Urban-rural differences in stunting and obesity

Sue Horton sehorton@uwaterloo.ca

Previous studies

- Rural-urban gap in stunting narrows with economic growth (Paciorek et al, 2013, for 45 LMICs)
- But socioeconomic gradient in stunting within urban areas is larger than rural-urban one, and urban poor can be as disadvantaged as rural poor (Menon et al, 2000; Van de Poel et al, 2007)
- Rural-urban gap in obesity for women initially widens with economic growth (Jaacks et al, 2015)
- But after about per capita income of $2500 (1990 $), obesity shifts more to middle socioeconomic groups (Ruel et al, 2015)
- Which may explain why rural-urban obesity gaps in some countries begin to narrow (Popkin et al, 2013) as incomes continue to increase

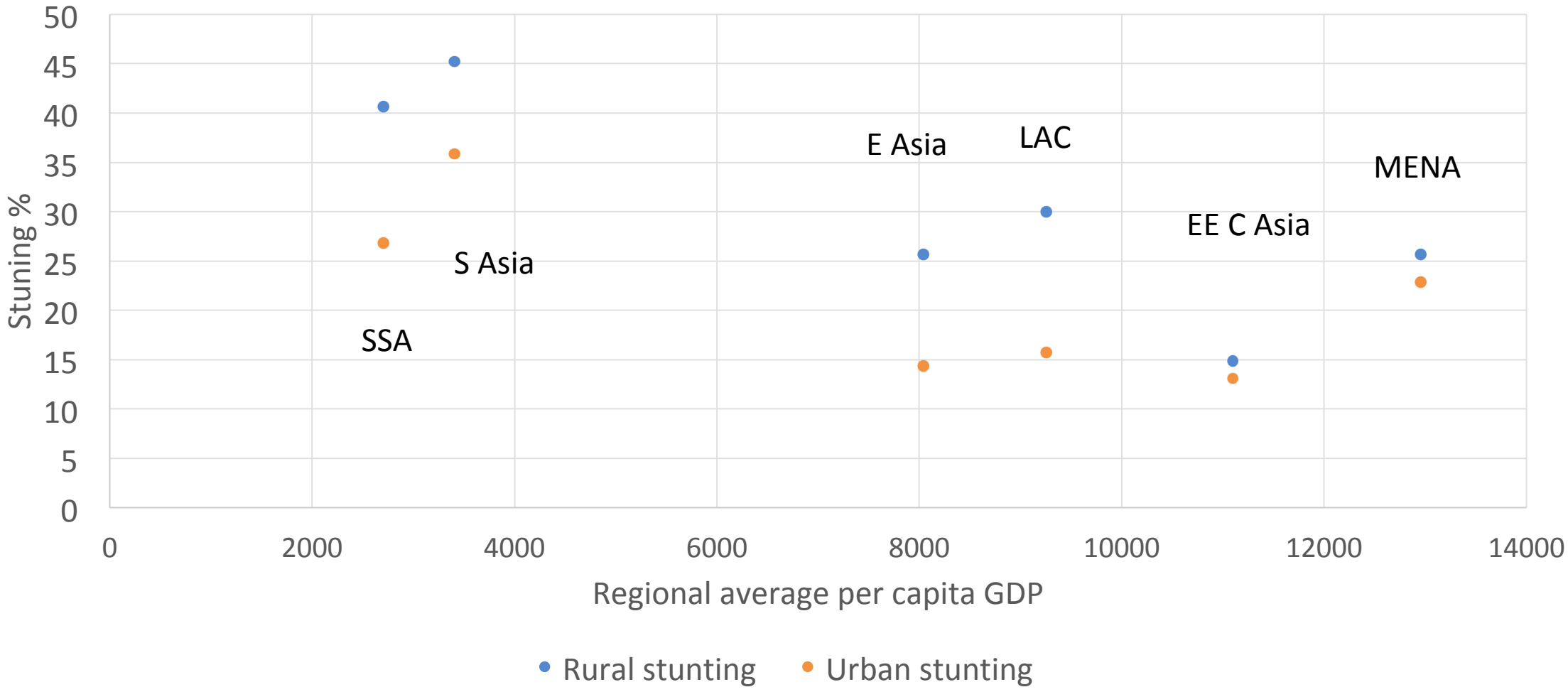
DOHaD Theory (Developmental Origins of Health and Disease)

