Characterizing the Food Environment in Rural Communities of Sri Lanka

Preliminary findings from 45 Grama Niladhari Divisions

Presented by: Quinn Marshall
Johns Hopkins Bloomberg School of Public Health

ANH2021
Agriculture, Nutrition and Health Academy Week

www.ANH-Academy.org/ANH2021
Conference Hashtag: #ANH2021

Co-authors: Dilini Hemachandra, University of Peradeniya
Deanna Olney, IFPRI
Samuel Scott, IFPRI
Kate Sinclair, World Food Programme
Jessica Fanzo, JHU SAIS

Partners and Acknowledgements

R5N Study Collaborators:

- International Food Policy Research Institute (IFPRI), *overall research lead*
- Johns Hopkins University, *food environment sub-study lead*
- University of Peradeniya, *food environment sub-study co-lead*
- Medical Research Institute of Sri Lanka
- University of Wayamba
- University of California, Davis
- World Food Programme (WFP), Foundation for Health Promotion, Government of Sri Lanka, *program partners*

Funding support from:

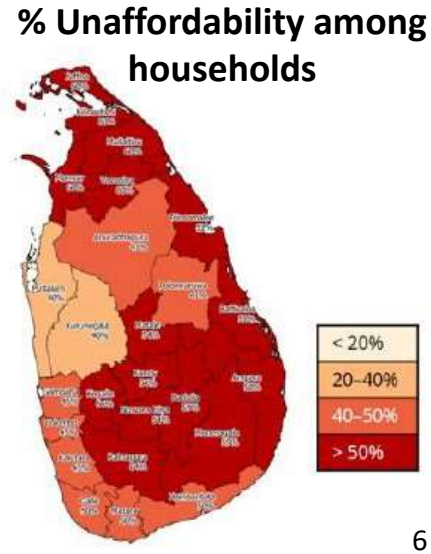
- Bloomberg Distinguished Professorship funding
- CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) led by IFPRI
- WFP

No conflicts of interest to disclose

Context and rationale

Access constraints in the food environment

- Sri Lanka is experiencing a double burden of malnutrition, with inadequate intake of fruits and vegetables and overconsumption of energy-dense processed foods and starchy staples.[1-4]
- Over 50% of households are unable to afford a healthy diet.[5-7]
- Food prices are subject to seasonal variation, short-term fluctuations, and now Covid-19 related shocks.[8]
- Roads and market infrastructure have improved, but physical access and availability of food may still pose challenges in isolated rural areas.[9]



Community food environments…

"Pola" markets

Village retail shops

… how do they influence diets?

Research aim:

How are food environments in R5N study communities characterized in terms of the cost and diversity of foods available, and physical access to retail shops and markets?

Market and retail shop sampling

Sampling strategy and sample overview:

