Determinants of malnutrition in selected Sahel countries
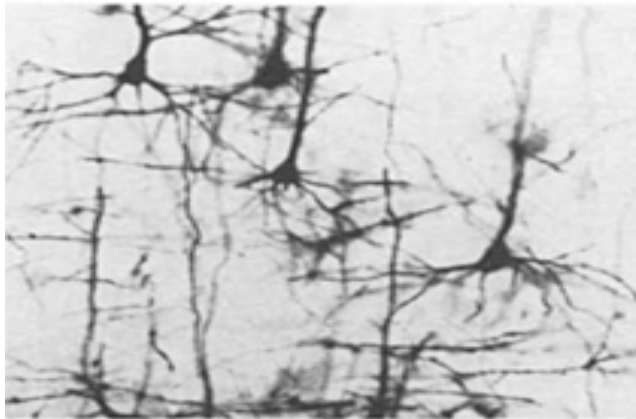
Eugenie Maïga

Lilongwe, August 31st 2018

Why should we care about malnutrition?
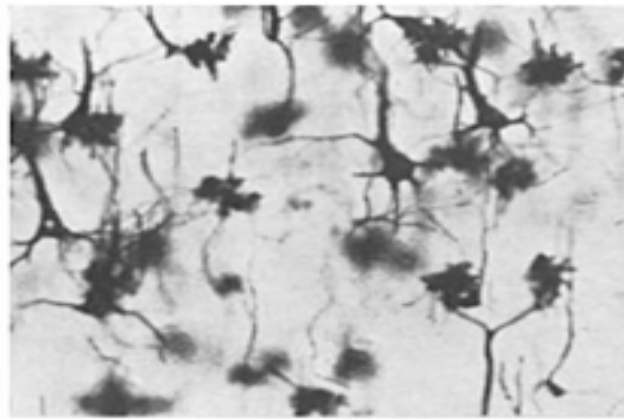

Effects of undernutrition on brain development

Well-nourished infant

Undernourished infant

Typical brain cells
Extensive branching
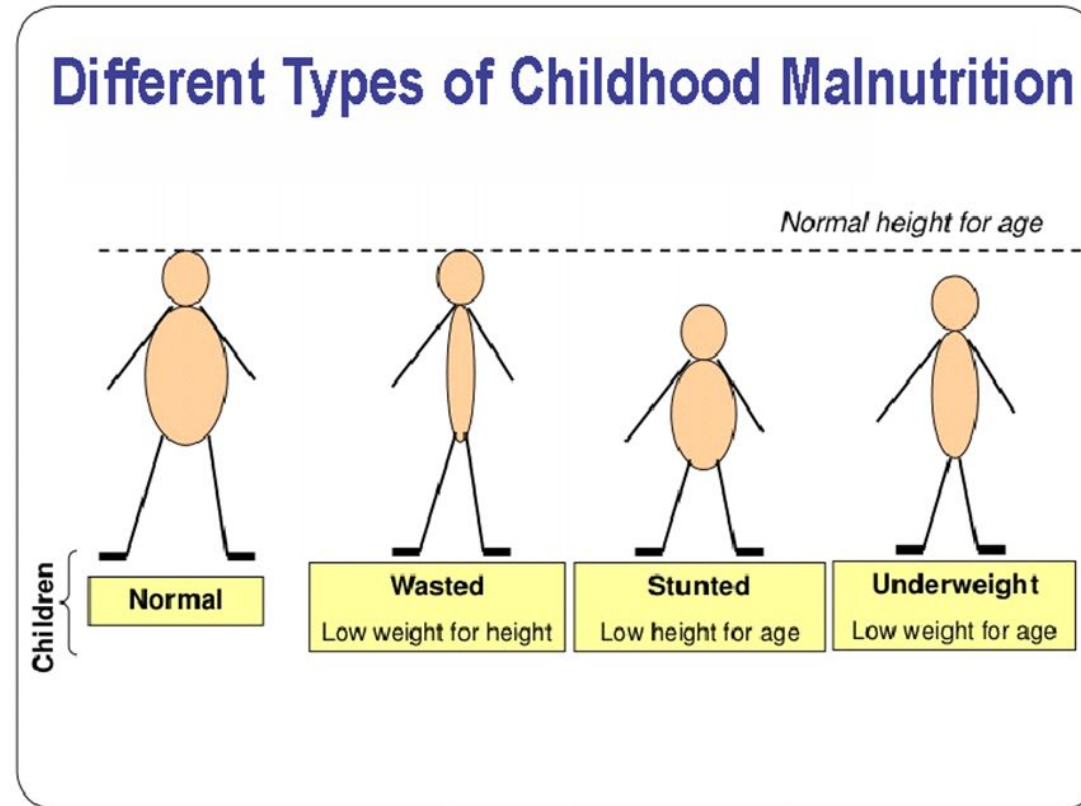
Impaired brain cells
Limited branching
Abnormal, shorter branches

