National Food Fortification Assessment Survey in Tanzania, 2015

Overview and methods

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National Bureau of Statistics (NBS)

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Karimjee Hall, Dar es Salaam

The 2015 National Food Fortification Assessment Survey in Tanzania, (2015 FACT) was implemented by the Africa Academy for Public Health (AAPH) in collaboration with the National Bureau of Statistics, the Office of Chief Government Statistics, Zanzibar; Ministry of Health, Community development, Gender, Seniors and Children, Mainland; Ministry of Health, Zanzibar; IHI; TFNC. GAIN and CDC provided technical assistance. The survey was funded by the Bill and Melinda Gates Foundation through GAIN.

gain Global Alliance for Improved Nutrition

AAPH Africa Academy for Public Health Research | Training | Practice

ihi

Tanzania Food and Nutrition Centre

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Survey Rationale and Background

- High burden of malnutrition in Tanzania
- Mandatory fortification of wheat flour, maize flour, and oil since 2011
- Mandatory iodization of salt since 1995
- Limited data available on:
  - Performance of large-scale fortification programs,
  - Who benefits from fortification programs,
  - If vulnerable populations are being reached, and
  - Household coverage and intake of fortified foods

Objectives

- To **assess the coverage and consumption** of fortified vegetable oil, wheat flour, maize flour, and salt among households
- To **measure levels of select nutrients** in samples of vegetable oil (vitamin A), wheat flour (iron), maize flour (iron), and salt (iodine) gathered at the household
- To **estimate the contribution** of fortified vegetable oil, wheat flour, maize flour, and salt among households **to the intake of select nutrients** among women of reproductive age (15-49 years)
- To **evaluate other health and nutrition indicators** and their association with coverage and consumption of fortified foods

Survey design and sampling

Survey design

a) Cross-sectional cluster household survey

b) Representative nationally with urban and rural stratification

c) Target population: Households and women of reproductive age (15 to 49 years)

d) Sample size: 1,050 households total

Sampling

A two-stage stratified random sampling strategy was applied:

a) First stage of sampling selected 70 enumeration areas (EAs) by probability proportional to size (PPS) sampling
   - 29 urban EAs (including 5 EAs from Zanzibar)
   - 41 rural EAs (including 6 EAs from Zanzibar

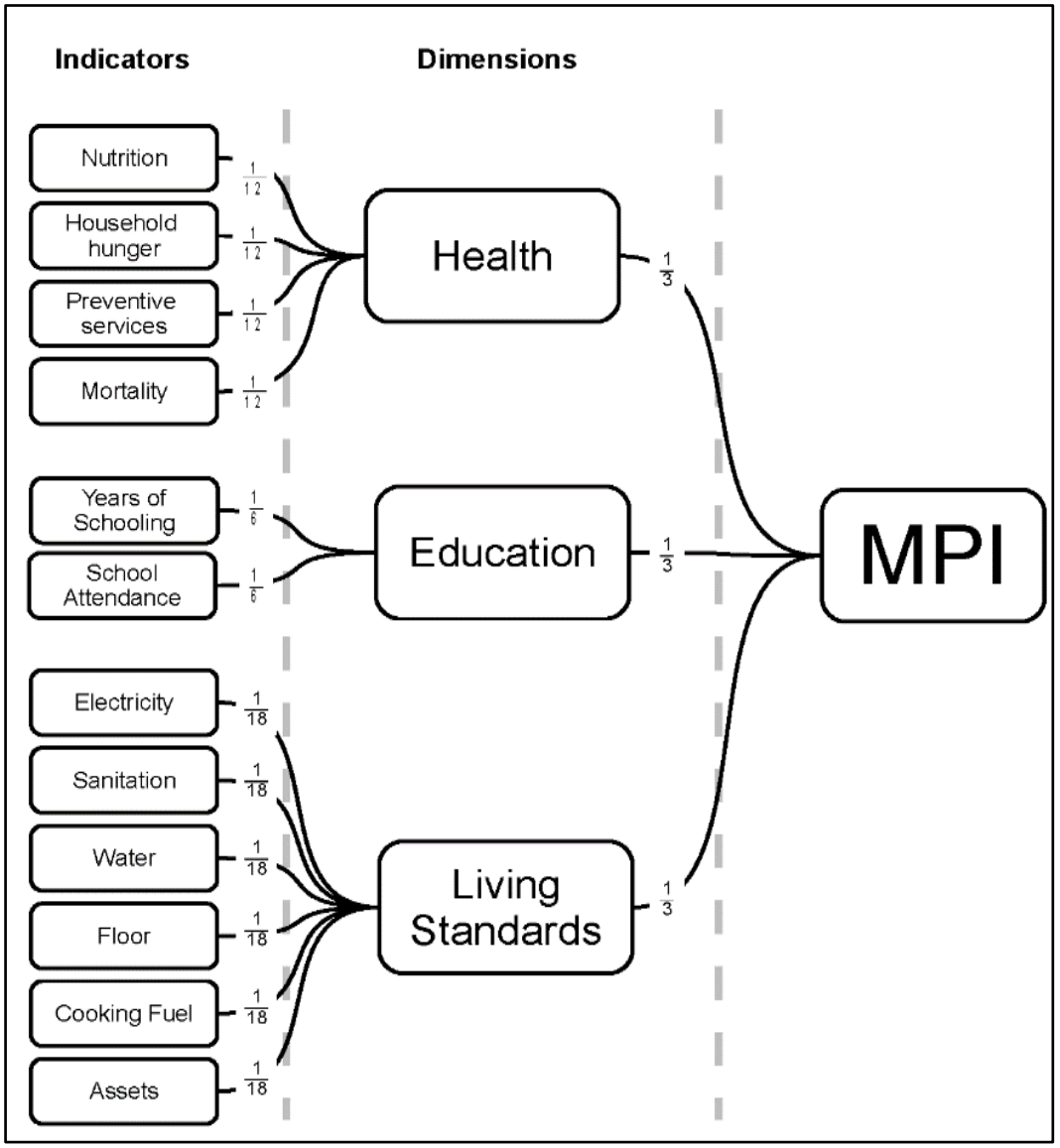
b) Second stage of sampling selected 15 households per EA by systematic random selection

Data collection

- **Questionnaire 1: Collected information on**
  - Household demographics;
  - Household characteristics
- **Questionnaire 2: Collected information on**
  - Fortified food use
  - Purchasing information; and
  - Fortification logo information
- **Women Questionnaire: Collected information on**
  - Woman's pregnancy status;
  - Woman's dietary diversity; and
  - Individual intake of products made from wheat flour.
- **Household food samples collection**
  - Samples of oil, wheat flour, maize flour and salt were collected and tested quantitatively for nutrient levels

Indicators of risk

Poverty



Multidimensional poverty index (MPI)

Weighted sum of dimensions of health, education and living standards that are linked to the millennium development goals (MDG).

Sensitive measure of *acute poverty* related to Millennium Development Goals

Low women's dietary diversity score

	Food groups	Score
FG1 :	Starchy staples	1
FG2 :	Beans and peas	1
FG3 :	Nuts and seeds	1
FG4 :	Dairy	1
FG5 :	Flesh foods	1
FG6 :	Eggs	1
FG7 :	Vitamin-A rich dark green leafy vegetables	1
FG8 :	Other vitamin-A rich vegetables and fruits	1
FG9 :	Other vegetables	1
FG10	Other fruits	1
	Total	**10**

Assessing coverage of staple food fortification – Step 1 the household

Assessing household coverage and intra-household intakes

If the vehicle is a staple in the household:

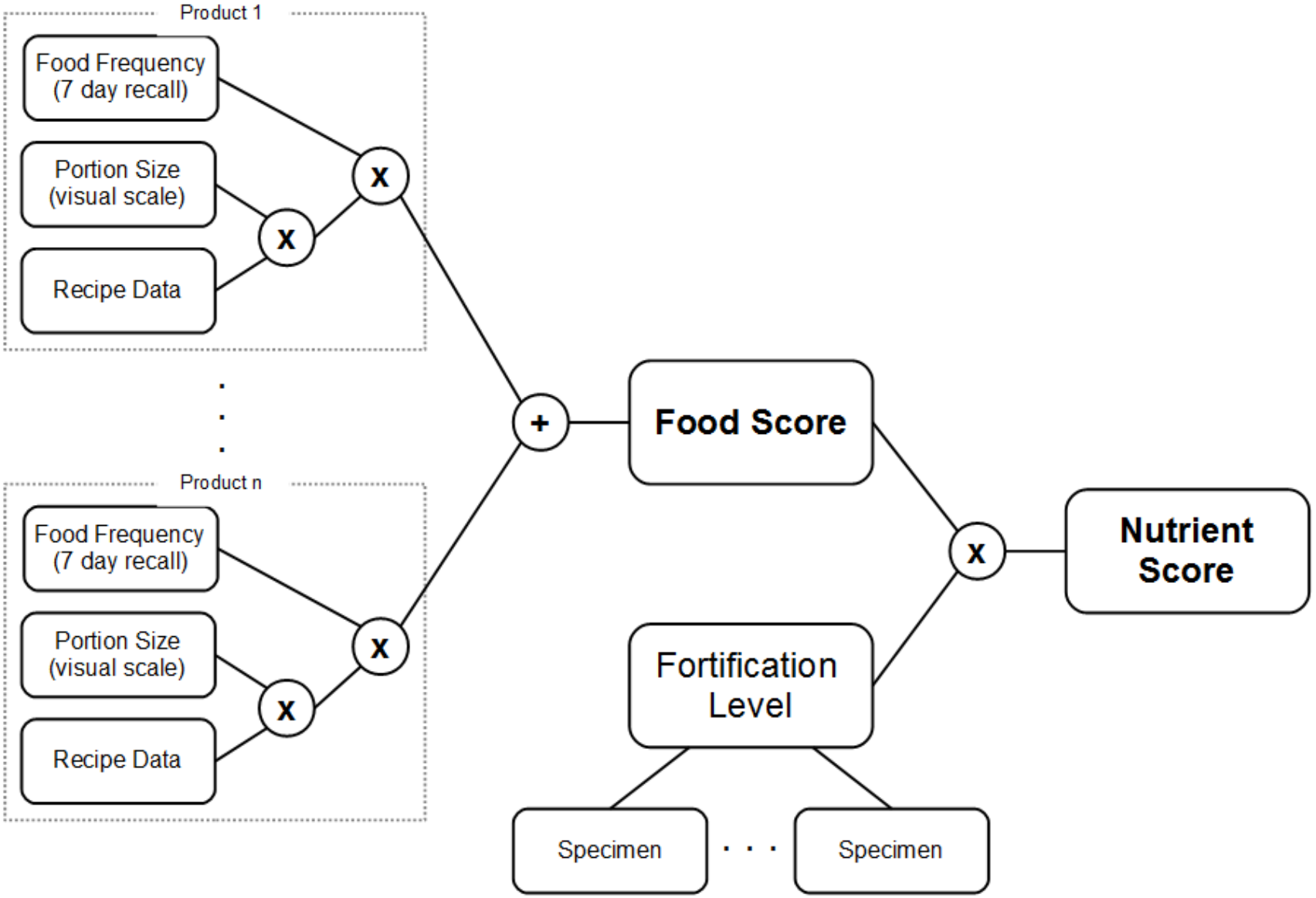
- What is the main [vehicle] type consumed?
- Is [vehicle] fortifiable (i.e. how is it processed, from where?)
- Is [vehicle] fortified?
- Is [vehicle] adequately fortified?

