IMPACT OF HEALTH ODA ON DEVELOPING COUNTRIES AND ITS IMPLICATIONS FOR KOREA'S HEALTH ODA

By

Sumi Jeong

THESIS

Submitted to

KDI School of Public Policy and Management

In partial fulfillment of requirements

for the degree of

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Committee in charge:

Professor Jaeun, SHIN, Supervisor

Professor Shun, WANG

Professor Boo Yuel, KIM

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ABSTRACT

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By

Sumi Jeong

Health sector development of a country requires efforts from various aspects including health service financing, establishment of health guarantee system, health infrastructure, health delivery system and strengthening health workforce. However, developing countries lack the capabilities and resources to improve their population health or to achieve health sector development. In that matter, the international society has been playing an important role in developing countries through Official Development Aid for health. As one of the donor countries, Korea also allocates high share of her total ODA to the health sector. Funding for health ODA has been constantly increasing especially after the inclusion of three health issues in the Millennium Development Goals. Along with the significant rise in health ODA, there has been rise of disputes about the effectiveness of the money invested in health.

The purpose of this study is to evaluate the impact of health ODA on the promotion of health in developing countries through an empirical analysis and compare the outcome with Korea's health ODA strategies. In doing so, this study contributes to the existing body of discussion on health aid effectiveness and provides implications for Korea's future health ODA directions and strategies. Infant mortality rate, under-five mortality rate, and life expectancy were used as outcome variables of health, and health ODA was used as the key explanatory variable. Health ODA is dissected into smaller subsectors to analyze if a specific type of health

ODA is more effective than others. Fixed effects methodology is applied to estimate whether health ODA has positive effects on the three health outcomes in the sample of 131 countries over the period of 2002-2013.

The study found that health ODA has a statistically significant and positive effect on target health outcomes and basic health ODA such as basic health care and infectious disease control are more effective than other types of health assistance. This supports the validity of the current strategy of health ODA in the international development cooperation where much stress is on increasing assistance to basic health. On the other hand, Korea's health ODA may need to revise the priority settings, as a large share of Korea's health ODA investment is directed to health infrastructure than the sectors that were found effective in this study.

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I. Introduction

With the target of increasing Official Development Aid (ODA) to 0.7% of each donor country's Gross National Income (GNI) set by the international society, the amount of foreign aid has significantly increased over decades. Health aid, in particular, is one of the top priority international development agenda with three of the eight Millennium Development Goals (MDGs) aiming health issues; MDG4: reduce child mortality by two-thirds, MDG5: improve maternal health by reducing maternal mortality rate by three quarters, MDG6: combat HIV/AIDS, malaria and other diseases (World Health Organization [WHO], 2007). In realization of the importance of improving the health of developing countries, aid for health has experienced a substantial increase in its amount. Total aid given by Development Assistance Committee(DAC) countries in 2013 amounted to approximately $134.480 billion, and 19.7% of the total aid which is about $26.5 billion was allocated to the health and education sector in 2013 (Organization for Economic Cooperation and Development[OECD], DAC, 2013).

Despite this increase in the Development Assistance for Health (DAH) by the international society, the goal of tackling the Millennium Development Goals is yet largely underachieved. Thus, the effectiveness of health aid has become one of the main topics of debate along with the emphasis on aid effectiveness in the Paris Declaration on Aid Effectiveness and Accra Agenda for Action and in many following high-level forums. While there are previous studies on the impact of overall aid on health in developing countries, analyzing the overall aid effectiveness with regard to health is too marginal, where program evaluation of individual projects can be too narrow to capture the overall aid effectiveness. Thus, this paper limits its scope of analysis to the effectiveness of aid specifically earmarked for the health sector in order to contribute to the meso-level analysis of aid effectiveness and the study only takes into account ODA to the health sector.

There are conflicting views on the effectiveness of health aid. Williamson (2008) found that health aid is ineffective in improving the health status of developing countries, when life expectancy, death rate, immunization, infant mortality rate were taken as the indicators. On the other hand, Mishra and New house (2009), in their study concluded that health aid has a beneficial and statistically significant effect on infant mortality, by reducing 2% of infant mortality rate when per capita health aid is doubled. Likewise, empirical results of studies of others on the effectiveness of DAH are also divided. In regard to this, this paper intends to study the impact of health ODA on developing countries by examining the relationship between three health indicators (Infant mortality rate, under-five mortality rate, life expectancy) and health ODA through empirical analysis. Panel data of 131 countries over the 2002-2013 period is used to both analyze the effectiveness of health ODA and the relative effectiveness of different types of health aid by dissecting health ODA into its subsectors. The empirical results are compared with international society's current approach to health ODA, as well as Korea's current health ODA strategies to draw out some implications for future health ODA to better achieve its goals.

The main findings of this paper are that health aid has a discernable impact on reducing infant mortality, under-five mortality and increasing life expectancy. When classified into subsectors, basic health ODA has a greater impact on outcome indicators than health ODA disbursed to secondary or upper-level health care. Additionally, out of four different types of health aid, basic health care, and infectious disease control showed a significant effect on improving health outcomes whereas health education and training had small or no significance and basic infrastructure did not have statistically significant meaning.

These research findings are consistent with the notion that in the field of development aid, effective primary health care such as effective delivery of vaccinations, medication, and treatment of common diseases is very important in poor countries where health resource is scarce. Effective delivery of primary care is essential in building the foundation of universal health care both accessible and in affordable cost range for all. The relative significance of basic health care and disease control among different types of basic health ODA also supports

the global trend of health ODA where growing number of Global Health Initiatives and projects are issue-oriented, in which their target is tackling specific type of diseases. However, this finding is in contrast with Korea's health assistance directions. Korea, while focusing more on assisting in basic health in overall, considerable portion of basic health ODA is concentrated on basic health infrastructure which includes investments such as constructing district-level hospitals, clinics and providing related medical equipment. In light of the conclusions drawn out by the paper's analysis, it is necessary to reconsider Korea's future health ODA directions and strategies for a more effective health aid.

The outline of this paper is as follows. Section II reviews the health ODA trend both global and Korean, as well as the characteristics of health sector and aid effectiveness issues of health ODA. Section III reviews the literature on the topic of the effectiveness of health ODA. Section IV presents the data and methodology of the study. Section V presents the empirical results of the relationship between DAH and health outcomes. First, the impact of health ODA is analyzed. Second, the impact of basic health ODA and general health ODA is analyzed. Third, the effectiveness of different types of basic health ODA is studied. Section VI discusses the conclusion and implications of the findings for Korea's future health ODA.

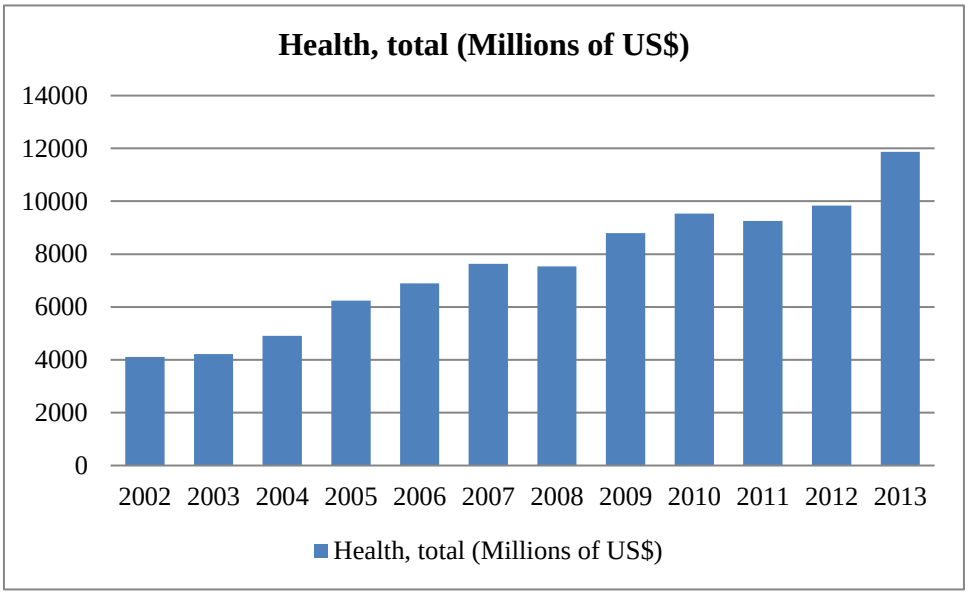
II. Review of Health ODA Trend

2.1. Global Health ODA Trend

2.1.1. Health ODA

Figure 1 shows that in 2002 the OECD DAC Creditor Reporting System(CRS) recorded bilateral and multilateral disbursements for health from all members (including four non-DAC countries; Estonia, Hungary, Kuwait, United Arab Emirates) totaling US$ 4.1 billion. This amount almost tripled to US$ 11.9 billion in 2013.

[Figure 1: Health ODA, 2002-2013]



Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

[Table 1: Share of Health ODA]

Unit: Millions of US$

Donor	Sector	2006	2007	2008	2009	2010	2011	2012	2013	Average
Total	Health	6,898	7,630	7,534	8,796	9,529	9,254	9,832	11,872	8,918
	Total	178,069	122,258	135,319	142,923	153,197	152,446	151,814	166,700	150,341
	Ratio(%)	3.9	6.2	5.6	6.2	6.2	6.1	6.5	7.1	6.0
DAC	Health	4,471	4,555	4,601	4,758	5,037	5,085	5,137	5,908	4,944
	Total	99,081	90,949	102,849	99,056	106,768	105,368	100,460	110,291	101,853
	Ratio(%)	4.5	5.0	4.5	4.8	4.7	4.8	5.1	5.4	4.9
Multi-lateral	Health	2,426	3,074	2,933	3,929	4,413	4,089	4,534	5,694	3,887
	Total	78,988	31,308	32,470	42,774	45,252	45,866	50,106	50,430	47,149
	Ratio(%)	3.1	9.8	9.0	9.2	9.8	8.9	9.0	11.3	8.8

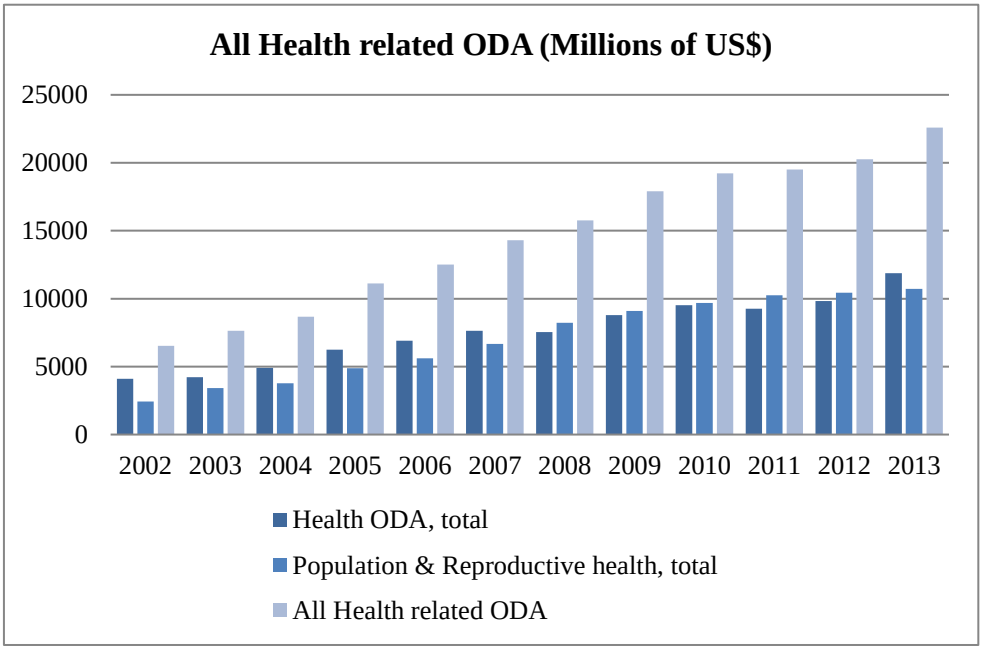
Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

All donors combined, an average of US$ 150.3 billion was assisted as total ODA including all sectors and an average of US$ 8.9 billion of health ODA was assisted to recipient countries between the years 2006 to 2013 (See Table 1). The average share of total health ODA was 6.0% of total ODA. DAC countries all combined marked higher average health ODA (US$ 4.9 billion) than that of multilaterals ($US 3.9 billion), but regarding the share of health ODA out of total ODA, multilateral agencies showed an average of 8.8% and DAC countries showed an average of 4.9%.

2.1.2. All Health related ODA

The OECD, CRS classifies aid by its aid purposes and designates purpose codes accordingly. Health aid (code 120) discussed in this paper does not include reproductive health care or STD control including HIV/AIDS. These types of aids are rather classified under population policies/programs and reproductive health (code 130).