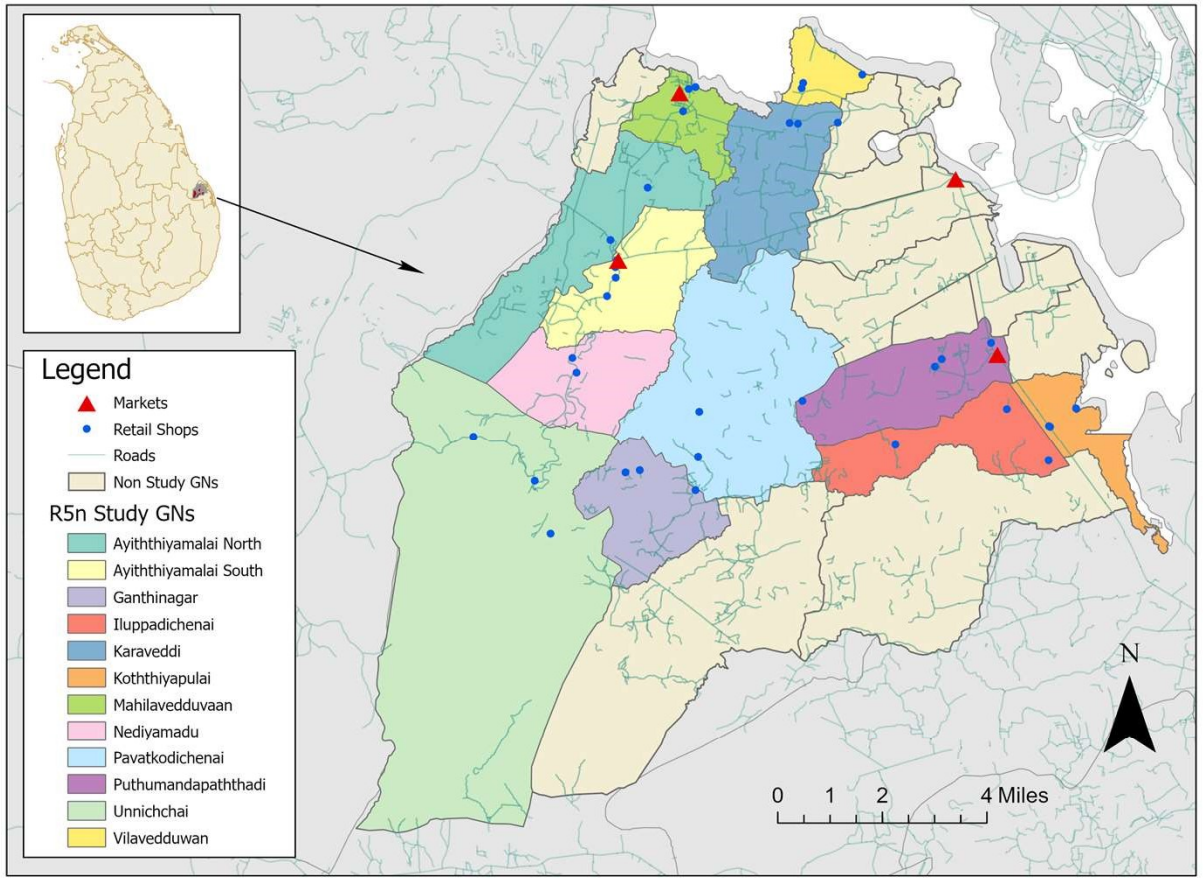
- WFP R5N districts targeted based on poverty, nutrition, and vulnerability to drought and floods
- Key informant interviews with WFP field officers and village leaders identified the most frequented markets and retail shops for each study cluster (GN Division)
- Targeted sample of 3 retail shops per cluster

	Retail shop survey	Market survey	
District	Number of retail shops sampled	Market type	Number of vendors (categorical)
Batticaloa	35	Pola	2 - 5
12 study clusters		Pola	6 - 15
		Pola	16 - 50
		Pola	16 - 50
Mannar	25	Daily market	1
10 study clusters		Daily market	2 - 5
Matale	23	Pola	16 - 50
8 study clusters		Pola	16 - 50
		Pola	16 - 50
		Pola	16 - 50
		Pola	51 - 100
Monaragala	12	Pola	6 - 15
4 study clusters		Pola	16 - 50
Mullaitivu	27	Daily market	6 - 15
11 study clusters		Daily market	6 - 15
		Daily market	101 - 200

Examples of markets

Examples of village retail shops

Batticaloa district study area - example



Overview of questionnaires

Market survey

- Market characteristics: location, size, accessibility, electricity, water availability, phone coverage
- Number of vendors selling different food groups
- Food availability and prices
  - Food list of ~ 200 items
  - Enumerators seek collect three price observations for each item

Approximately 1 – 2 hours

Retail shop survey

- Shop characteristics: location, size, accessibility, electricity, water availability, phone coverage
- Supply chain constraints experienced (*as of March*)
- Food availability and prices
  - Food list of ~ 200 items, plus an extended list of packaged foods
  - One price observation per item
  - Prices are not collected for most packaged foods

