



Assessing the Effectiveness of Foreign Aid on Health Outcomes in Developing Countries: An Empirical Comparison of Sub-Saharan Africa (SSA) and Non-SSA Regions

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Chapter One: Introduction

- ▶ Centrality of health outcome to economic but global development: Post-Covid 19
- ▶ Social protection relevance to UHC (Systematic review in Yakobori et al. 2023), with two major achievements:
 - i Right approach in public health discourse, i.e. SP floor, ADB SP index
 - ii Health financing models: Social security and social assistance
- ▶ Insufficiency of health investment capital created the demand for ODA in developing countries: 0.7% of GNI endorsed in 1970 at the United Nations development decades and 2002 Monterrey Consensus on development financing in Mexico
 - i Aid Effectiveness Debate: Optimists vs. Pessimists
 - ii Conditional and non-linearity of ODA Effectiveness
- ▶ Gaps in the past studies
 - i Choice of predictor: Total vs Health ODA; Commitment vs Disbursement
 - ii Lack of comprehensive outcome indicators endangers cross-country comparison
 - iii More importantly, mechanism of the effect of ODA on Health outcome
 - iv Methodological problem

Introduction cont.

Primary Research Question:

What is the overall effectiveness and impact of foreign aid, specifically Official Development Assistance (ODA), on health outcomes in developing countries? This overarching research question aims to investigate the comprehensive impact of ODA on diverse composite health dimensions created from relevant SDG 2 and 3 indicators.

Sub Questions:

- i What is the direct impact of ODA on health outcomes in developing countries?
- ii Are there regional variations in the impact of ODA on health outcomes, particularly in SSA and non-SSA regions?
- iii Is the impact of ODA on health outcomes mediated by social protection development in developing nations?

Chapter Two: Conceptual Clarification and Preliminary Analysis

The chapter presents conceptual analysis of the three germane concepts in the study: foreign aid (ODA), health outcomes, and social protection, divided into two sections:

- ▶ Conceptual Clarification:
 - ▶ ODA classification systems and method of data compilation
 - ▶ Broadening the concept of health outcomes, moving from narrow health metrics to six composite health dimensions
 - ▶ Highlights the complexity of social protection definition and metrics. Also lack of panel data for social protection.
- ▶ Characterization of respective variables' data
 - ▶ Note: Preliminary data for ODA spans between 1990 to 2021, while the rest of the analysis only use data between 2000 to 2021 due to high missing values.

Conceptual Analysis Cont.

Characterisation of ODA by Status and Sectors

Note: All ODA are in 2021 constant price in USD billion, sourced from the OECD (2023)

Figure 1: Evolution of Disbursements and Commitments ODA

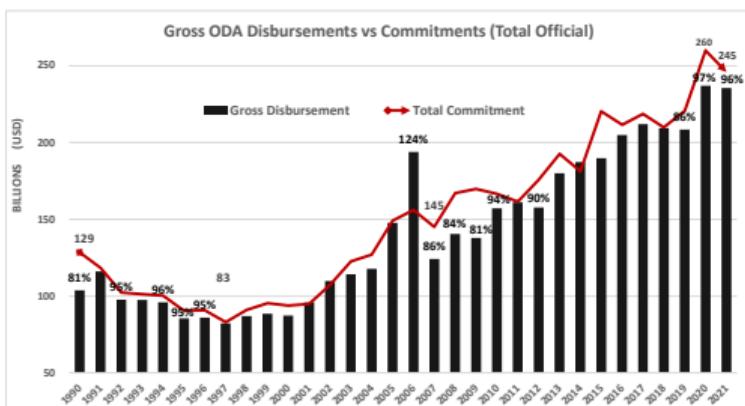
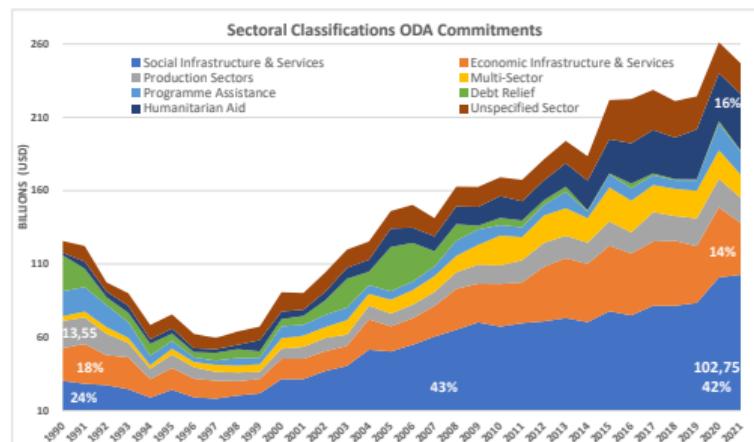


Figure 2: ODA Commitments of Sectors



Note. Data for sectoral allocation of ODA is only available for commitment, and not disbursement. However, given the closeness of the two, commitment is a valid proxy for disbursement.