[Figure 2: All Health related ODA, 2002 – 2013]

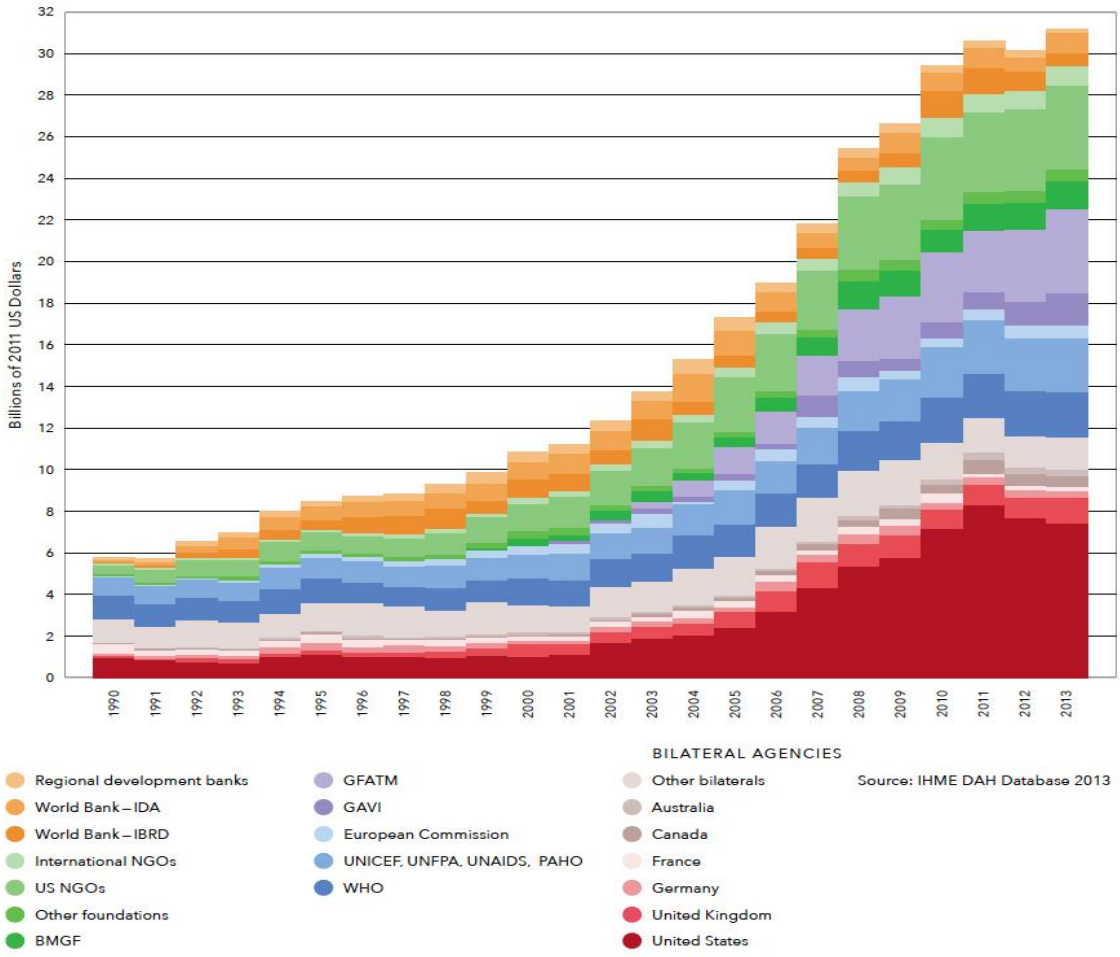


Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

Figure 2 shows disbursements to all health-related aid including population policies/programs and reproductive health. In 2002 population and reproductive health amounted to US$ 2.4 billion and this number increased to US$ 10.7 billion in 2013. Adding both health ODA and population & reproductive health ODA, total health-related ODA increased from US$ 6.5 billion in 2002 to US$ 22.6 billion in 2013. One noticeable change in the disbursement of health related ODA for the following years is that population & reproductive health ODA has increased substantially for almost five times the amount of 2002 in 2013, exceeding the size of health ODA since 2006. Increased funding for HIV/AIDS activities accounting for a large share of the increase in population & reproductive health ODA explains this change.

[Figure 3: International Spending on Health 1990-2013]

Unit: Billions of US$



Source: IHME DAH Database (2013)

Moreover, because OECD statistics do not combine all funds provided by non-OECD governments or all funds provided by private entities, the real magnitude of health aid flow is much bigger (WHO, 2009). A new analysis from the Institute for Health Metrics and Evaluation at the University of Washington suggests that if all donors such as bilateral donors, multilateral organizations, and other charity organizations are combined, then approximately US$ 31.3 billion was assisted in helping developing countries on health projects in 2013. This is shown in Figure 3. Some of the biggest increase in the health spending is largely due to the assistance coming from issue-focused agencies such as Bill and Melinda Gates Foundation, Global Fund to Fight AIDS, Tuberculosis and Malaria, the GAVI Alliance.

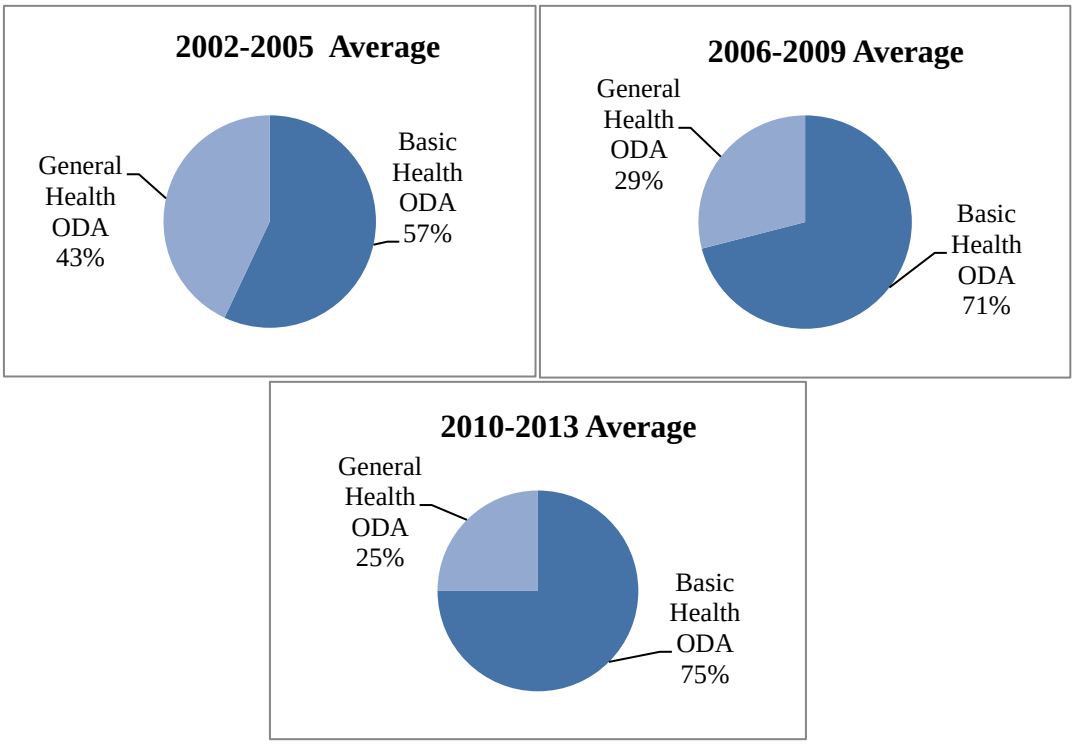
2.1.3. Sub-sectoral Breakdown of Health ODA

Health ODA can be broken down into two different subsectors; basic health ODA and general health ODA according to OECD CRS aid purpose codes. Then again, basic health ODA can be broken down into its subsequent subcategories. Basic health ODA includes categories such as basic health care, basic nutrition, basic health infrastructure, infectious disease control and health education. General health ODA includes subsectors such as health policy and administrative management, medical training and education, medical research, medical services. Figure 4 shows four-year averages of the share of basic health aid and general health aid out of total health aid over the periods of 2002-2013. As it can be seen it the figure, basic health ODA takes up majority share of total Health ODA, accounting for more than 70% of the total since 2006.

As mentioned above, basic health ODA and secondary health ODA can also be sub-categorized into different types of aid. Table 2 depicts the sub-categorized aids for general and basic health ODA from 2002 to 2013. While basic health ODA is getting the lion's share of the total health ODA, 35.5% of aid money is disbursed to controlling diseases when infectious disease control, malaria control, tuberculosis control are added all together. This is followed by basic health care (average 26.1%) and health policy and administrative management

(19.0%). Considering that aid given to STD/HIV is counted separately as a sub-category of population and reproductive health sector, the total share of aid money assisted to disease control including STD/HIV should be even bigger out of all health-related aid. Aid related to health infrastructure or medical equipment is getting a small share of below an average of 5%. Aid related to health education or training accounts for an even smaller proportion of each around an average of 1%.

[Figure 4: Sub-sectoral Breakdown of Aid to Health, 4 Year Averages]



Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

Interpreting the given information, much of the health aid is being allocated to addressing more basic health needs. This analysis of sectoral breakdown is consistent with WHO (2009)'s analysis "Funding for MDG-6(combat HIV/AIDS, malaria, and other diseases) accounts for much of the recent increase in health ODA. Many other health and health-related priorities remain insufficiently funded. In particular, "systems issues", such as management, logistics, procurement, infrastructure and workforce development, are often neglected".

[Table 2: Sub-category of General and Basic Health ODA]

(Unit: Millions of US$, %)

Sub	Types	2006		2007		2008		2009		2010	
General Health ODA	Health policy and administrative management	1,848	26.8	1,544	20.2	1,453	19.3	1,646	18.7	1,713	18.0
	Medical education and training	61	0.9	78	1.0	81	1.1	79	0.9	113	1.2
	Medical research	459	6.7	252	3.3	197	2.6	188	2.1	209	2.2
	Medical services	232	3.4	232	3.0	203	2.7	345	3.9	370	3.9
Basic Health ODA	Basic health care	1,565	22.7	2,030	26.6	2,335	31.0	2,059	23.4	2,464	25.9
	Basic health infrastructure	455	6.6	462	6.0	347	4.6	476	5.4	435	4.6
	Basic nutrition	193	2.8	242	3.2	242	3.2	418	4.7	456	4.8
	Infectious disease control	1,243	18.0	1,817	23.8	1,182	15.7	1,335	15.2	1,096	11.5
	Malaria control	513	7.4	529	6.9	929	12.3	1,569	17.8	1,685	17.7
	Tuberculosis control	246	3.6	333	4.4	423	5.6	523	5.9	824	8.6
	Health personnel development	33	0.5	67	0.6	85	1.1	98	1.1	94	1.0
	Health education	50	0.7	44	0.6	55	0.7	59	0.7	71	0.7
Total	All types	6,898	100	7,630	100	7,534	100	8,796	100	9,529	100

[Table 2: continued]

Sub	Types	2011		2012		2013		Average amount	Average share
General Health ODA	Health policy and administrative management	1,792	19.4	1,568	15.9	1,621	13.7	1,648	19.0
	Medical education and training	104	1.1	90	0.9	95	0.8	88	1.0
	Medical research	255	2.8	335	3.4	349	2.9	280	3.3
	Medical services	398	4.3	359	3.6	593	5.0	342	3.7
Basic Health ODA	Basic health care	2,382	25.7	2,634	26.8	3,217	27.1	2,336	26.1
	Basic health infrastructure	339	3.7	365	3.7	403	3.4	410	4.7
	Basic nutrition	467	5.0	726	7.4	926	7.8	459	4.9
	Infectious disease control	1,199	13.0	974	9.9	1,343	11.3	1,274	14.8
	Malaria control	1,360	14.7	1,782	18.1	1,967	16.6	1,292	14.0
	Tuberculosis control	779	8.4	778	7.9	1,085	9.1	567	6.7
	Health personnel development	96	1.0	102	1.0	107	0.9	85	0.9
	Health education	83	0.9	119	1.2	167	1.4	81	0.9
Total	All types	9,254	100	9,832	100	11,872	100	8,918	100.0

Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

2.2. Korea's Health ODA Trend

2.2.1. Korea's Health ODA

Korea was admitted to the member of OECD DAC group in 2009, and is an active donor since 2010. Korea has been participating in aid activities before the admission to DAC group as well, but there is a substantial increase in the total amount of aid after the year 2010 (See Table 3). One feature of Korean aid is that the share of health ODA takes bigger part of her total aid compared to the world average. The DAC country's average share of health ODA is 4.9%, multilateral 8.8%, and total 6%, but Korea shows average of 11.2% ratio. In 2009, the total share of Korea's health ODA amounted to 15% of total aid.

[Table 3: Korea's Health ODA]

(Unit: Millions of US$, %)

Donor	Sector	2006	2007	2008	2009	2010	2011	2012	2013	Average
Total	Health	6,898	7,630	7,534	8,796	9,529	9,254	9,832	11,872	8,918
	Total	178,069	122,258	135,319	142,923	153,197	152,446	151,814	166,700	150,341
	Ratio(%)	3.9	6.2	5.6	6.2	6.2	6.1	6.5	7.1	6.0
DAC	Health	4,471	4,555	4,601	4,758	5,037	5,085	5,137	5,908	4,944
	Total	99,081	90,949	102,849	99,056	106,768	105,368	100,460	110,291	101,853
	Ratio(%)	4.5	5.0	4.5	4.8	4.7	4.8	5.1	5.4	4.9
Multi-lateral	Health	2,426	3,074	2,933	3,929	4,413	4,089	4,534	5,694	3,887
	Total	78,988	31,308	32,470	42,774	45,252	45,866	50,106	50,430	47,149
	Ratio(%)	3.1	9.8	9.0	9.2	9.8	8.9	9.0	11.3	8.8
korea	Health ODA	41	48	62	119	149	102	132	146	100
	Total ODA	406	508	648	764	1,019	1,065	1,277	1,375	883
	Ratio(%)	10.1	9.5	9.6	15.6	14.6	9.6	10.4	10.6	11.2

Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/.

