

Gender gap in health outcomes among the rural working-age: Does weather effects play a role?



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Presentation Outline

- ✓ Introduction and pathways
- ✓ Research questions
- ✓ Methodology – Study area, data sources, empirical framework
- ✓ Results
- ✓ Conclusion

Introduction - Gender and Health

- ✓ Health and gender equality - fundamental human rights in the sustainable development goals.

Health

- An asset for economic growth and development (Bloom et al., 2001, 2019; Schultz, 2010).
- Ability to cope with the effects resulting from natural disasters (WHO, 2014).

Gender equality

- A key determinant of health (WHO Commission on Social Determinants of Health, 2008)
- Facilitates economic growth and development – ‘*smart economics*’ (World Bank, 2012).
- Improved food and nutrition security (Agarwal, 2018; Meinzen-Dick et al., 2012)
- Lowers fertility and child mortality (Shannon et al., 2019).
- Peaceful societies

Pathways through which gender is translated into health risks

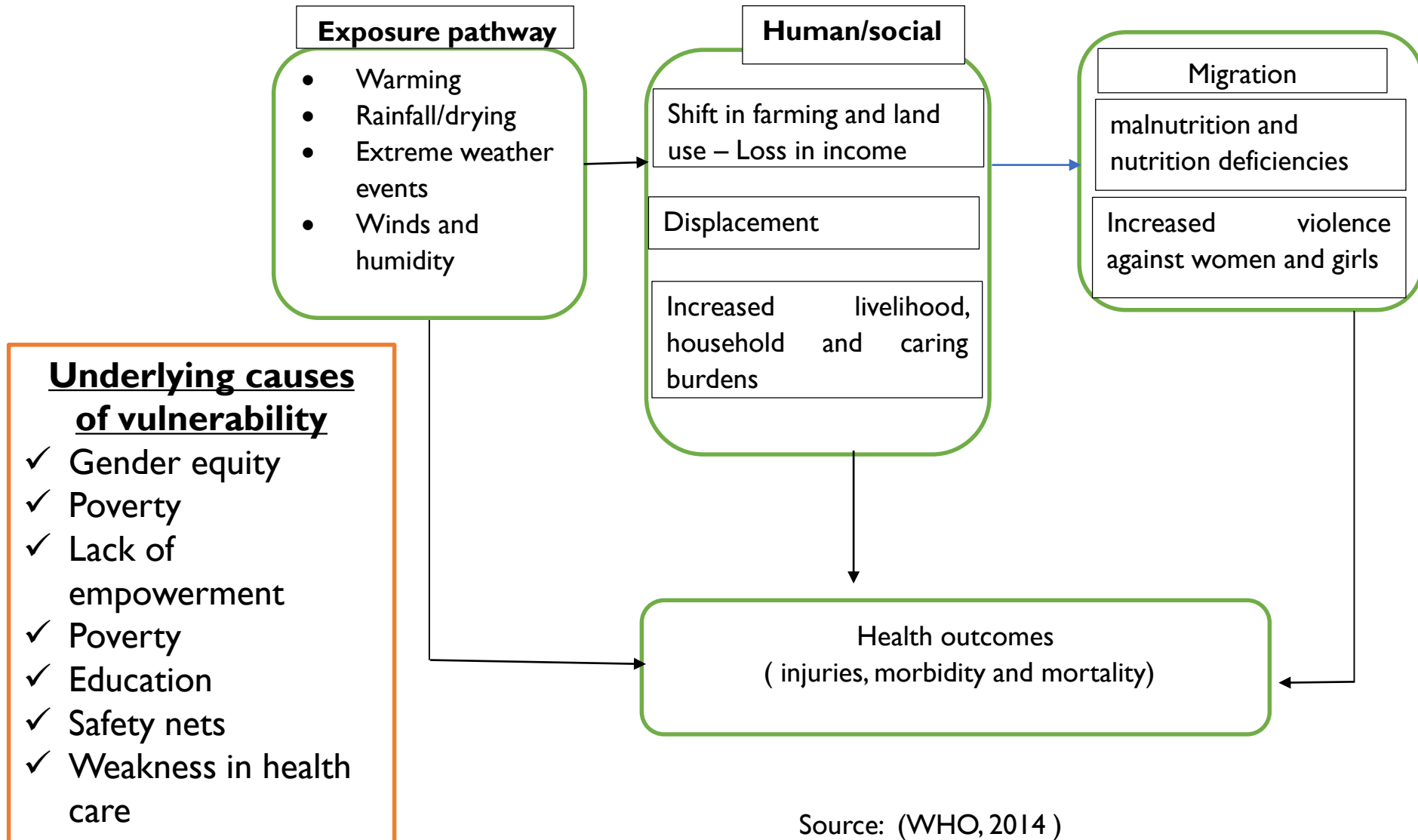
- *Differential susceptibility and exposures to injuries, diseases and disabilities.*
- *Differences in health behaviors and health care access.*
- Biases in health system and health research.

Source; (Gupta et al., 2019; Manandhar et al., 2018; Shannon et al., 2019)

- Gender roles - determine how and where women and men spend most of their times. A major determinant of the different exposure and intensity patterns to infectious agents of diseases (Rancourt, 2013; WHO, 2007).
- Multiple roles, caregiving, breadwinner roles, risk taking roles and masculinity are all sources of health risks in either men or women (Shannon et al., 2019).
- Both gender and sex matter; women live longer today than men in most countries (Zarulli et al., 2018). What about quality of life and morbidity rates?