Conceptual Analysis Cont.: ODA by Payment Status and Sectors

Figure 3: Social Infrastructure Sector ODA

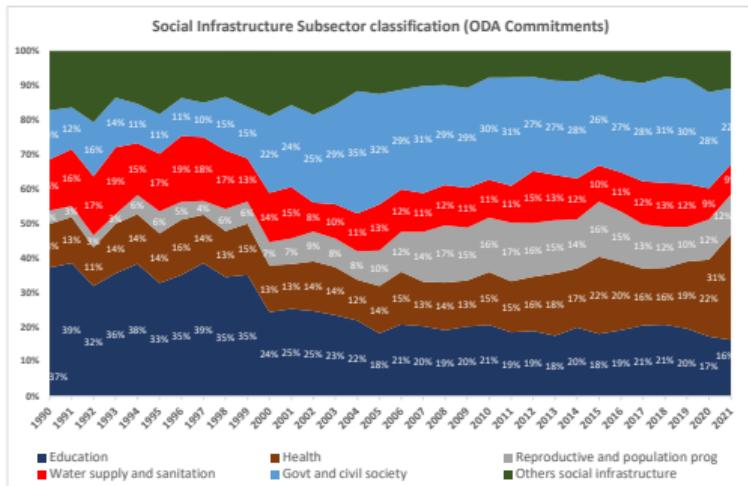
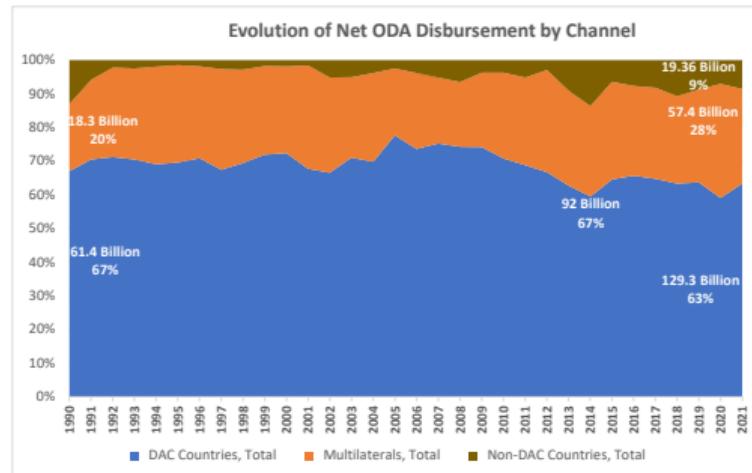


Figure 4: Donors' Classification of Net ODA



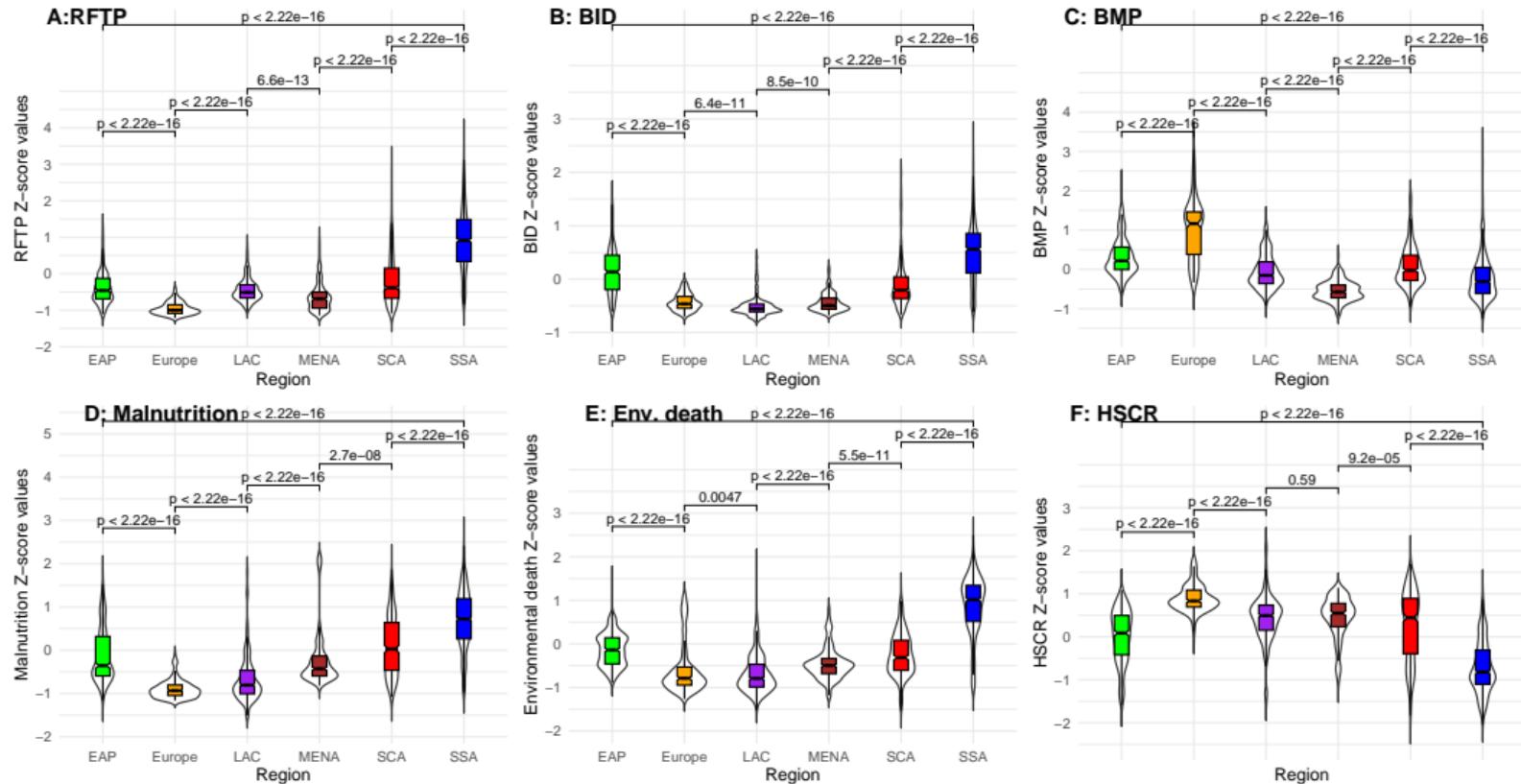
Despite growth in health ODA, unspecified social infrastructure ODA is high. Therefore, the thesis combines the social infrastructure ODA with the total Net ODA for the main analysis.