Korea's contribution to the total health ODA out of all donors recorded in the CRS data was 1.56%, 1.1%, 1.35% and 1.23% for the year 2010, 2011, 2012 and 2013 respectively (See Table 4). Korea's share of total Health ODA out of all DAC countries was 3%, 2%, 2.6%, 2.5% for years 2010, 2011, 2012 and 2013 respectively. The sub-sector analysis in Figure 5 shows that in the years 2010-2013, Korea has divided 65% of

her health ODA to basic health ODA, and 35% to general health ODA. The share of Korea's basic health ODA is smaller than the average of all donors, which is 75% as shown earlier in Figure 4.

[Table 4: Korea's share of Health ODA]

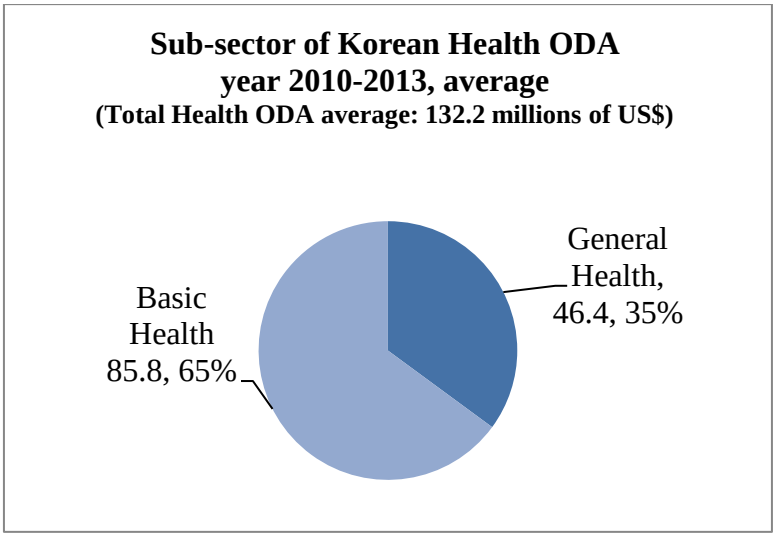
(Unit: Millions of US$, %)

Donors	2010	2011	2012	2013
All donors	9,528(1.56)	9,254(1.1)	9,832(1.35)	11,871(1.23)
DAC	9,528(3.0)	5,084(2.0)	5,136(2.6)	5,907(2.5)
Korea	149	102	132	146

Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/

[Figure 5: Sub-sector of Korean Health ODA]

(Unit: Millions of US$, %)



Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/

Sub-category analysis of Korea's general and basic health ODA is shown in Table 5. Korea's health ODA on basic health infrastructures such as constructing district-level hospitals, clinics, and dispensaries and providing related medical equipment excluding specialized hospitals and clinics (OECD CRS purpose codes, 2014) has been the dominant part of Korea's total health ODA accounting for more than half of Korea's total health ODA over the years 2006 - 2013.

[Table 5: Sub-category of Korea's General and Basic health ODA]

(Unit: Millions of US$, %)

Sub	Types	2006	2007	2008	2009	2010	2011	2012	2013
General Health ODA	Health policy and administrative management	2.4 (5.85)	1.64 (3.41)	9.91 (15.94)	10.27 (8.59)	9.73 (6.55)	3.47 (3.41)	2.96 (2.24)	7.95 (5.45)
	Medical education and training	0.73 (1.80)	0.42 (0.87)	2.27 (3.64)	0.42 (0.35)	1.44 (0.97)	4.1 (4.04)	6.34 (4.79)	10.95 (7.5)
	Medical research	0.38 (0.92)	0.7 (1.46)	0.00	2.6 (2.18)	0.18 (0.12)	0.12 (0.11)	0.2 (0.15)	0.05 (0.03)
	Medical services	4.69 (11.46)	9.88 (20.57)	0.84 (1.36)	23.89 (19.99)	39.67 (26.69)	25.46 (25.02)	31.33 (23.65)	41.59 (9(28.5)
	General Health Total	8.2 (20.03)	12.64 (26.31)	13.01 (20.94)	37.18 (31.12)	51.03 (34.32)	33.14 (32.57)	40.83 (30.82)	60.52 (41.49)
Basic Health ODA	Basic health care	4.36 (10.66)	7.26 (15.12)	4.65 (7.49)	8.18 (6.85)	9.69 (6.52)	6.9 (6.78)	6.88 (5.20)	9.25 (6.34)
	Basic health infrastructure	25.1 (61.31)	23.28 (48.48)	37 (59.51)	67.55 (56.54)	77.44 (52.09)	53.4 (52.47)	73.8 (55.71)	64.3 (44.07)
	Basic nutrition	0.46 (1.11)	0.86 (1.79)	0.24 (0.39)	0.28 (0.24)	0.34 (0.23)	1.2 (1.18)	1.23 (0.93)	0.86 (0.59)
	Infectious disease control	2.15 (5.26)	2.9 (6.04)	1.67 (2.69)	3.92 (3.28)	6.67 (4.49)	4.86 (4.78)	4.8 (3.63)	3.87 (2.65)
	Health education	0.18 (0.45)	0.37 (0.77)	0.18 (0.29)	0.07 (0.06)	0.37 (0.25)	0.24 (0.23)	0.98 (0.74)	1.83 (1.26)
	Malaria control	0.00	0.00	0.044 (0.07)	0.92 (0.77)	1.07 (0.72)	0.74 (0.73)	1.06 (0.8)	1.43 (0.98)
	Tuberculosis control	0.32 (0.78)	0.44 (0.91)	0.26 (0.42)	1.36 (1.14)	1.55 (1.04)	1.23 (1.21)	2.36 (1.78)	2.13 (1.46)
	Health personnel development	0.16 (0.4)	0.28 (0.59)	5.11 (8.21)	0.00	0.5 (0.34)	0.04 (0.04)	0.52 (0.39)	1.69 (1.16)
	Basic Health Total	32.73 (79.97)	35.39 (73.69)	49.2 (79.06)	82.29 (68.88)	97.65 (65.68)	68.61 (67.43)	91.64 (69.18)	85.36 (58.51)
Total	All types	40.94	48.03	62.18	119.47	148.68	101.76	132.47	145.88

Source: OECD, "OECD.StatExtracts", http://stats.oecd.org/

Korea's focus on physical assistance is a consistent pattern as the second biggest portion of the total health ODA is medical services. Medical services include infrastructure such as laboratories, specialized clinics, and hospitals (including equipment and supplies), ambulances, dental services, mental health care, medical rehabilitation, control of non-infectious diseases, drug and substance abuse control (OECD CRS purpose codes, 2014). Other types of aid in the order of their size are basic health care, medical education and training and health policy and administrative management. However the provided medical education and training are targeted for tertiary level health services and basic health information such as the promotion of personal hygiene

and health knowledge, or training of health staff for basic health care services accounts for a very little portion of total health ODA. Basic nutrition and disease controls are also the types that are neglected.

This characteristic of Korean ODA; concentration on physical assistance, is in contrast with the international society's overall trend which was shown in Table 2, where average 35.5% of health aid is disbursed to controlling diseases followed by basic health care (average 26.1%) and health policy and administrative management. On the other hand, Korea's health ODA is concentrated on physical assistance in terms of infrastructure or equipment supplies. Table 6 shows analysis results of different types of Korean Health ODA by using Herfindahl-Hirschman Index (HHI). Herfindahl-Hirschman Index is an index of concentration of export on a specific country or specific industry, and it is generally used to assess monopoly and oligopoly of a market or any sectors that have the concept of concentration. The maximum value of Herfindahl-Hirschman Index is 1 (perfect monopoly) and the bigger the concentration, the bigger the index. The results of Herfindahl-Hirschman Index analysis of top five types of Korean's Health ODA was over 0.3 for subject years which falls into the category of oligopoly in evaluation standards. The concentration is especially high for basic health infrastructure (Choi Jae Wook, 2013).

[Table 6. Korean Health ODA Herfindahl - Hirschman Index, % Share of Top Five Sectors]

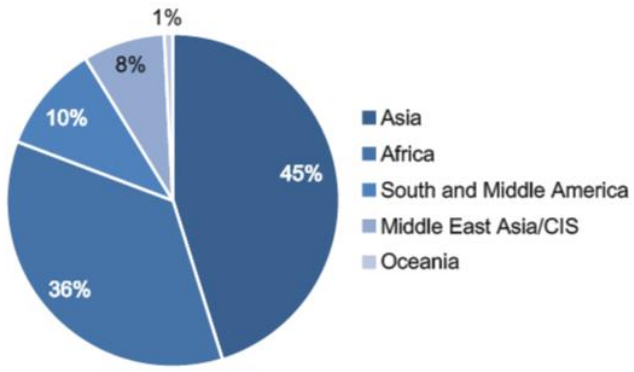
2009 HHI=0.367		2010 HHI=0.346		2011 HHI=0.345	
Sector	%	Sector	%	Sector	%
Infrastructure	56.5	Infrastructure	52	Infrastructure	52.4
Medical Service	19.9	Medical Service	26.6	Medical Service	25.5
Policy & Administration	8.5	Policy & Administration	6.5	Basic Health Care	6.7
Basic Health Care	6.8	Basic Health Care	6.5	Infectious Disease Control	4.7
Infectious Disease Control	3.2	Infectious Disease Control	4.4	Medical Education & Training	4
Top Five	94.9	Top Five	96	Top Five	93.3

Source: Choi Jae wook (2013)
*Only the three most recent years of the study is shown in this table.

2.2.2. Korea's Health ODA by Region

A study by Eun-mee Kim et al. (2015) analyzed all health ODA projects of Korean government during the period of 2006 to 2012 and found that Asia and Africa received 81% of the assistance of all health related projects (see Figure 6).

[Figure 6: Korea's Health ODA Projects by Region, 2006-2012]



CIS, Commonwealth of Independent States.

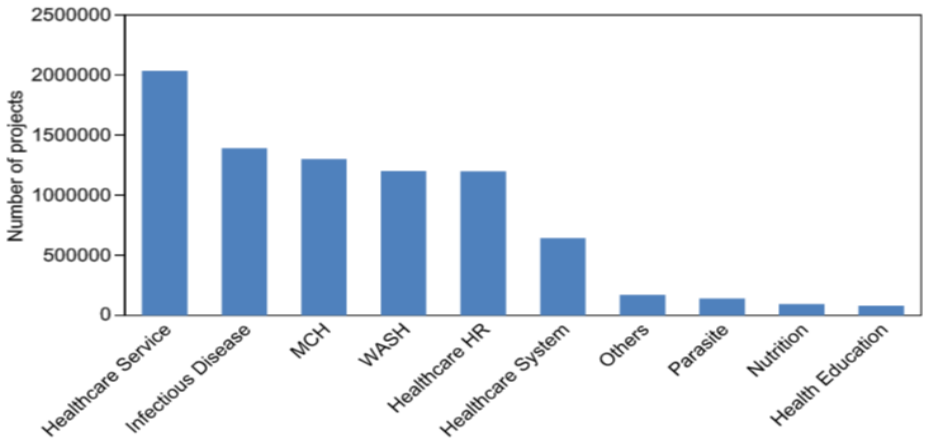
Source: Eun-mee Kim et al. (2015)

Asia is the largest recipient of Korea's health aid projects with the proportion of 45%. The rest of the regions (South and Middle America, Middle East Asia, CIS and Oceania) received 19% of all projects. This result shows that Korea's focus regions in health sector are Asia and Africa. However, this accounting includes all health-related projects such as water and sanitation aid, HIV/STD, reproductive health care which are not included in the definition of health ODA in this paper.

Their findings on analysis by Asian and African regions show (Figure7 and Figure8), that in Asia, health care services accessibility (strengthening primary programs and health delivery systems) accounts for the biggest portion of all projects and this is followed by infectious disease, maternal and child health, water, sanitation and hygiene. Much of healthcare service accessibility, as we have reviewed earlier, is likely to be consisted of basic health infrastructure and equipment supply. Assistance to African regions is more focused on

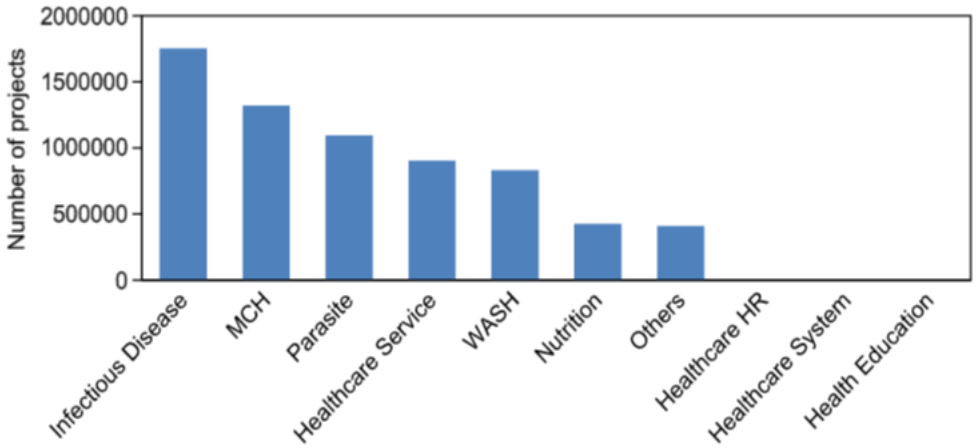
infectious disease control and maternal and child health projects. However healthcare service accessibility still accounts for a fair portion.