Source: de Onis and Franca (2016), adapted from Cordero *et al.* 1993).

Which malnutrition?

Different Types of Childhood Malnutrition

Normal height for age

Children

Normal

Wasted
Low weight for height

Stunted
Low height for age
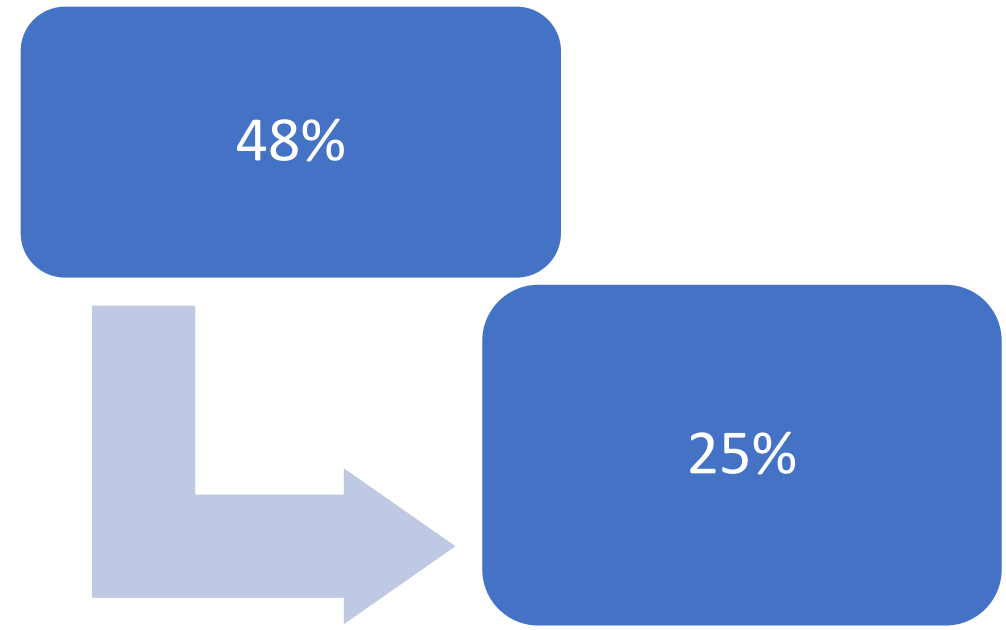
Underweight
Low weight for age

Which malnutrition?

- **Stunting** (low-height-for-age): to capture long term effects of undernutrition

- Wasting (low weight-for-height): to capture short term effects of undernutrition

How big is the problem?