Detailed household roster to calculate intra-household estimates (adult male equivalent (AME) method)

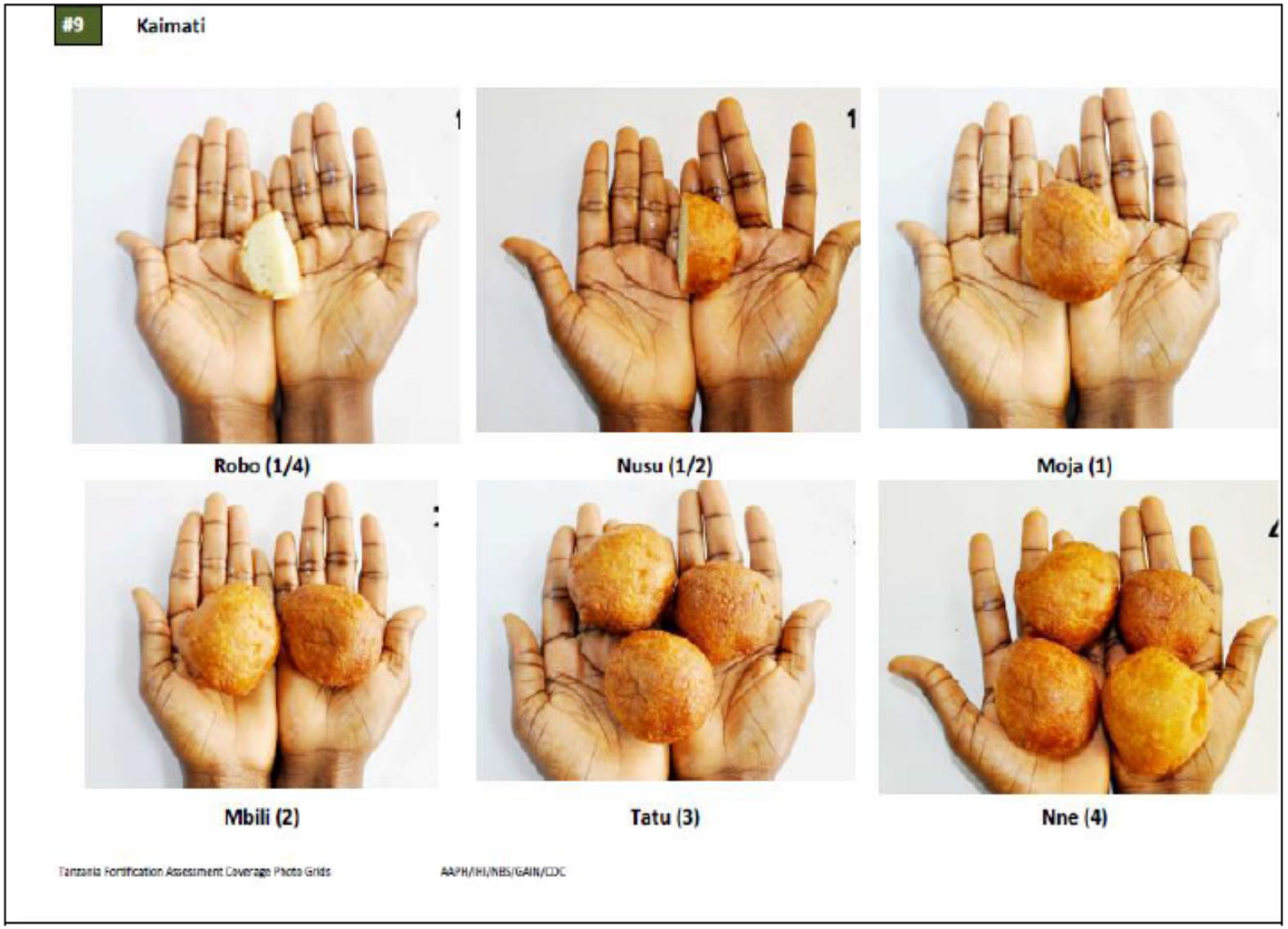
- How much is purchased?
- How long does the amount last?

Assessing coverage of staple food fortification – Step 2 the individual

Assessing individual coverage and intakes



Example of a picture grid



Key Results

National Food Fortification Assessment Survey in Tanzania, 2015

Key Results

Mary Mwanyika-Sando
Deputy CEO
Africa Academy for Public Health
(AAPH)

Characteristics of the survey population

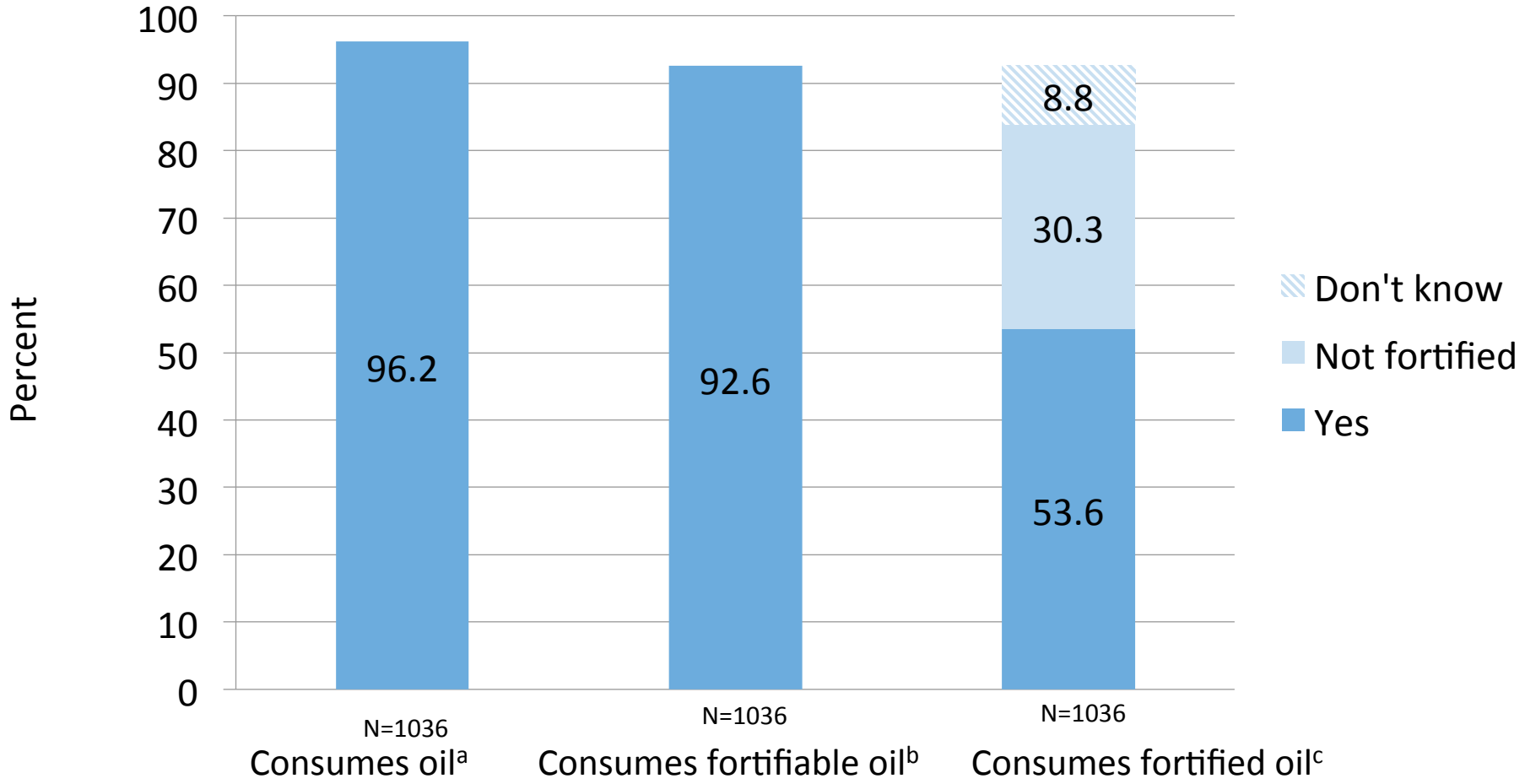
Variable	National	Rural	Urban	Zanzibar
Selected sample size	1050	615	453	165
Achieved sample size	1041	609	432	159
Response rate, %	99.1	99.0	99.3	96.4
At risk of poverty, %	45.0	59.4	16.0	28.9
Low dietary diversity, %	26.8	28.5	23.6	19.6
Mean age of women of reproductive age in years	28.7	28.7	28.6	28.4

Important terminologies

- Consumed vehicle
- Consumed fortifiable
- Consumed fortified
- Adequately fortified

OIL

National Coverage, Tanzania, 2015: Household use of cooking oil to prepare food



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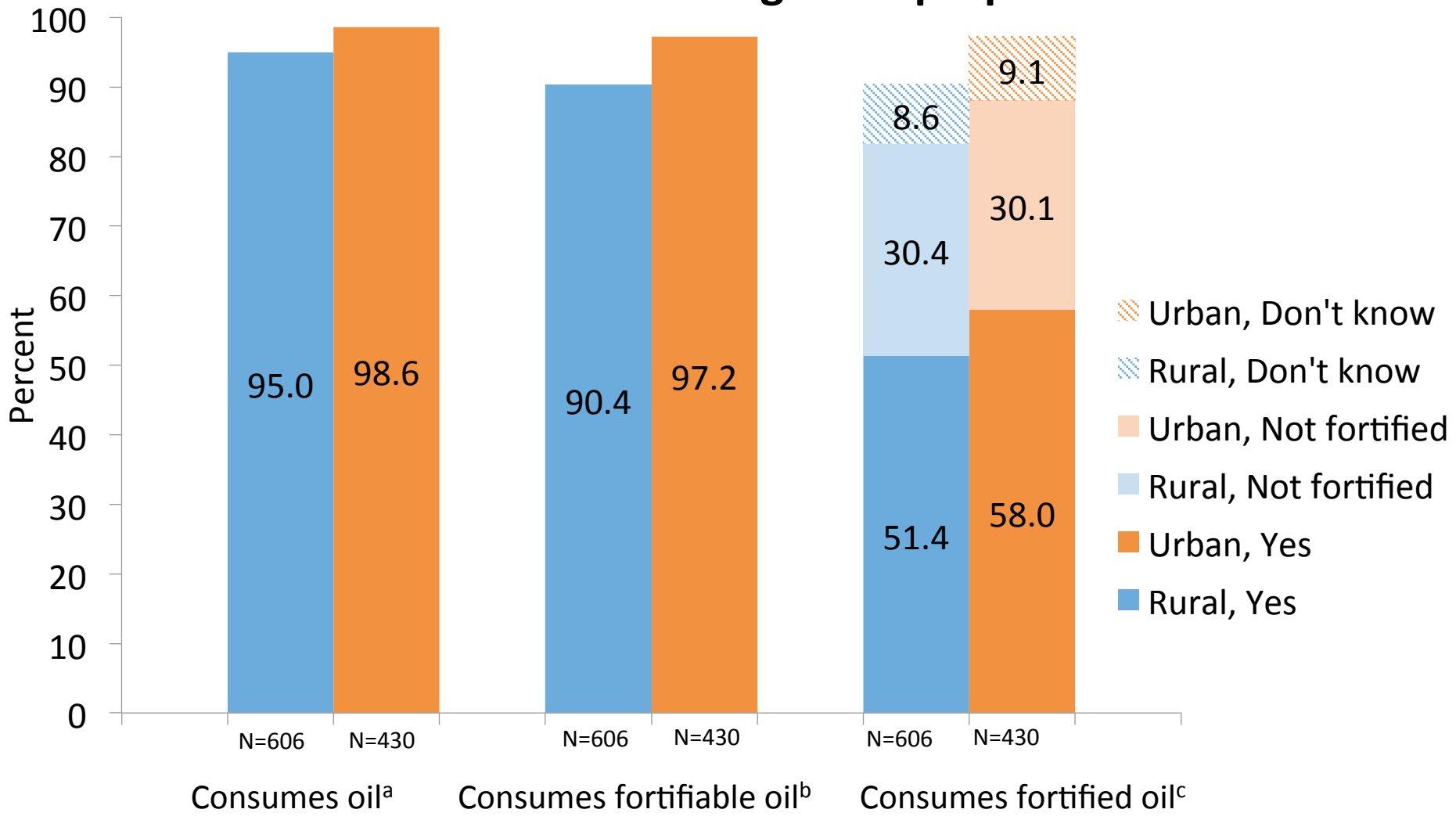
Urban and Rural Coverage, Tanzania, 2015: Household use of cooking oil to prepare food