Approximately 30 minutes

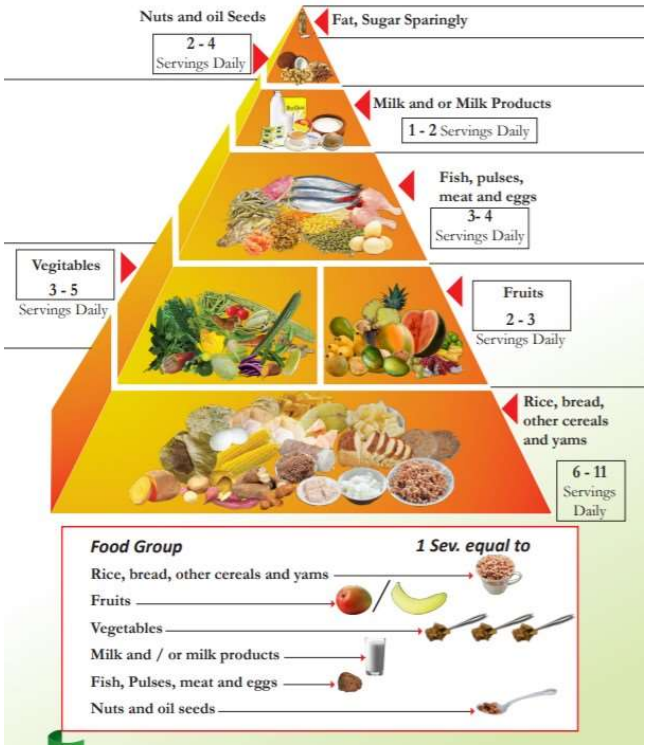
Preliminary findings

Measure: Cost of a healthy diet

- Estimates the minimum cost of following food-based dietary guidelines, by selecting the least cost food items within each food group[5].
- Prices converted to Rupees per serving, adjusted for inedible portions.