[Figure 7: Korea's Health ODA Projects in Asia, 2006-2012]



Source: Eun-mee Kim et al. (2015)

[Figure 8: Korea's Health ODA Projects in Africa, 2006-2012]



Source: Eun-mee Kim et al. (2015)

2.2.3. Objectives and Strategies of Korea's Health ODA

There are mainly three health aid implementing agencies in Korea - Korea International Cooperation Agency (KOICA), Korea Foundation for International Healthcare (KOFIH), and Economic Development and Cooperation Fund (EDCF) and they all fall under one overarching priorities and goals.

According to KOICA's 2011-2015 Health ODA strategy report, KOICA's general direction of health assistance is to concentrate on priority sectors recognized in the international society, which is choosing projects that fall in line with the Millennium Development Goals so that internationally problematic issues can be dealt with. In doing so, KOICA's target group is women and children with the goal of strengthening health system so that developing countries can self-sufficiently provide necessary health services to vulnerable groups of people. To achieve this goal KOICA has five objectives and focus programs. 1) Strengthening health care workforce by training health personnel both for primary and tertiary care. 2) Strengthening health system and institution which includes health insurance, policy and financing. 3) Strengthening accessibility of health care service through basic health care and basic health care delivery system. This is done through nutrition, vaccination, infant care and establishment of health posts and upper level health infrastructure. 4) Improve maternal health and family planning. 5) Prevention and management of infectious diseases such as tropical disease, tuberculosis, AIDS, malaria and other infectious diseases. These five objectives are to be achieved in combination with vertical and horizontal approach to health ODA.

2.3. Characteristics and Issues of Health ODA

2.3.1. Characteristics of Health Sector

The health problem in developing countries is still severe. According to the Global Health Observatory of World Health Organization (WHO) health status and health system of developing countries are generally low

comparing to that of developed countries. Developing countries have higher death and prevalence rate of tuberculosis, HIV/AIDS, malaria and other infectious diseases. Sub-Saharan African countries have the highest burden of HIV/AIDS. In these countries, 1 out of every 20 adults is infected with this disease accounting for 71% of the world HIV/AIDS prevalence rate. More than half of death caused by malaria is from African and South East Asian countries (Global Health Observatory WHO, 2014). While infection of communicable diseases is rampant in developing countries, the seriousness of the non-communicable disease is also rising. 5.6 million people died in 2012 globally, and 3.8 million people (68%) died due to non-communicable diseases. The four representative non-communicable diseases are cardiovascular disease, cancer, diabetes, chronic lung diseases and the burden for these types of deaths are increasing in developing countries as well. In 2010, 3/4 of deaths caused by non-communicable disease occurred in low income or developing countries (Global Health Observatory WHO, 2014). Maternal and child health also needs better care in developing countries. In the case of maternal deaths, approximately 800 women died every day in 2013 due to complications from pregnancy and birth delivery. These kinds of deaths are most prevalent in countries where health resources are scarce; developing and low-income countries. The risks of women dying from pregnancy or birth delivery are 23 time higher in developing countries than in developed countries. Also for infant and child mortality rates, 74% of all under 5 deaths take place in African and South East Asian countries.

Whether a country is a developing country or a developed country, health is a complex sector for both. It is challenging to see tangible and short-term outcomes in health sector because, health outcomes are dependent on a range of inputs not only that are directly health related such as health infrastructure, social security system including health insurance, health and medical personnel development, health provision system management, and health financing but also economic growth, education, water and sanitation, nutrition requiring interactive coordination of many different socio·economic, environmental factors, something for which there is little incentive or finance and structure to manage. It is also reversible if access to health services is hindered, and

takes long time for the inputs to make up the output. Moreover, in many cases, it is dependent on individual behavior, which is difficult to influence or change (WHO, 2007).

Financing health system is equally complex because, health system funding is in nature long-term recurrent cost, when in reality much of the health funding for developing countries comes from external sources which is unpredictable and short-term. This makes low income countries difficult to exercise their impact on overall health investments and assure financial protection and equity. On top, managing health system is also difficult because health may be governed by more than one ministry (WHO, 2007). At any country level, non-state actors play a substantial role in both financing and delivery of health services. These issues are particularly bigger where the capacity of governments is weak, monitoring is limited, and the qualities of health policies are poor.

Thus, the role ODA can play in helping the health status of developing countries is very much highlighted, as is apparent in the past goals set in MDGs, and the newly set goals in the 2015 Sustainable Development Goals (SDGs). However, despite the large increase and continuing aid for health, and the goal of tackling major health issues is yet underachieved. This is not only a matter of health sector alone but also a matter of aid in general. The effectiveness of aid has become one of the main topics of debate and its importance has been emphasized in the Paris Declaration on Aid Effectiveness and Accra Agenda for Action and in many subsequent high- level forums on aid effectiveness. The issues of health aid effectiveness is further discussed in the following.

2.3.2. Health Aid Effectiveness Issues

Many factors could affect aid effectiveness of health sector. First is fragmentation. The global aid architecture in health is that there are hundreds of different flows of public and private funds to specific countries. According to WHO (2007) “These various international organizations have overlapping and unclear mandates, with no single organization to coordinate global health policy, financing and implementation processes at a country or

regional levels. Many of the new players in the global health architecture are funding for specific disease programs, accounting for a significant proportion of donor aid. The global health architecture has become more complex with the emergence of large global health partnerships (GHP) such as Global Alliance for Vaccines and Immunizations (GAVI), The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM)". Estimates suggest that there are between 75 to 100 GHPs. Vast majority related to communicable diseases, and may target the big three diseases of HIV/AIDS, tuberculosis (TB) and malaria. Although these new players and GHPs brought the much needed financial resources to the global health sector and brought the attention, however, it may intensify the 'vertical' nature of health financing where donors use aid on a specific program to see a direct link between their aid money and the results. This leaves the recipients little flexibility to reallocate monies according to their priorities or to fund health system costs, and also the large number of separate health programs can create significant transaction costs for the government (WHO, 2007).

Second, the problem that may be causing the ineffectiveness of health is fungibility. If health is a low priority for governments of the recipient countries and/or poorly reflected in national development plans, the governments of recipient countries may receive aid through budget support, but the money may well not be used on health issues. This characteristic is called the fungibility of aid. Institute for Health Metrics and Evaluation (2011), found every 1$ of DAH channeled through the government of the recipient country, the governments on average took $0.34 to $1.14 of their own money away from the health sector.

The third factor is the quality of recipient country's government. According to World Bank (1998), assessing aid report and many other studies have proven that aid was more effective in countries which had sounder policies. This aspect is also connected with fungibility issue as well, in the sense that corrupt government is likely to use the money away from its original purposes. Also, as the old orthodox "aid works better in well-governed countries" most of the aid recipient countries are fragile states and fragile states have weak governance and institutions. Thus, it is not easy for governments to engage or work with fragile states. Therefore, aid in fragile states tend to be more volatile, and when donors do engage, they often establish parallel

systems rather than working through the government, making the future capacity building of the government difficult (WHO, 2007).

Another potential problematic factor is resource misallocation. The current distribution of aid may not be directed towards where they are most needed, not achieving their potential impact. For example, some countries or certain diseases need the most help, but popularity of some countries means that donors and implementing agencies have a tendency to typically provide aid for overlapping countries, resulting in duplication and competition (WHO, 2007).

Additionally, within health interventions, there is also another debate on what type of assistance should be given to make the existing health aid more effective in developing countries. The question of 'on what' health aid should be used can be related to the resource allocation issue above. Thus, to test health aid effectiveness, it is meaningful to draw empirical evidence whether aid earmarked specifically for health has a positive impact on health promotion of recipient countries and divide health aid into different types of health aid following the CRS aid purpose classifications to distinguish the health outcomes of different health care approaches.

III. Literature Review

3.1. Literature Review

3.1.1. Previous Studies on Aid Effectiveness on Economic Growth

There is no consensus among development scholars on whether development assistance actually promotes growth. Some advocate more aid saying that given the right conditions such as "good" policy environments and institutions including sound fiscal and economic policies, aid leads to growth (Burnside & Dollar, 2000), while others say that it is ineffective or even has negative influence on the recipient countries' growth (Brautigam & Knack, 2004).

Adversaries who doubt the beneficial impact of international aid, largely base their claims on the following reasons. First, because of weak political system, corruption, lack of transparency of the developing country government, money given as aid is not directed towards programs to benefit the poor, but instead is directed towards the wealthy elite, leading to ineffectiveness in poverty reduction, let alone promoting economic growth (Bauer & Yamey, 1982; Boone, 1995; Petterson & Van de Welle, 2008). Second, in the case of aid given directly to the country's governments as budget support, the money can be fungible. This fungibility of aid can allow the recipient governments to use the funds on other issues they prioritize than on the donors' intended goals (Burnside & Dollar, 2000; Collier & Dollar 2002). Third, when projects overlap with each other or are even in conflict, the absence of coordination between the donors will make aid ineffective or even be detrimental (Van de Walle, 1999). Fourth, when governments continue to depend on external assistance, these domestic governments will not be able to build own government capacity such as strong accountability and legitimacy as the result of dependency, making the country lose its competitiveness (Brautigam & Knack, 2004; Rajan and Subramanian, 2005).

On the other hand, some researchers claim that aid has a positive impact on economic growth. Sachs (2005) advocates the beneficial effects of aid if the amount is largely scaled up and is given in the right way. By supplying developing countries with the much needed resources that they are unable to self-supply with, this will help them to get out of poverty trap and achieve the Millennium Development Goals (MDGs). Some researchers agree that certain types of aid can have a positive effect on promoting economic growth, of which the types are short-term or multilateral aid (Clemens, Radelet, Bhavnani, & Bazzi, 2004). Arndt, Jones and Tarp (2011) presents in their study that there was a positive impact of aid on growth using a structural model where life-expectancy along with investment and education are intermediary factors through which aid affects growth.

There also is another group of studies that argue, aid is only a minor determinant of development. The main determinant of growth is decided domestically such as the success of domestic institutions. These views are

expressed by Lewis (1982) “The aid input usually is a minor determinant of development outcomes; it can catalyze internal forces positively, but it can also fail to do so or be swamped by extraneous circumstances.”, and Birdsall, Rodrik and Subramanian (2005) express similar views as sustained growth is principally dependent on the recipient country and aid at best, can help remove certain bottlenecks or construction but jump starting or sustaining economic growth itself.

As effectiveness of aid is usually discussed in the sense of its role in promoting economic growth of the recipient countries the disagreement on aid effectiveness is somewhat discouraging because development of many other social infrastructures such as health, education, and institution all have strong causal relationship with economic growth. Although, there is no clear and certain evidence aid promotes growth, it doesn’t deny aid’s impact on a sectoral level, in our case - health. There are proven evidence that improvement in health doesn’t always require economic growth as a prerequisite. For instance, many countries have shown remarkable improvements in health with little or no economic growth and vice versa (Cutler, Deaton & Lleras-Muney, 2006). Existing estimates suggest that economic growth explains less than half of the overall improvements in health in the past 50 years in developing countries (Bloom, Canning & Sevilla, 2004). Easterly (2006) says that aid may have contributed to some of the improvements in Africa despite its ineffectiveness in spurring economic growth. He notes, that “despite the zero-growth payoff to aid in Africa, there has been a fall in infant mortality and a rise in secondary enrollment in the most aid-intensive continent”.

Thus, although previous studies fail to find out the exact effect of aid on growth, looking at aid in the perspective of economic growth only, can lead to misleading interpretations because it can overlook the specific impacts of aid projects that are not specifically designed to improve economic growth, at least not in a longer term. Such approach can miss micro level improvements in daily life such as gained access to safe and clean drinking water, or higher literacy rates among women that could be the results of many aid projects (Gebhard, Kitterman, Mitchell, Nielson & Wilson, 2008). Thus, there remains room for finding out whether aid can directly improve specific sectors or development indicators, in our case, health outcomes.

3.1.2. Previous Studies on Health Aid Effectiveness and Health

There are some previous studies that focused on the aid's effect on health outcomes. Peter Boone (1995)'s study shows that aid has no discernible impact on health indicators. Similarly, Burnside and Dollar (1998) found positive but statistically insignificant coefficient for aid on health. Masud and Yontcheva(2005)'s findings show that bilateral aid, which consists majority of the channel health aid is disbursed, has no statistically significant effect on health indicators represented by mortality rate in the paper. However, health aid given by NGOs showed a statistically significant impact on reducing mortality rate possibly implying aid has a greater impact on health outcomes on a micro level. Filmer and Pritchett (1999)'s study on the impact of public spending on health and non-health factors in determining child and infant mortality finds that impact is small with a coefficient that is typically both numerically small and statistically insignificant.

On the other hand, advocates argue that aid helps relax resource constraints in poor countries which directly help delivery in health service (Levine et al., 2004). Fielding, et. Al.(2006) found overall aid had a statistically substantial impact on reducing child mortality. Yousuf(2012), from 135 samples between 1975-2010, derived a statistically significant coefficient for aid per capita in that doubling aid per capita leads to roughly 1.3% decrease in infant mortality rate.

As seen above, the previous studies were concentrated on the effect of aggregate aid on the health sector. However by analyzing the relationship between total aid and certain development indicator, where much of the aid can be allocated to many different sectors to achieve different goals, the impact aid has on a specific sector can be unclear. Also, the effects of successful projects can be overlooked as well. Likewise, looking at only the highly successful cases tells us little about whether development assistance for health in aggregate, has had a positive impact on overall health outcomes (Wilson, 2012). Hence, when it comes to analyzing aid effectiveness

for a particular development or welfare indicator, a meso-level analysis should be applied, and only aid that has been specifically earmarked for that sector has to be used for comparison (Gebhard et al., 2008).