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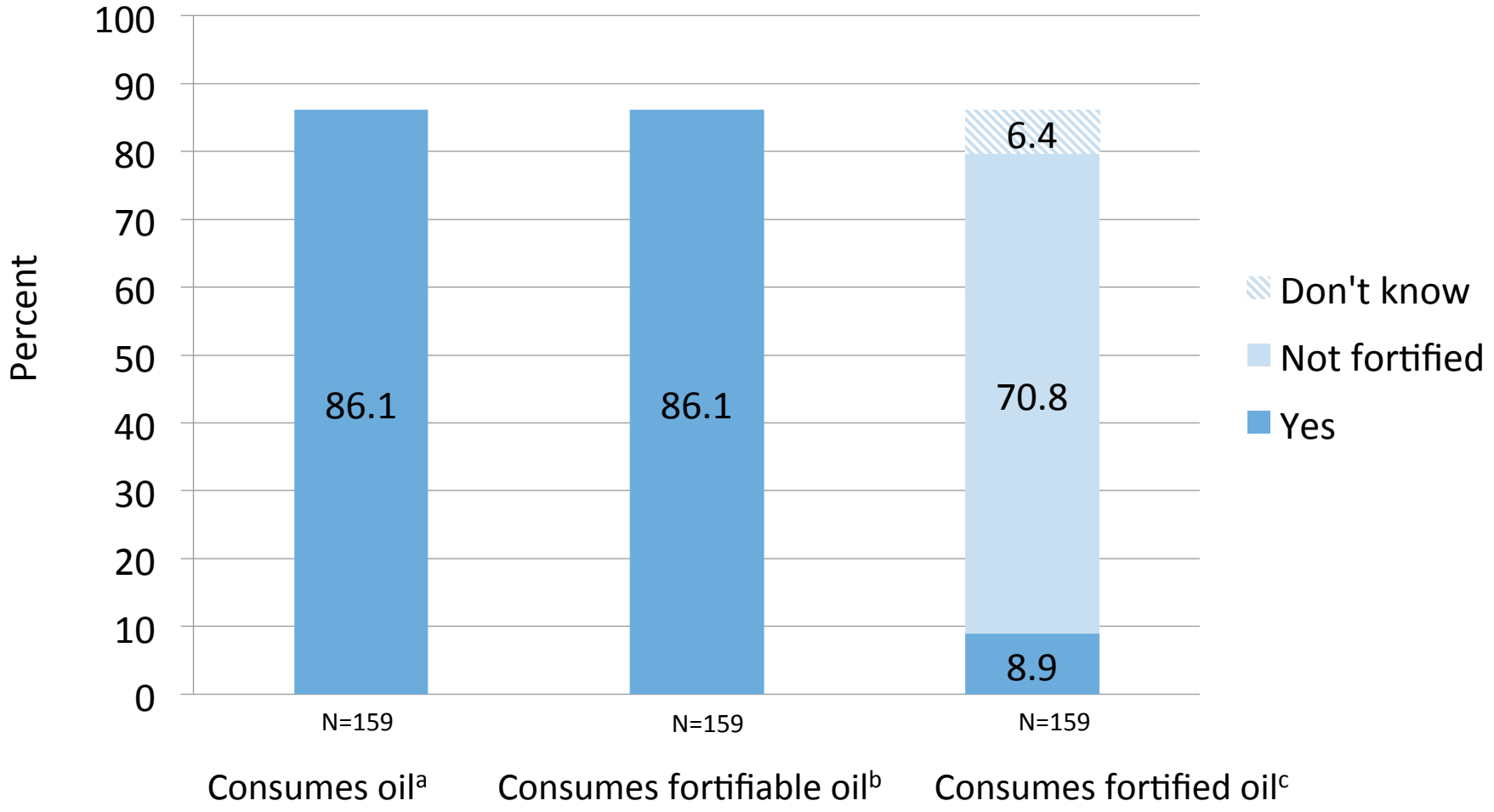
Zanzibar Coverage, Tanzania, 2015: Household use of cooking oil to prepare food



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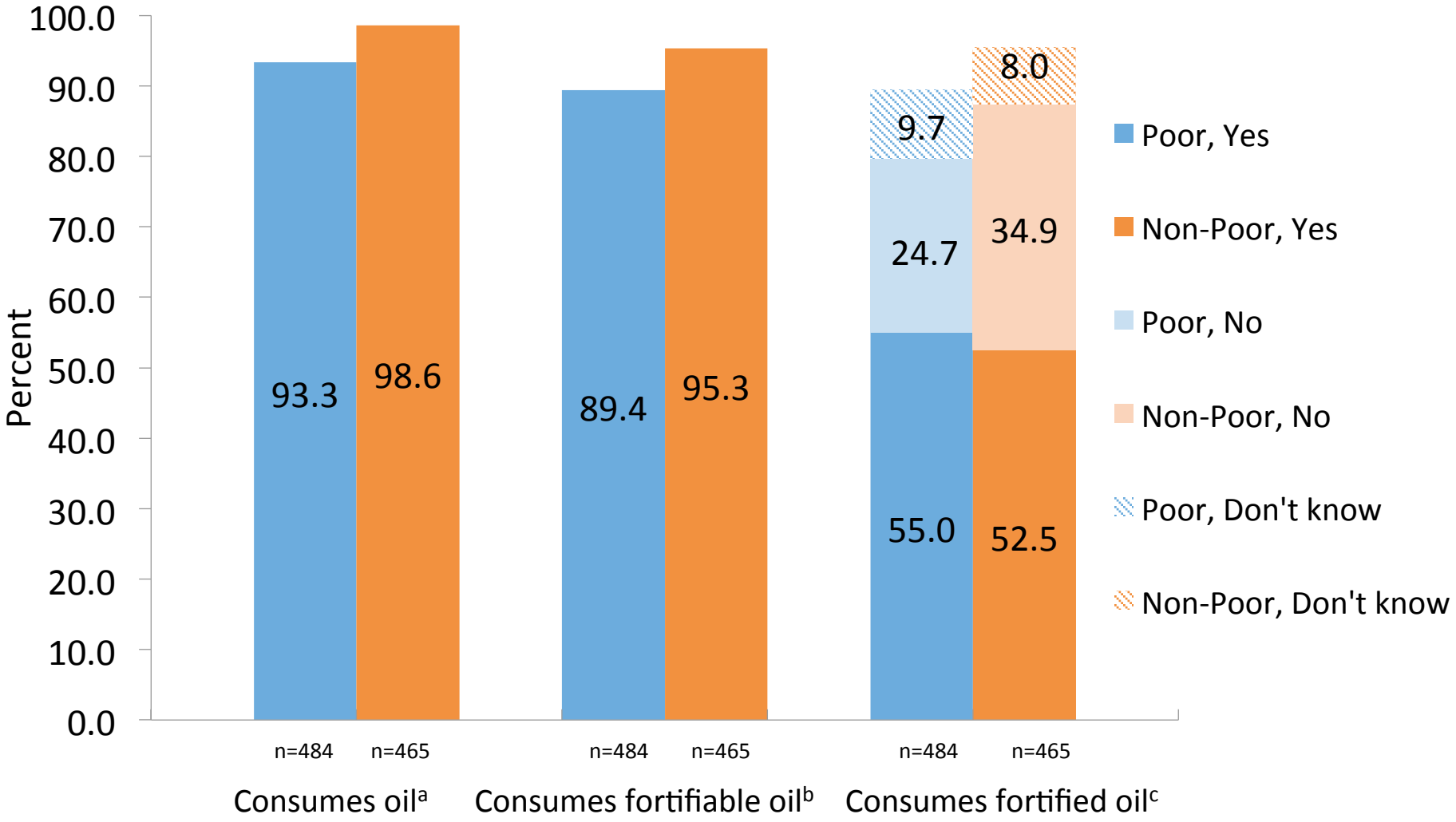
Household coverage by risk factors

National, Tanzania 2015:
Oil coverage at household level by poverty risk



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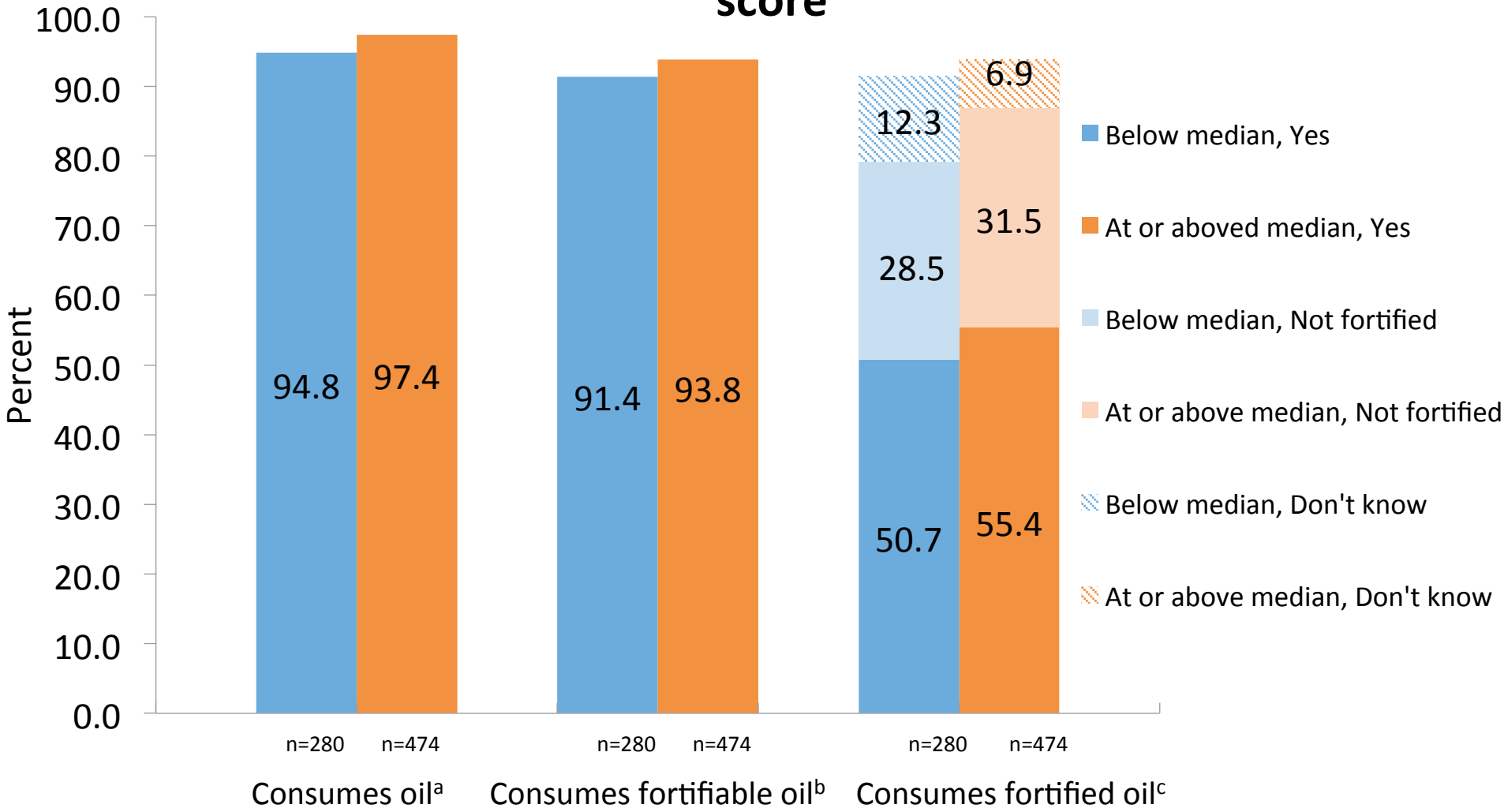
National, Tanzania 2015: Oil coverage at household level by dietary diversity score



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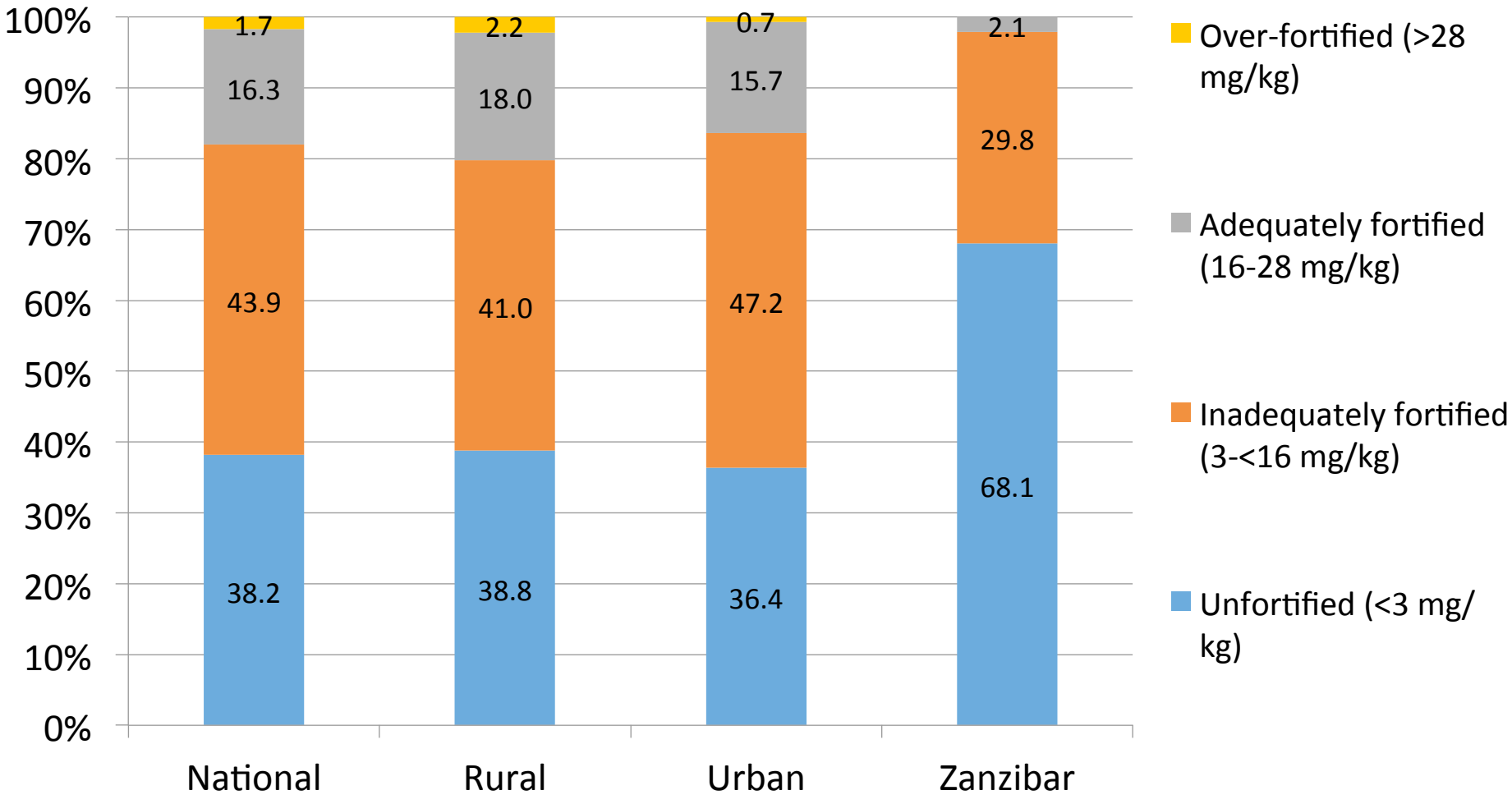
Adherence to standards