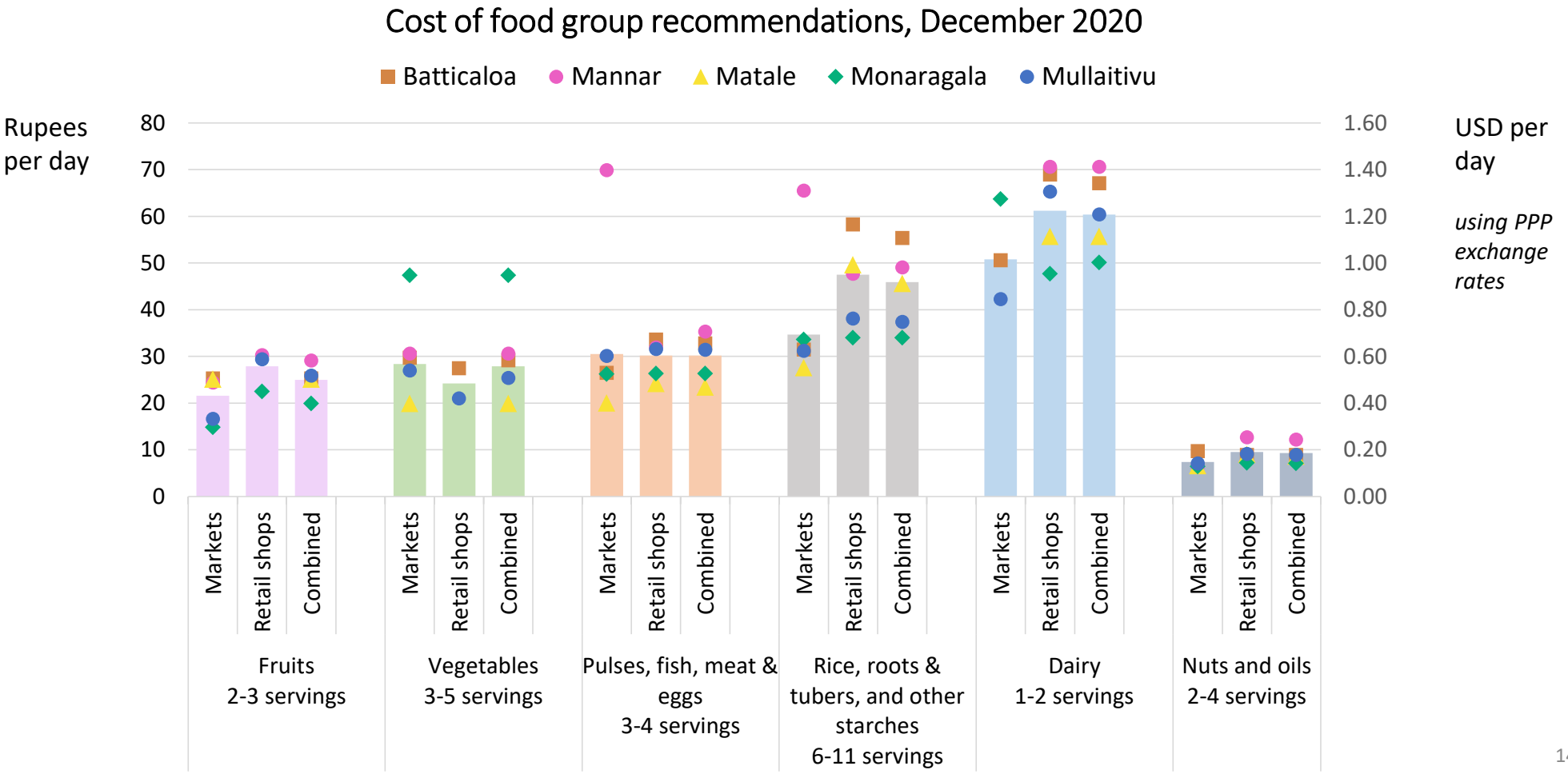
Sri Lanka Food-Based Dietary Guidelines:		Other requirements:
Fruits	2 - 3 servings*	2 unique fruits
Vegetables	3 - 5 servings	3 unique vegetables, including one DGLV
Fish, pulses, meat, eggs	3 - 4 servings	2 protein sources, meat is not required
Rice, bread, other cereals, and yams	6 - 11 servings	2 unique starches
Milk and dairy	1 - 2 servings	
Nuts and oil	2 - 4 servings	

** This analysis uses the mean of the upper and lower bound for each recommendation*



Source: Nutrition Division, Ministry of Health (2011). Food Based Dietary Guidelines for Sri Lankans.

Results: Cost of a healthy diet (1)



Results: Cost of a healthy diet (2)

District	Cost of a healthy diet, total (Rs/person/day)*	Average food expenditure (Rs/person/day)**	Healthy diet, as % of average food expenditure	Healthy diet, as % of poorest income decile food expenditure *National average***
Batticaloa	219	195	112%	195%
Mannar	227	232	98%	203%
Matale	178	181	99%	159%
Monaragala	185	161	115%	165%
Mullaitivu	189	170	112%	169%
TOTAL	**199**	**188**	**106%**	**177%**

* Summing the cost of each food group recommendation, using retail prices from markets and retail shops

** Source: Department of Census and Statistics (2018). Household Income and Expenditure Survey, 2016. Colombo, Sri Lanka.