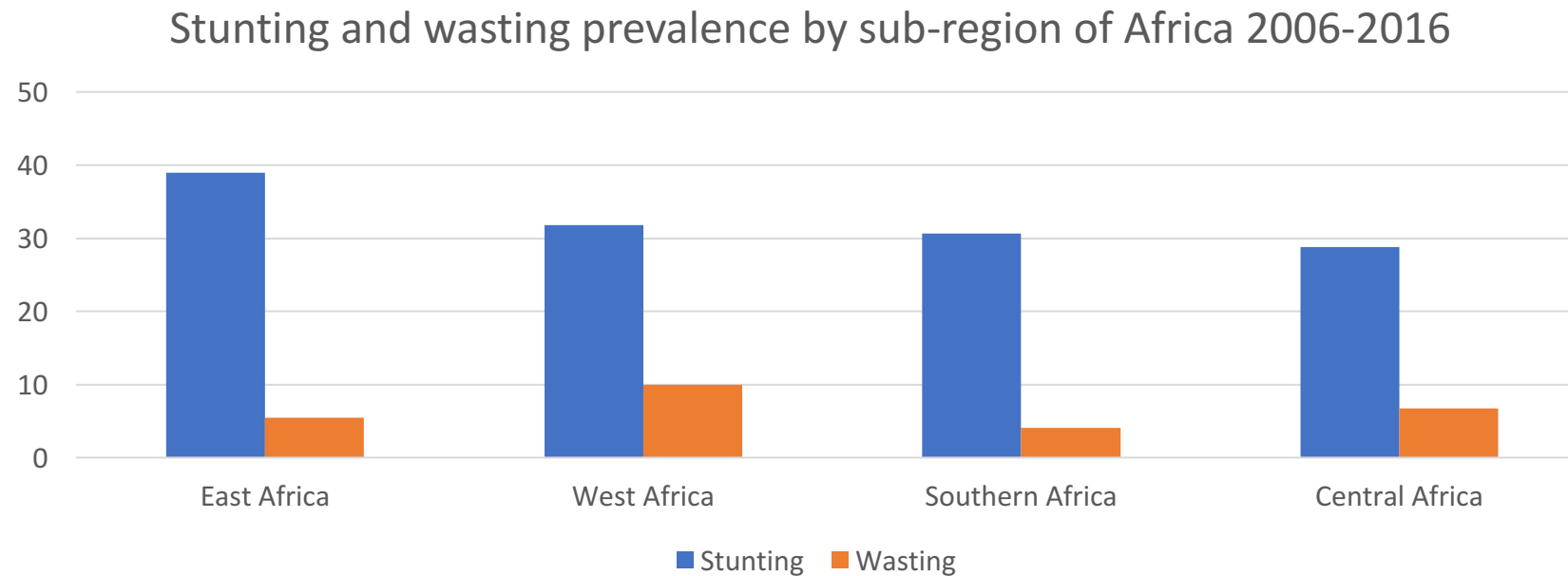Evolution of stunting rates between 1990 and 2013

AFRICA

ASIA

42%

34%

48%

25%

Data source: De Onis and Branca (2016)

How big is the problem?

Stunting and wasting prevalence by sub-region of Africa 2006-2016
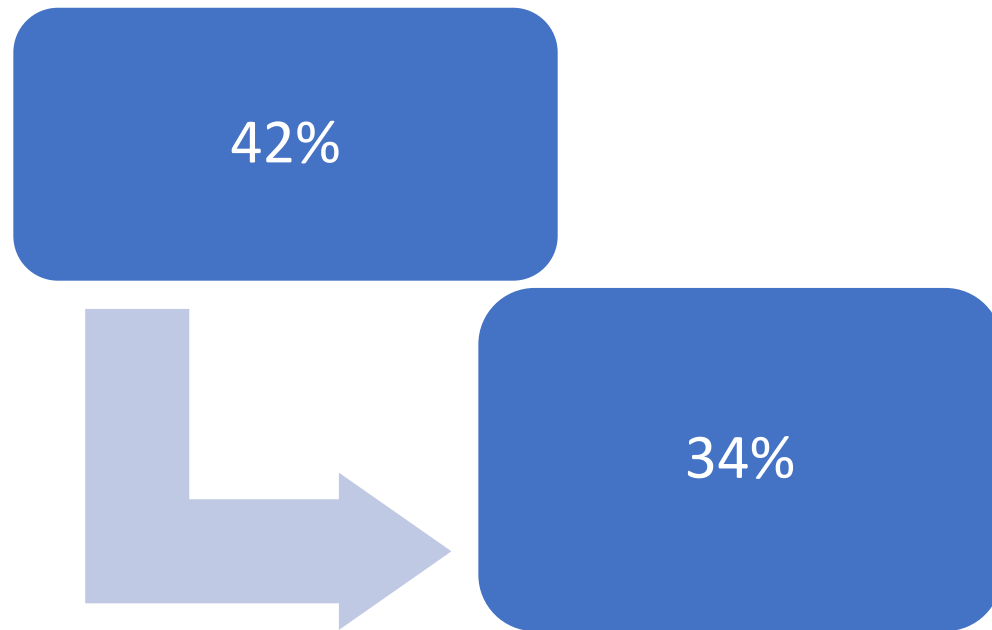
Data source: Akombi et al. (2017)

Why Sahel countries?