Fortification quality of household samples using Tanzania National Standard 2010: Oil quantitative analyses of vitamin A levels



Micronutrient contribution

Daily consumption and vitamin A contribution from oil by WRA among households that reported consuming oil in Tanzania[1,2]

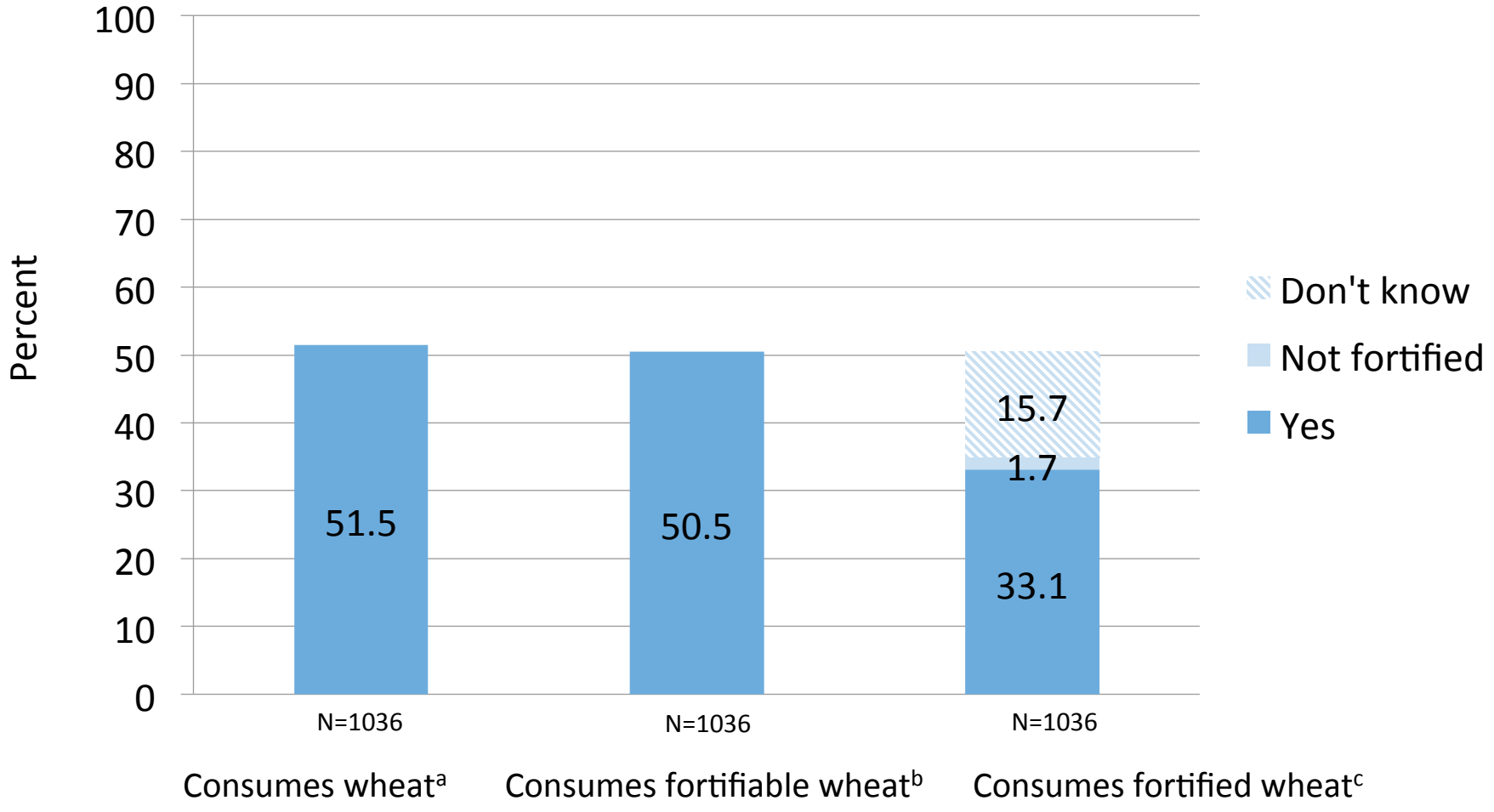
	National	Rural	Urban	Zanzibar	p-value
	N=833	N=472	N=361	N=117	
Oil consumed (ml/day)	22.2 (11.9, 40.6)	18.8 (11.0, 33.1)	31.1 (17.7, 58.8)	35.4 (18.0, 68.3)	<.0001
Vitamin A from oil (% RNI)[3]	20.8 (9.1, 48.8)	17.2 (7.3, 42)	28.0 (14, 67.3)	15.3 (8.2, 34.1)	<.0001

WRA, Women of reproductive age (15 to 49 years); RNI, Recommended Nutrient Intake
[1]Results based on household assessment and adult male equivalent (AME) methodology
[2]Values shown are median (25%, 75%)
[3]World Health Organization vitamin A RNI for women is: 600 micrograms retinol equivalents (mcg RE)/day (15-18 years), 500 mcg RE/day (19-50 years), 800 mcg RE/day (pregnant women), and 850 mcg RE/day (lactating women)

WHEAT FLOUR

Photo: www.ganeshagro.com

National Coverage, Tanzania, 2015: Household coverage of wheat flour



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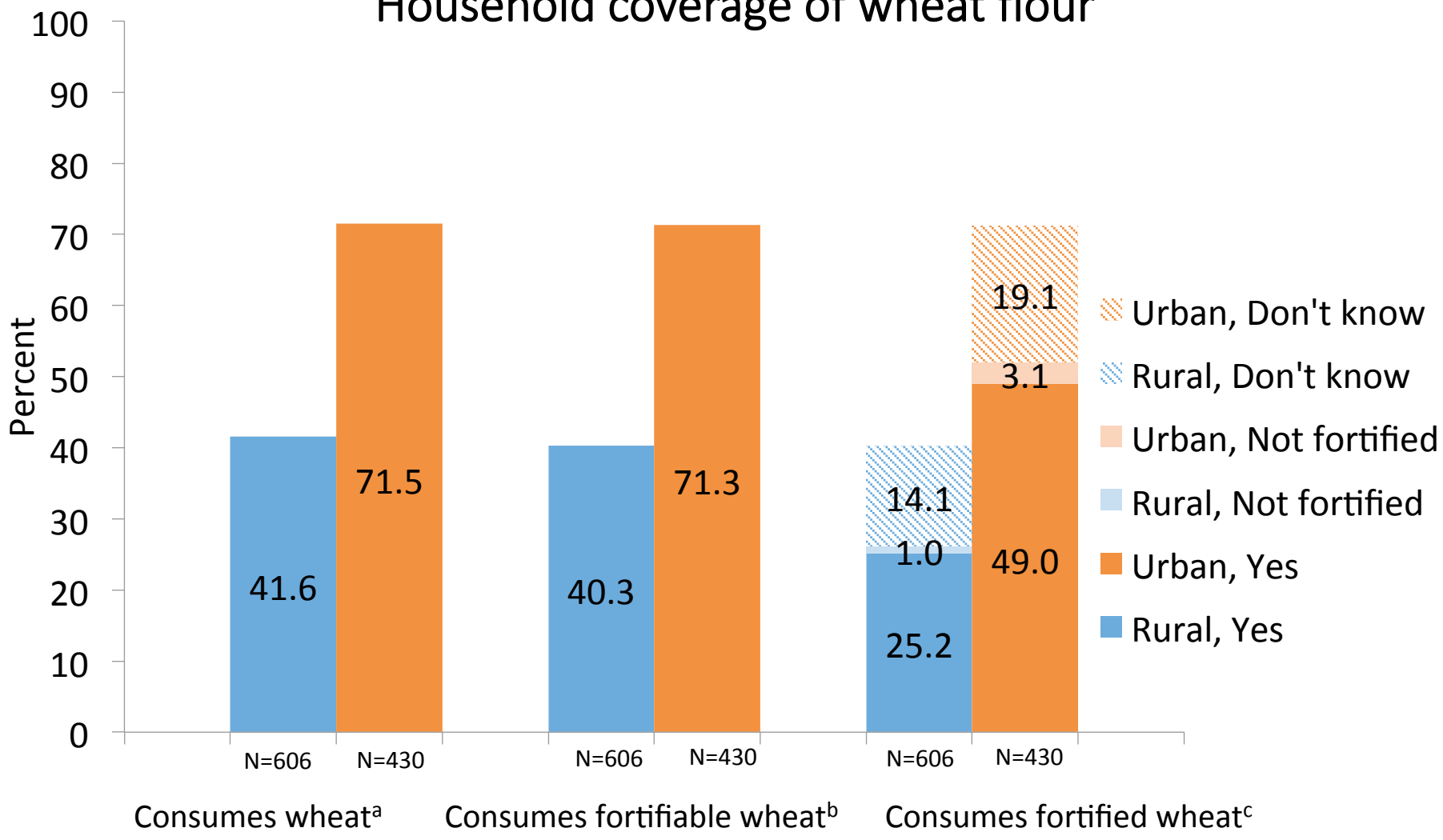
Urban and Rural Coverage, Tanzania, 2015: Household coverage of wheat flour



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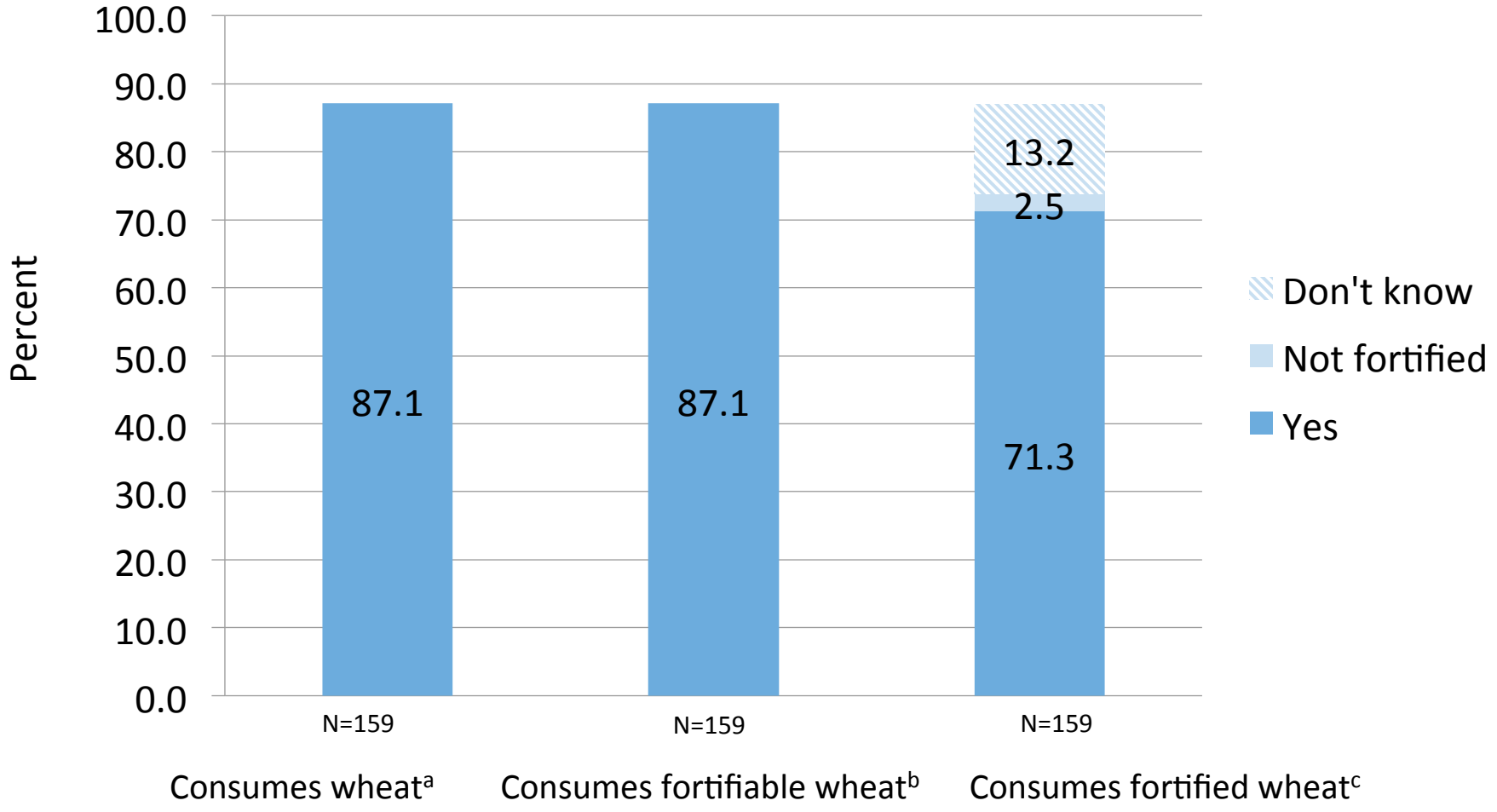
Zanzibar Coverage, Tanzania, 2015: Household coverage of wheat flour