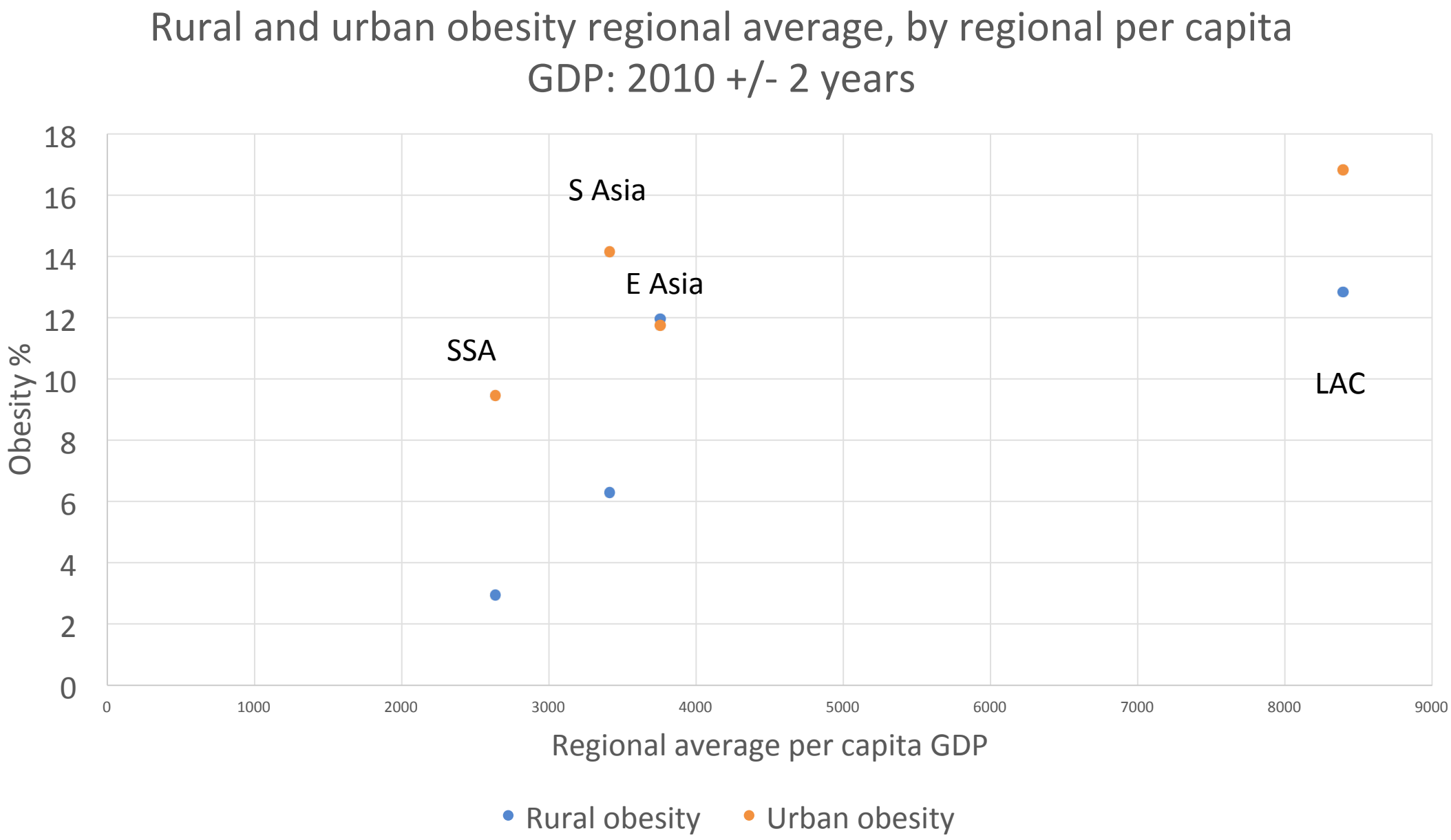
- Barker hypothesis suggests that epigenetic changes for children exposed *in utero* to food scarcity, program them for scarcity
- If they face instead plenty in later life (e.g. their family moves from rural to urban areas) they are more susceptible to cardiovascular disease and type II diabetes
- Subsequent work has shown that children of mothers who are obese or have type II diabetes, are also susceptible to metabolic syndrome
- Hence rural and urban malnutrition, in conditions of rapid urbanization, interact