Conceptual Analysis Cont.: Health Outcomes

Against the limitation of previous studies, the thesis broadens the concept of health.

- ▶ Health outcomes is proxied by six composite health dimensions, derived from 25 unique indicators from SDG 2 on Malnutrition and SDG 3 on health and well-being.
- ▶ Composite health dimensions are: Reproductive Fatality and Teen Pregnancy (RFTP), Burden of Infection and Diseases (BID), Malnutrition, Environmental death, Burden of Mental Problem (BMP), Health System Capacity and Responsiveness (HSCR).
- ▶ This preliminary health analysis focuses on understanding the distribution of health burdens across the six regions in developing countries.
- ▶ The six regions of interest are: Subsaharan Africa (SSA), Europe, East Asia and Pacific (EAP), Middle East and North Africa (MENA), South and Central Asia (SCA), and Latin America and Caribbean (LAC).
- ▶ A z-score standardization combined with row mean is used for creating composite health dimensions. Detailed in the thesis Appendix.
- ▶ All health data span between 2000 to 2021, sourced from UNSDG (2023) and WDI (2023)

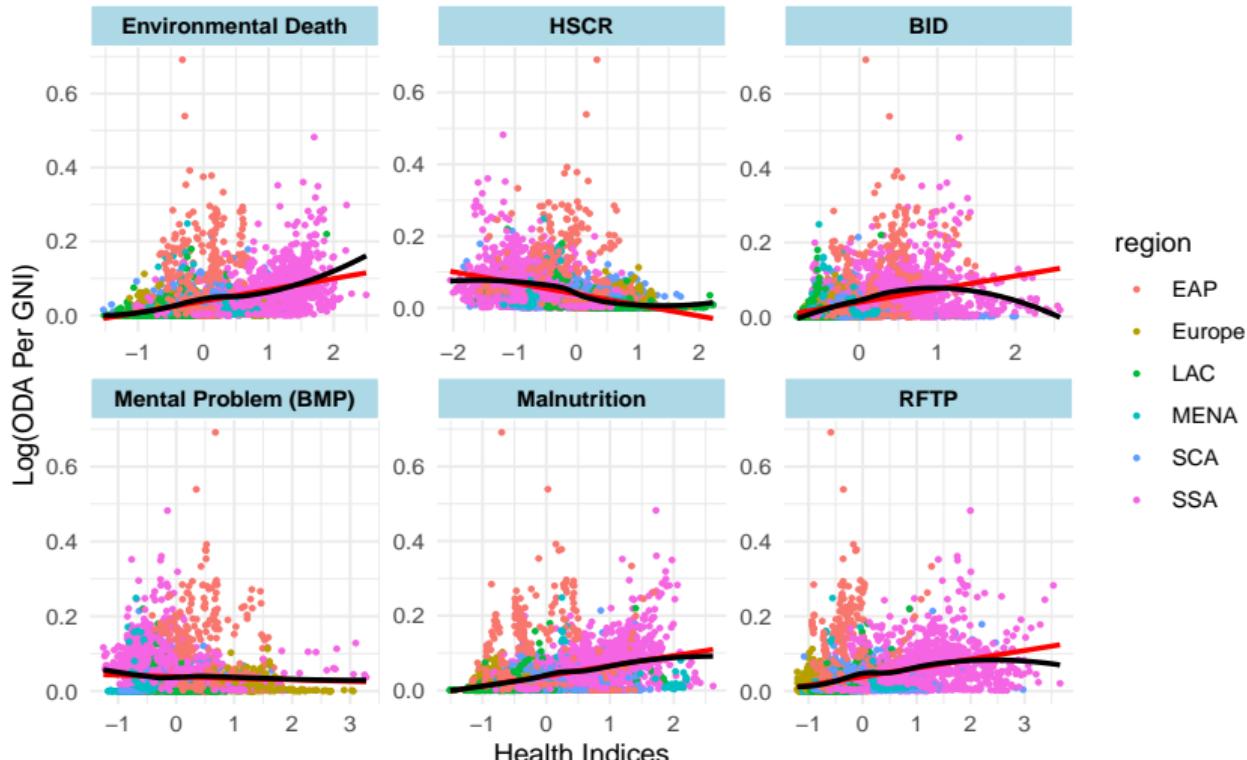
Figure 5: Composite Health Dimensions Across Regions of Developing Countries



Note: Each plot panel corresponds to one of the six composite health dimensions, created with equal weightings.