Despite the vast empirical literature considering the effect of foreign aid on growth, and despite the largest attention that is given to the health sector in aid, there is little empirical evidence on how overall health aid effects health. The first study to estimate the effect of aid specifically earmarked for health sector on health indicator was by Williamson (2008), and in her study, aid for health, similar to aid in general, did not have a significant effect on human development when five health indicators including infant mortality were used as dependent variables. Similarly, a study by Wilson (2011) found that, even though mortality trajectories of countries have almost universally and largely improved since 1975, countries receiving high levels of DAH have done no better, on average, than countries receiving low levels of DAH. Infant mortality rate, under-five mortality rate, life expectancy at birth were measured in relation to DAH and all of the coefficients estimated near zero although the relation was negative. Wilson (2011) states that this results could be because DAH dollars move towards countries with declining mortality, where additional money has no added benefit to mortality.

Gebhard et al. (2008) found the DAH had a negligible impact on the health of recipient countries when infant mortality rate and child mortality were used as proxies. Their model included health aid, water aid, and all other aid and health aid turned out statistically insignificant or has the wrong sign indicating that health aid may lead to improved health indicators under certain conditions, but the resulting improvements are negligible. However, there may be endogeneity issues regarding aid in his work, and thus, it might have some drawbacks. Nunnenkamp and Öhler (2010) studied the effectiveness of ODA specially targeted at sexually transmitted diseases in alleviating HIV/AIDS and found that ODA-financed prevention has been insufficient to reduce the number of people living with HIV. This finding is in contrast with the claim that performance based support has been effective in saving near five million lives by 2009 from the biggest players in issue-oriented health aid - the Global Fund to Fight AIDS, Tuberculosis, and Malaria. However, significant results do exist on the

treatment effects on AIDS-related deaths when the donor is the United States, the major bilateral source of HIV/AIDS-related ODA such as the President's Emergency Plan for AIDS Relief (PEPFAR).

Nevertheless, there are also positive views on the impact DAH has on health. Although World Bank once emphasized that health spending is highly ineffective in reducing infant or child mortality rates and instead stresses the growth approach, where reduction in mortality rates are explained by a country's income per capita, Hanmer, Lensik and White (2006) states mortality rates have been continuously decreasing in African countries despite their stagnant or even reverse income growth, shedding light on the fact that health status can improve independent of income growth. Also in Middle Eastern countries, big fall in mortality rates are observed even after their significant jump in income from their oil resources in 1970s. They argue that while income growth being an important factor in reducing mortality, so are health interventions. Health interventions such as immunization are a cost-effective way to promote health.

Croghan, Beatty and Ron, (2006)'s study of four countries whose reductions in child mortality exceeded what might be expected from their poor economic circumstances suggests that targeted health interventions and foreign aid matter more than contextual factors, including the degree of economic development, good governance and strong health care systems. Chauvet, Gubert and Mesple-Somps (2008), analyzed the respective impact of remittances and health aid on under five mortality rate and infant mortality rate and finds a positive and statistically significant relationship for health aid, but only when aid is interacted with income per capita. Mishra and Newhouse (2009), in their study concluded that health aid has a beneficial and statistically significant effect on infant mortality, by reducing 2% of infant mortality rate when per capita health aid is doubled. In another sense, this implies we can reduce 1.5 infant deaths by increasing US$1.60 per capita aid. Burgeot and Soto (2011), found aid allocated to assisting infectious diseases had a significant impact on under-five mortality rate in the period of 2000-2010, while aid for non-infectious disease was not statistically different from zero. This may imply that certain types of health aid can be more effective than others.

Shpak (2012), used avoidable mortality as the main health outcome and found that health targeted aid seems to have positive effect in reducing mortality. Chong-Sup Kim and Heeyeon Kim (2013), adopted eight health indicators; child mortality rate, maternal mortality rate, tuberculosis incidence, tuberculosis death rate, tuberculosis treatment success rate, malaria case reported, and malaria caused death reported, to see whether aid effectiveness is consistent across various health indicators and the results showed that DAH has been effective in general improvement of health sectors though coefficient is relatively small. A new study by Bendavid and Bhattacharya (2014) examined both public and private health-aid programs between 1974-2010 in 140 countries and found that health-aid grants led to significant health improvements with lasting effects over time, having a direct link to increase in life expectancy and decrease in child mortality in developing countries.

3.1.3. Effectiveness of Primary Health Care and Upper-level Health Care

Apart from whether or not health aid is effective, there is also another debate within health interventions. The debate is about what type of health assistance approach should be taken to make the public spending most effective. When this is applied to health ODA, it comes to studying what type of health aid is more effective in improving developing countries' health outcomes and it is an important factor in guiding donors with the right direction on how their money should be spent.

Largely structure of health service falls into three categories of health care. Primary health care, secondary health care, and tertiary health care. Primary health care refers to "socially appropriate, universally accessible, scientifically sound first level care provided by a suitably trained workforce supported by integrated referral systems and in a way that gives priority to those most needed, maximizes community and individual self-reliance and participation and involves collaboration with other sectors", according to Primary Health Care Research and Information Service. This model of primary health care is the core of WHO's goal of 'Health for All', after the Alma Ata Declaration on primary health care in 1978. Primary health care includes effective

delivery of vaccinations, medication, and treatment of common diseases which is very important in poor countries where health resource is scarce, and it is more important when it comes to achieving the Sustainable Development Goals. Secondary health and tertiary health care are usually more specialized consultative care, where primary care practitioner refers the patient to a specialist. When discussing upper-level health care in relation to health aid, it is often in the form of providing infrastructure other than basic health infrastructure, such as constructing hospitals and providing high-end hospital equipment. CRS aid purpose codes also divide total health ODA (code 120) into either general health ODA (code 121) or basic health ODA (code 122). General health ODA has the characteristics of upper-level health care and basic health ODA has the features of primary health care.

Many argue that primary health care is more important in developing countries than upper-level care. A study on decline of mortality in children in rural Gambia in comparison between villages that had Primary Health Care (PHC) and villages that didn't have PHC found, there was significant additional effect of PHC on the survival of 1-4 years old, and the differentials between PHC and non-PHC villages widened when extra resources to PHC was given and supervision of the village-level health services were strict (Hill, MacLeod, Joof, Gomez and Walraven, 2000). Gebhard et al. (2008) found that it is possible that certain types of health aid are more effective than others at reducing mortality. Those programs that improve health most dramatically are the cheapest, such as malaria inoculations or treatment with rehydration therapies possibly implying that primary care is a more effective approach to developing countries.

However, in resemblance to the debate on the effectiveness of health aid, there is also thin and conflicting evidence on the effectiveness of primary health care approach as well. In recent World Bank publications, there is a shift in attention from community-based health care at the village level to strengthening basic health services at higher levels (Hill et al. 2000). Thus, when donor's goal is to improve the health status of recipient country populations, either indirectly through budget assistance for government health ministries or directly through projects they should have to choose between largely two approaches – primary health care or upper

level health care. On top of this, even after choosing the general approach, there are numerous mechanisms how aid-funded projects can lead to increased health in recipient countries; providing medical equipment, training medical workers, increasing accessibility of medical care, preventative programs (nutritional programs, neonatal care) like immunization, and medicine distribution (Gebhard et al., 2008). Thus, it is meaningful to examine the effectiveness of health ODA by two largely different approaches and by project types.

IV. Data and Methodology

4.1. Research Questions

(1) Development assistance specifically targeting health should be able to bring measurable and positive improvements in health indicators in recipient countries in order to support the current ODA flows into health sector and to provide ground for further investments. If Development Assistance for Health (DAH) is effective, then aid and the improvement in health indicator of the recipient countries should be highly correlated. I test this by modeling health aid's effect on developing countries' infant mortality rate, under-five mortality rate, and life expectancy as the proxy for measuring public health.

(2) Examine whether health ODA is more effective when aid is used for primary health care or for upper level health care. In this study, health aid classified as basic health(code 122) by CRS aid purpose codes will be regarded as primary health care and general health aid(code 121) will be regarded as secondary and tertiary level health care.

(3) Specific type of health aid may be more effective than others, thus I dissect health aid into its relevant sub-sectors and examine each of their effectiveness. Sub-sectors also followed the classification of CRS aid purpose codes.

4.2. Empirical Model

This study takes into account the bulk of previous literature and introduce the fixed effects model. A Hausman test was run to confirm the superiority of a fixed effects model over random effects. The equation specifies as follows:

$$H_{it} = \beta_1 \log(Aid_{it}) + \beta_2(X_{it}) + S_i + \varepsilon_{rt}$$

Where H_{it} corresponds to the health outcomes - infant mortality rate, under-five mortality rate or life expectancy in aid recipient country *i* in period *t*, Aid_{it} corresponds to different types of aid per million people in country *i* in period *t*, X_{it} is a vector of control variables (which includes variables such as log of GDP per capita, fertility, primary school enrollment rate, urban population, corruption perception index). S_i corresponds to a vector of country fixed effects which denotes time invariant differences in the dependent variable across countries.

4.3. Data Description

I compiled data for 131 low income and lower-middle income developing countries according to World Bank classification for the period of 2002-2013. Name of each country in the dataset are listed in Appendix C. Most of the socioeconomic and health system variables are extracted from the World Development Indicators and OECD CRS data.

4.3.1. Dependent Variables

I adopted three dependent variables as health outcome indicators- infant mortality rate, under-five mortality rate, and life expectancy. Reducing infant mortality and child mortality rate were one of the main Millennium

Development Goals and it will continue to serve as the proxy for measuring one of the main Sustainable Development Goals. Life expectancy at birth is one of the complementary national indicators that can measure healthy lives and well-being of a country population. All of the three indicators are extracted from World Development Indicators.

Infant Mortality Rate

Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year (World Development Indicators). Mortality rate is one of the health indicators that is consistently utilized in both medical and social science research as the proxy for a population's overall health (Gebhard et al., 2008). This is in light of the following four reasons according to Mishra and Newhouse (2008). First, data on infant mortality are available for a large set of countries. Second, infant mortality rate is a better response variable corresponding to changes in economic conditions, thus can be a flash reflection of the conditions that surround the health of the poor (Boone, 1996). Third, reductions in infant and child mortality largely explain the substantial improvement in life expectancy over the last fifty years in poor countries (Cutler er al., 2006). Finally, past studies on the determinants of mortality rate indicate, that in developing countries, infant mortality depends on per capita house hold income, mother's education, maternal health, access to sanitary water, access to health facilities, place of residence, undernourishment, prevalence of diseases, maternal health, fertility rate, occupation, and health system. This means that infant mortality rate can be a good measurement for a variety set of human development performance and reflect many important health factors.

Under-five Mortality Rate

Under-five mortality rate is the probability per 1,000 children that a newborn baby will die before reaching age five, if subject to age-specific mortality rates of the specified year (World Development Indicators). Child mortality rate similar with infant mortality rate is more sensitive to the changes of the surroundings and is more

vulnerable to poor and inadequate health conditions thus, can serve as a good measure of responsive indicator to health aid.

Life-expectancy

Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay same throughout its life (World Development Indicator). Life expectancy can serve as an inclusive and long-term measure of overall health environment of a country as its predictions build upon various mortality rates of different causes.

4.3.2. Independent Variables

Total Health ODA, General Health ODA, Basic Health ODA

All official development assistance for health including ODA grants, ODA grant-like flow, ODA loans, equity investment from all channels in constant prices are taken from the OECD CRS database. I used disbursements rather than commitments since it measures the actual amount of money that the donor transferred. The total amount of health ODA excludes health aid related to population management and reproductive health or any water and sanitation related health aid. This variable also excludes health aid from private donors. In CRS database, aid is classified with given codes according to its aid purposes where total health aid falls into code 120 and again disaggregated into general health aid(code 121) and basic health aid(code 122). General health aid and basic health aid will be used as the key variables as well. Each of these two health aids is again, categorized into different types of aid activities. These aid variables are in $US per million people and transformed by taking their natural logarithms.

Sub-Categorized Basic Health Aid*: Basic Health Care, Basic Infrastructure, Infectious Disease Control, Health Education and Training*

The subcategorized health aids for basic health ODA (code 122) are used as key variables as well. The types of aid in the subcategory are as follow: basic health care, basic health infrastructure, basic nutrition, infectious disease control, health education, malaria control, tuberculosis control, health personnel development. I group similar types of health aid together into four groups and use them as explanatory variables - *basic health care*(basic health care and nutrition), *basic infrastructure*, *infectious disease control*(infectious disease control, malaria control, tuberculosis control), *health education and training* (health education, health personnel development). These aid variables are in $US per million people and transformed by taking their natural logarithms. This code classification method of DAC allows projects to be allocated to one sector code only to avoid double counting, and it is up to the reporting donor to decide on the appropriate code. Thus, the items in these codes are mutually exclusive. The OECD CRS purpose codes are listed in APPENDIX A.

4.3.3. Control Variables

Following the bulk of previous literature measuring the impact of health ODA, GDP per capita, fertility, urban population, primary school enrollment rate, and corruption perception index which are considered the most important factors that affect public health were taken as a set of control variables in my study to further isolate the effect of health aid.

Gross Domestic Product (GDP) per capita

GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products (World Development Indicators). I transform this variable by taking its natural logarithm. GDP represents overall level of economic development and should show a positive relationship with human development (Williamson, 2008). GDP is essential to control in health studies because wealthier countries have much better health indicators than poor countries because wealthier countries should have overall

better living condition, better access to health facilities, trained medical staff, higher quality of health service and the availability to pay for treatment.