Data and methods

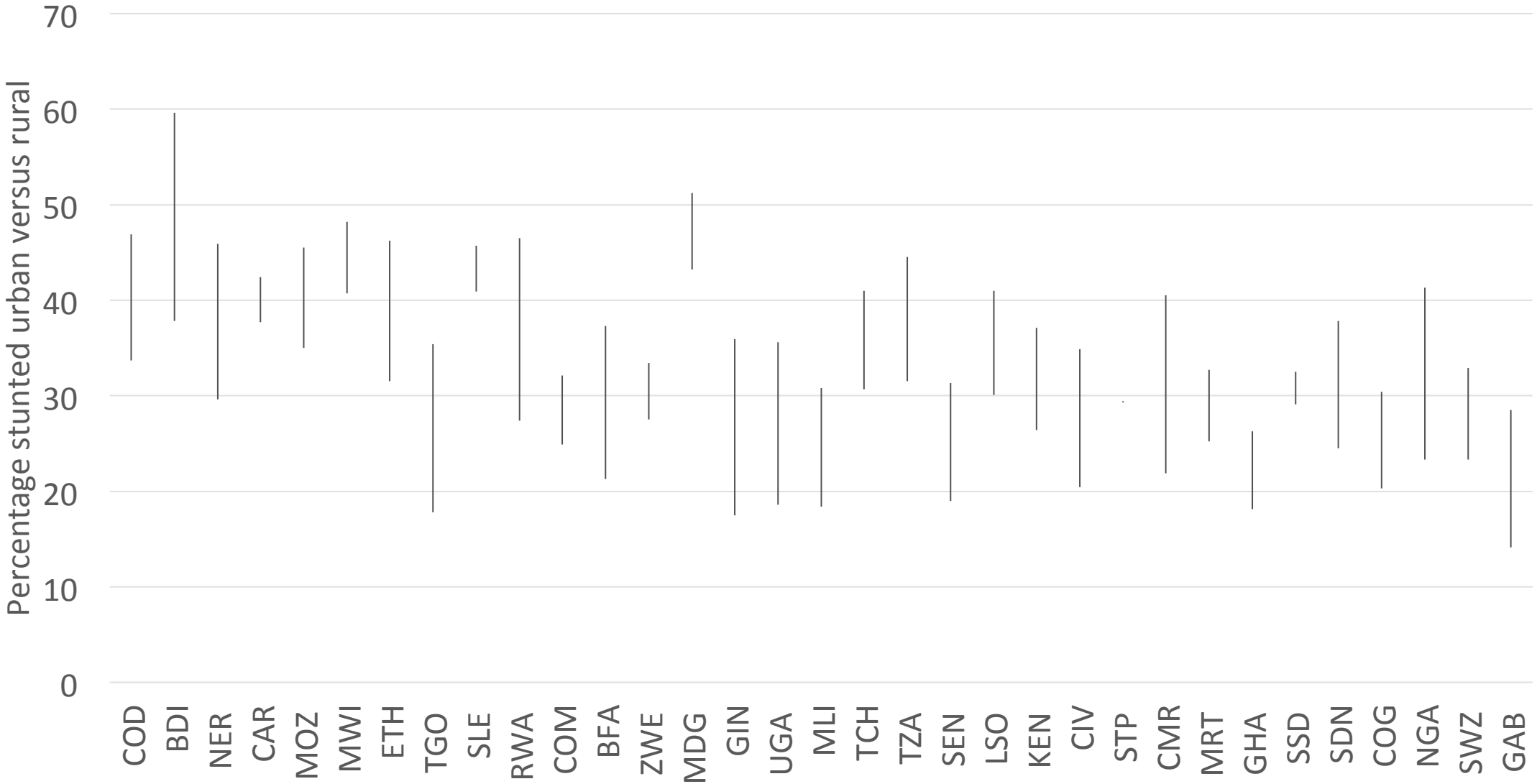
- Use WHO Global Health Observatory database for MICS and DHS surveys for LMICs
- Use stunting in under-5 children, and obesity in women 15-49
- Data available for 102 countries, for selected years 1991-2015, more commonly for stunting, but around half also have obesity data
- 2 sets of analysis
  - First, cross-section “snapshots” for 2010 (or closest year between 2008-2012)
  - Next, OLS regression controlling for GDP per capita (2011 PPP $), time, region (6 World Bank regions: SSA, S Asia, LAC, EE C Asia, E Asia, LAC)
- Limitations of data: large countries, upper-middle income, are underrepresented