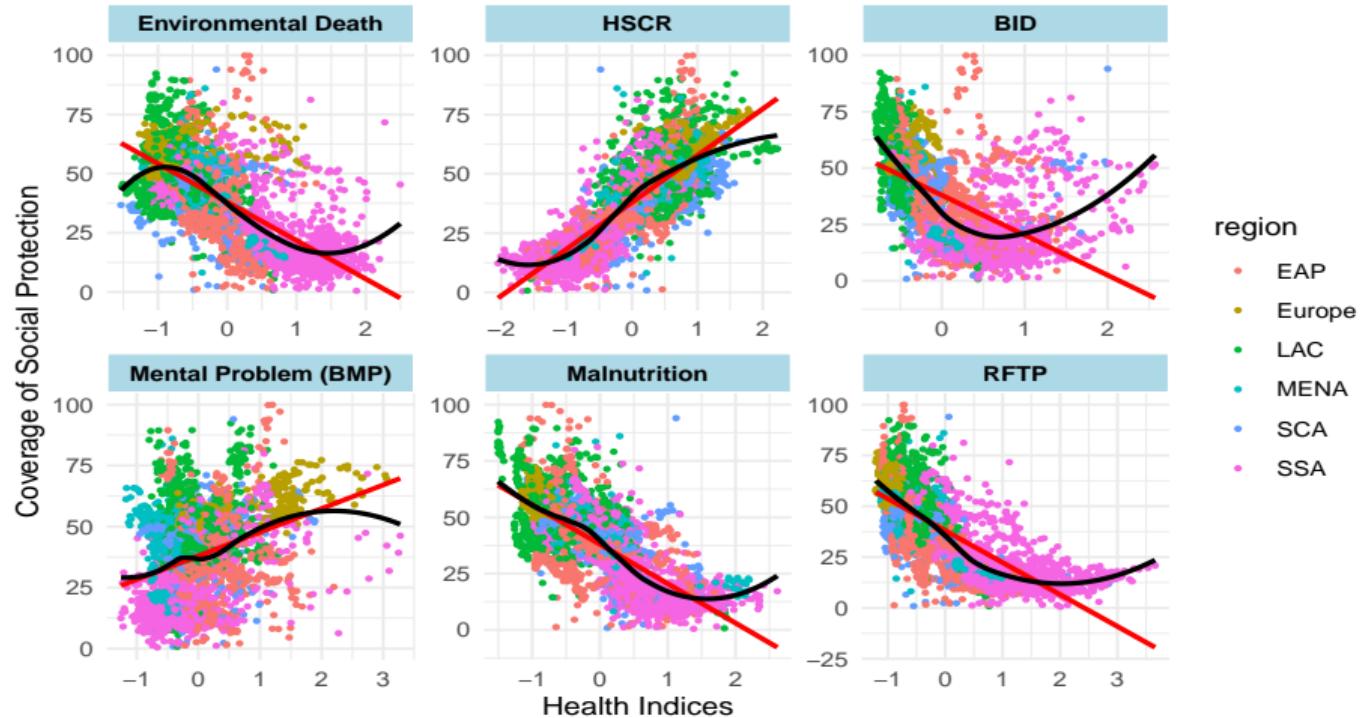
Conceptual Analysis Cont.: Does ODA Flow Align with Health Needs?

Relationship Between Total Net ODA and Health Dimensions



Conceptual Analysis Cont.: Social Protection Roles in Health

Relationship Between Social Protection Coverage and Health Dimensions



Note: Social protection coverage is in % of the total population

Conceptual Analysis Cont.: Major Take Away

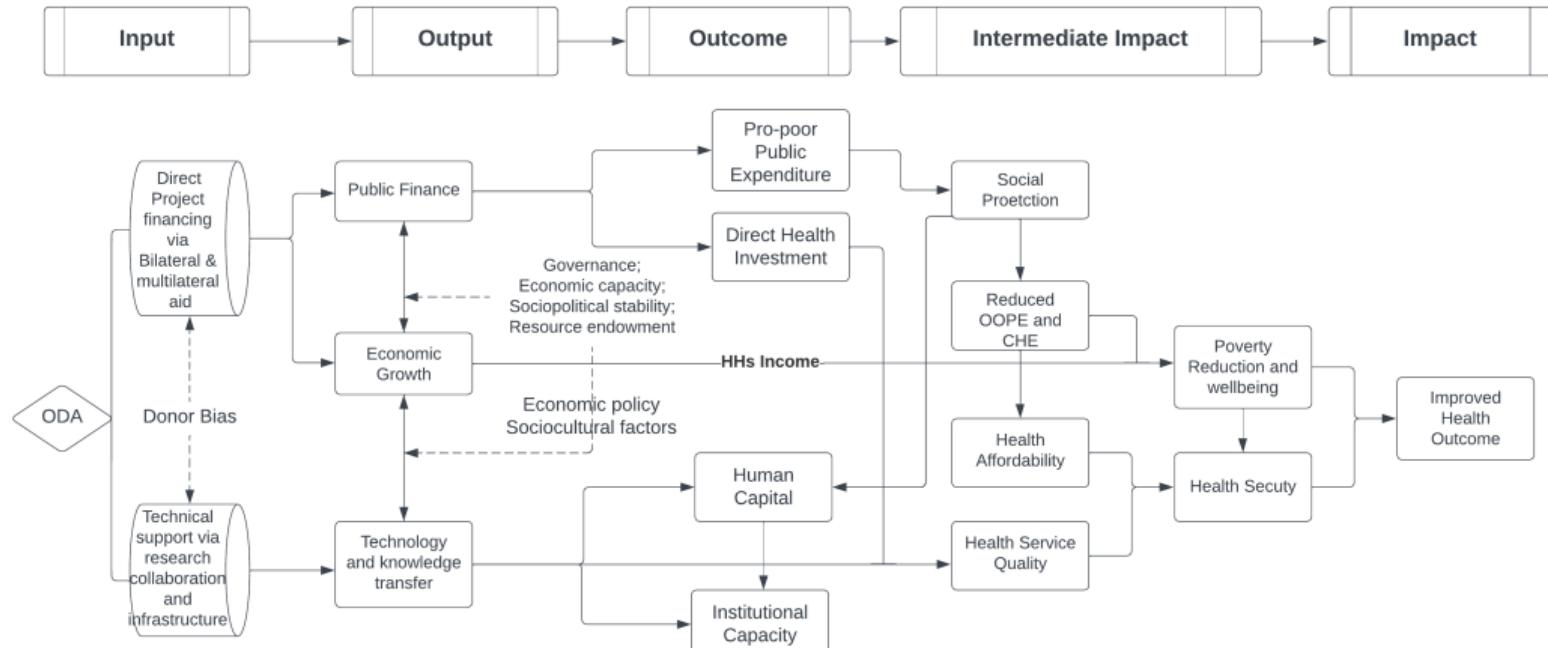
In essence, the preliminary analysis chapter delves into the complex interplay between the allocation patterns of Official Development Assistance (ODA), health dimensions, and social protection.