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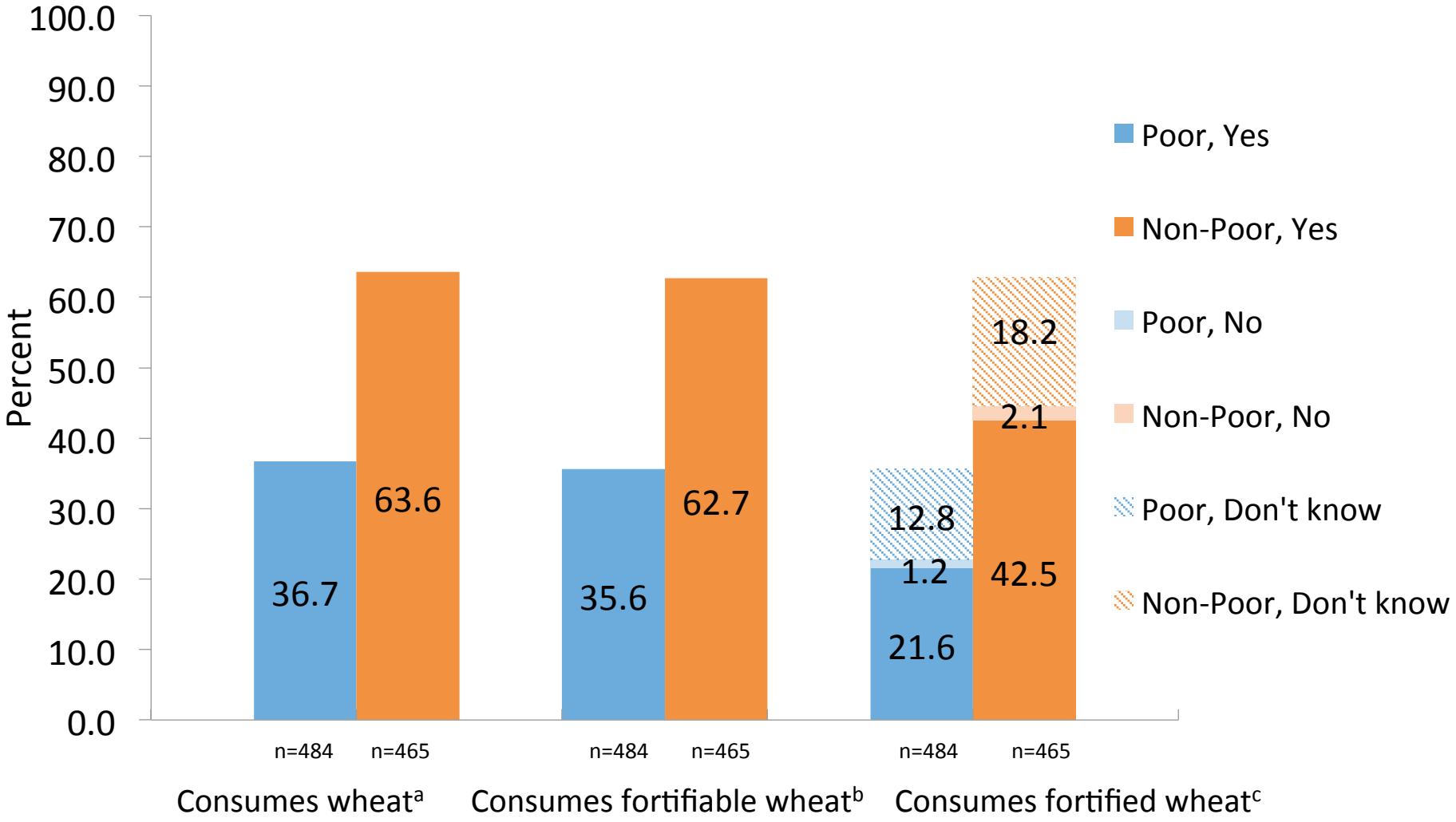
Household coverage by risk factors

National, Tanzania 2015:
Wheat flour coverage at household level by poverty risk



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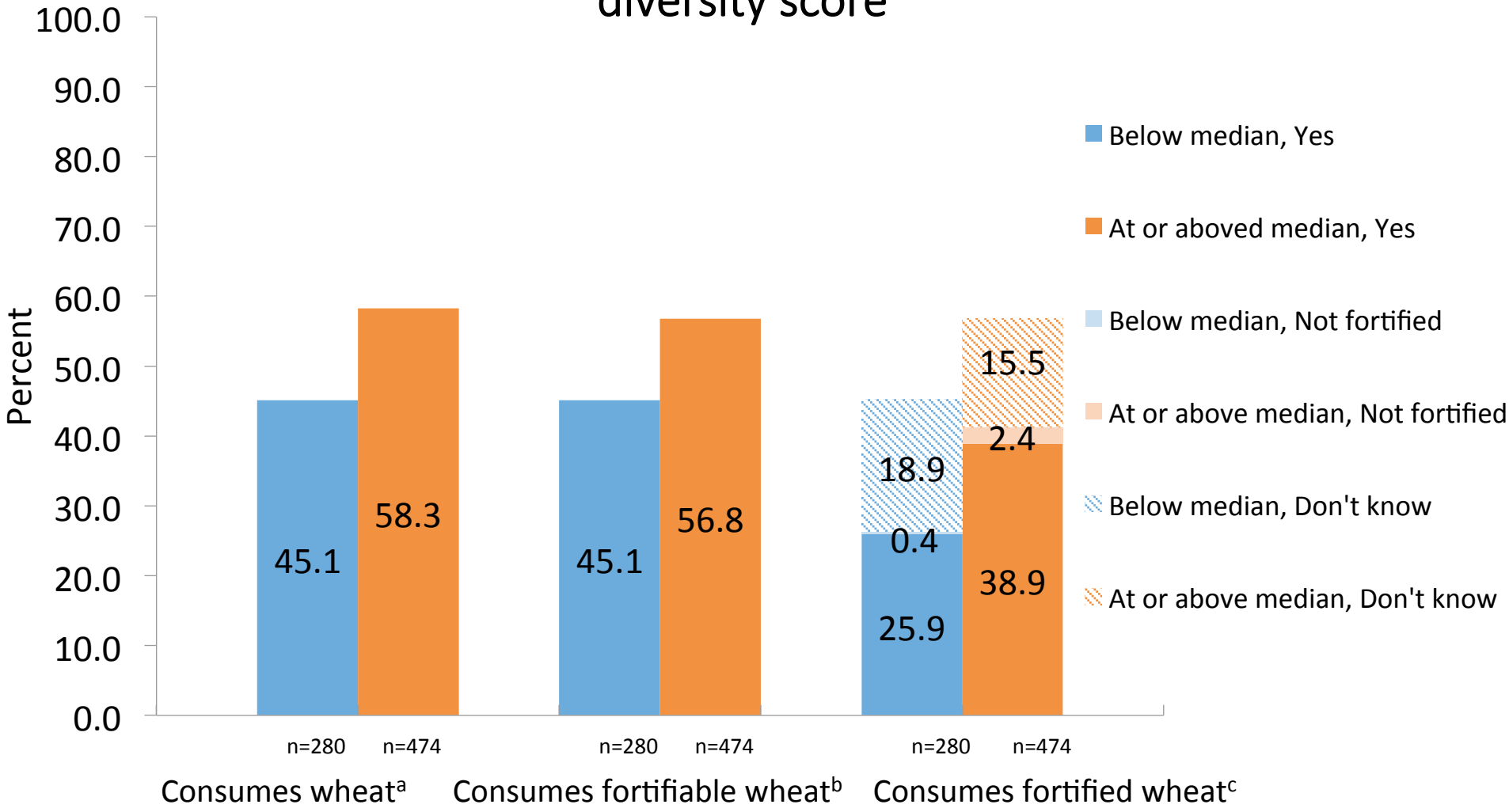
National, Tanzania 2015: Wheat flour coverage at household level by dietary diversity score



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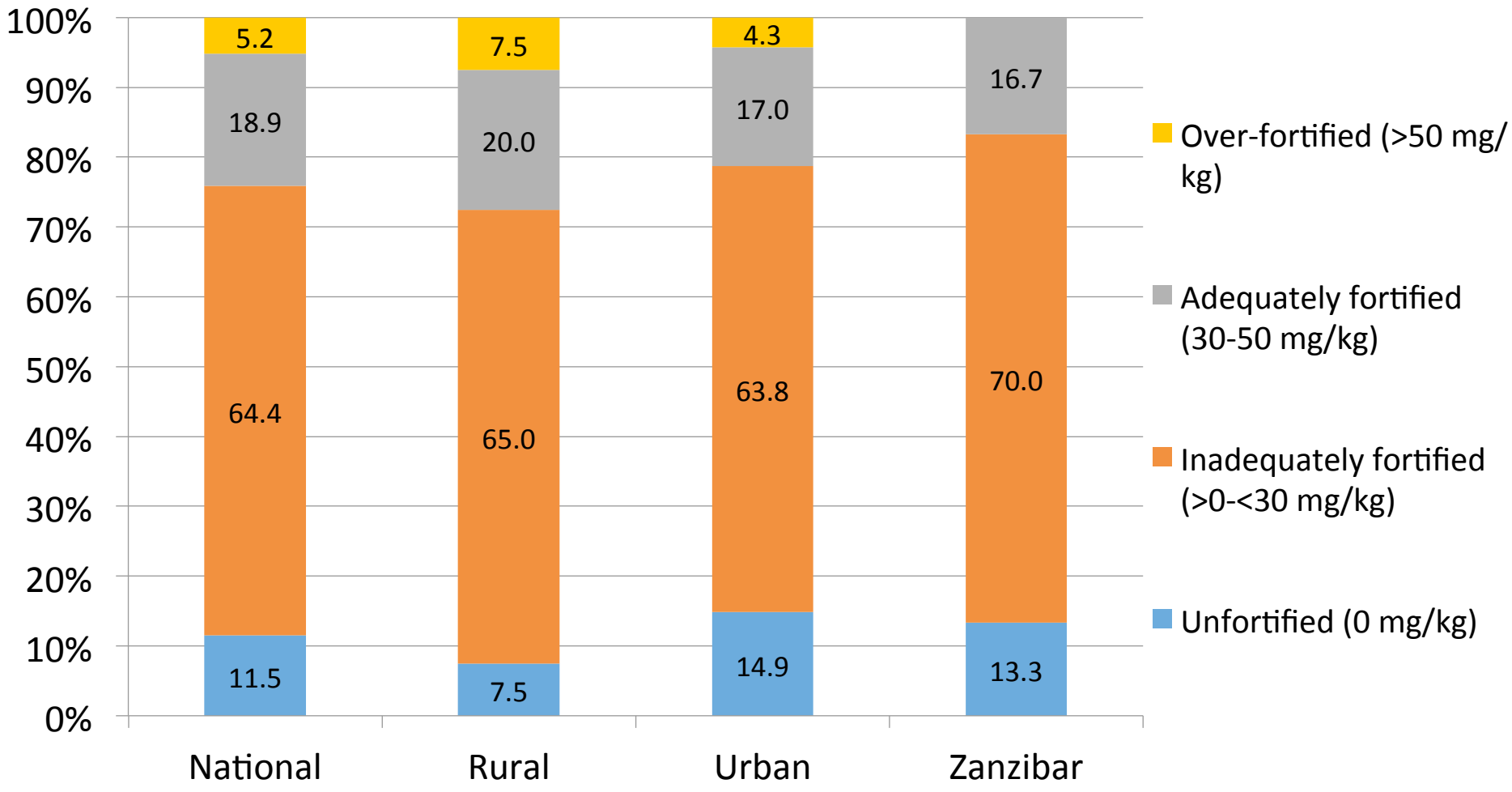
Adherence to standards