Pathways of climate related health risks (gender perspective)

Climate/weather extremes - a gender-based health inequality risk-multiplier (Sorensen et al., 2018; WHO, 2014).

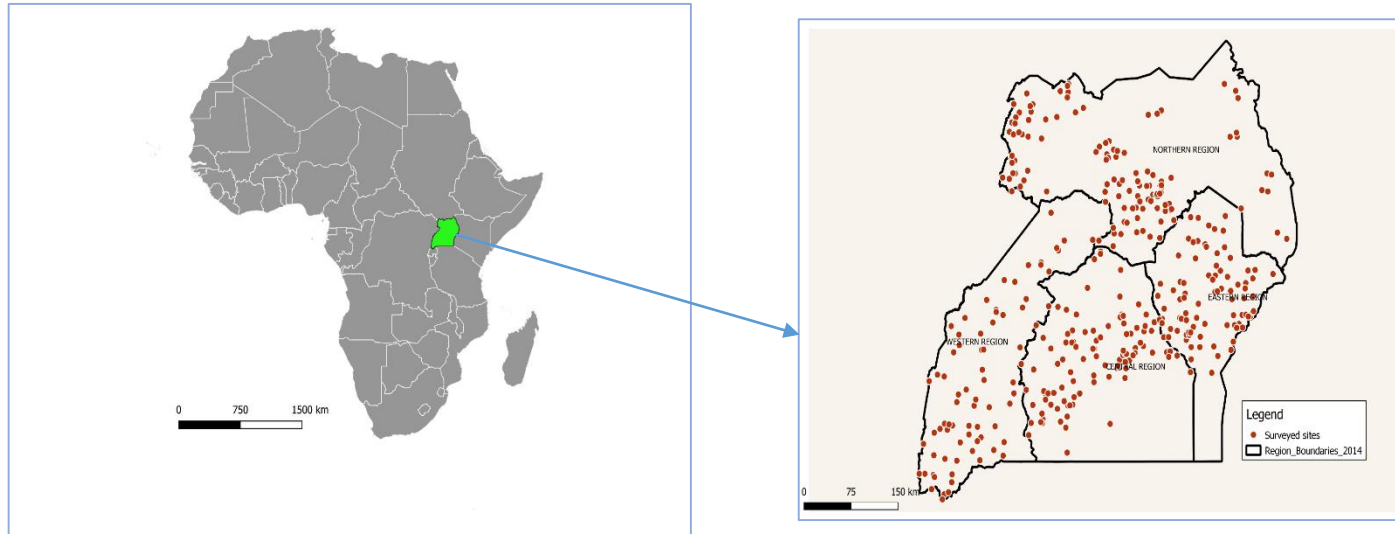


Source: (WHO, 2014)

Research questions

- What is the effect of temperature and rainfall variabilities on the health of men and women in the working age group?
- What is the association between healthcare services and health outcomes of men and women?
- What is the gender gap in health outcomes among the working age individuals? Do weather effects play a role in explaining the gender health gap?
- What is the contribution of the health care services in explaining the gender gap?

Methodology – Study area (Uganda)



- ✓ Total population in 2019 : 44 million (World Bank, n.d).
- ✓ At least 75% of the inhabitants reside in rural areas (*Ibid*).
- ✓ 50.7% of the total population were female (*Ibid*).
- ✓ 51.5% (22.8M) of population in the working age (15-64 years) as of 2019 (*Ibid*)
- ✓ Proportion of working age projected to increase until 2070 (UNICEF 2019).
- ✓ **Achievement of gender parity** - ranked position 65/153 countries with a score of 0.717 towards (World Economic Forum, 2020).