- Recent studies have linked vulnerability and resilience to shocks to dynamic poverty and to malnutrition (Marzo et. al., 2017; Darrouzet-Nardi and Masters, 2017)

- Sahel region prone to many shocks, including droughts, erratic rainfall, land erosion, WASH related diseases

- Adaptive social protection is an area of focus of the health nutrition and population global practice at the World Bank (Sahel ASP program)

What do we know from past studies?

- Theory: quality of children matters to parents (Becker and Lewis, 1973, Becker,1974, Becker and Tomes, 1976), UNICEF conceptual framework(immediate, underlying, basic causes of malnutrition)

- Empirical studies: child age and gender, household characteristics- parents education, mother's autonomy, HH income (Carlson et al, 2015; Soriano and Garrido, 2016; Headey, Hoddinott, and Park, 2017), environmental factors- acess to health services,water, sanitation, hygiene (Skoufias, 2015, Cumming and Cairncross, 2016, Danaei et.al., 2017)

What this study is trying to do?

- Main objective : contribute to a better understanding of the main drivers of malnutrition in Sahel countries by focusing on Senegal with a model to be tested in other countries in the Sahel using available relevant data

- Specifically: check patterns in stunting and wasting across the four Sahel countries over time (Burkina Faso, Mali, Niger, and Senegal) and see if lessons can be drawn for one another.

- Highlight the importance of seasonal data: prevalences rates vary depending on the period of data collection

What this study is trying to do?

- Interested in studying both short-term effects of shocks and the effects of shocks over time. In particular, we want to identify shocks that occurred two years before survey data was collected to check whether it has a lasting effect on malnutrition.

- Test the hypothesis that it is not the lack of food that causes a spike of wasting in June-Sept, but is it the onset of the rainy season that leads to poor sanitation and diarrhea

What this study is trying to do?

- Intend to use pseudo panel data methods (Deaton; 1985; Verbeek, 2008) to conduct the analysis. We will identify cohorts of kids under five years of age in the data sets that might have been exposed to shocks at different times of their life and at a given time of the year.

- Children will be grouped into seven cohorts (0-6 months; 7-12 months; 13-18 months; 19-24 months; 25-36 months; 37-48 months and 49-60 months) to take into account the fact that under 2 years of age, children grow faster.

What we have so far

- Data from several rounds of DHS surveys for the four countries, rainfall and malaria data at the communal level for Senegal