- ▶ The chapter reveals ODA allocation varies with time and reflects global situations. Moreover, Africa and Asia have been the highest recipient of ODA with the United States (US) and Germany being the highest and most predictable donors. Additionally, countries in East Asia and the Pacific (EAP) and Sub-Saharan Africa tend to be more aid-dependent than others.
- ▶ By leveraging comprehensive health dimensions, the chapter unveils substantial variations in health situations across regions. Specifically, while reproductive fatality, infection and diseases, and environmental death are prevalent in SSA, SCA, and EAP, mental issue is the major problem in Europe. Moreover, Europe has the best health system capacity, with the SSA region being the poorest in the dimension.
- ▶ The analysis reveals that ODA allocation does not necessarily align with the health needs of recipient countries.
- ▶ Finally, While social protection tends to have a clear and discernible relationship with all health dimensions, ODA has a weak relationship with social protection.

Note: While the preliminary offers hint on the pattern of the relationship, it does not imply causality. All hypotheses are further tested in the main analysis in Chapter Five.

Chapter Three: Theoretical Framework

Figure 3: Causal chain of ODA's impact on Health outcome



Note: All text with dotted lines represents confounding factors that may impede the treatment and outcome.

Source: Student's drawing

Chapter Four: Research Methodology

The study is an econometric macro-analysis, using a panel data approach.

- ▶ According to Gujarati (2004), Panel data enhances the quality of inference through:
 1. Pooling entities across different times increases the number of observations
 2. Studying behaviours across entities (countries) at different times mitigates unobserved variable bias (unobserved heterogeneity).
 3. Effective in modeling bidirectional causal relationships and sequence or predominance of the causal order.
- ▶ Panel models is categorized into static and dynamic.

In a simple static panel model, the standard assumption is that $f(y_{it}|x_{it}, \epsilon_{it})$ with $E[\epsilon|x_{it}] = 0$:

$$y_{it} = \alpha + \beta^T x_{it} + \epsilon_{it}, \begin{cases} i &= 1, 2, 3, \dots, N \\ t &= 1, 2, 3, \dots, T \end{cases} \quad (1)$$

Here, β^T represents the average effect for all units (countries) i at all time (year) t . In our context, x denotes ODA allocation, while y_{it} is the health outcome (HO), α is constant across time and units and accounts for baseline health outcome in the absence of ODA (when $x = 0$).

Research Methodology Cont.: Causal Assumptions

1. Unit homogeneity and heterogeneity:

- ▶ Static model assumes β^T is the same for all countries across time, thus $p(y_{it}, x_{it})$ is an ATE.
- ▶ Since health situations are different for countries and regions, and the impact of ODA allocation likely depends on country-level characteristics, the homogeneity assumption fails.
- ▶ Failure of unit homogeneity leads to using two-way Fixed Effect in Equation 2:

$$HO_{it} = \beta_1 ODA_{it} + \theta_i z_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (2)$$

Here, μ_i is unit time-fixed parameters for various countries, $n - 1$, while λ_t signifies the time-varying unit constant effect. z_{it} is a vector of covariates.

2. Dynamic Panel Model: Reverse causality and Sequential Ignorability

- ▶ Fixed effect model relies on strict exogeneity, that is, past or current health conditions in a country should not directly influence the allocation of foreign aid.
- ▶ This assumption is not true, as previous health conditions influence ODA allocation (feedback effect).
- ▶ Moreover, ODA may also have delayed effect, that is, impact of ODA continuing till future.
- ▶ As strict exogeneity fails, DPM models control for previous health outcome in Equation 3:

$$HO_{it} = \delta_1 HO_{it-1} + \beta_1 ODA_{it} + \theta_i z_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (3)$$

Research Methodology Cont.: Hypotheses and Estimation Approaches

Hypotheses:

- i H_0 : The impact of ODA on all health dimensions is not significant
 $(\beta_{H01} ODA_{it} = \beta_{H02} ODA_{it} \dots \beta_{H06} ODA_{it} = 0)$.
- ii H_0 : The impact of ODA on health outcomes is not significantly different between SSA and non-SSA regions on at least one health dimension.
- iii H_0 : The indirect role of Social protection in the impact of ODA on health outcome is not statistically significant for at least one health dimension.

Estimation Approach:

- ▶ Fixed Effect Cross-Lag Panel Model (FE-CLPM) (Allison et al., 2017)
- ▶ Unit Fixed Effect with time trend as control variable
- ▶ Local Projection method to understand temporal dynamics of ODA
- ▶ Mediation path analysis for mediating role of social protection

Variables and Data Transformation

- ▶ Data 2000-2021, mean-aggregated into 5 periods, mitigating noise and serial correlation
- ▶ All models are estimated with mean aggregated data, except the local projection.