Uganda - Health indicators

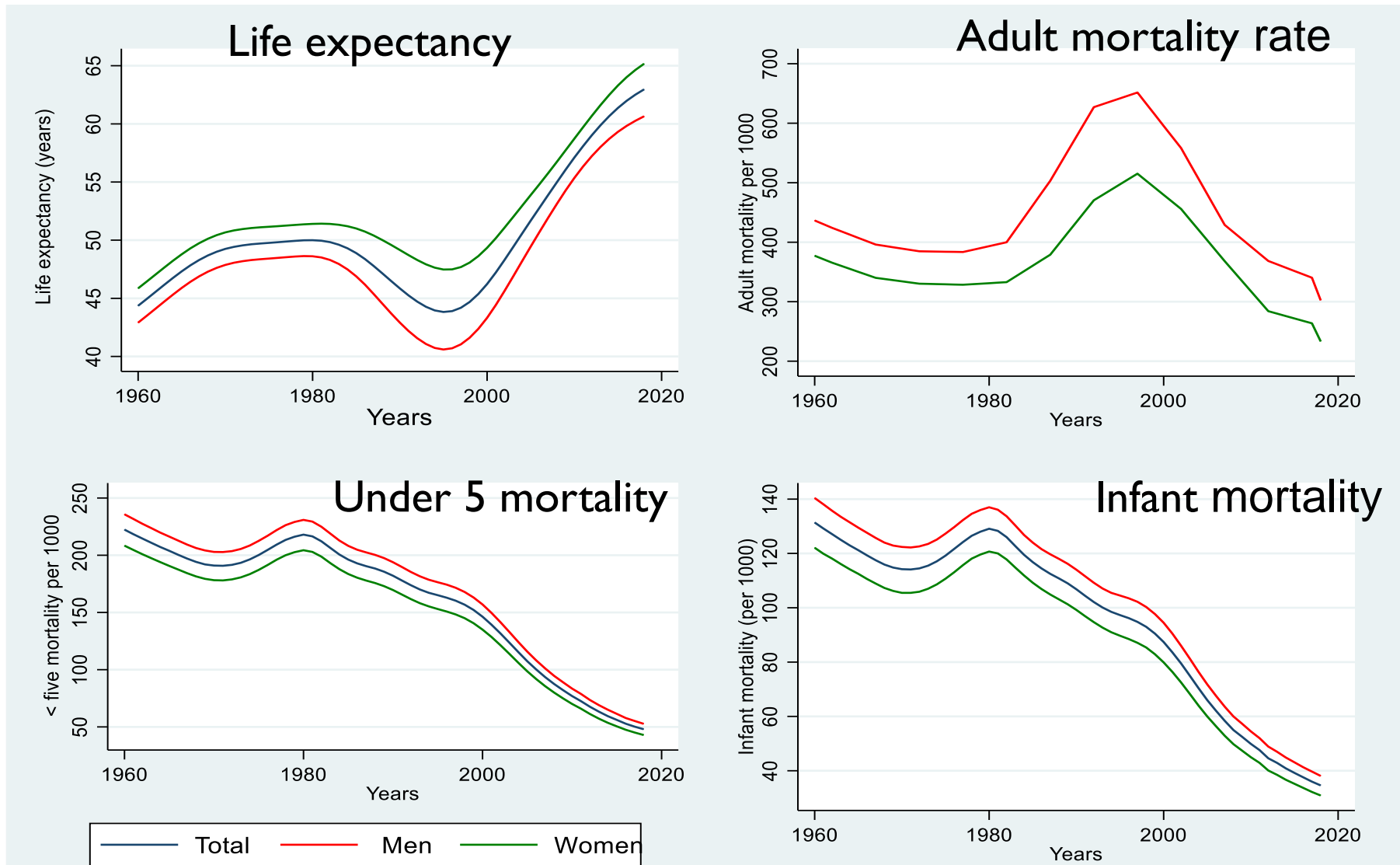


Figure I: Life expectancy, infant and adult mortality rates in Uganda

Source, adapted from the World bank data

Data sources

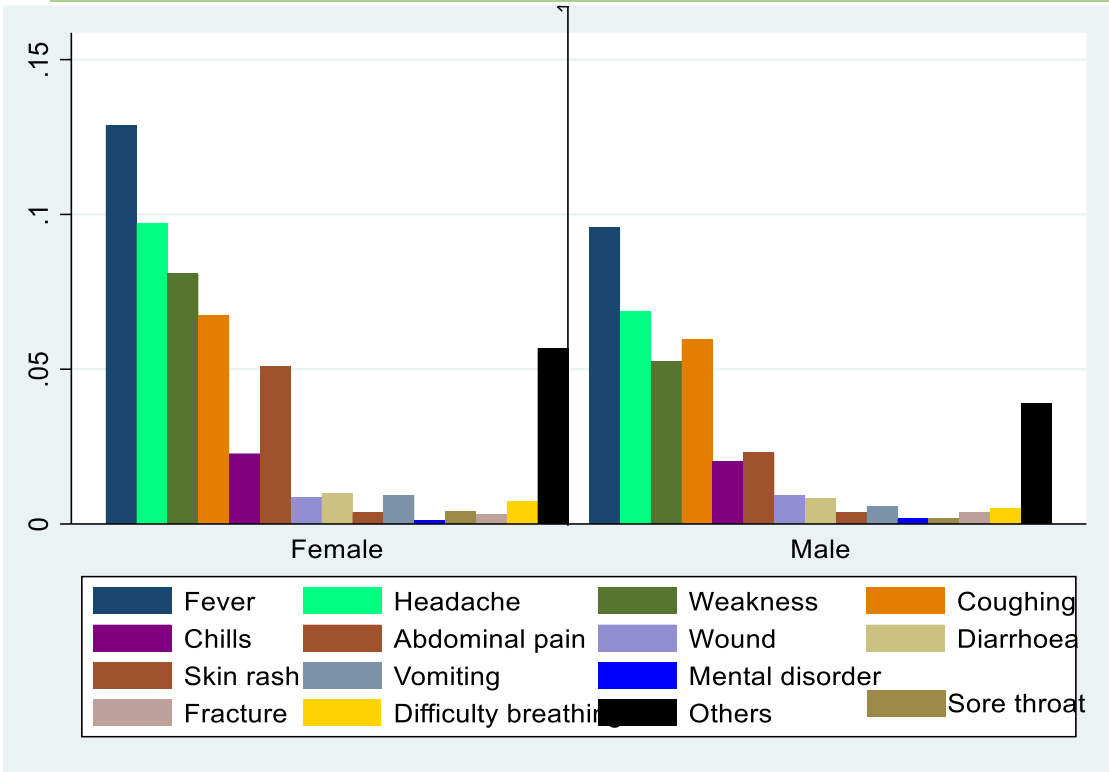
1). Uganda National Panel Survey (UNPS) –LSMS (2009-2014).

- Pooled sample of rural individuals in 4 waves was 49,644 with **22,746** individuals in the working age category.
- Individual as well as household factors – health, healthcare access, labor force, education and marital status at individual level.
- Locations geo-referenced.