Urban and rural stunting regional averages, by per capita regional GDP: 2010 +/- 2 years



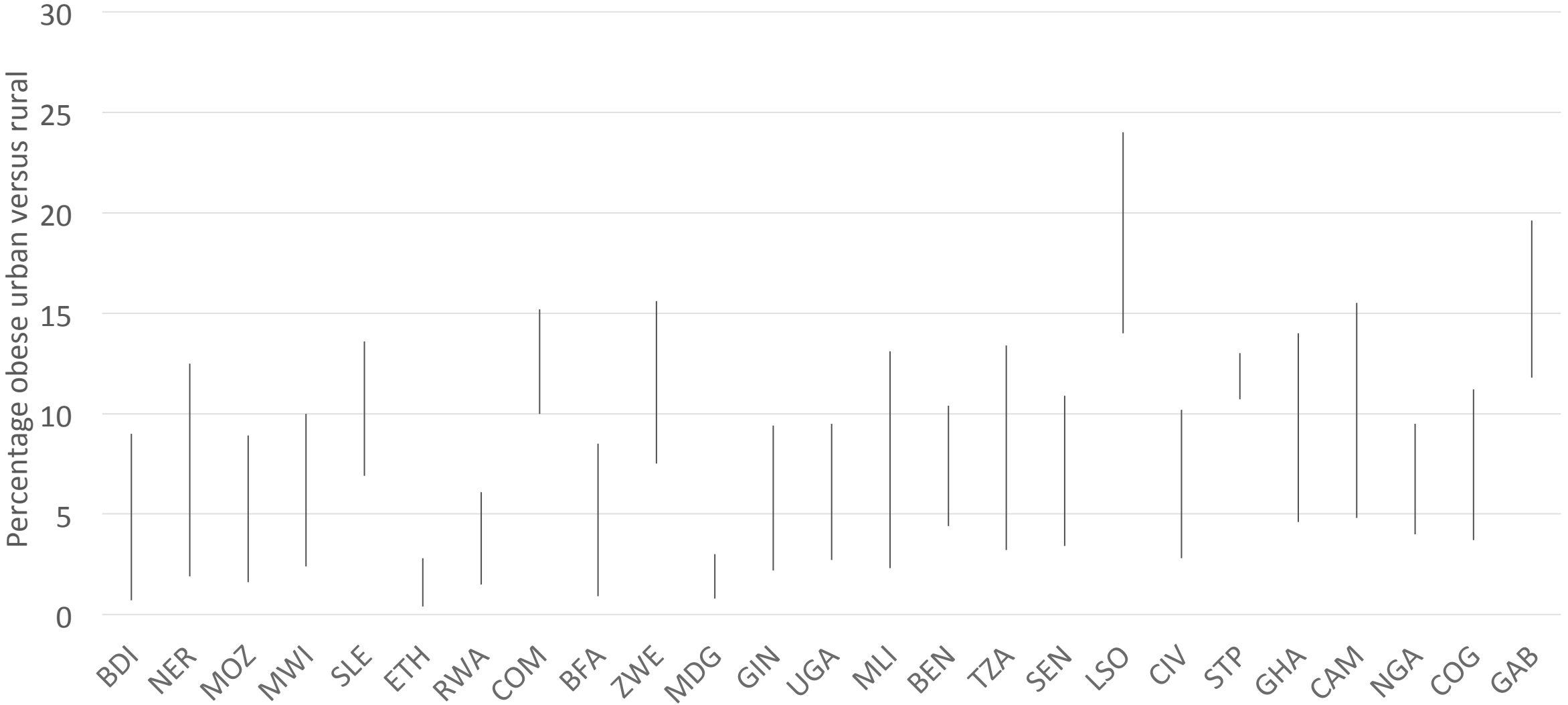

Rural and urban obesity regional average, by regional per capita GDP: 2010 +/- 2 years
Obesity %
18
16
14
12
10
8
6
4
2
0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
S Asia
E Asia
SSA
LAC
Regional average per capita GDP
Rural obesity
Urban obesity