- Variables:

- ▶ Outcome variables: health outcomes proxied by six health dimensions: reproductive fatality (RFTP), burden of infection and diseases (BID), burden of mental problem (BMP), malnutrition, environmental death, health system capacity and responsiveness (HSCR)
- ▶ Explanatory variables: Total net ODA (social infrastructure ODA used as robustness checks) (all log-transformed)
- ▶ Control variables (Factors with competing explanatory power on health outcome) include:
 - ▶ Level of development (GDP p.c., HDI)
 - ▶ Public finance (Health spending p.c., public debt)
 - ▶ Governance (Governance index, Bayesian Corruption Index (BCI))
 - ▶ Infrastructure level (Access to electricity, public investment)
 - ▶ Demographic structure (population, population density)
 - ▶ Foreign inflow (Remittances, FDI)
 - ▶ Climate vulnerability and exposure (Climate risk index (CRI))

Result Presentation

Impact of ODA on various health dimensions:

Unit Fixed Effect with Time Trend as Control (linear-log model with aggregated data)

	Dependent variables:					
	RFTP (1)	BID (2)	BMP (3)	Malnutrition (4)	ED (5)	HSCR (6)
log_ODA_lag	-0.016*	-0.008	-0.016	-0.003	-0.018	-0.011
Electricity	-0.007***	-0.005**	-0.002	-0.002	-0.001	0.005***
log_GDP_Cap	-0.061	-0.118*	0.027	-0.495***	-0.233***	0.336***
cri_score	0.001	0.000	0.001	-0.000	0.001	-0.001*
log_remittance	-0.003	0.002	-0.003	-0.005	-0.005	0.007
log_Pop	-1.080***	-0.956***	-0.090	-0.591*	-0.154	-0.293
log_Pop_dens	0.312	0.494*	0.166	-0.132	-0.094	0.501***
log_hlth_Per_Cap	0.037	0.031	0.100*	-0.074	0.075	0.075*
Gov	-0.052	-0.025	-0.031	-0.165***	-0.074	0.067
log_External_debt	0.024	0.003	0.006	0.035	-0.026	-0.036*
time_var	-0.042***	-0.016*	-0.053***	0.006	-0.055***	0.024*
Num.Obs.	576	576	576	576	576	576
R2	0.768	0.566	0.258	0.621	0.564	0.581
R2 Adj.	0.683	0.407	-0.014	0.482	0.405	0.427
AIC	-1162.8	-1239.9	-872.3	-1005.1	-1006.8	-1023.8
BIC	-1110.6	-1187.6	-820.0	-952.8	-954.5	-971.5
RMSE	0.09	0.08	0.11	0.10	0.10	0.10

Note: *p<0.1; **p<0.05; ***p<0.01

DPM: Fixed Effect Cross-Lag Panel Model (FE-CLPM) (linear-log model with aggregated data)