2) Weather data

- Climate Hazards group Infrared Precipitation with Stations (CHIRPS) data version 2, (Funk et al., 2015).. (1981 to 2009/2014)
- Moderate Resolution Imaging Spectroradiometer-MODIS (Hooker et al., 2018; Wan et al. 2015)

Data variables (LSMS data) illness prevalence



Illness captured in terms of symptoms

Outcome variables

- ✓ Number of sick days (illness or injury) in last 30 days.
- ✓ Number of work day lost due to illness
- ✓ Dummy variable (Yes/No)- if suffered any illness or injury.

Figure 2: Proportion of men and women who suffered from different illness in the study areas

Independent variables (LSMS data)

- ✓ Places individuals consulted first when ill (pharmacy/drug shop, private hospital etc).
- ✓ Distance to the health care facility
- ✓ Use of (treated) mosquito net.

Data Variables (*independent*) – Weather data

- I). Temperature in the month prior to the interview (0C).
- Rainfall in the month prior to the interview (log).
 - Negative rainfall deviation
 - Positive temperature deviations

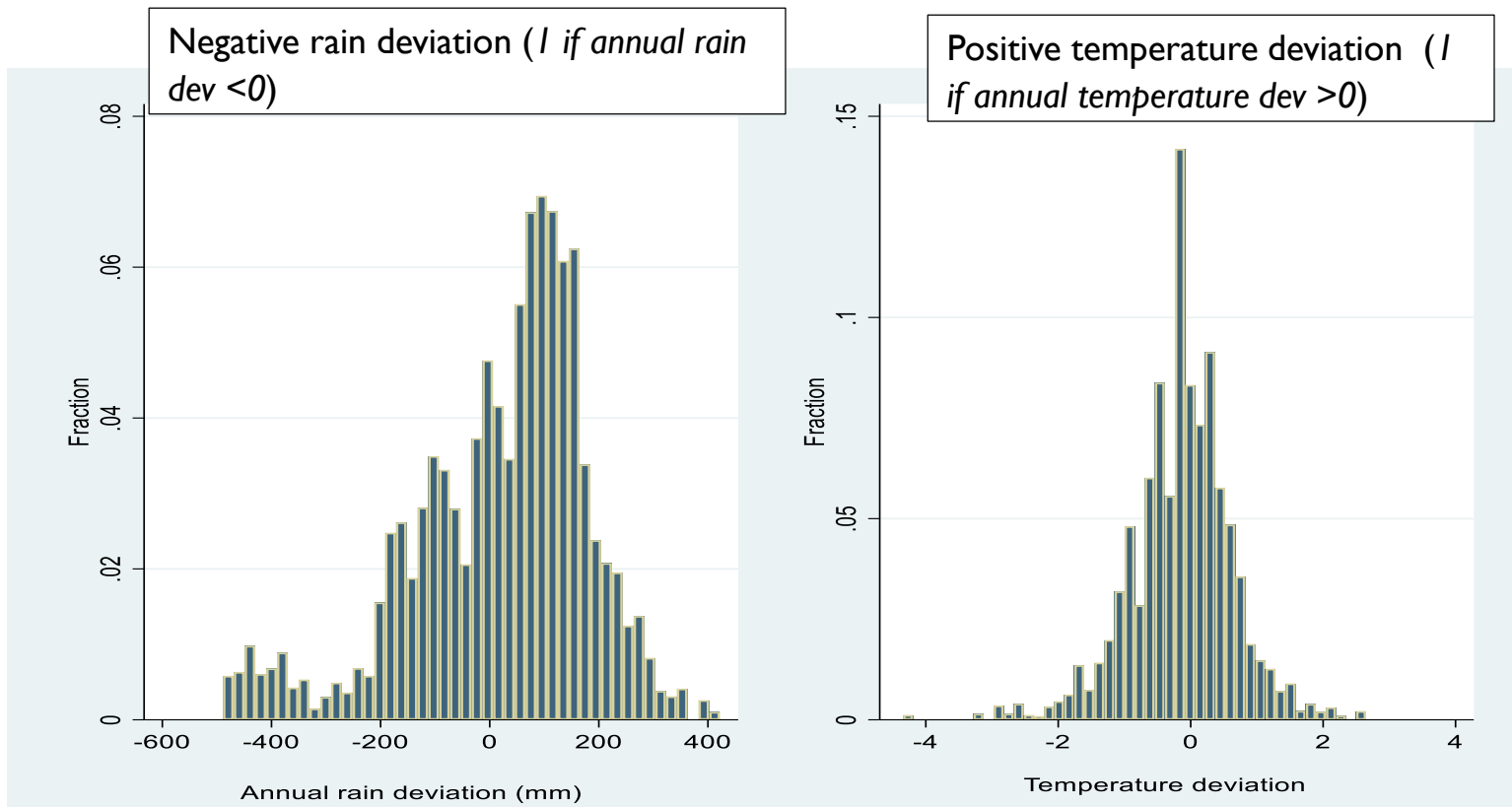


Figure 3: Distribution of annual rainfall (a) and temperature (b) deviations from the mean.