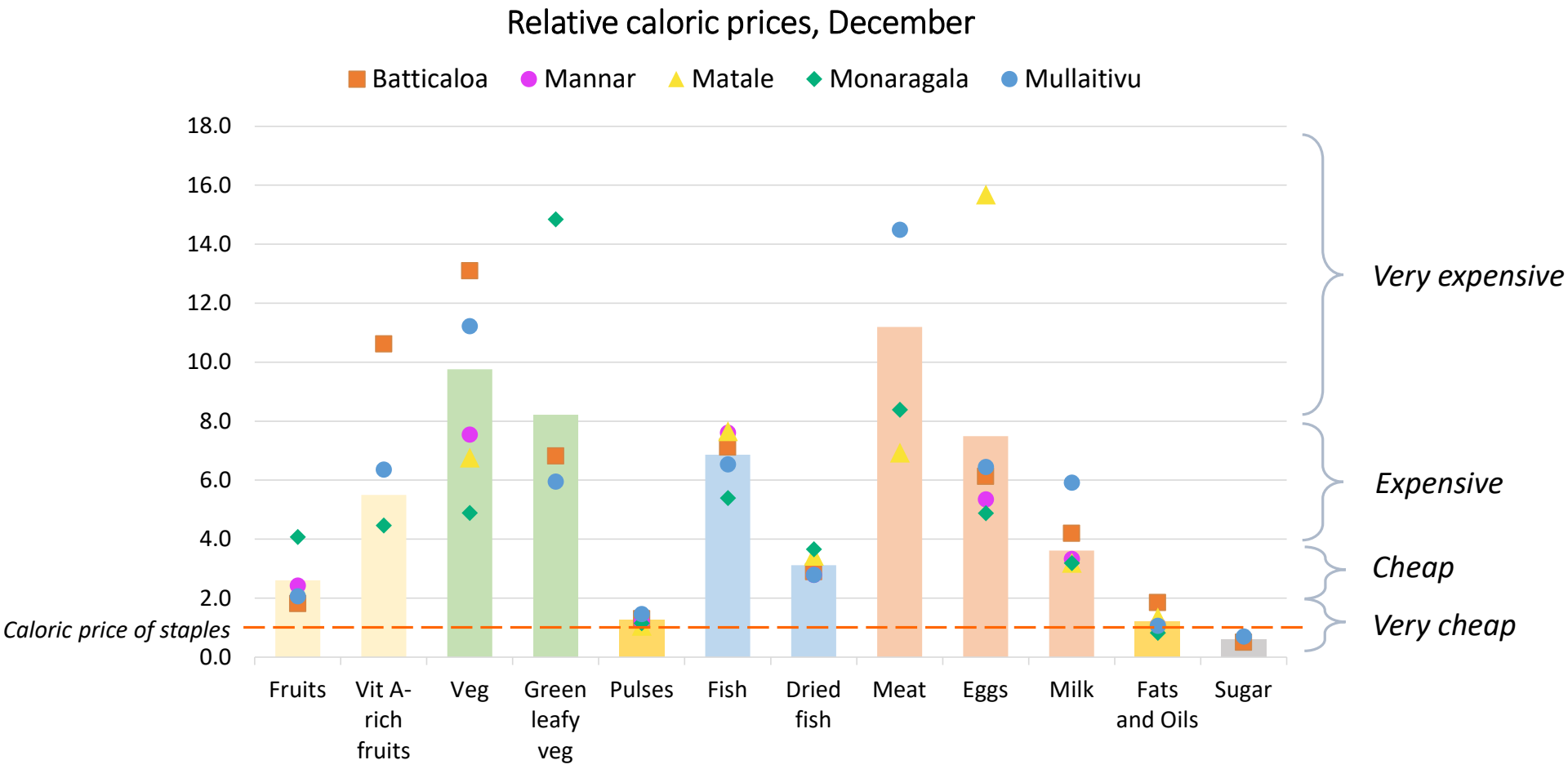
*** 112 SLR per person per day

Measure: Relative caloric prices

- The ratio of the price of 1 kcal of a given food group to the price of 1 kcal of a basket of starchy staples.[10]
- Or, the cost per kcal of diversifying away from staple foods to other more nutrient dense food groups (or to energy-dense processed foods).