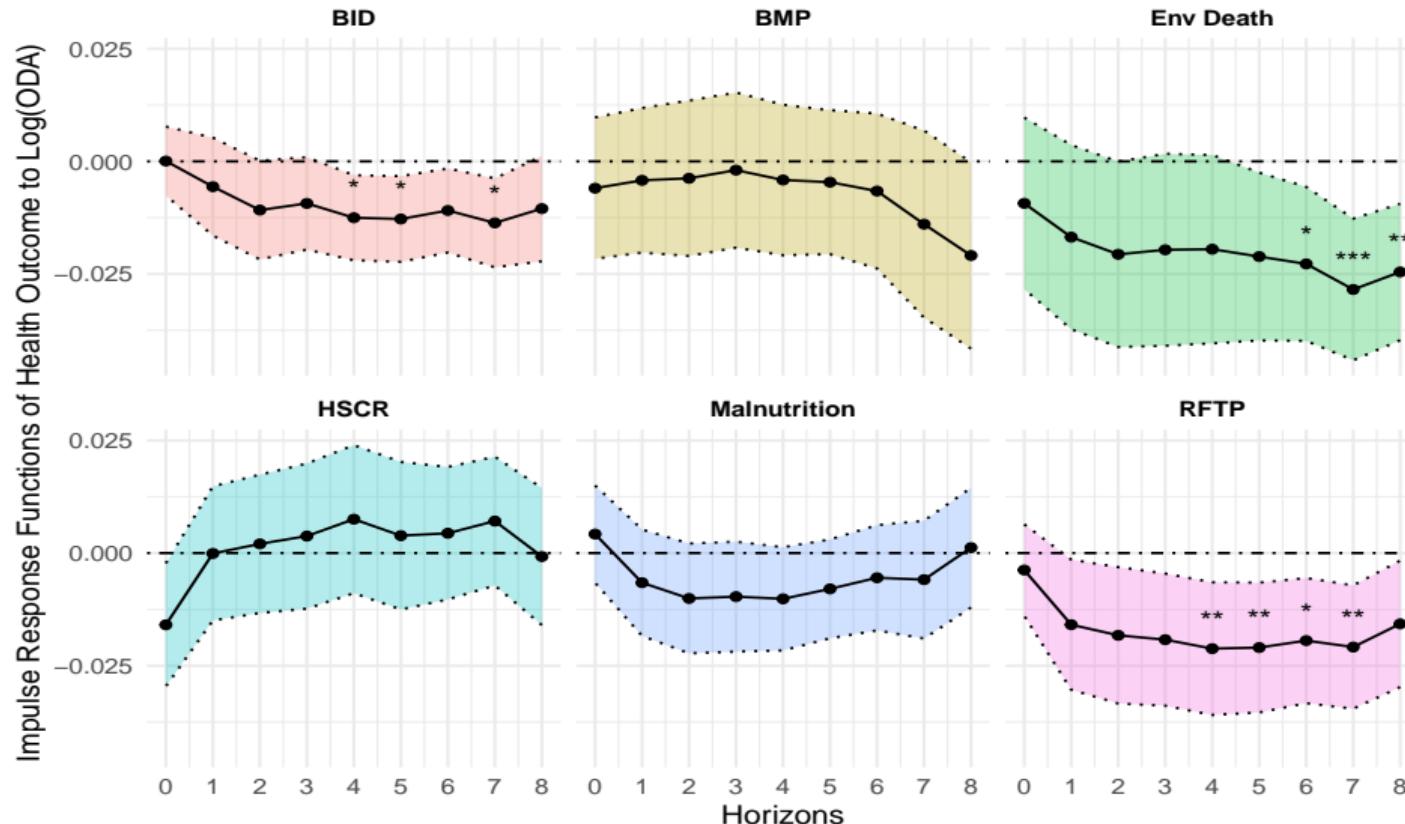
	<i>Dependent variables:</i>					
	RFTP (1)	BID (2)	BMP (3)	Malnutrition (4)	ED (5)	HSCR (6)
log_ODA_lag	−0.041***	−0.030**	−0.066	−0.042**	−0.035*	−0.015
ae	0.000	−0.001	−0.003	0.001	0.000	0.003***
log_GDP_Cap	0.062	−0.010	0.023	−0.024	0.007	0.208***
cri_score	−0.000	−0.000	−0.000	−0.001	0.001*	−0.001
log_remittance	0.000	0.001	0.004	−0.006*	0.001	0.005**
log_hlth_Per_Cap	−0.012	−0.077	−0.043	0.000	0.076	0.094**
Gov	−0.053	−0.001	−0.001	−0.063	−0.043	0.042
log_External_debt	0.013	−0.011	−0.061*	0.048*	0.010	−0.021
Zscore_Reprd_index (t - 1)	0.768***					
Zscore_InfDis_index (t - 1)		1.138***				
Zscore_Mental_index (t - 1)			1.240***			
Zscore_Nutrit_index (t - 1)				0.896***		
Zscore_EnvDeath_index (t - 1)					0.825***	
Zscore_HSCR_index (t - 1)						0.512***
DF	89.000	89.000	89.000	89.000	89.000	89.000
Chi-Square (χ^2)	257.574	212.063	249.795	286.456	173.344	150.279
Observations (N)	144.000	144.000	144.000	144.000	144.000	144.000
RMSEA	0.115	0.098	0.112	0.124	0.081	0.069
RMSEA 90% CI Lower	0.098	0.081	0.096	0.108	0.063	0.049
RMSEA 90% CI Upper	0.131	0.115	0.129	0.140	0.099	0.088
p(RMSEA < 0.05)	0.000	0.000	0.000	0.000	0.003	0.055
SRMR	0.012	0.015	0.016	0.013	0.010	0.006

Note:

*p<0.1; **p<0.05; ***p<0.01

- Local Projections: Understanding the Temporal Dynamics of ODA Impact on Health

$$HO_{it+h} = \beta^h ODA_{it} + \theta z_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (4)$$



Result Presentation Cont.: Regional Variation of ODA Impact

Note: All covariates have been removed to prevent too long table

Unit Fixed Effect with Time Trend as Control (linear-log model with aggregated data)

	Dependent variables:					
	RFTP (1)	BID (2)	BMP (3)	Malnutrition (4)	ED (5)	HSCR (6)
EAP_log_ODA_lag	0.013	-0.007	0.001	-0.003	0.001	-0.001
SSA_dum:log_ODA_lag	-0.005	-0.004	-0.020	0.021	0.010	0.006
MENA_dum:log_ODA_lag	-0.027*	0.032**	-0.011	0.002	0.019	0.011
LAC_dum:log_ODA_lag	-0.004	0.010	-0.010	-0.003	-0.002	-0.008
SCA_dum:log_ODA_lag	-0.022	0.026	0.003	0.030	0.000	0.037
Europe_dum:log_ODA_lag	-0.032**	-0.009	-0.016	0.002	-0.041*	-0.009
Num.Obs.	576	576	576	576	576	576
R2	0.801	0.651	0.355	0.587	0.559	0.617
R2 Adj.	0.725	0.518	0.108	0.429	0.391	0.471
AIC	-1820.2	-1615.0	-1488.1	-1751.1	-1725.0	-1894.8
BIC	-1746.1	-1540.9	-1414.0	-1677.0	-1650.9	-1820.7
RMSE	0.05	0.06	0.06	0.05	0.05	0.05

Note:

* p<0.1; ** p<0.05; *** p<0.01

Result Presentation Cont.: Regional Variation of ODA Impact

DPM: Regional Heterogeneity with FE-CLPM (linear-log model with aggregated data)

