

# **Private Sector Provision of Oral Rehydration Therapy for Child Diarrhea in Sub-Saharan Africa**

**Zachary Wagner  
(Co-Authored with Neeraj Sood)**

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# Background

- **Diarrheal diseases are the second leading cause of death for children under five years old (700,000 annually)**
- **Cheaply preventable with oral rehydration salts (ORS)**
  - Invented in the 1960s
  - Lauded as one of the most important medical advances of the 20<sup>th</sup> century by the Lancet (1978)
  - Led to two thirds reduction in diarrheal mortality since the 1980s
- **Health providers in poor countries still often fail to provide ORS for child diarrhea cases**

# Background Cont.

- **Possible Barriers for Health Providers**
  - 1. Profitability**
    - Other treatments (e.g. antibiotics or antimotility agents) are more profitable than ORS
  - 2. Client Preference**
    - ORS effectively treats dehydration but does not reduce the volume of diarrhea, which could lead to a perception of inefficacy and reinforces a preference for more expensive alternatives.
  - 3. Stock Outs**
    - Supply of ORS could run out
- **Barriers to providing ORS may be stronger in the private sector**

# Literature Review

- **Studies shown private sector is less likely to provide ORS than the public sector in developing countries (Langsten and Hill, 1995; Muhuri et al. 1996; Waters et al. 2008)**
- **Limitations of Prior Work**
  1. Outdated – Data from 80s and 90s
  2. No controls for important confounding factors
  3. Do not distinguish between for-profit and non-profit private sector providers

# This Study

**This study used DHS data from 29 countries in sub-Saharan Africa (SSA) for the years 2003-2011 to examine public-private differences in diarrheal treatment.**

## **Contribution**

1. SSA has high disease burden and thriving private health sector
2. Distinguish between for-profit and non-profit private providers
3. More recent data
4. Control for key confounders

## **Hypotheses**

1. Private for-profit providers are less likely to provide ORS and more likely to use other treatments
2. Public-private disparities in ORS provision would be more pronounced for poorer children and children in rural areas, who are also the most vulnerable to diarrheal mortality

# Sample Eligibility Criteria

- 1. Aged 0-59 months**
- 2. Diarrheal episode within two weeks of the survey**
- 3. Sought treatment from a health provider including:**
  - Hospitals
  - Clinics
  - Pharmacies
  - Mobile clinics
  - Community health workers

**Note:** traditional healers not included

Final Sample of **19,059 children**

# Analysis Approach

- **Model 1:** Probit model to estimate the difference in the probability of receiving a treatment type between private and public facilities while controlling for key confounders
- **Models 2 and 3 :** Include interaction terms to estimate how these effects differ for poor children vs. rich children and for rural children vs. urban children.

# Key Variables

- **Dependent Variables:** Types of Diarrheal Treatment
  - **ORS:** Child received oral rehydration salts
  - **ORT:** Child received ORS or recommended home fluids
  - **Other Treatments (No ORS) :** pills/syrups, antibiotics, injections, herbal remedy, antimotility medicines, and zinc
- **Key Explanatory Variable:** Public (71%), Private For-Profit (24%), NGO (5%)



# Control Variables

- **Child Demographics:** age, age squared, gender
- **Child Health:** concurrent cough or fever, weight for age, height for age
- **Household Characteristics:** mother's age, mother's age squared, Female head of the household, DHS wealth index (quintiles), number of children in the household, and source of drinking water
- **Geography:** country-region and rural/urban
- **Facility Type:** hospital/clinic, pharmacy, mobile clinic, community health worker, and other
- **Secular Trends:** Year

# Higher SES Children Use the Private Sector

<i>Dependent Variable</i>	<i>For-Profit Private</i>	<i>Public</i>
<b>Demographics</b>		
Rural	68%	76%
Age of Child (Months)	23.5***	22.2
Number of Children in HH	2.1	2.1
Age of Mother	28.3	28
Female Household Head	20%	20%
<b>Education of Mother</b>		
No Education	30%	38%
Primary	49%	46%
Secondary	21%**	16%
<b>Wealth Status</b>		
Poorest	21%**	25%
Poorer	19%	21%
Middle	18%***	21%
Richer	19%	18%
Richest	23%***	15%