Fortification quality of household samples using Tanzania National Standard 2010: Wheat flour quantitative analyses of added iron levels



Micronutrient contribution

Daily consumption and iron contribution from wheat flour by WRA among those that reported consuming wheat flour or wheat-flour products in Tanzania[1]

	National	Rural	Urban	Zanzibar	p-value
Household assessment	**N=530**	**N=253**	**N=277**	**N=116**	
Wheat flour consumed (g/day)	162.0 (106.4,225.3)	162.7 (110.5,220.6)	161.0 (99.4,229.9)	185.6 (105.2,261.6)	0.4580
Iron from wheat flour (% RNI)[3]	16.1 (8.6,27.3)	18.5 (10.5,30.9)	13.2 (6.8,22.8)	14.7 (7.8,25.9)	<.0001
Individual assessment	**N=1231**	**N=702**	**N=529**	**N=182**	
Wheat flour consumed (g/day)	106.8 (21.9,239.9)	57.1 (0,167.6)	205.3 (108.4,329)	182.0 (69,370.9)	<.0001
Iron from wheat flour (% RNI)[3]	10.2 (2.1,26.5)	6.0 (0,15.7)	23.2 (11.9,39.2)	16.5 (5.9,29.3)	<.0001

WRA, Women of reproductive age (15 to 49 years); RNI, Recommended Nutrient Intake

[1]Values shown are median (25%, 75%)

[2]Results based on household assessment and adult male equivalent (AME) methodology

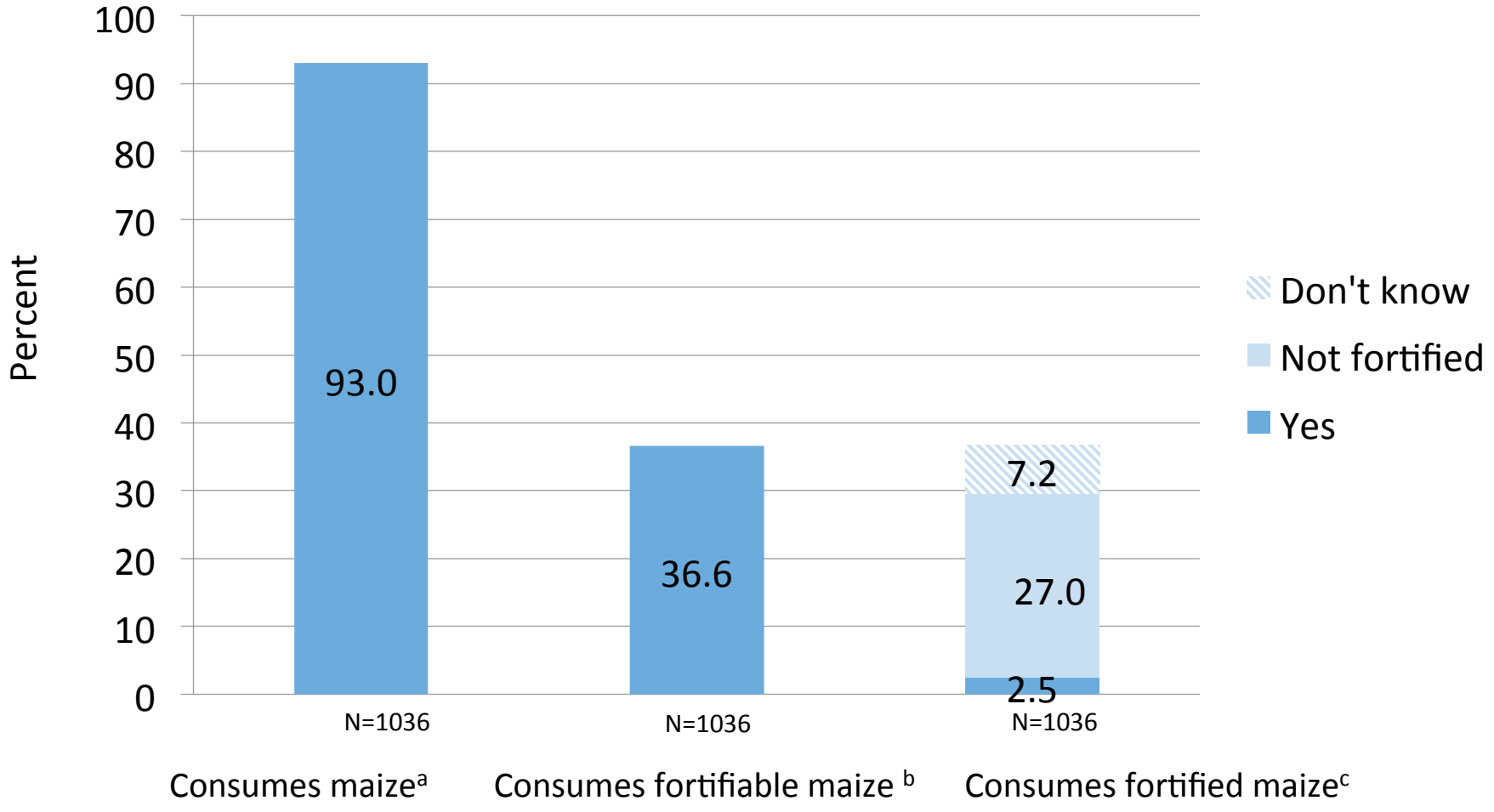
[3]The iron RNI for women, assuming 12% bioavailability, was drawn from the World Health Organization and is as follows: 25.8 mg/day (15-18 years), 24.5 mg/day (19-50 years), 24.5 mg/day (pregnant women), 12.5 mg/day (lactating women)

[4]Results based on individual assessment of wheat flour containing products over the past 7 days

MAIZE FLOUR

Photo: http://www.priyasinternational.com/corn-flour.htm

National Coverage, Tanzania, 2015: Household coverage of maize flour



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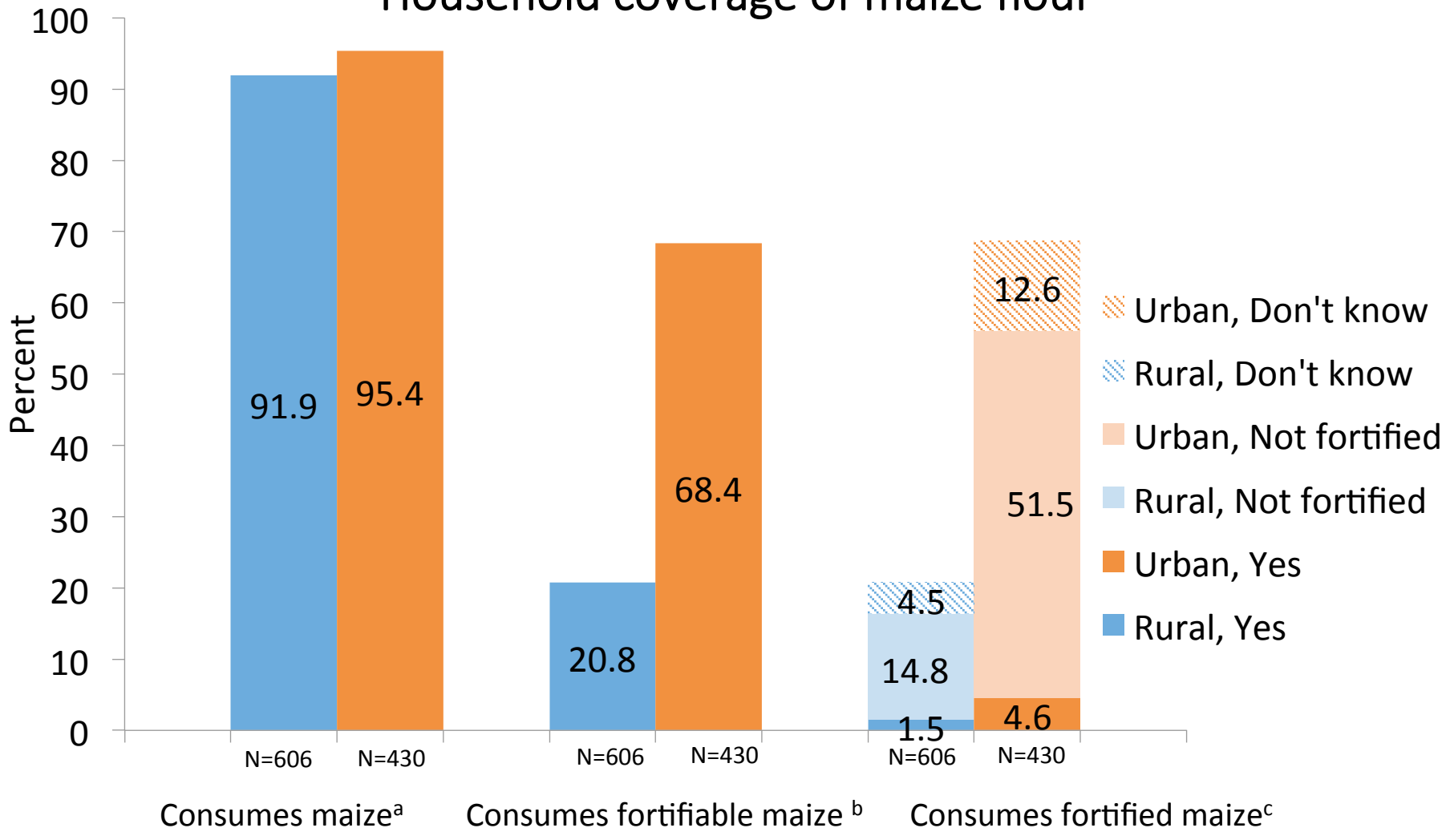
Urban and Rural Coverage, Tanzania, 2015: Household coverage of maize flour



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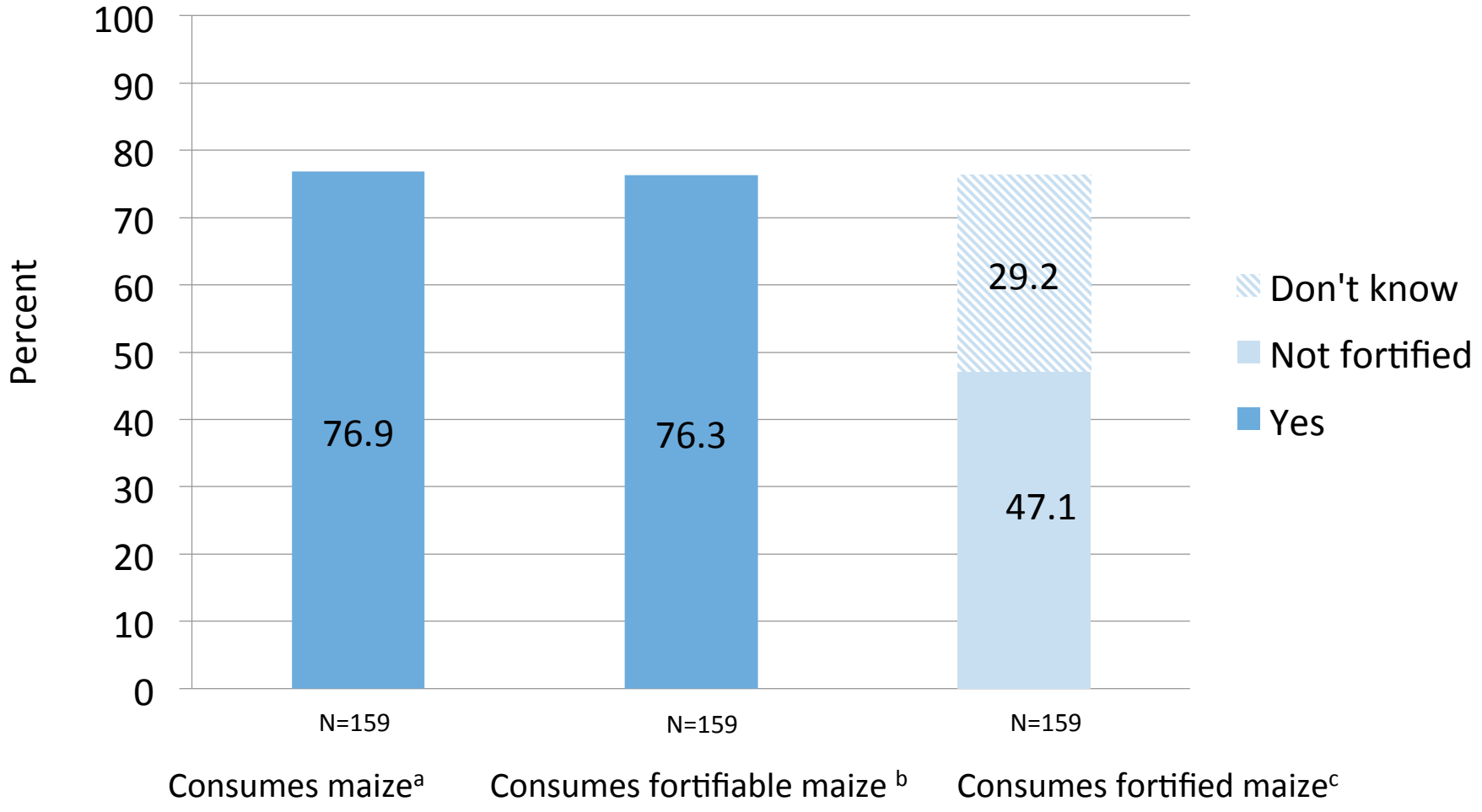
Zanzibar Coverage, Tanzania, 2015: Household coverage of maize flour