Prevalence of stunting in children under 5: Sub-Saharan Africa 2010



Countries are ranked left to right in order of increasing GDP per capita

Prevalence of obesity in women 15-49, sub-Saharan Africa 2010



Countries are ranked left to right in order of increasing GDP per capita

Results: OLS regressions, stunting & obesity

Independent variable	Rural stunting	Urban stunting	Rural obesity	Urban obesity
Ln(per capita GDP)	↓	↓	↑	↑
East Asia dum	-	-	-	lower
EE/Central Asia dum	lower	lower	higher	-
LAC dum	-	lower	higher	higher
MENA dum	-	-	much higher	much higher
S Asia dum	higher	higher	-	lower
Time	↓	↓	↑	↑

Omitted dummy variable is SSA; lower/higher indicates the coefficient for regional dummy is significant;
- indicates coefficient is not significant at 5% level; sample size is 255 for stunting, 179 for obesity; Adjusted R^2 is 0.55-0.56 for stunting, 0.73-0.78 for obesity

Results: OLS, stunting & obesity gaps

Independent variable	Rural-urban stunting gap	Urban-rural obesity gap
Ln (per capita GDP)	↓	↑
Ln(per cap GDP) squared	-	↓
East Asia dum	-	Lower
EE/Central Asia dum	Lower	Lower
LAC dum	Higher	-
MENA dum	Lower	-
S Asia dum	-	Lower
Time	↓	↑

Omitted dummy variable is SSA; lower/higher indicates the coefficient for regional dummy is significant;
- indicates coefficient is not significant at 5% level; sample size is 255 for stunting, 179 for obesity; Adjusted R^2 is 0.23 for stunting gap, 0.26 for obesity gap

Conclusions

- Rising incomes and time trends are reducing stunting and narrowing the urban-rural gap
- But urban poor remain very vulnerable (SES very important)
- Rising incomes and time trends are increasing obesity; urban-rural gap first widens, and then may narrow
- SES also important for obesity, as is behavior change
- Middle East/North Africa faces particular challenges with barriers to physical activity particularly for women, and high levels of obesity
- DOHaD adds an additional dimension to the rural-urban challenges

References

- Jaacks LM, M.M. Slining and B. M. Popkin. Recent underweight and overweight trends by rural-urban residence among women in low- and middle-income countries**.** J Nutr. 2015 Feb;145(2):352-7. doi: 10.3945/jn.114.203562
- Menon, P., M..R. Ruel and S. S. Morris. Socio-economic differentials in child stunting are consistently larger in urban than in rural areas. *Food and Nutrition Bulletin,* vol. 21: 282-289, 2000.
- Paciorek C. J, Stevens G. A., Finucane, M. M., Ezzati, M. and on behalf of the Nutrition Impact Model Study Group (Child Growth). Children's height and weight in rural and urban populations in low-income and middle-income countries: a systematic analysis of population-representative data. Lancet Glob Health. 2013 Nov; 1(5): e300–e309.
- Popkin BM, Adair LS, Ng SW. NOW AND THEN: the global nutrition transition: the pandemic of obesity in developing countries. Nutr Rev. 2013
- Ruel, M.T., J. Garrett, S. Yosef and M. Olivier. Urbanization, Food Security and Nutrition. In S. de Pee et al. (eds.), Nutrition and Health in a Developing World. New York: Springer, 2017
- van de Poel, E., O. O'Donnell, and E. van Doorslaer (2007): Are Urban Children really healthier?, Tinbergen Institute Discussion Paper, No. 07-035/3, Tinbergen Institute, Amsterdam and Rotterdam


pepsi
Sweet Drop Oil
Sunflower
KILIMANJARO