	Dependent variables:					
	RFTP (1)	BID (2)	BMP (3)	Malnutrition (4)	ED (5)	HSCR (6)
EAP_log_ODA_lag	0.005	-0.030	-0.001	-0.041	0.004	0.006
SA_ODA	-0.051	-0.035	-0.043	0.096*	-0.030	0.031
ENA_ODA	-0.011	0.061	0.023	0.037	0.011	-0.020
LAC_ODA	0.192**	-0.217**	-0.422*	-0.213**	0.264**	-0.284**
SCA_ODA	-0.056	-0.088	-0.068	0.239***	-0.008	-0.102
Europe_ODA	-0.037	0.031	-0.008	0.058	-0.068*	-0.005
Autoregressive Parameter	0.770*** (0.043)	0.953*** (0.093)	0.987*** (0.100)	0.829*** (0.096)	0.737*** (0.121)	0.783*** (0.112)
DF	125.000	125.000	125.000	125.000	125.000	125.000
Chi-square (χ^2)	280.205	211.046	233.490	259.328	184.373	193.121
Observation (N)	144.000	144.000	144.000	144.000	144.000	144.000
RMSEA	0.093	0.069	0.078	0.086	0.057	0.062
RMSEA 90% CI Lower	0.078	0.053	0.062	0.071	0.039	0.044
RMSEA 90% CI Upper	0.107	0.085	0.093	0.101	0.074	0.078
p(RMSEA < 0.05)	0.000	0.030	0.003	0.000	0.238	0.134
SRMR	0.007	0.011	0.011	0.008	0.009	0.009

Note:

*p<0.1; **p<0.05; ***p<0.01

Result Presentation Cont.: Mediation Analysis of Social Protection in ODA Impact

Mediation Analysis of Social Protection in ODA impact on Health Outcomes (linear-log model)

	Main Predictor: $\log(\text{ODA})_{it-4}$					
	Mediating Variable: $\text{Social_Protection_Coverage}_{it-3}$					
	Reproductive Fatalities (1)	Malnutrition (2)	Infections and Diseases (3)	Health Capacity (4)	Envir. Death (5)	Mental Burden (6)
Total Effect:	-0.008*** (0.002)	-0.015 (0.020)	-0.002 (0.002)	0.031 (0.025)	-0.006 (0.015)	0.026 (0.016)
Direct Effect:	-0.008*** (0.002)	-0.015 (0.020)	-0.002 (0.002)	0.031 (0.025)	-0.006 (0.015)	0.026 (0.016)
Indirect Effect:	-0.000	0.000	-0.000	-0.000	0.000	-0.000
Lower CI:	-0.00010	-0.00253	-0.00005	-0.00245	-0.00217	-0.00060
Upper CI:	0.00006	0.00258	0.00004	0.00218	0.00249	0.000347
Confidence Level:	95%	95%	95%	95%	95%	95%
Bootstrap Replicates:	5000	5000	5000	5000	5000	5000
<i>Note:</i>	$* p < 0.1; ** p < 0.05; *** p < 0.01$					

Insights from findings

The impact of foreign aid (ODA) on health varies based on ODA type, econometric model, and health dimensions. Despite the mix findings, the study reveals the followings insights:

1. ODA Impact on Health:

- ▶ Both total and social infrastructure ODA have positive impacts on reproductive fatality, infections and diseases, as well as environmental death across multiple models.
- ▶ Surprisingly, all coefficients of ODA for health system capacity (HSCR) are negative.
- ▶ Temporal dynamics of ODA impact: using year-wave data show intermediate (4 years) and long-term (6 years) effects of ODA on reproductive fatalities and infections and diseases, while ODA's impact on environmental death is long-term.

2. Regional Heterogeneity:

- ▶ Weak evidence suggests varying impacts of ODA on health across Sub-Saharan Africa (SSA) and non-SSA regions, with social infrastructure ODA more impactful on reproductive fatality in SSA, EAP, and MENA regions.
- ▶ Social infrastructure ODA is only significant for health system capacity in the EAP region.

3. Mediating Role of Social Protection in the ODA Impact

- ▶ There is no evidence that social protection plays an indirect role in ODA's impact on health.
- ▶ Due to data limitations and causal order assumptions, findings are presented as a pragmatic policy guide rather than definitive conclusions.

Conclusions:

- ▶ While there is evidence that ODA has an impact on various health problems, there is no evidence that ODA enhances health system capacity, which is crucial to ensuring sustainable health security in developing countries.
- ▶ This is perhaps why William Easterly argued ODA focuses on treatment rather than prevention (Easterly, 2004)
- ▶ This study contributes to the pool of evidence on the effectiveness of foreign aid. However, it is important to acknowledge certain limitations, including the causal assumption, data quality, and model specifications, that may have influenced the results.
- ▶ In essence, no study has the best model, as threats to validity can only be mitigated, not eliminated.
- ▶ Thus, the true causal impact of ODA on health lies at the confluence of many evidence, including the previous studies.

Policy Recommendations

► **ODA Allocation Mechanisms Strengthening:**

- ▶ Preliminary findings suggest ODA allocation patterns do not align with countries' health needs.
- ▶ Strengthening the capacity of the Development Assistance Committee (DAC) of the OECD and implementing a result-based financing approach can enhance targeted ODA allocation.

► **Optimal Utilization of ODA by Recipient Governments:**

- ▶ Recipient governments should adopt a visionary approach to ODA utilization.
- ▶ Prioritize policies enhancing healthcare systems, poverty alleviation, and investments in education, social protection, and health research to build absorptive capacity and optimize ODA effectiveness.

► **Governance and Accountability:**

- ▶ Governance deficiencies, such as corruption, impede ODA effectiveness.
- ▶ Propose international sanctions for governments mismanaging ODA, including prevention from future access or requests for ODA return, to enhance accountability.

► **Focus on Economic Development, Debt Forgiveness, and Conflict Prevention:**

- ▶ Economic development and excessive debt contribute to poverty and poor health outcomes.
- ▶ The International community should prioritize development efforts on critical health infrastructures that boost health systems, and debt forgiveness, as well as preventing war and violence in developing countries.

Thank You

Q & A