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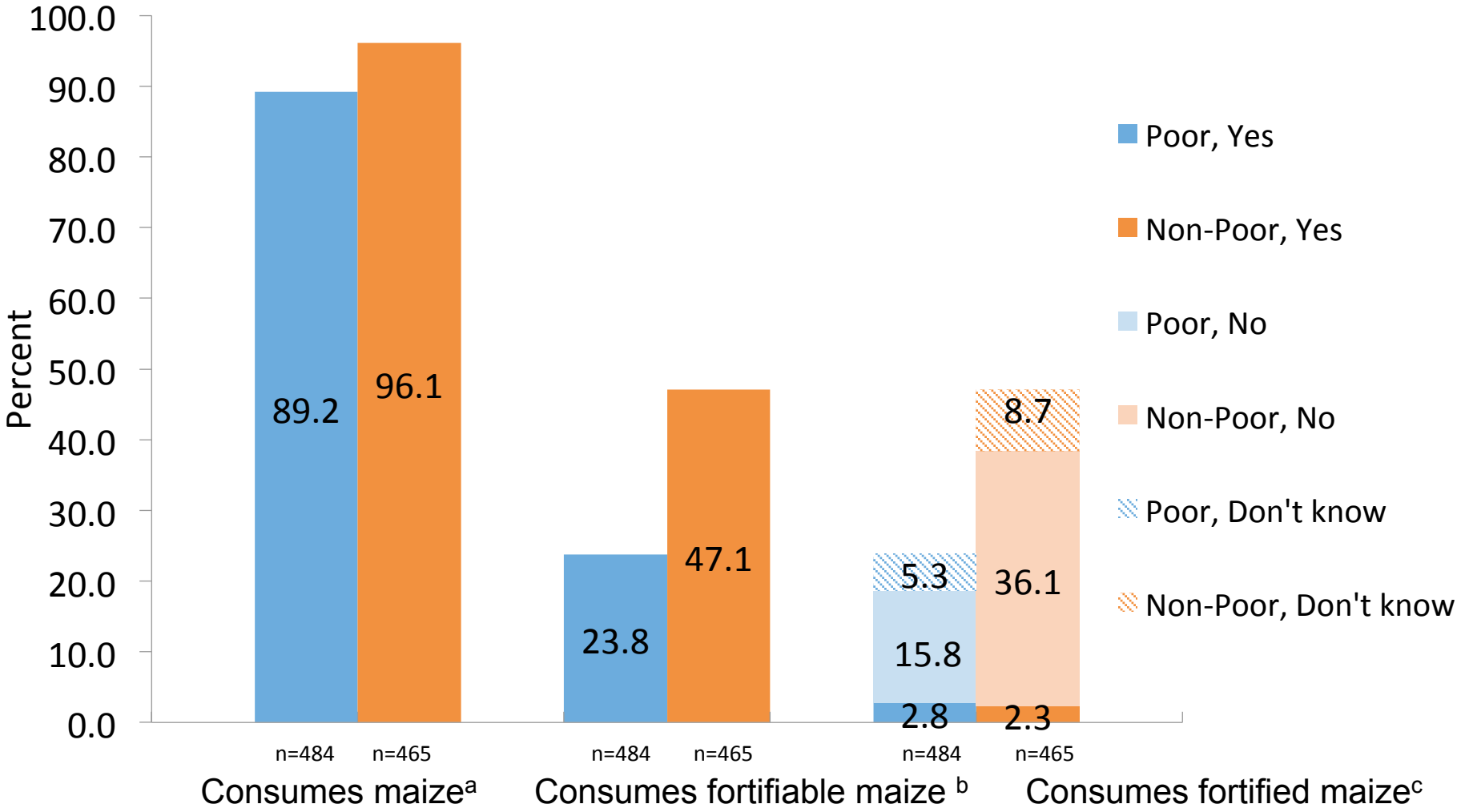
Household coverage by risk factors

National, Tanzania 2015:
Maize flour coverage at household level by poverty risk



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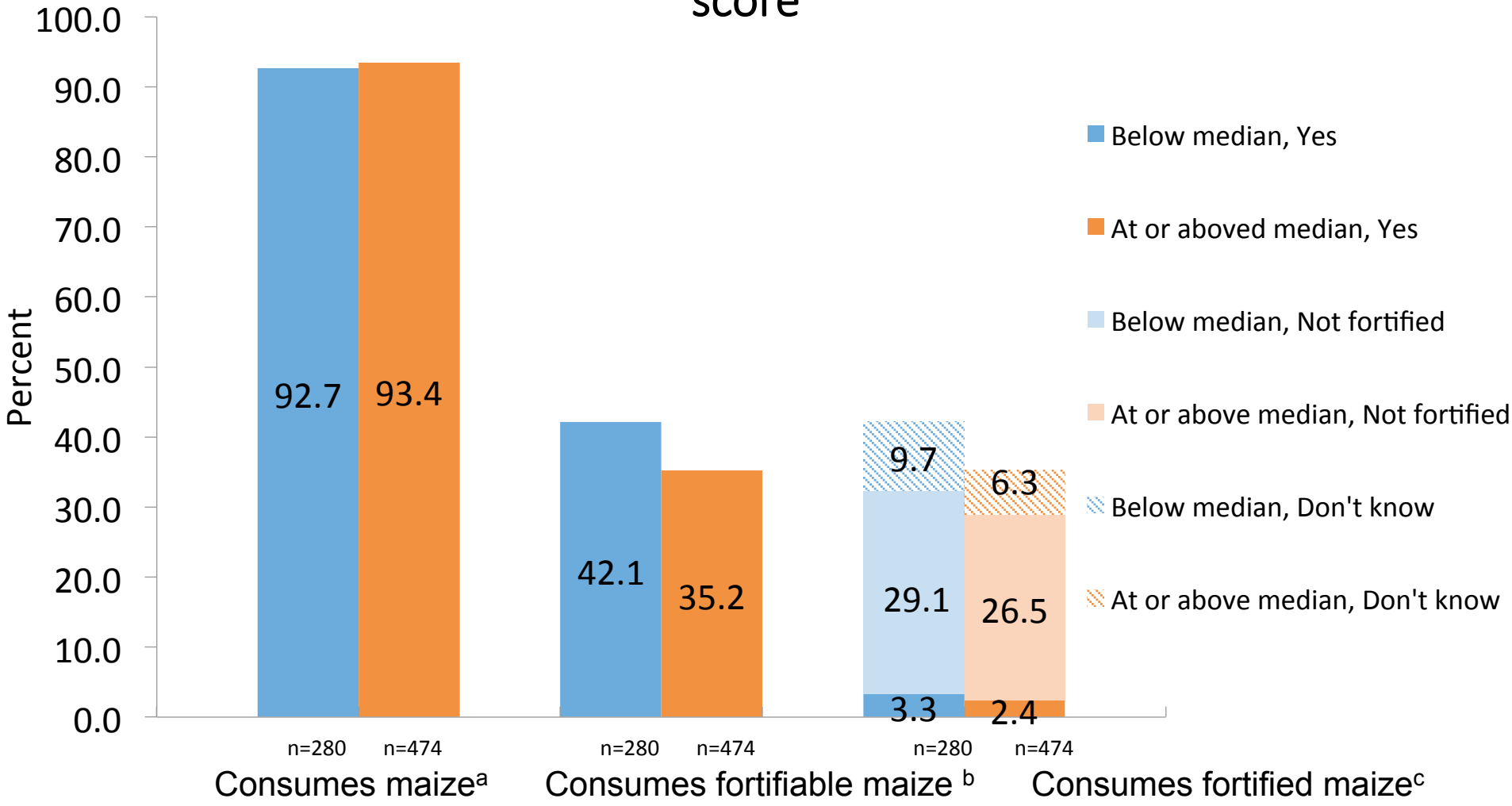
National, Tanzania 2015: Maize flour coverage at household level by dietary diversity score



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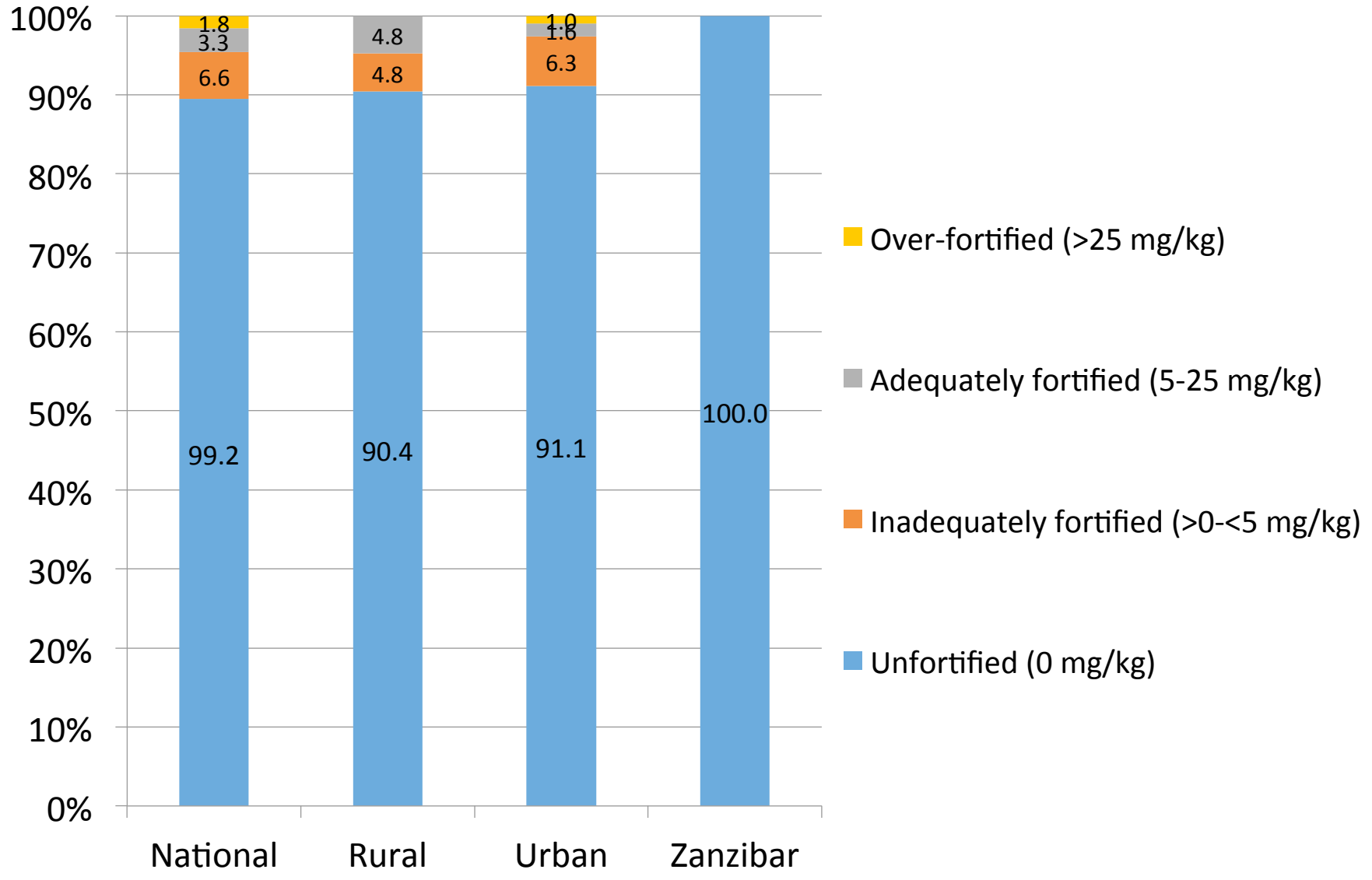