- Preliminary descriptive analysis

- Preliminary econometric analysis

RESULTS: Senegal fares best, Niger is lagging far behind
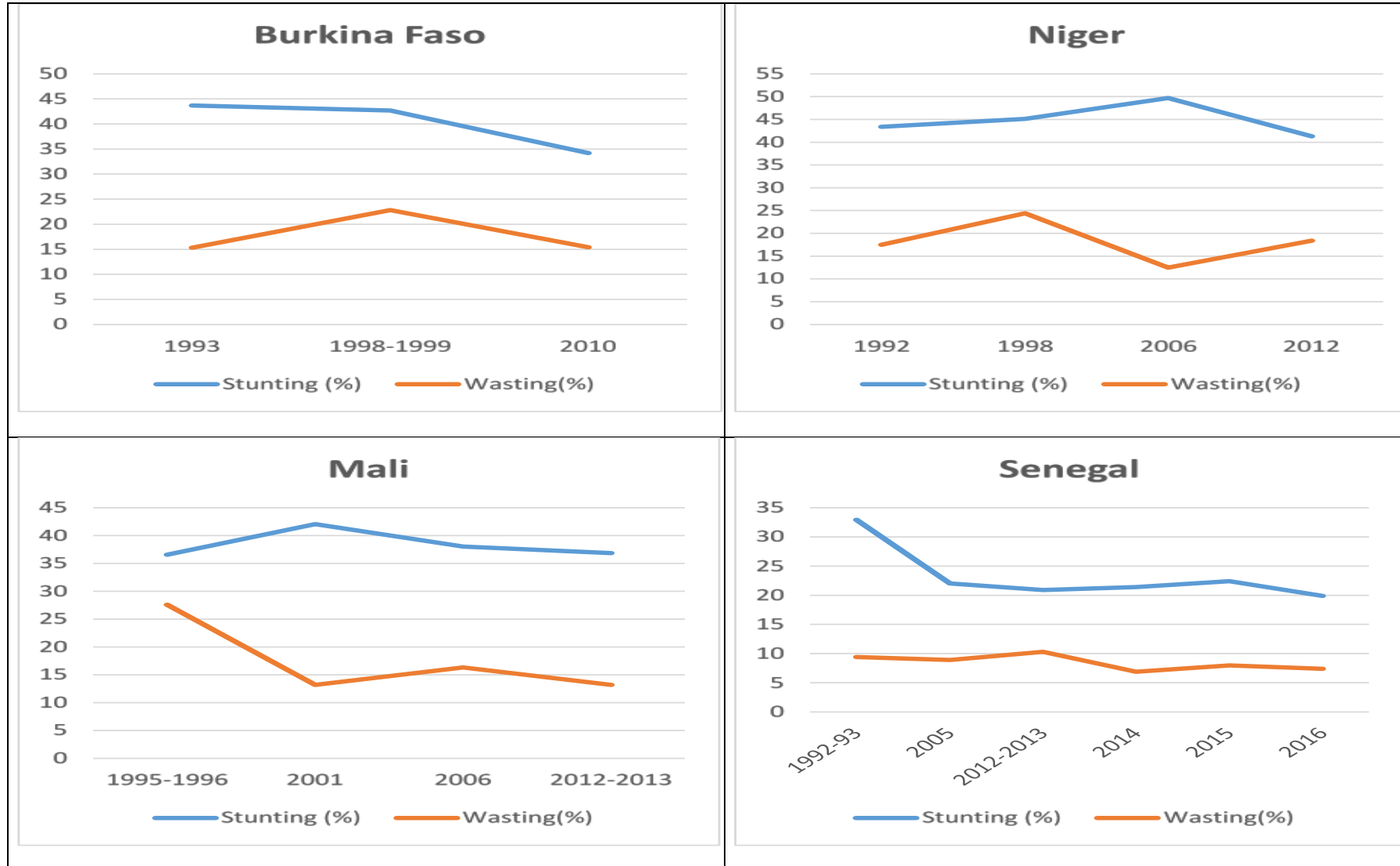
RESULTS: Regional disparities exist and persist (case of Senegal)

Stunting prevalence by region in Senegal, DHS 2016
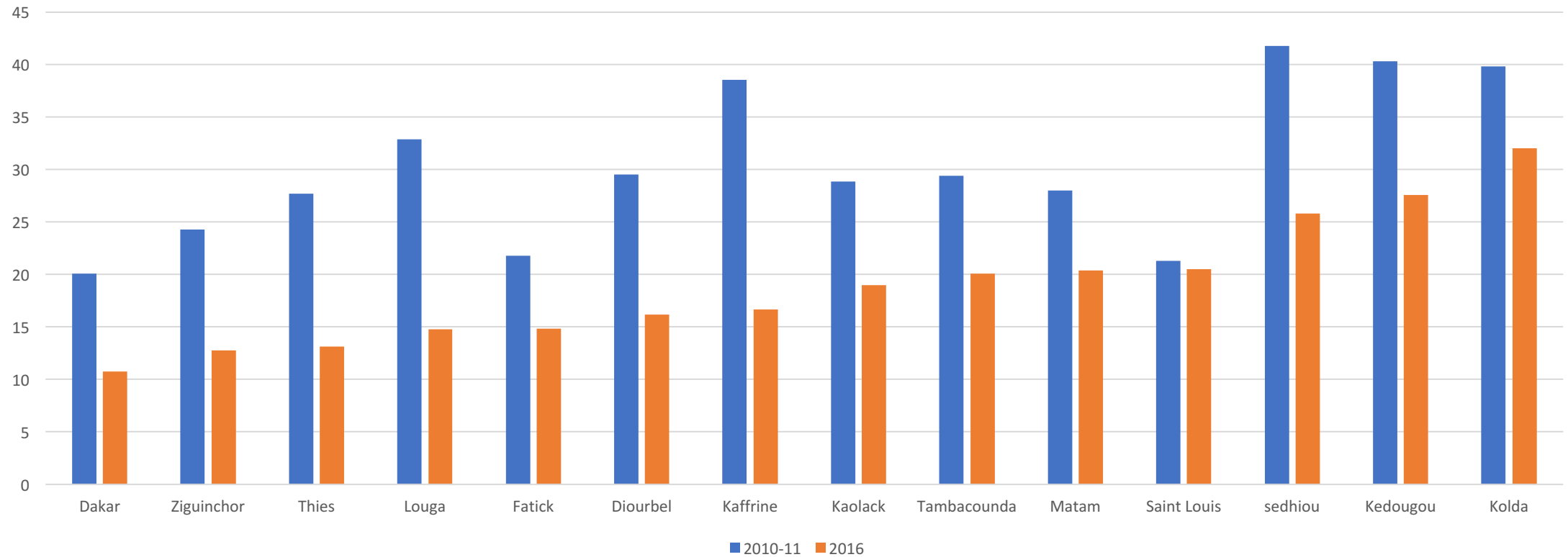
RESULTS: Rural residence, gender and wealth seem to matter for stunting outcomes