Most aid effectiveness studies look at GDP growth as the dependent variable, but when other outcomes are being studied it is important to include household income as a control, especially when examining changes over time. The strong correlation between income and mortality has been recognized since the pioneering work of Preston (1975).

Fertility

Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates (World Development Indicators). Fertility is another determinant of infant mortality or child mortality because more children can potentially mean less care given to each child (Suwal, 2001), and numerous studies suggest that higher fertility implies a shorter birth interval which is associated with higher mortality (Hanmer et al., 2006).

Urban Population (%)

Urban population represents people living in urban areas as defined by national statistical offices (World Development Indicators). Urbanization is highly correlated with income growth. As the economy grows bigger more part of the country become cities. In cities, basic infrastructure for water and other sanitation facilities as well as clinics and hospitals are established which is not the case in rural areas (Suwal, 2001). Thus, the level of urbanization is a factor that determines the health status of developing countries.

Primary School Enrollment Rate, gross (%)

Education variable is constructed based on gross enrollment rate of primary school (World Development Indicators). Missing values of primary school enrollment rate were imputed in a way of taking the average of values from nearest years before and after. If the missing value was the first or the last year of the data set the

values following or preceding that year has been taken. Improving access to education is essential in increasing the number of trained health workers and helps build the kind of behaviors and habits that can improve one's health. Evidence shows that later in life, children who had basic education are more likely to manage the size of their families according to their capacities and are more likely to provide better care of their children comparing to those who did not get basic education (UN chronicle, 2007). Thus, primary school enrollment rate as a representative of access to basic education is included as the control variable.

Corruption Perception Index (Corruption)

Corruption Perception Index measures perceived levels of public sector corruption worldwide. Estimates of score range from 0(highly corrupt) to 100(very clean). Thus, the higher this index the cleaner and well-functioned the government. The scales in the years between 2002-2011 are 0-10 and the scales in the year 2012 and 2013 are 0-100. Thus, for the study, the units of years 2002-2011 are converted into 0-100 range. Missing values of the corruption perception index were imputed in a way of taking the average of values from nearest years before and after. If the missing value was the first or the last year of the data set the values following or preceding that year has been taken. There are many evidence showing that increase in economic and political freedom positively affects economic development (Acemoglu, Johnson, & Robinson 2001), and thus, a country's institutional environment should have an influence on human development including the public health (Williamson, 2008).

V. Empirical Results

5.1. Descriptive Statistics

Table 7 summarizes the data. For each variable, the number of observations, mean, standard deviation, minimum and maximum are provided. Aid recipient countries have extremely varied initial health indicators.

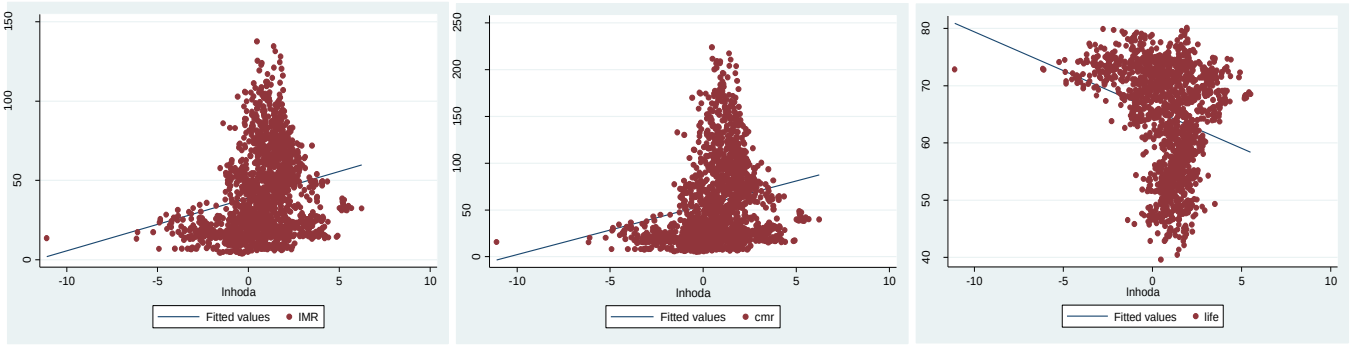
Some have infant mortality rates similar to that of OECD countries and some experience up to 137.7% of infant mortality. Child mortality also shows extreme variance across countries.

[Table 7: Summary Statistics]

Variables	(1) Observations	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Infant mortality	1,572	41.49	27.34	3.80	137.7
Under-five mortality	1,572	58.86	45.83	5.00	223.9
Life expectancy	1,527	64.78	9.094	39.65	80.13
Log health ODA	1,541	0.815	1.729	-11.09	6.243
Log basic health ODA	1,541	1.041	0.821	0	6.194
Log general health ODA	1,541	0.836	0.946	-0.167	5.667
Log basic health infrastructure	1,541	0.183	0.453	0	6.168
Log basic health care	1,541	0.630	0.631	0	3.863
Log infectious disease control	1,541	0.490	0.541	-0.148	3.521
Log health education and health personnel training	1,541	0.109	0.331	-0.00526	3.779
Log GDP per capita	1,520	8.375	0.920	6.089	10.28
Urban population	1,572	45.74	19.17	8.682	87.55
Fertility	1,530	3.594	1.576	1.126	7.681
Primary school enrollment	1,500	103.7	17.41	29.20	164.90
Corruption Perception Index	1,524	30.40	11.230	3.1	92

Before proceeding to the regression analysis it is instructive to document bivariate relationships between key variables using simple scatter plots. Figure 8 shows a positive correlation between health ODA and health outcomes. These positive associations likely reflect the endogeneity of aid, as more aid flows to countries where health indicators are worse. However, the scatterplot is only suggestive, and the next section present results from regression analysis that includes additional control variables.

[Figure 9: Scatter Plot of Health ODA and Different Health Outcomes]



*Health outcome on the Y axis
*Figures from the left, in the order of infant mortality rate, under-five mortality rate, life expectancy

5.2. Empirical Results

5.2.1. Benchmark Specification

Table 8 below shows the estimation results from fixed effects benchmark specification on Infant mortality rate. Determinants of Infant mortality were additionally added through three stages of regressions. The key variable overarching this paper is, of course, health ODA thus, added in the very first stage. Results show that health ODA has statistically significant impact on infant mortality. The negative sign and coefficient interpret to increase in 1% of Health ODA per million leading to 0.027 reductions in infant mortality rate per 1000 lives. GDP per capita was added in the second stage since it is a critical factor in determining the infant mortality. The negative sign and bigger coefficient compared to health ODA show that GDP per capita has a strong impact on reducing Infant mortality rate. Other control variables were added in the third stage. Fertility, primary school enrollment, urban population, except corruption perception index all had statistically significant effect on infant mortality within the 0.01 significance level.

[Table 8: Estimated Impact of Health ODA on Infant Mortality- Benchmark Specification]

	Fixed Effects Model		
Dependent Variables	**(1) Infant mortality**	**(2) Infant mortality**	**(3) Infant mortality**
Log Health ODA(per mil)	-2.727***	-1.603***	-1.086***
	(0.217)	(0.183)	(0.158)
Log GDP per capita		-27.30***	-12.62***
		(0.972)	(1.034)
Fertility			10.227***
			(0.624)
Primary school enrollment rate, gross (%)			-0.139***
			(0.0168)
Urban population (%)			-0.768***
			(0.0787)
Corruption Perception Index			-0.0624
			(0.0252)
Constant	43.78***	271.1***	162.42***
	(0.239)	(8.095)	(9.019)
Observations	1540	1,488	1,365
R-squared	0.101	0.428	0.658

Standard errors in parentheses
*** p<0.01, ** p<0.05

5.2.2. Impact of Health ODA

Table 9 below shows the results from the fixed effects specification. The dependent variables are infant mortality rate, under-five mortality rate, and life expectancy. The key explanatory variable here is the log of the total health aid per million people. All the regressions include control variables. Specification (1) shows health ODA has statistically significant and negative impact on infant mortality rate. The negative sign indicates that growing health aid can reduce infant mortality rate. Specification (2) shows that the estimated coefficient on health ODA is negative and statistically significant for under-five mortality rate. Specification (3) shows that health ODA has a positive and statistically significant effect on life expectancy. The positive sign can be interpreted that more health aid can lead to longer life expectancy. These results give an answer to my original research question, the effectiveness of health ODA. The findings here advocate and support the increasing investment in the health sector. This provides the basis for the growing funding for Development Aid for Health

and supports Korea's high concentration on health ODA. Korea spends an average of over 10% of total aid on health sector while the international average is somewhere around 7%.

Health ODA coefficients from all three models are though significant, small in comparison with the impact of GDP per capita. GDP per capita shows significant contribution in reducing both infant mortality and under-five mortality and prolonging life expectancy. This affirms the notion about income having a strong effect on infant mortality rate, as higher levels of income will translate into improved public health infrastructure such as water and sanitation, better housing and nutrition, improved health-care facilities and also the ability for people to pay for their medical consumptions.

Fertility shows positive signs for the two mortality rates and a negative sign for life expectancy while being statistically significant for all three dependent variables. These consistent results can be interpreted that higher fertility has a negative impact on health. These results can be interpreted in line with previous literature that studied determinants of infant mortality rates, where higher fertility rates disperse the needed care given to one child, leaving the child more vulnerable to health risks (Suwal, 2001). Also, the higher fertility, the greater potential for maternal complications during and after pregnancy which are threats to both mothers and children born under these conditions. Additionally, higher fertility potentially refers to higher population, with some exceptions (for instance, China regardless of their large population, due to past family planning each household were encouraged to have only one child). Bigger population limits the size of health investment delivered per capita when health resources are scarce, which may lead to an increase in mortality rates.

[Table 9: Estimated Impact of Health ODA on Health Outcome]

	Fixed Effects Model		
Dependent Variables	**(1) Infant mortality**	**(2) Under-five mortality**	**(3) Life expectancy**
Log health ODA(per mil)	-1.086***	-1.804***	0.247***
	(0.159)	(0.312)	(0.0416)
Log GDP per capita	-12.62***	-14.85***	2.559***
	(1.034)	(2.036)	(0.269)

Fertility	10.23***	18.65***	-2.851***
	(0.624)	(1.227)	(0.163)
Primary school enrollment (%)	-0.139***	-0.313***	0.00836
	(0.0168)	(0.0330)	(0.00437)
Urban population (%)	-0.768***	-1.495***	0.174***
	(0.0788)	(0.155)	(0.0205)
Corruption Perception Index	-0.0624**	-0.157***	0.0243***
	(0.0252)	(0.0496)	(0.00655)
Constant	162.4***	222.9***	43.93***
	(9.019)	(17.75)	(2.347)
Observations	1,365	1,365	1,360
R-squared	0.658	0.596	0.598

Standard errors in parentheses
*** p<0.01, ** p<0.05

Gross primary school enrollment rate measures the overall education level of the country population. Results show that primary school enrollment has a negative and statistically significant impact on both infant and child mortality and positive impact on life expectancy without statistical significance. It has been confirmed in many previous studies that education leads to individual's behavioral changes and increases awareness of sanitation and a more hygienic way of living providing incentives to undertake changes to improve health. In the study of determinants of infant mortality rate usually, women's education, in particular, is thought to have greater influence because they are the primary caretakers of their children. More educated women are likely to have more health knowledge to take care of their children subsequently. However, this paper takes gross primary school enrollment which counts both male and female enrollment regardless of relevant age group because when education can lead to improved skills, better paid jobs, breaking of traditional or inefficient rules, exposure to media and information, these effects are not exclusive to women but also all family members who can influence each other (Niraula, 1994; Suwal, 2001). Also, gross primary enrollment rate is more appropriate when the dependent variable is life expectancy.

Urban population has a significant and negative effect on infant and child mortality rate and has a positive and significant effect on life expectancy. The three results indicate that higher urbanization level improves

health level. The effect of urbanization is subject to its living standards in the urban area. While rising living standards could improve health, urbanization wasn't initially a good factor for health because crowded cities with unsanitary conditions are susceptive to pandemic spread of diseases (Cutler et al. 2004). However, urbanization generally improves health because rural areas lack basic sanitary infrastructures such as running water, toilets, baths, and importantly access to basic health care facilities (Suwal, 2001).

Corruption Perception Index measures the level of corruption and governance of a country. The index shouldn't be mistaken, the higher the index, the cleaner the government. Ideally, governments will spend public money on where it is needed to be spent. However, if governments are more corrupt they are more likely to use the money away from its original purposes. This is the fungibility problem in aid effectiveness, where health aid targeted to benefit the unhealthy poor, gets directed towards benefitting wealthy elites. Consistent with this idea, this index has a significant contribution to longer life expectancy but it does not take significance on infant mortality and under-five mortality. This is possible because life expectancy is a more sticky indicator which will be affected by not only physical capital but also social capital such as corruption and institutional stability for a longer time-span (Idrovo, Sanin & Cole D., 2005).

All variables are less strongly correlated with life expectancy than infant and child mortality. This is because infant and child mortality are less sticky health indicator but are rather flash indicators of environmental changes as explained earlier, although the model used for these three is similar (Gebhard et al., 2008).

