 연구에서는 DAC가 규정한 개발도상국 중 97개국을 대상으로 정신건강에 영향을 미치는 요인들을 탐색하고 정신건강분야 원조와 정신건강 질병부담(장애보정손실년수: DALYs)과의 상관성을 패널 회귀분석을 통해 살펴보고자 한다.

방법 : 정신건강분야 원조규모와 정신건강 질병부담과의 상관성 및 질병부담에 영향을 미치는 요인을 살펴보기 위해 DALYs를 정신건강 질병부담 측정단위로 사용하였다. 통계적인 방법으로는 패널 데이터 모형 중 고정효과 모

형을 사용하였으며 STATA 15.1 버전이 사용되었다. 2007년부터 2016년까지의 정신건강 질병부담과 2005년에서 2014년까지의 정신건강분야 원조규모가 종속변수와 설명변수로 각 사용되었으며 정신건장 질병부담은 성별에 따른 관계를 확인하기 위하여 정신건강 질병부담 (남,여 포함), 여성의 정신건강 질병부담, 남성의 정신건강 질병부담으로 나누었다. 통제변수로는 정신건강분야에 종사하는 사회 복지사, 심리사 및 정신과 의사와 기여가족종사자 비율, 보건분야 국가지출액, 남학생 대 초등교육기관에 입학한 여학생 비율, 인구밀도, 흡연율, 음주율, 여성에 대한 폭력비율, 경제활동참가율 및 남성 일반 인구의 연간 약물 사용률이 사용되었다. 연구대상은 OECD CRS에 포함된 총 150개국 중 97개 개발도상국으로 한정하였다.

결과 : 패널 회귀분석결과에 따르면 보건분야 국가지출액(β=0.005, p-value =0.011), 인구밀도 (β=0.00035, p-value=0.000) 및 음주율 (β=0.0028, p-value=0.011) 지표가 남성의 정신건강 질병부담에 통계적으로 유의한 수준에서 정(+)의 영향을 미치는 것으로 나타났다. 반면 흡연율(β=0.00094 p-value=0.046)과 경제활동참가율(β=0.0010, p-value=0.002)은 통계적으로 유의한 수준에서 부(-)의 영향을 미치는 것으로 나타났다. 여성의 정신건강 질병부담은 남성과는 다른 양상을 보이며 정신건강분야에 종사하는 전문 인력인 사회 복지사(β=0.0048, p-value=0.000), 인구밀도(β=0.00027, p-value =0.008), 여성에 대한 폭력비율(β=0.152, p-value=0.000) 및 경제활동참가율 (β=0.111, p-value=0.006)이 통계적으로 유의한 수준에서 정(+)의 영향을, 흡연율(β=0.00286 p-value=0.011은 부(-)의 영향을 미치는 것으로 나타났다. 보건분야 국가지출액((β=0.0054, p-value=0.005)과 인구밀도(β=0.00038, p-value=0.001), 음주율(β=0.0029, p-value=0.001)은 전체 정신건강 질병부담에 정(+)의 영향을 미치는 것으로 나타났으며 기여가족종사자 비율(β=0.0012, p-value=0.008)과 흡연율(β=0.0012, p-value=0.000)은 부(-)의 영향을 미치는 것으로 나타났다.

정신건강 질병부담에 대한 정신건강분야 원조의 p-value는 각 0.16, 0.072 및 0.14로서

두 변수 간 유의미한 상관성은 없는 것으로 나타났으며 이는 정신건강분야 원조가 정신건강 질병부담에 미치는 영향을 유의하게 설명하기 어렵다는 것을 보여주고 있다. 이러한 결과에는 다양한 요인이 영향을 미치나 그 중에서도 전체 보건분야 원조사업 대비 정신건강 증진만을 목적으로 하는 사업의 저조한 재정비율이 가장 큰 영향을 미친 것으로 보인다.

고찰 : 정신건강분야 원조와 정신건강 질병부담 간 패널회귀분석은 3가지 의미있는 결과를 보여주었다. 첫째, 기여가족종사자 비율, 보건분야 국가지출액, 인구밀도, 정신건강분야에 종사하는 사회 복지사, 여성에 대한 폭력비율, 경제활동참가율, 음주율, 흡연율이 정신건강분야 질병부담과 5%의 수준에서 유의미한 상관성을 보였다. 둘째, 흡연율(p-value=0.046, 0.011, 0.008)은 정신건강 질병부담과 5% 수준의 유의미한 부(-)의 상관성을 보이는 것으로 나타났다. 이러한 결과는 사회적, 경제적 어려움에 처한 사람일수록 높은 흡연율을 보이며 이러한 행위가 정신적 스트레스를 해소하기 위한 자가 치유방법으로 사용되기도 한다는 선행연구와 관련이 있는 것으로 보인다(Chang et al., 2011). 그러나 흡연이 오히려 우울증이 없는 그룹에 비해 2배 가량 우울증 위험도를 높인다는 반박 연구도 많음에 따라 이러한 연관성을 후속 연구를 통해 연구해 볼 필요가 있겠다. 셋째, 정신건강 분야에 종사하는 사회 복지사(β =0.0048, p-value=0.000)와 여성의 정신건강 질병부담 간 유의미한 정(+)의 상관성을 보이는 것으로 나타났다. 이러한 결과를 통해 사회 복지사의 수가 증가하면 여성들의 경우 정신건강 질병부담이 다소 증가할 수 있으나 장기적인 측면에서는 이를 관리하는데 중요한 역할을 할 수 있을 것으로 기대할 수 있다.

본 연구는 정신건강분야 질병부담을 관리하기 위해서는 정신건강분야 원조 증액과 국제사회에서의 공여기관들의 관심증대가 필요하며 이를 위해서는 정신건강분야에 특화 된 펀딩이 필요하다고 판단하였다. 이는 공여기관들의 정신건강 질병부담과 정신건강분야 예산 부족에 대한 인식 개선을 통해 이루어 질 수 있을 것으로 사료된다. 또한, 각 개도국 정부에서는 장기적인 관점에

서 정신건강관련 질병부담관리에 긍정적인 역할을 할 수 있는 사회복지사 양성에 더욱 노력을 기울여야 한다. 또한, 선진국의 재정적 지원과 개도국의 선진 연구기관이 파트너쉽을 맺고 지속적으로 정신건강 분야에 종사하는 전문인력들을 교육시키고 관리할 수 있는 종합 체계를 구축해야 한다. 이는 사회복지사의 수가 여성의 정신건강 질병부담과 5% 수준의 유의미한 정(+)의 상관성을 보이는 본 연구의 결과에 기인한다.

주요어 : 정신건강, 공적개발원조, 해외 원조, 질병부담, 패널 분석

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