Summary statistics

Variable (Socio- economic)	Total Sample) (N = 22,746)	Women (N= 11,711)	Men N= (11,035)	Difference
	1	2	3	4
Age (years)	31.33	31.90	30.72	1.181***
Education (years)	5.786	5.065	6.551	-1.486***
Occupation				
Salaried /wage (I = yes)	0.218	0.161	0.278	-0.117***
Business (I = yes)	0.177	0.172	0.183	-0.010**
Farming (I = yes)	0.834	0.865	0.801	0.064***
Income categories				
No personal income (I = yes)	0.826	0.879	0.771	0.107***
Income (I <=250000 UGX)	0.141	0.107	0.177	-0.069***
Income (>250000 -750000)	0.027	0.012	0.042	-0.031***
Income (>750000)	0.005	0.002	0.009	-0.007
Marital status				
Married monogamous (I = yes)	0.401	0.410	0.392	0.018***
Married polygamous (I = yes)	0.130	0.151	0.108	0.042***
Divorced / Separated (I = yes)	0.057	0.078	0.034	0.045***
Widow/Widower (I = yes)	0.039	0.068	0.006	0.064***
Never married (I = yes)	0.372	0.290	0.459	-0.169***
HH Asset Index	-0.466	-0.479	-0.452	-0.027
WASH index	-0.370	-0.377	-0.362	-0.015
Dependency ratio	125.75	134.91	116.03	18.88***
HDDS	7.770	7.749	7.792	-0.042

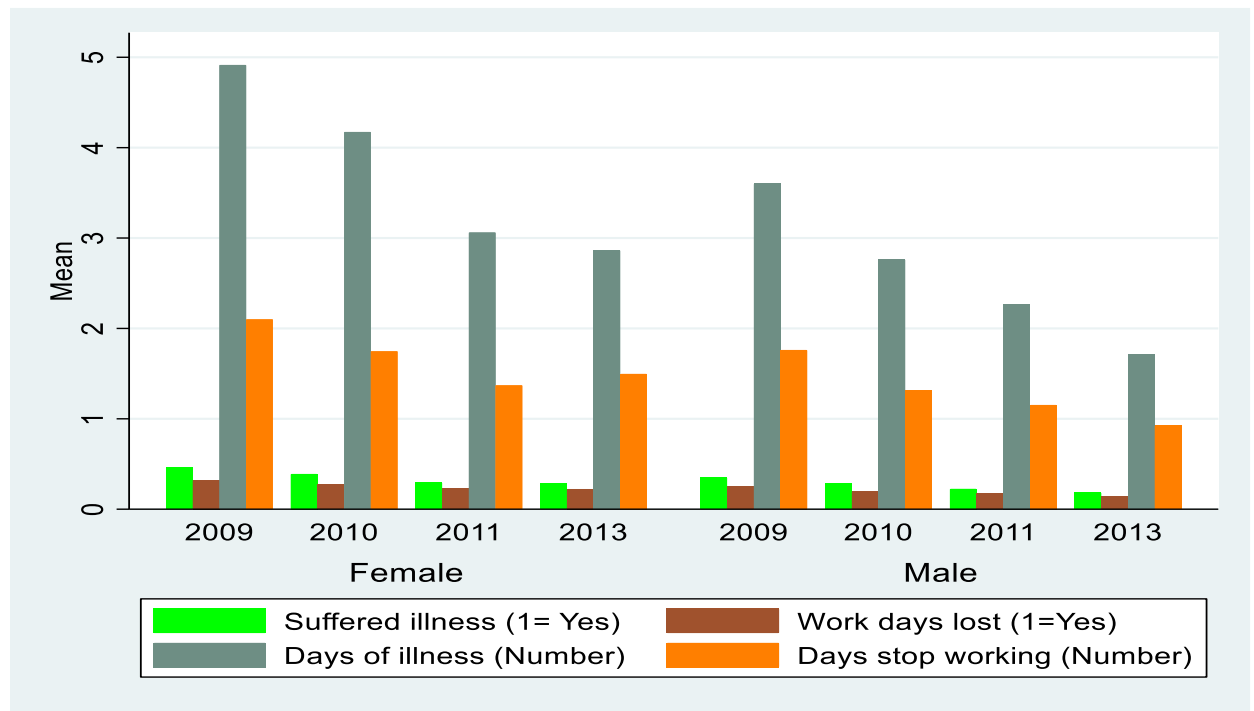
Summary statistics

Variable (Health care)	Total Sample)	Women	Men	Difference
	1	2	3	4
Mosquito net use (I=Yes)	0.483	0.514	0.450	0.064***
Treated mosquito nets (I=Yes)	0.394	0.421	0.365	0.056***
Illness consulted (I=Yes)	0.879	0.881	0.876	0.005
Distance to health facility (Km)	4.598	4.794	4.310	0.483**
Government hospital (I=Yes)	0.338	0.368	0.294	0.073***
Private hospital/doctor (I=Yes)	0.355	0.341	0.375	-0.034***
Pharmacy or shop (I=Yes)	0.249	0.230	0.275	-0.044***
Other healthcare (I=Yes)	0.050	0.053	0.046	0.007

Weather variables	Total Sample	Women	Men	Difference
	1	2	3	4
Negative rain deviation (I=yes)	0.382	0.377	0.386	-0.008
Positive temperature deviation (I=Yes)	0.410	0.409	0.413	-0.003
Rainfall (month mm)	107.65	107.02	108.34	-1.318
Temperature (month oC)	29.16	29.21	29.11	0.114**

Summary statistics (outcome variables)

N	Variable	All individuals	Women	Men	Difference
		(1)	(2)	(3)	(4)
22,746	Suffered illness (1=Yes)	0.309 (0.462)	0.356 (0.438)	0.259 (0.478)	0.097***
22,746	Days illness	3.164 (6.517)	3.726 (6.921)	2.568 (6.001)	1.157***
7,028	Days of illness if >0	10.220 (8.074)	10.437 (8.024)	9.905 (8.138)	0.532***
22,746	Stopped working (1=Yes)	0.225 (0.417)	0.261 (0.439)	0.188 (0.391)	0.073***
22,746	Days stopped working	1.482 (4.087)	1.673 (4.149)	1.282 (4.009)	0.391***
5,129	Days stopped working if >0	6.576 (6.371)	6.411 (5.970)	6.819 (6.914)	-0.408**



Empirical strategies

I) **Two parts model** (Belotti et al., 2015).