$$\frac{\textit{Average of the three lowest caloric prices in the target food group}}{\textit{Weighted index of caloric prices of common starchy staples}}$$

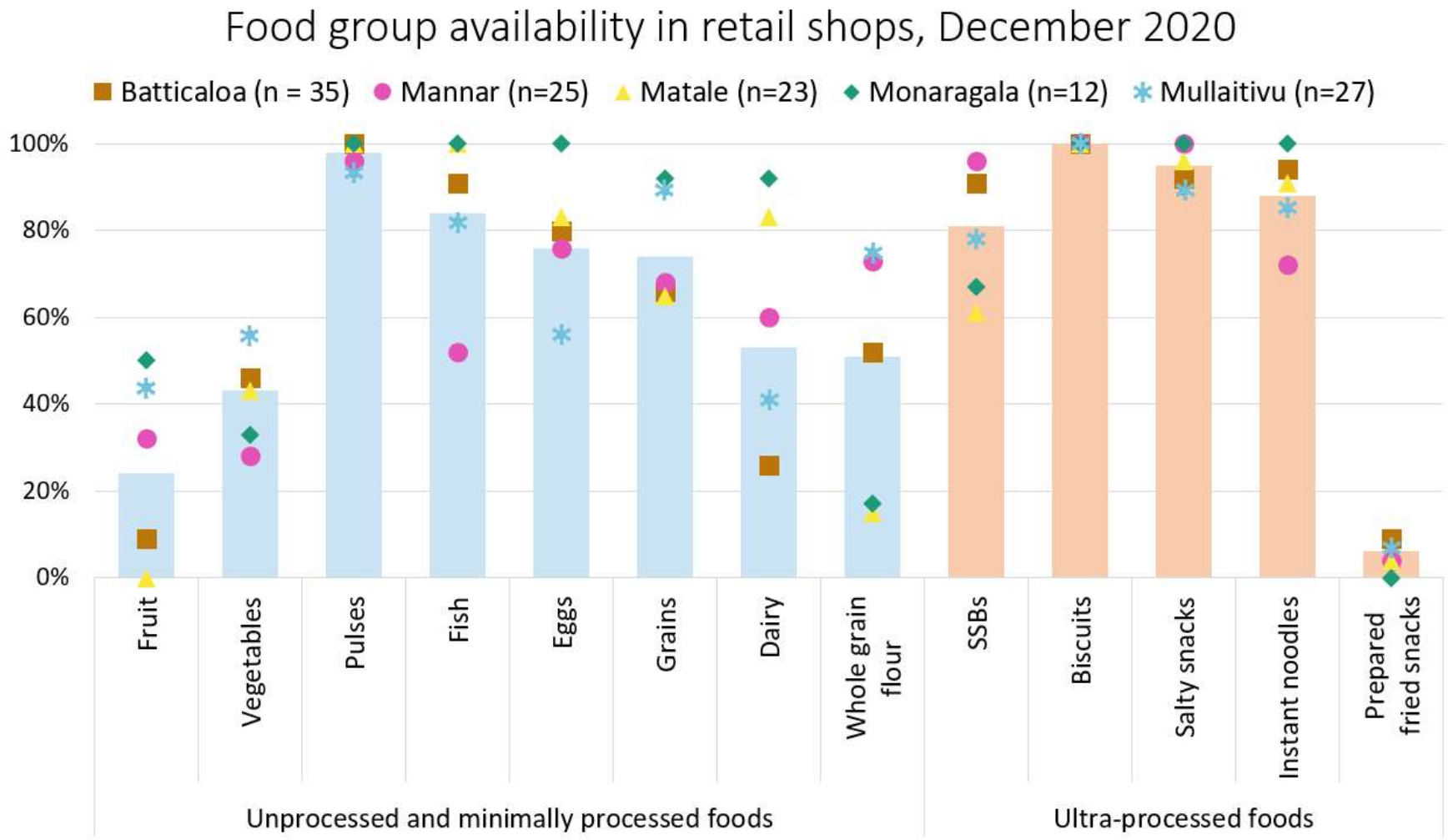
Results: Relative caloric prices (1)