Stunting incidence comparison (latest year available)

Country	Overall incidence	By area		Ratio rural to urban	By gender		By wealth quintile		Ratio poorest to richest	Year of reference
		Rural	**Urban**		**Female**	**Male**	**Poorest**	**Richest**		
Burkina Faso	**34,2**	37,22	24,21	1,54	31,65	36,94	40,45	19,98	2,02	2010
Mali	**36,8**	41,42	22,75	1,82	35,49	38,17	46,79	21,66	2,16	2012
Niger	**41,3**	44,58	29,63	1,50	39,04	43,57	44,98	31,89	1,41	2012
Senegal	**19,9**	21,09	14,17	1,49	16,51	21,67	24,86	9,21	2,70	2016

RESULTS: season of interview seems to matter

Stunting and wasting by month of interview in Senegal
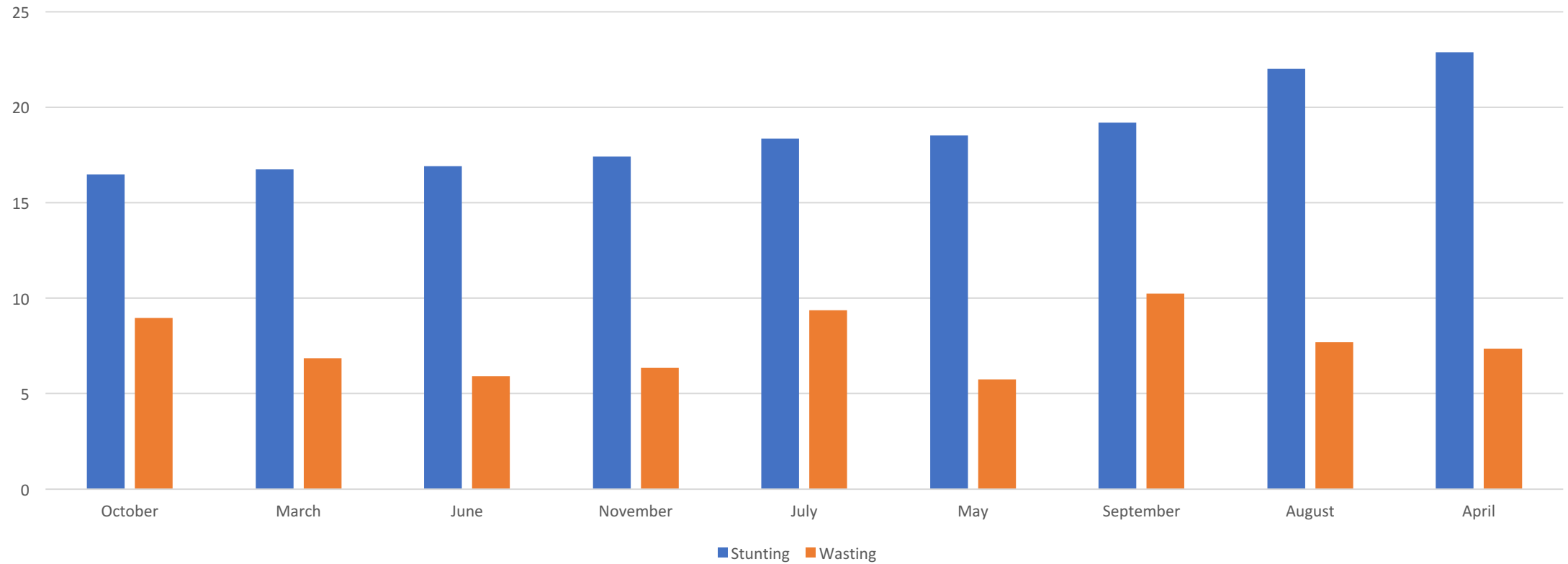
Preliminary results: correlates of stunting