- ✓ Separate estimations at **extensive margin** (*if any day of illness or workday lost*).
 - ✓ **Intensive margins** (*intensity of days/how much – number of days*) of those ill.
 - ✓ **Overall effect** of the outcome variable – total sample.
-
- Logit model in the first part - the probability that an individual has any illness & factors
 - GLM model in the second part – conditional (No. of days, if any).
 - Log link function and gamma as the distribution family.

$$E(Y_i) = \Pr(Y_i > 0) * E(Y_i | Y_i > 0)$$

- Hurdle negative binomial model (HNBM) – for robustness check.

2) Single index model (GLM, NBM): Health care services on days of illness/workday lost: -

Empirical strategies : decomposition

Multivariate decomposition methods for non-linear models (Powers et al. (2011)).

- Explain sources of differences in women-men illness.
- Quantify inequalities in health to be eliminated or narrowed down, if both groups had same resources or if women had male covariates.
- Overall and detailed decomposition.

$$\bar{Y}_w - \bar{Y}_m = [F(\bar{X}_w \hat{\beta}_w) - (\bar{X}_m \hat{\beta}_w)] - [F(\bar{X}_m \hat{\beta}_w) - (\bar{X}_m \hat{\beta}_m)]$$

- Logit and count data decomposition approaches.

Results: weather and days of illness (AME)

Variables	Total Sample			Women			Men		
	Logit (1)	GLM (2)	Overall (3)	Logit (4)	GLM (5)	Overall (6)	Logit (7)	GLM (8)	Overall (9)
Negative rain deviation	0.075*** (0.009)	-0.198 (0.319)	0.688*** (0.137)	0.083*** (0.014)	0.557 (0.418)	1.043*** (0.203)	0.067*** (0.013)	-1.228** (0.475)	0.337* (0.179)
Log monthly rain	-0.044* (0.025)	-0.095 (0.779)	-0.473 (0.345)	-0.021 (0.036)	-0.262 (0.997)	-0.306 (0.502)	-0.064* (0.034)	0.323 (1.215)	-0.545 (0.462)
Log rainfall squared	0.007** (0.003)	0.009 (0.100)	0.073* (0.044)	0.005 (0.005)	0.030 (0.129)	0.059 (0.065)	0.009** (0.004)	-0.046 (0.156)	0.075 (0.059)
Positive temperature deviation	0.023*** (0.007)	0.016 (0.217)	0.232** (0.095)	0.021** (0.009)	-0.031 (0.284)	0.198 (0.142)	0.024** (0.009)	0.145 (0.335)	0.268** (0.125)
Monthly temperature	0.044*** (0.009)	-0.041 (0.297)	0.423*** (0.128)	0.039*** (0.012)	0.246 (0.359)	0.493*** (0.182)	0.049*** (0.013)	-0.373 (0.499)	0.377** (0.179)
Temperature squared	-0.001*** (0.000)	0.000 (0.005)	-0.006*** (0.002)	-0.001*** (0.000)	-0.004 (0.006)	-0.007** (0.003)	-0.001*** (0.000)	0.006 (0.008)	-0.006** (0.003)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	22,468	6,970	22,468	11,567	4,134	11,567	10,901	2,836	10,901

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

Other variables include; age , years of schooling, asset index, WASH index, treated net use, occupation, marital status, dependency ratio, survey years

Weather and days of work lost

Variables	Total Sample			Women			Men		
	Logit (1)	GLM (2)	Total (3)	Logit (4)	GLM (5)	Total (6)	Logit (7)	GLM (8)	Total (9)
Negative rainfall deviation	0.068*** (0.009)	-0.787*** (0.282)	0.262*** (0.084)	0.080*** (0.013)	-0.772** (0.365)	0.303** (0.123)	0.056*** (0.012)	-0.762* (0.423)	0.226** (0.113)
Log month rainfall	0.018 (0.024)	0.499 (0.662)	0.226 (0.215)	0.036 (0.034)	1.466* (0.801)	0.607** (0.304)	0.000 (0.032)	-1.293 (1.141)	-0.243 (0.303)
Log rain squared	-0.001 (0.003)	-0.059 (0.086)	-0.022 (0.028)	-0.003 (0.004)	-0.184* (0.104)	-0.069* (0.039)	0.001 (0.004)	0.162 (0.146)	0.034 (0.039)
Positive temperature deviation	0.012** (0.006)	0.034 (0.192)	0.088 (0.059)	0.015* (0.009)	0.017 (0.239)	0.101 (0.085)	0.008 (0.008)	0.094 (0.312)	0.074 (0.081)
Month temperature	0.027*** (0.008)	-0.111 (0.250)	0.150* (0.078)	0.019 (0.012)	-0.142 (0.290)	0.082 (0.106)	0.038*** (0.012)	0.044 (0.444)	0.264** (0.116)
Temperature squared	0.000*** (0.000)	0.002 (0.004)	-0.002* (0.001)	-0.000 (0.000)	0.003 (0.005)	-0.001 (0.002)	-0.001*** (0.000)	-0.001 (0.007)	-0.004** (0.002)
Other variables & year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	22468	5083	22468	11,568	3028	11568	10901	2056	10901