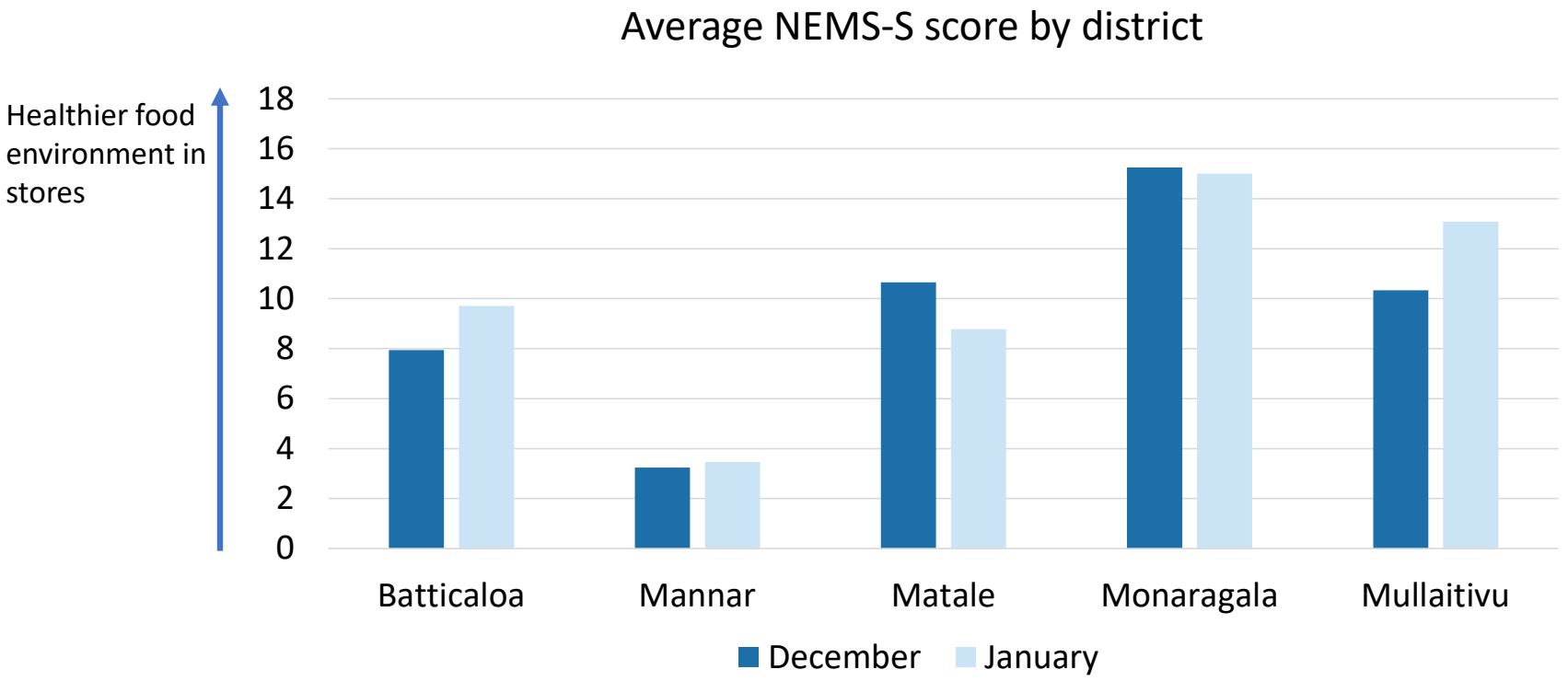
Measure: Nutrition environment measures survey for stores (NEMS-S)[11,12]