5.2.3. Impact of Basic Health ODA and General Health ODA

Table 10 shows the results of the impact of different types of health ODA on health outcomes. Health ODA is largely divided into two subsectors - basic health and general health, where general health is related to secondary or tertiary health care. Basic health ODA is significant and has expected signs on all three dependent

variables. In model (1) the estimated coefficient of basic health ODA means that 1% increase in basic health ODA per million reduces infant mortality by 0.018 per 1,000 lives. In model (2) 1% increase in basic health ODA per million reduces under-five mortality by 0.039 per 1,000 lives. In model (3) 1% increase in basic health ODA per million leads to an increase of 0.056 years of life expectancy. On the contrary, general health ODA has no significant effect on any of the three dependent variables. Control variables all have a significant impact on reduction in mortality rates and increase in life expectancy, with GDP per capita and fertility having relatively bigger coefficients. Again, only corruption perception index did not have a significant impact on infant mortality and under-five mortality, but it has a significant impact on life expectancy.

These findings provide an answer to my second research question: examining whether one type of health aid is more effective than other between basic health aid and upper-level health aid. The significant impact of basic health ODA found in this analysis supports the stress on primary health care approach for developing countries, which is also the main goal of WHO; "Health for All". The effectiveness of basic health ODA also explains the large inflow of international money towards basic health care and controlling infectious diseases. In the earlier section of this paper, we saw that the international society's health ODA was focused on basic health care accounting for more than 70% of total health aid while less than 30% was invested in upper-level health care.

Korea has been investing an average of 65% of her health ODA on basic health over the periods 2010-2013, after becoming a member of the DAC (See Figure 6). Reflecting on the evidence found in this study, a bigger proportion of investment in basic health ODA could yield more effective outcomes in promoting public health of recipient countries. However, the trend is that basic health ODA is decreasing in its share of Korea's health ODA. In 2006 Korea had disbursed more than 79% of health ODA to basic health but over the years, investment in general health care increased, and now basic health ODA accounts for a smaller portion of total health ODA (58% of total health ODA in 2013). In 2013, more than 20% of total Health ODA has been used on medical services which fall into the category of general health. The evidence here suggests that Korea's trend is somewhat against the direction to an effective health aid as well as the global trend.

[Table 10: Estimated Impact of Basic Health ODA and General Health ODA on Health Outcome]

	Fixed Effects Model		
Dependent Variables	**(1) Infant mortality**	**(2) Under-five mortality**	**(3) Life expectancy**
Log basic health ODA (per mil)	-1.888***	-3.887***	0.559***
	(0.247)	(0.481)	(0.0641)
Log general health ODA (per mil)	-0.0606	0.870	-0.0710
	(0.272)	(0.530)	(0.0735)
Log GDP per capita	-12.56***	-14.91***	2.658***
	(1.007)	(1.961)	(0.261)
Fertility	9.647***	17.23***	-2.597***
	(0.625)	(1.218)	(0.163)
Primary school enrollment rate, gross (%)	-0.142***	-0.317***	0.00954**
	(0.0166)	(0.0323)	(0.00430)
Urban population (%)	-0.740***	-1.409***	0.164***
	(0.0788)	(0.154)	(0.0204)
Corruption Perception Index	-0.0607**	-0.145***	0.0210***
	(0.0246)	(0.0479)	(0.00637)
Constant	164.5***	226.9***	42.24***
	(8.718)	(16.99)	(2.263)
Observations	1,379	1,379	1,374
R-squared	0.661	0.607	0.608

Standard errors in parentheses
*** p<0.01, ** p<0.05

5.2.4. Different Types of Basic Health ODA and Health Outcomes

Health ODA may be effective for some particular types of aid more than others. Since it was proven that basic health ODA has a significant impact on health promotion and not general health ODA in the analysis above, basic health ODA was again dissected into its relevant subsectors, into different types of health aid. Basic health ODA is divided into the following activities by CRS aid purpose code: basic health care, basic health infrastructure, basic nutrition, infectious disease control, health education, malaria control, tuberculosis control, health personnel development. For the simplicity of the analysis, I grouped them into similar aid

activities and classified them into four different types: basic health infrastructure, basic health care, infectious disease control, health education and health personnel training. The unit of the variables is per million people and each takes log form in the analysis.

Basic health infrastructure such as district-level hospitals, clinics, and dispensaries and related medical equipment, excluding specialized hospitals and clinics does not have statistically significant impact on the health outcome indicators (see Table 11).

Basic health care that includes activities such as basic and primary health care programs, basic nutrition, paramedical and nursing care programs, supply of drugs, medicines, and vaccines related to basic health care is statistically significant in contributing to health promotion and has the expected signs. This is in line with the common fact that infant and child mortality rates are high in developing countries due to deaths from lack of the most basic health care or undernourishment.

Infectious disease control is also significant with expected signs. This includes immunization, prevention and control of infectious and parasite diseases, such as diarrheal diseases, vector-borne diseases (e.g. river blindness and guinea worm), viral diseases, mycosis, helminthiasis, zoonosis, diseases by other bacteria and viruses, pediculosis, malaria , tuberculosis, etc. except HIV/AIDS and other STDs. Also, this type of disease related aid has the biggest contribution among the four types of aid across all three health outcome variables. This explains the fact that infant and child mortality rates are high in developing countries often due to preventable diseases which are relatively less costly to prevent through proper vaccinations and medication.

Health education and health personnel training have the expected signs for all three outcome indicators but are only statistically significant for life expectancy. This again, maybe because life expectancy is a more sticky indicator which will be affected by not only physical capital but also social capital, in this case, education, for a longer time horizon. Infant mortality and under-five mortality can immediately respond to exogenous treatments such as intake of medication, but it takes more than physical health assistance to prolong life expectancy. Health

education can lead to personal behavioral change and awareness of health issues that can have an incremental effect over years and health personnel training is related to the overall capacity building of human resources for health in the country which will affect population health over a longer term period.

[Table 11: Estimated Impact of Different Types of Basic health ODA on health outcome]

	Fixed Effects Model		
Dependent Variables:	**(1) Infant mortality**	**(2) Under-five mortality**	**(3) Life expectancy**
Log basic health infrastructure (per million)	0.636	1.137	-0.0710
	(0.338)	(0.657)	(0.0861)
Log basic health care (per million)	-1.639***	-3.287***	0.298***
	(0.304)	(0.590)	(0.0775)
Log infectious disease control (per million)	-2.259***	-4.474***	0.716***
	(0.321)	(0.623)	(0.0817)
Log health education and health personnel training (per million)	-0.456	-1.189	0.672***
	(0.728)	(1.413)	(0.187)
Log GDP per capita	-11.33***	-12.89***	2.455***
	(0.981)	(1.904)	(0.249)
Fertility	9.877***	17.30***	-2.531***
	(0.623)	(1.209)	(0.159)
Primary school enrollment rate, gross (%)	-0.127***	-0.287***	0.00612
	(0.0166)	(0.0322)	(0.00422)
Urban population (%)	-0.711***	-1.371***	0.156***
	(0.0785)	(0.152)	(0.0200)
Corruption Perception Index	-0.0706***	-0.168***	0.0241***
	(0.0245)	(0.0475)	(0.00622)
Constant	150.8***	206.5***	44.23***
	(8.540)	(16.57)	(2.172)
Observations	1,394	1,394	1,389
R-squared	0.667	0.618	0.625

Standard errors in parentheses
*** p<0.01, ** p<0.05

There are proven successes in global health through basic health care and disease control. Across 11 countries in West Africa, a regional onchocerciasis control program has prevented 600,000 cases of river blindness and freed 18 million children from the risk of the disease since the program was launched in 1974. In

Nepal, the Nepal government capitalized on the discovery of vitamin A that could save child lives, by National Vitamin A program in 1995 that averted nearly 200,000 child deaths. At the beginning of 1985, in a regional polio elimination effort led by the Pan American Health Organization, almost every young child in the Americas was immunized and polio threat was eliminated in the Western hemisphere in 1991(Levine & Roodman, 2004).

These findings are consistent with the current inflow of international health ODA, where on average 35.5% of total Health ODA was spent on disease control and 31.0% was spent together in basic health care and basic nutrition (see Table 2) over the period 2006-2013. However, Korea is not only reducing its share of basic health ODA but also a dominant share of Korea's basic health ODA is being spent on the least effective type of health aid - basic health infrastructure.

Basic health infrastructure does not hold any statistical significance in my analysis. However, basic health infrastructure accounts for an average of over 50% of total health ODA of Korea over the 2006-2013 period. Within general health care, Korea is also investing over 20% of total Health ODA on medical services which include tertiary level clinics, hospitals, and laboratories. This shows Korea's bias on physical assistance in Health ODA and lack of assistance in basic health care, infectious disease control, and health education.

Developing countries have bad health mostly due to the shortfall in health resources such as lack of service and health workforce, lack of relevant health care policy. Lack of health workforce in rural and remote areas is a common problem for both developed and developing countries but this becomes more serious in developing countries where more than half of the total population live in rural areas (WHO, 2014). When the institutional and management capabilities are limited, and when there is no trained health personnel, constructing health clinics/hospitals and supplying medical equipment will intrinsically have no meaning. Moreover, much of the deaths in poor countries are related to preventable diseases and conditions that can be taken care of by basic health care services which do not always need the establishment of costly infrastructure as a prerequisite.

5.3. Robustness check

5.3.1. Lagged key variables

Although in all contemporaneous estimations in my analysis health ODA had significant and expected signs, the estimated model may be prone to endogeneity problem if countries that have higher mortality rates receive more health targeted aid. As a solution to this, several studies suggest (Hansen and Tarp, 2001) that lagged aid should be used as an instrument for the current aid. Therefore, it is very likely that by including lagged values, the problem of reverse causality can be mitigated at least partially.

Moreover, health ODA may take a longer time to be spent after its initial disbursement and even longer for the cumulative health to take effect on the health indicators. Thus, I lag the key health ODA variables by three years and test for its robustness. The regression results of the key health ODA variables remain consistent with the scenario without lagged values (See Table 12 and Table 13)

[Table 12: Estimated Impact of Three Year Lagged Health ODA on Different Health Outcomes]

	Fixed Effects Model		
Dependent Variables	**(1) Infant mortality**	**(2) Under-five mortality**	**(3) Life expectancy**
Lagged log Health ODA (per mil)	-0.715***	-1.118***	0.140***
	(0.139)	(0.277)	(0.0411)
Log GDP per capita	-10.66***	-11.39***	2.452***
	(1.177)	(2.340)	(0.347)
Fertility	10.75***	20.48***	-3.050***
	(0.684)	(1.360)	(0.202)
Primary school enrollment rate, gross (%)	-0.0847***	-0.192***	0.00100
	(0.0165)	(0.0328)	(0.00488)
Urban population (%)	-0.753***	-1.436***	0.180***
	(0.0838)	(0.167)	(0.0247)
Corruption Perception Index	-0.148***	-0.304***	0.0291***
	(0.0264)	(0.0526)	(0.00780)
Constant	139.6***	174.9***	46.12***
	(10.26)	(20.40)	(3.030)

Observations	1,018	1,018	1,015
R-squared	0.669	0.607	0.573

Lagged three years
Standard errors in parentheses
*** p<0.01, ** p<0.05

[Table 13: Estimated Impact of Three Year Lagged Basic Health ODA and General Health Aid on Health Outcomes]

Dependent Variables	Fixed Effects Model		
	(1) Infant mortality	(2) Under-five mortality	(3) Life expectancy
Lagged log Basic Health ODA (per mil)	-1.127***	-2.277***	0.375***
	(0.209)	(0.411)	(0.0636)
Lagged log General Health ODA (Per mil)	0.0356	0.724	-0.0691
	(0.239)	(0.470)	(0.0768)
Log GDP per capita	-10.17***	-11.31***	2.507***
	(1.152)	(2.266)	(0.344)
Fertility	10.49***	19.50***	-2.767***
	(0.680)	(1.338)	(0.204)
Primary school enrollment rate, gross (%)	-0.0836***	-0.190***	0.000827
	(0.0165)	(0.0324)	(0.00492)
Urban population (%)	-0.765***	-1.399***	0.181***
	(0.0842)	(0.166)	(0.0251)
Corruption Perception Index	-0.136***	-0.280***	0.0251***
	(0.0264)	(0.0520)	(0.00788)
Constant	137.2***	176.2***	44.48***
	(9.877)	(19.43)	(2.949)
Observations	1,032	1,032	1,028
R-squared	0.668	0.614	0.574

Lagged three years
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3.2. Additional controls

To minimize omitted variable bias, I add additional controls to the estimation. Table 14 depicts the results of this analysis. The additional variables included here are the percentage of people with access to clean

water and HIV prevalence rate since clean water and HIV prevalence are critical determinants of many health indicators. I also include here the dummy of public expenditure on health per capita. I have divided the observations into below average and above average of public health spending per capita. The impact of the main interest variable health ODA remains significant as well as other variables. Access to clean water has a significant impact on reducing infant mortality and under-five mortality, as well as increasing life expectancy. HIV prevalence rate has the opposite effect. HIV significantly affects mortality rates to increase and life expectancy to decrease. The dummy variable public health spending per capita shows that compared to the base; below average, if the public health expenditure per capita is above average then the impact of health ODA on reducing mortality rates and increasing life expectancy is greater and significant.

The results of this estimation with additional controls imply that ODA related to clean water could also be effective in contributing to health promotion in developing countries. Also, since HIV strongly affects health outcomes, health ODA to prevent and/or treat HIV/AIDS can be crucial. This result strengthens the idea that health aid used for disease control and basic health service such as clean water will have a considerable impact on improving health outcomes. However, both of these items are not included in the health ODA variable that is used in this paper. The results of the dummy variable - public health expenditure per capita imply that more investment in public health can lead to improvement in population health. However, this result is only relative since the average was taken amongst developing countries. These sample countries still have significantly low per capita health expenditure than the world average.