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

Other variables include; age, years of schooling, asset index, WASH index, treated net use, occupation, marital status, dependency ratio, survey years

Health care services on days of illness

Variables	Total sample			Women			Men		
	GLM (1)	Truncated NB (2)	Negative Binomial (3)	GLM (4)	Truncated NB (5)	Negative Binomial (6)	GLM (5)	Truncated NB (8)	Negative Binomial (9)
Distance to health facility	0.125*** (0.010)	0.123*** (0.011)	0.122*** (0.010)	0.113*** (0.012)	0.112*** (0.013)	0.111*** (0.013)	0.141*** (0.018)	0.138*** (0.018)	0.136*** (0.017)
Government hospital (I=yes)	-1.128** (0.441)	-1.142*** (0.412)	-1.125*** (0.396)	-0.669 (0.556)	-0.686 (0.527)	-0.679 (0.508)	-1.839*** (0.708)	-1.867*** (0.660)	-1.835*** (0.631)
Private hospital/doctor	-1.098** (0.442)	-1.128*** (0.413)	-1.114*** (0.396)	-0.555 (0.563)	-0.586 (0.533)	-0.583 (0.514)	-1.979*** (0.696)	-2.021*** (0.651)	-1.988*** (0.622)
Pharmacy or shop	-3.214*** (0.453)	-3.289*** (0.430)	-3.209*** (0.413)	-2.887*** (0.580)	-2.958*** (0.558)	-2.889*** (0.537)	-3.768*** (0.713)	-3.861*** (0.675)	-3.766*** (0.644)
Weather variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6,122	6,122	6,122	3,639	3,639	3,639	2483	2,483	2483

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

Other variables include; age , years of schooling, asset index, WASH index, treated net use, occupation, marital status, dependency ratio, survey years

Health care services on work days lost

VARIABLES	Total sample			Women			Men		
	GLM	Truncated NB	Negative Binomial	GLM	Truncated NB	Negative Binomial	GLM	Truncated NB	Negative Binomial
	(1)	(2)	(3)	(7)	(8)	(9)	(4)	(5)	(6)
Distance to health facility	0.092*** (0.009)	0.090*** (0.009)	0.082*** (0.009)	0.089*** (0.011)	0.088*** (0.010)	0.077*** (0.011)	0.092*** (0.015)	0.089*** (0.015)	0.085*** (0.015)
Government hospital (1=yes)	-1.182*** (0.359)	-1.208*** (0.327)	-1.183*** (0.322)	-0.900* (0.459)	-0.907** (0.398)	-0.977** (0.396)	-1.691*** (0.579)	-1.743*** (0.563)	-1.532*** (0.545)
Private hospital/doctor	-1.111*** (0.359)	-1.148*** (0.326)	-1.088*** (0.321)	-0.764* (0.464)	-0.779* (0.402)	-0.761* (0.399)	-1.782*** (0.564)	-1.847*** (0.555)	-1.671*** (0.537)
Pharmacy or shop	-3.041*** (0.380)	-3.217*** (0.352)	-3.261*** (0.342)	-2.745*** (0.491)	-2.903*** (0.437)	-2.992*** (0.427)	-3.546*** (0.603)	-3.751*** (0.593)	-3.718*** (0.568)
Weather variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4632	4632	6122	2,776	2,776	3,639	1,856	1,856	2,483

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

Other variables include; age , years of schooling, asset index, WASH index, treated net use, occupation, marital status, dependency ratio, survey years