- Used to assess and score the quality of food environments in village retail shops
- Village retail shops receive points for unprocessed and minimally processed food items; points are lost for ultra-processed foods
- Depth of availability within certain categories is awarded more points
- Healthy options are awarded more points than unhealthy options, e.g. whole wheat flour is scored higher than white flour alone
- NEMS-S scale: -18 to 66

Results: NEMS-S (1)



Results: NEMS-S (2)



Summary of key preliminary findings

- The average cost of a healthy diet is 199 SLR (3.94 USD) per day in the R5N study communities → likely unaffordable for many households.
  - CoRD is 23% higher in the most expensive district, Mannar, compared to the least expensive district, Matale.
- The relative costs of eggs, meat, and vegetables are high, while pulses, fats & oils, and sugar are very cheap.
- Wide variation in the quality of food environments in retail shops across districts
  - Some districts stocking more healthy foods, especially dairy, which is difficult to find in markets.
  - Fruit + veg. are not commonly found in retail shops.
- Retail shops in all districts commonly stock a variety of ultra-processed foods, including SSBs, biscuits, and salty snacks.

Future analysis

- How do food environments change throughout the year as a result of seasonality and Covid-19?
- How is diet quality among study participants associated with food environment exposures?
- Does variation in food environments modify the effect of the R5N program on diet quality?

Thanks!

References

1. NCD Risk Factor Collaboration. Country Profile: Sri Lanka [Internet]. NCD RisC. 2017 [cited 2019 Oct 10];Available from: http://ncdrisc.org/country-profile.html
2. WHO. Prevalence of anaemia in women - Estimates by country [Internet]. World Health Organization; 2017 [cited 2019 Oct 15]. Available from: http://apps.who.int/gho/data/view.main.GSWCAH28v
3. Jayatissa R, Gunathilaka MM, Fernando DN. Sri Lanka National Nutrition and Micronutrient Survey 2012. Colombo, Sri Lanka: 2012.
4. WHO. Non Communicable Disease Risk Factors: STEPS Fact Sheet Sri Lanka 2015 [Internet]. 2015 [cited 2019 Oct 16]. Available from: https://www.who.int/ncds/surveillance/steps/STEPS-2015-Fact-Sheet-Sri-Lanka.pdf
5. Dizon F, Herforth A. The Cost of Nutritious Food in South Asia. Policy Research Working Paper 8557 [Internet]. 2018 [cited 2019 Oct 20]. Available from: http://www.worldbank.org/research.
6. WFP. Fill the Nutrient Gap Sri Lanka - Summary Report. 2018.
7. FAO, FAO, IFAD, UNICEF, WFP and WHO. 2020. The State of Food Security and Nutrition in the World 2020.Transforming food systems for affordable healthy diets. Rome, FAO. https://doi.org/10.4060/ca9692en
8. Ismail S. Veggie surpluses and wild price fluctuations – the cycle continues [Internet]. Sunday Times Sri Lanka. 2018 [cited 2019 Oct 20];Available from: http://www.sundaytimes.lk/180708/news/veggie-surpluses-and-wild-price-fluctuations-the-cycle-continues-301682.html
9. Sri Lanka National Strategic Review of Food Security and Nutrition: Towards Zero Hunger. Colombo, Sri Lanka: 2017
10. Headey D and Alderman H (2019). The relative caloric prices of healthy and unhealthy foods differ systematically across income levels and continents. Journal of Nutrition, 149(11): 2020-2033.
11. Glanz K, Sallis JF, Saelens BE, Frank LD (2007). Nutrition Environment Measures Survey in stores (NEMS-S): development and evaluation. Am J Prev Med, 32(4):282–9.
12. Martins PA, Cremm EC, Leite FHM, Maron LR, Scagliusi FB, Oliveira MA (2013). Validation of an adapted version of the nutrition environment measurement tool for stores (NEMS-S) in an urban area of Brazil. J Nutr Educ Behav, 45(6):785–92.