[Table 14: Estimated impact of Health ODA on health outcomes with additional variables]

	Fixed Effects Model		
Dependent Variables	**(1) Infant mortality**	**(2) Under-five mortality**	**(3) Life expectancy**
log Health ODA(per mil)	-0.840***	-1.310***	0.115**
	(0.186)	(0.365)	(0.0417)
log GDP per capita	-8.943***	-6.536***	2.597***

	(1.185)	(2.324)	(0.266)
Fertility	4.932***	7.986***	-1.500***
	(0.727)	(1.427)	(0.163)
Primary School Enrollment (%)	-0.117***	-0.262***	0.0004
	(0.0171)	(0.0337)	(0.0038)
Urban Population (%)	-0.477***	-1.026***	0.1654***
	(0.0882)	(0.1730)	(0.0197)
Corruption Perception Index	-0.0697	-0.1726***	0.0220***
	(0.0266)	(0.0523)	(0.0059)
Access to Clean Water (%)	-0.907***	-1.859***	0.127***
	(0.0569)	(0.112)	(0.0127)
HIV Prevalence (%)	1.792***	3.572***	-0.718***
	(0.291)	(0.572)	(0.0654)
Public Health Expenditure per capita	-1.250**	-3.819***	0.1592
	(0.614)	(1.203)	(0.137)
Constant	204.54***	307.85***	31.239***
	(10.36)	(20.30)	(2.321)
Observations	1080	1080	1080
R-squared	0.755	0.719	0.749

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VI. Conclusions and Implications

This paper contributes to the existing debate on the effectiveness of Development Aid for Health by analyzing a sample of 131 countries from 2002-2013. The empirical results suggest that increase in health ODA, although not the most powerful determinant is associated with a statistically significant reduction in infant mortality rates and under-five mortality rates and a statistically significant increase in life expectancy. These results suggest that foreign aid to the health sector is establishing actual and positive effects on health. It supports the growing funding for Development Aid for Health and the big share of health ODA in Korea's total aid. Korea invests about over 10% of her total aid in health sector while the world average is approximately 7%.

The analysis also suggests that basic health ODA has a significant impact on turning health outcomes around while general health ODA does not. Developing countries suffer from illnesses and disease that are easily preventable with simple vaccinations or drug intakes, or supplement of basic nutrition and health care. Treatment for these kinds of illness is cost effective in that investment in the above-mentioned treatment

methods can save the lives of millions. Basic health is more important in poor countries because they don't have enough income to pay for any severe sickness; thus, prevention of illness is critical. Hence, primary health care rather than upper-level health care should be given much more weight in health assistance as is the case of the international society's Development Assistance for Health. Korea although smaller than the world average, is investing a majority of her health ODA on basic health ODA as well.

Additionally, empirical evidence on the impact of different types of basic health ODA shows that health assistance in basic health care, infectious disease control has a significant impact on the health outcomes. Education and health personnel training is only partially effective on life expectancy, and no significant effect was found on assistance to basic health infrastructure. Basic health care and disease control, the two significant type of health assistance is the core of primary health care approach further strengthening the importance of basic health ODA. This result is consistent with the pattern of global health ODA. More than an average of 35% out of total health ODA is invested in disease control and more than an average of 25% of total health ODA is invested in basic health care combining all donors. If HIV/AIDS and STDs related health aid is counted, the amount funded for basic health is even larger. However, over 50% of Korea's average investment in global health over the years was directed towards basic health infrastructure. If the medical services that fall into the category of general health ODA are combined, then the portion of Korea's investment in physical resources is even bigger.

Korea's health ODA objectives since 1992 were strengthening health care service by establishing basic health infrastructure. Later it expanded to building service delivery system between community- health clinics-regional hospitals (Choi Jae wook, 2015). These objectives explain a large part of Korea's health investment in basic health infrastructure. According to KOICA's 2011-2015 Health ODA strategies, recent strategic objectives are to strengthen overall health system which includes strengthening health workforce, strengthening institutional capabilities (insurance, financing, information, policy), strengthening accessibility to health services (enhancing basic health care delivery system), improving maternal health and family planning, and

infectious disease prevention and control (KOICA, 2011). In carrying out these five objectives, their overarching goal is to focus on international priority sectors to contribute to MDGs, main target group are women and children and intends to harmonize vertical approach and horizontal approach.

Based on the empirical evidence of my research the conclusion I draw out here is that majority of Korea's health ODA has been directed to infrastructure projects where it is difficult to see fruitful outcomes. The new strategies for 2011-2015 had a more diversified and comprehensive approach encompassing infrastructure, basic health care for children and women, disease control, human resource, health institution. However, the trajectory of actual usage of Korea's health ODA through years 2006-2013 did not align with the suggested goals. Over 72% of Korea's Health ODA was disbursed to infrastructure and equipment. Disease control and health education received the least attention.

To draw a conclusion out of my research findings, not only the current focus of Korea's health ODA may be misdirected but also, the new strategic direction itself has room for reconsideration. Although a comprehensive approach is idealistic, when resources are limited a sharper focus on specific sectors could yield better outcomes. For instance, if the overarching goal is to contribute to the suggested health targets of Millennium Development Goals, then much of the investment should be made to disease control and basic health care for children and women. However, the intention to harmonize vertical health assistance and strengthening overall health delivery system may be overwhelming with financing constraints.

Although the estimates of health ODA has significant impacts on infant and child mortality and life expectancy, the effects seem rather small in size considering the great amount of aid activities. One of the main criticisms health ODA receives is the fragmentation of projects. While basic health care and disease control programs are proven effective in reducing mortality rates and prolonging life expectancy, its effectiveness may potentially be bigger when aid is not fragmented. Fragmentation is a common problem for all donors both domestically and internationally. In the case of Korea, KOICA has mainly been implementing basic

infrastructure and equipment programs, while KOFIH has been implementing capacity building of maternal health projects and EDCF focused on building tertiary hospitals and equipment supply. The individual agencies separately implement projects which to some extent overlap with each other and make it hard for an integrated sectoral and regional focus to take place. Thus, streamlining the focus sectors between implementing agencies is equally important.

Finally, there are some possible limits to the study. The data from OECD suffers from the limits that, it does not include donors whose volume of aid contributions have gone up significantly, many of the non-OECD bilateral donors and a diverse variety of multilateral financial institutions including regional development banks. These types of donors are not accounted for by the Creditor Reporting Service. Importantly, it also does not include health-related funding from the Bill and Melinda Gates Foundation (BMGF) and from the Global Alliance for Aids and Vaccinations (GAVI). Also, the Health ODA defined within this paper excludes other health related AIDs such as water population, HIV/AIDS, and STD related assistance. The health effects of aid projects outside the health sector warrant further study. As projects for clean drinking water and sanitation may be a more cost-effective method of improving the quality of life than building hospitals (Gebhard et al., 2008).

Another is endogeneity issue. Although lagged values of health ODA were used to mitigate the effect of potential endogeneity issues, it is not a complete instrument for solving this issue. Division of the findings confirms that different systemic modeling of measuring the effectiveness of health ODA yield vastly different outcomes even with the lagged variables. Moreover, the indicator that I set as proxies for health may not be sufficient enough to represent general health status of a developing country. Thus, further study may be needed on a range of different outcome indicators to explain for a more accurate effect of health ODA.

APPENDICES

APPENDIX A

OCED CRS aid purpose codes

DAC 5 CODE	CRS CODE	DESCRIPTION	Clarifications / Additional notes on coverage
120		HEALTH	
121		Health, general	
	12110	Health policy and administrative management	Health sector policy, planning and programmes; aid to health ministries, public health administration; institution capacity building and advice; medical insurance programmes; unspecified health activities.
	12181	Medical education/training	Medical education and training for tertiary level services.
	12182	Medical research	General medical research (excluding basic health research).
	12191	Medical services	Laboratories, specialised clinics and hospitals (including equipment and supplies); ambulances; dental services; mental health care; medical rehabilitation; control of non-infectious diseases; drug and substance abuse control [excluding narcotics traffic control (16063)].
122		Basic health	
	12220	Basic health care	Basic and primary health care programmes; paramedical and nursing care programmes; supply of drugs, medicines and vaccines related to basic health care.
	12230	Basic health infrastructure	District-level hospitals, clinics and dispensaries and related medical equipment; excluding specialised hospitals and clinics (12191).
	12240	Basic nutrition	Direct feeding programmes (maternal feeding, breastfeeding and weaning foods, child feeding, school feeding); determination of micro-nutrient deficiencies; provision of vitamin A, iodine, iron etc.; monitoring of nutritional status; nutrition and food hygiene education; household food security.
	12250	Infectious disease control	Immunisation; prevention and control of infectious and parasite diseases, except malaria (12262), tuberculosis (12263), HIV/AIDS and other STDs (13040). It includes diarrheal diseases, vector-borne diseases (e.g. river blindness and guinea worm), viral diseases, mycosis, helminthiasis, zoonosis, diseases by other bacteria and viruses, pediculosis, etc.
	12261	Health education	Information, education and training of the population for improving health knowledge and practices; public health and awareness campaigns; promotion of improved personal hygiene practices, including use of sanitation facilities and handwashing with soap.
	12262	Malaria control	Prevention and control of malaria.
	12263	Tuberculosis control	Immunisation, prevention and control of tuberculosis.
	12281	Health personnel development	Training of health staff for basic health care services.
130		POPULATION POLICIES/PROGRAMMES AND REPRODUCTIVE HEALTH	

	13010	Population policy and administrative management	Population/development policies; census work, vital registration; migration data; demofigureic research/analysis; reproductive health research; unspecified population activities.
	13020	Reproductive health care	Promotion of reproductive health; prenatal and postnatal care including delivery; prevention and treatment of infertility; prevention and management of consequences of abortion; safe motherhood activities.
	13030	Family planning	Family planning services including counselling; information, education and communication (IEC) activities; delivery of contraceptives; capacity building and training.
	13040	STD control including HIV/AIDS	All activities related to sexually transmitted diseases and HIV/AIDS control e.g. information, education and communication; testing; prevention; treatment, care.
	13081	Personnel development for population and reproductive health	Education and training of health staff for population and reproductive health care services.

APPENDIX B

Data Sources

Variable	Source
Infant Mortality (per 1000 births)	World Bank, WDI, 2015
Under-five Mortality (per 1000)	World Bank, WDI, 2015
Life Expectancy	World Bank, WDI, 2015
Health Aid(total, general, basic) (US $)	OECD, CRS
GDP per capita (US $)	World Bank, WDI, 2015
Fertility	World Bank, WDI, 2015
Urban Population(%)	World Bank, WDI, 2015
Primary school enrollment rate(%)	World Bank, WDI, 2015
World Governance-Corruption Perception Index	Transparency International, 2015
Access to Clean Water (%)	World Bank, WDI, 2015
HIV Prevalence (%)	World Bank, WDI, 2015
Public Health Expenditure per capita	World Bank, WDI, 2015

APPENDIX C

Countries Observed

1	Afghanistan	45	Guatemala	89	Pakistan
2	Albania	46	Guinea	90	Palau
3	Algeria	47	Guinea-Bissau	91	Panama
4	Angola	48	Guyana	92	Papua New Guinea
5	Armenia	49	Haiti	93	Paraguay
6	Azerbaijan	50	Honduras	94	Peru
7	Bangladesh	51	India	95	Philippines
8	Belarus	52	Indonesia	96	Rwanda
9	Belize	53	Iran, Islamic Rep.	97	Samoa
10	Benin	54	Iraq	98	Sao Tome and Principe
11	Bhutan	55	Jamaica	99	Senegal
12	Bolivia	56	Jordan	100	Serbia
13	Bosnia and Herzegovina	57	Kazakhstan	101	Sierra Leone
14	Botswana	58	Kenya	102	Solomon Islands
15	Brazil	59	Kiribati	103	Somalia
16	Burkina Faso	60	Korea, Dem Rep.	104	South Africa
17	Burundi	61	Kyrgyzstan	105	South Sudan
18	Cabo Verde	62	Lao PDR	106	Sri Lanka
19	Cambodia	63	Lebanon	107	St. Lucia
20	Cameroon	64	Lesotho	108	St. Vincent and the Grenadines
21	Central African Republic	65	Liberia	109	Sudan

22	Chad	66	Libya	110	Suriname
23	China	67	Macedonia, FYR	111	Swaziland
24	Colombia	68	Madagascar	112	Syrian Arab Republic
25	Comoros	69	Malawi	113	Tajikistan
26	Congo, Dem. Rep	70	Malaysia	114	Tanzania
27	Congo, Rep.	71	Maldives	115	Thailand
28	Costa Rica	72	Mali	116	Timor-Leste
29	Côte d'Ivoire	73	Marshall Islands	117	Togo
30	Cuba	74	Mauritania	118	Tonga
31	Djibouti	75	Mauritius	119	Tunisia
32	Dominica	76	Mexico	120	Turkey
33	Dominican Republic	77	Micronesia	121	Turkmenistan
34	Ecuador	78	Moldova	122	Tuvalu
35	Egypt	79	Mongolia	123	Uganda
36	El Salvador	80	Montenegro	124	Ukraine
37	Eritrea	81	Morocco	125	Uzbekistan
38	Ethiopia	82	Mozambique	126	Vanuatu
39	Fiji	83	Myanmar	127	Viet Nam
40	Gabon	84	Namibia	128	West Bank and Gaza Strip
41	Gambia	85	Nepal	129	Yemen
42	Georgia	86	Nicaragua	130	Zambia
43	Ghana	87	Niger	131	Zimbabwe
44	Grenada	88	Nigeria		

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