Source of gap in illness between men & women – decomposition

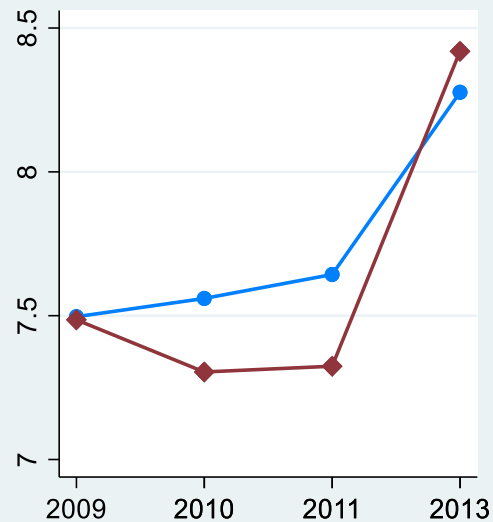
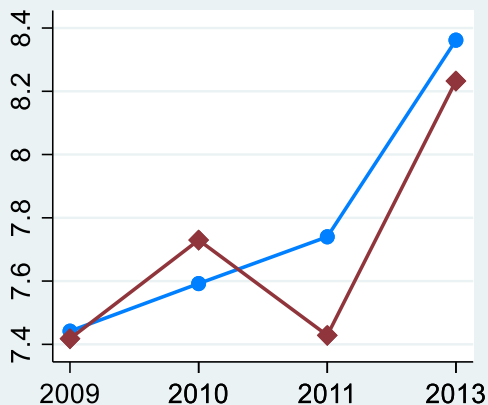
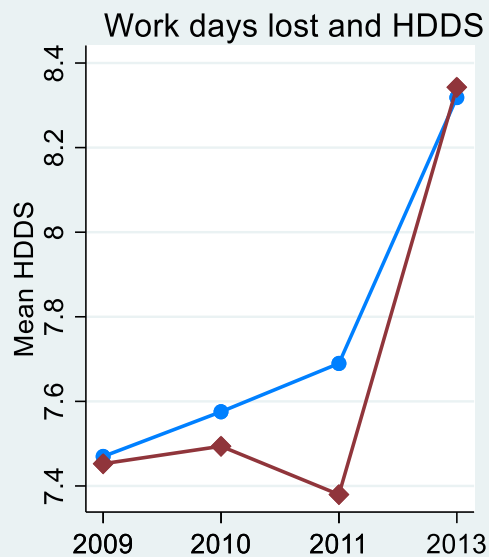
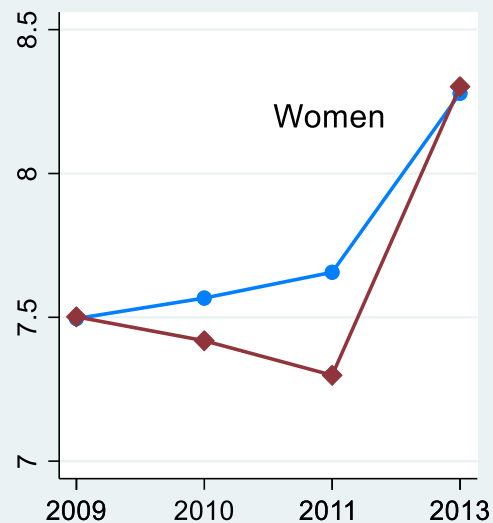
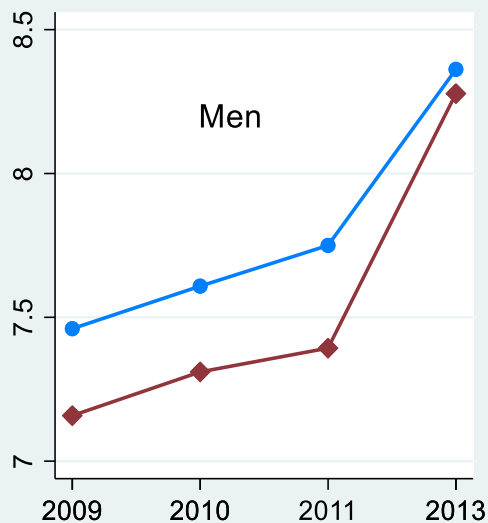
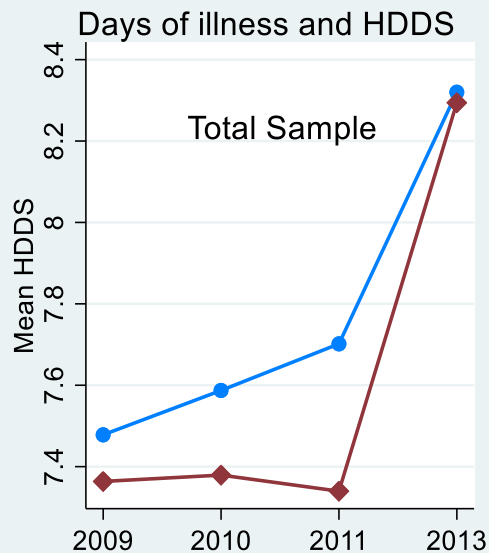
Without health care services

VARIABLES	Logistic				Negative binomial			
	Suffered illness (dummy)		Stopped working (dummy)		Days illness (number)		Days stopped working	
Overall decomposition <i>(Women - men)</i>	Coefficients	Percent	Coefficients	Percent	Coefficient	Percent	Coefficient	Percent
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Characteristics (E) – (Explained)	0.025*** (0.003)	26.61	0.024*** (0.003)	33.89	0.318*** (0.076)	27.997	0.155*** (0.039)	40.19
Coefficients (C) – (Unexplained)	0.068*** (0.009)	73.39	0.046*** (0.008)	66.10	0.817*** (0.174)	72.003	0.230** (0.092)	59.81
Raw difference	0.093*** (0.008)	100	0.070*** (0.007)	100	1.134*** (0.168)	100	0.385*** (0.0896)	100

With health care services (*comparison with columns 5 & 6 above*)

VARIABLES	(1)	(2)
Overall decomposition	Days illness	
	Coefficients	Percent
Characteristics (E)- Explained component	0.187*** (0.026)	54.02
Coefficients (C) – Unexplained component	0.159*** (0.056)	45.98
R – raw difference	0.345*** (0.059)	100

Implication of illness on dietary diversity



—●— 1 (Less than 15 days)
—◆— 2 (= or > 15 days)

Conclusion

- Both men and women health were negatively affected by weather anomalies at the extensive margins.
- Overall effect of weather variables was significant, positive and of higher magnitude in women than in men.
- Health care services matter in reduction of the number of illness and number of work day lost.
- Health-seeking behaviours is the main source of the women-men health gap in terms of days of illness. Also education, income, occupation.

- Improved access to quality health care and women empowerment.
- Investment in health adaptation such as early warning systems, health insurance.
- Time poverty reduction strategies.

The End

Thank you for listening