\*\*\*P < 0.01, \*\*P < 0.05, relative to public  
standard errors are clustered at the country level

# Results

Diarrheal Treatment	For-Profit Private	Public	Difference	Adjusted Difference (95% CI)
ORS	44%	68%	-24%***	-15%*** (13.0-17.5)
ORT	50%	73%	-23%***	-15%*** (12.9-17.3)
Other Treatments	37%	20%	17%***	13%*** (10.4-14.7)

\*\*\*P<.001

Bootstrap standard errors are estimated with 500 iterations and are clustered at the country level

# Effect is Worse for the Poor

Diarrheal Treatment	Adjusted Difference	Adjusted Difference	Difference
	Poor	Rich	
ORS	-16.5%	-13.2%	-3.3%*
ORT	-17.0%	-13.0%	-4.0%**
Other Treatments	14.7%	10.4%	4.3%**

\*\*P<.05, \*P<.1

Bootstrap standard errors are estimated with 500 iterations and are clustered at the country level

“Poor” represents bottom tercile of the DHS Wealth Index

“Rich” represents top tercile of the DHS Wealth Index

# Effect is Worse in Rural Areas

Diarrheal Treatment	Adjusted Difference		Difference
	Rural	Urban	
ORS	-16.2%	-13.0%	-3.2%*
ORT	-16.8%	-11.1%	-5.7%***
Other Treatments	14.5%	7.8%	6.7%***

\*\*\* $P < .01$ , \* $P < .1$

Bootstrap standard errors are estimated with 500 iterations and are clustered at the country level

# Results Are Robust

- **Sensitivity Analyses**
  - Sample Weights
  - Propensity score matching
  - Excluding each country individually
  - Restricting sample to children that were treated at hospitals and clinics only

**NO CHANGE IN RESULTS**

**Note:** Lower ORT provision in 28 of 29 countries

# Conclusion

- **For-profit private providers are less likely to provide ORS or ORT**
- **For-profit private providers are more likely to provide other treatments that do not combat dehydration and are potentially harmful**
- **Problem is worse for more vulnerable children —poor children and children in rural areas**

# Discussion

- **Effective engagement with the private sector is Important**
- **Evidence that private sector engagement in SSA is limited (Sood et al. 2011, World Bank 2011)**
- **Policy makers should aim to nudge private sector health workers to increase provision of ORT and other cost-effective treatments.**



# Limitations

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- **Unable to provide evidence of the mechanism driving public-private disparities in ORT provision**
- **Selection bias from unobservables**

# Thank You

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# Data

- **Demographic and Health Survey (DHS) data for 29 countries in SSA from 2003 to 2011 (19,059 Children)**

Country	Year/s Used	N	Country	Year/s Used	N
Benin	2006	293	Mali	2006	231
Burkina Faso	2003	312	Mozambique	2003	567
Burundi	2010	1006	Namibia	2007	294
Cameroon	2004	255	Niger	2006	307
Chad	2004	207	Nigeria	2003, 2008	1,630
Congo (Brazzaville)	2005	154	Rwanda	2005, 2008, 2010	871
Congo (DRC)	2007	391	Sao Tome and Principe	2009	118
Ethiopia	2005, 2011	931	Senegal	2005, 2011	1,275
Ghana	2003, 2008	553	Sierra Leone	2008	276
Guinea	2005	204	Swaziland	2007	232
Kenya	2003, 2008	759	Tanzania	2005, 2010	902
Lesotho	2004, 2009	335	Uganda	2006, 2011	2,548
Liberia	2007	614	Zambia	2007	533
Madagascar	2004	164	Zimbabwe	2006, 2011	365
Malawi	2004, 2010	2,732	<b>Total</b>	<b>2003-2011</b>	<b>19,059</b>

# Private vs. Public ORT Provision by Country

Difference in ORT Provision Rate of Private  
Relative to Public Providers