VARIABLES	Burkina Faso	Mali	Niger	Senegal
Child age in months	-0.026***	-0.029***	-0.024***	-0.005***
	(0.001)	(0.002)	(0.002)	(0.001)
Child gender (male=1)	-0.167***	-0.126**	-0.162***	-0.124***
	(0.045)	(0.059)	(0.061)	(0.044)
Father's education (years)	0.007**	0.029**	-0.002	0.026***
	(0.003)	(0.011)	(0.004)	(0.006)
Mother's education (years)	0.042***	0.003	0.035**	0.020***
	(0.011)	(0.013)	(0.014)	(0.006)
Mother's age (years)	0.014***	0.010*	0.012**	0.003
	(0.004)	(0.005)	(0.005)	(0.004)
Number of children under 5 years of age	-0.015	-0.005	0.004	-0.032***
	(0.020)	(0.030)	(0.027)	(0.010)
HH head's age	-0.001	-0.004	0.002	0.002
	(0.002)	(0.003)	(0.003)	(0.002)
Drinking watersource (=1 if potected well or piped)	0.015	0.208***	-0.038	0.006
	(0.060)	(0.076)	(0.092)	(0.059)
Type of toilet (=1 if latrine or better)	0.218***	0.126	0.367***	0.183***
	(0.062)	(0.121)	(0.099)	(0.050)
Urban residence	0.205***	0.432***	0.043	0.090
	(0.074)	(0.130)	(0.105)	(0.057)
Observations	6,546	4,411	4,824	5,399
R-squared	0.106	0.102	0.081	0.073

Preliminary results: correlates of wasting

VARIABLES	Burkina Faso	Mali	Niger	Senegal
Child age in months	0.019***	0.009***	0.005***	-0.010***
	(0.001)	(0.002)	(0.002)	(0.001)
Child gender (male=1)	-0.039	-0.021	-0.028	-0.008
	(0.037)	(0.047)	(0.048)	(0.043)
Father's education (years)	0.003	0.007	-0.002	0.001
	(0.004)	(0.007)	(0.003)	(0.007)
Mother's education (years)	0.029***	0.010	0.013	0.020***
	(0.011)	(0.012)	(0.014)	(0.005)
Mother's age (years)	0.004	-0.000	-0.004	0.003
	(0.003)	(0.004)	(0.005)	(0.003)
Number of children under 5 years of age	-0.005	-0.004	0.002	0.008
	(0.017)	(0.020)	(0.022)	(0.009)
HH head's age	-0.002	0.002	0.001	0.000
	(0.002)	(0.002)	(0.003)	(0.001)
Drinking watersource (=1 if potected well or piped)	0.008	0.124**	0.033	0.030
	(0.048)	(0.062)	(0.065)	(0.039)
Type of toilet (=1 if latrine or better)	0.142***	-0.044	0.117	0.017
	(0.054)	(0.083)	(0.087)	(0.050)
Urban residence	-0.133*	-0.031	-0.054	0.014
	(0.072)	(0.118)	(0.127)	(0.054)
Observations	6,494	4,411	4,787	5,377
R-squared	0.078	0.016	0.021	0.071

Take away and next steps

- Take away:
  - Prevalence rates seem to be reducing but slowly; Senegal is doing better than to the other countries
  - Regional disparities exist
  - Importance of seasonal data
  - Correlates of stunting besides child characteristics include parents' education, mother's age, type of toilet used, and urban residence
- Next steps
  - Construct cohorts for pseudo panel analysis for Senegal
  - Gather more data on shocks (rainfall and malaria) for the other countries

Zikomo!

Thank you for your kind attention!