Micronutrient contribution

Daily consumption and iron contribution from maize flour by WRA among households that reported consuming maize flour in Tanzania[1,2]

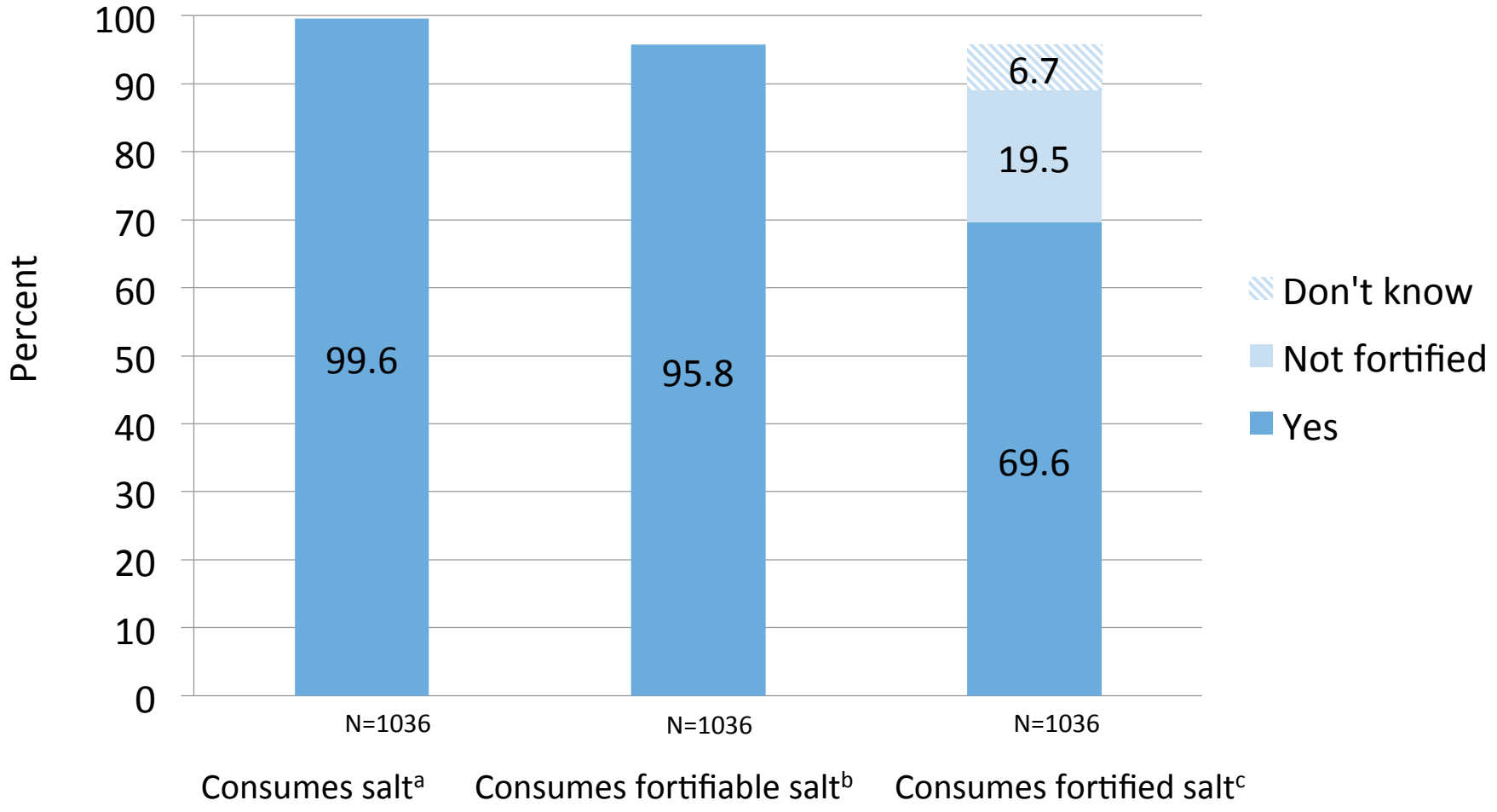
	National	Rural	Urban	Zanzibar	p-value
	N=402	N=140	N=262	N=99	
Maize flour consumed (g/ day)	161.3 (111.4, 224)	176.2 (140.1, 246)	147.7 (94.5, 209.2)	191 (118.3, 250.4)	0.3612
Iron from maize flour (% RNI)[3]	0.0	0.0	0.0	0.0	<.0001

WRA, Women of reproductive age (15 to 49 years); RNI, Recommended Nutrient Intake
[1]Results based on household assessment and adult male equivalent (AME) methodology
[2]Values shown are median (25%, 75%)
[3]The iron RNI for women, assuming 12% bioavailability, was drawn from the World Health Organization and is as follows: 25.8 mg/day (15-18 years), 24.5 mg/day (19-50 years), 24.5 mg/day (pregnant women), 12.5 mg/day (lactating women)

SALT

Photo: http://www.delmonte.ph/

National Coverage, Tanzania, 2015: Household coverage of salt



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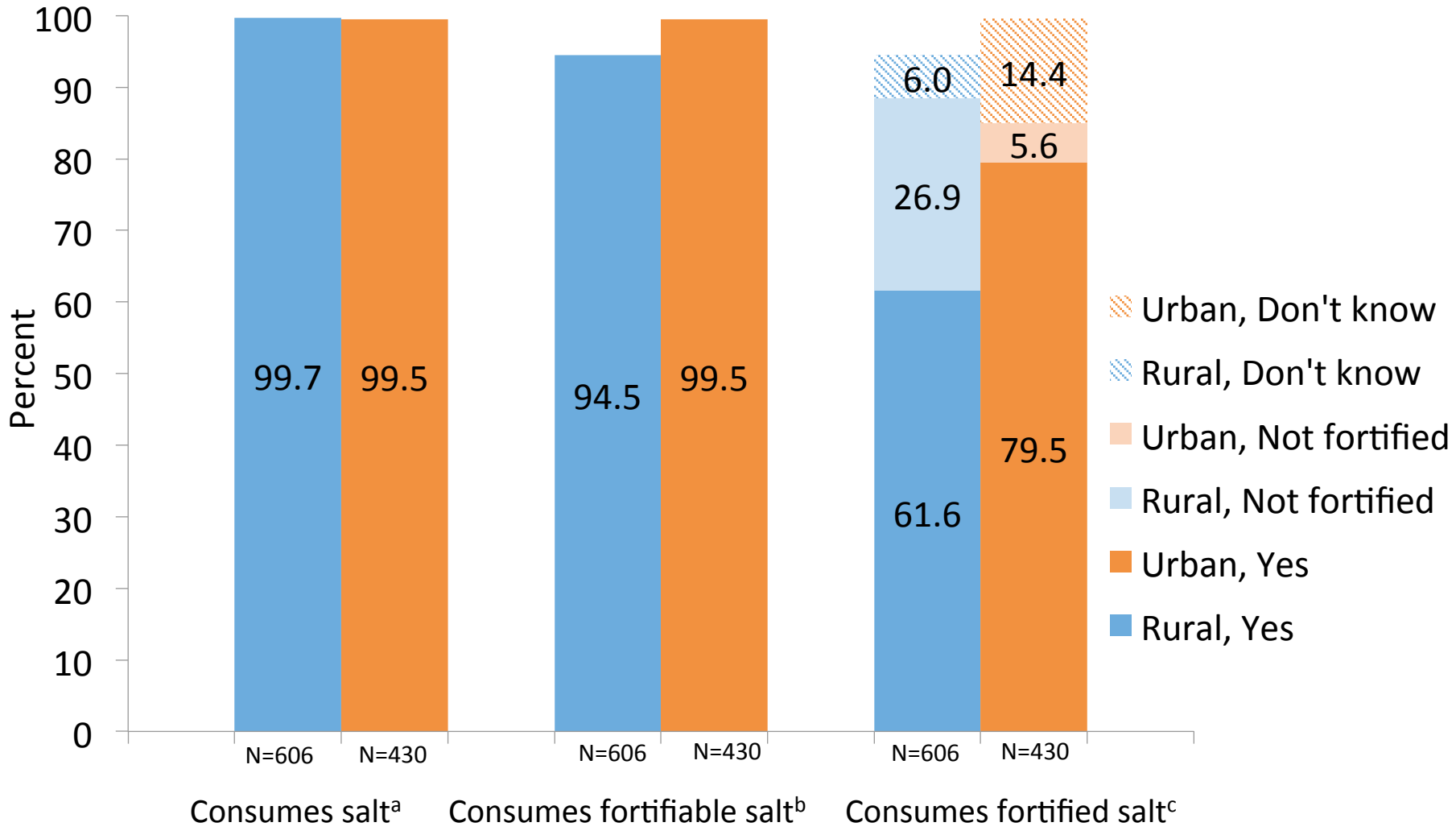
Urban and Rural Coverage, Tanzania, 2015: Household coverage of salt



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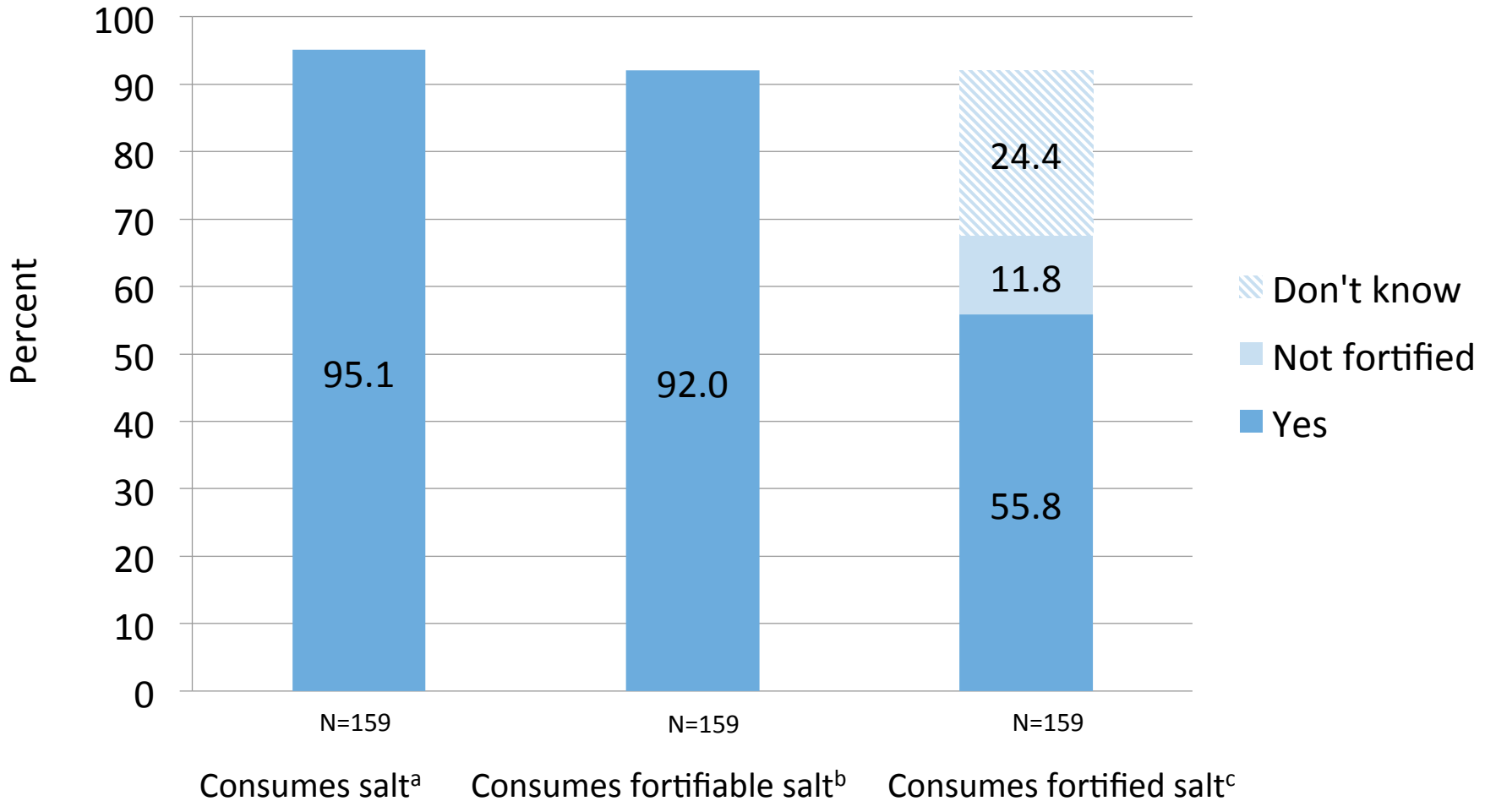
Zanzibar Coverage, Tanzania, 2015: Household coverage of salt



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Household coverage by risk factors

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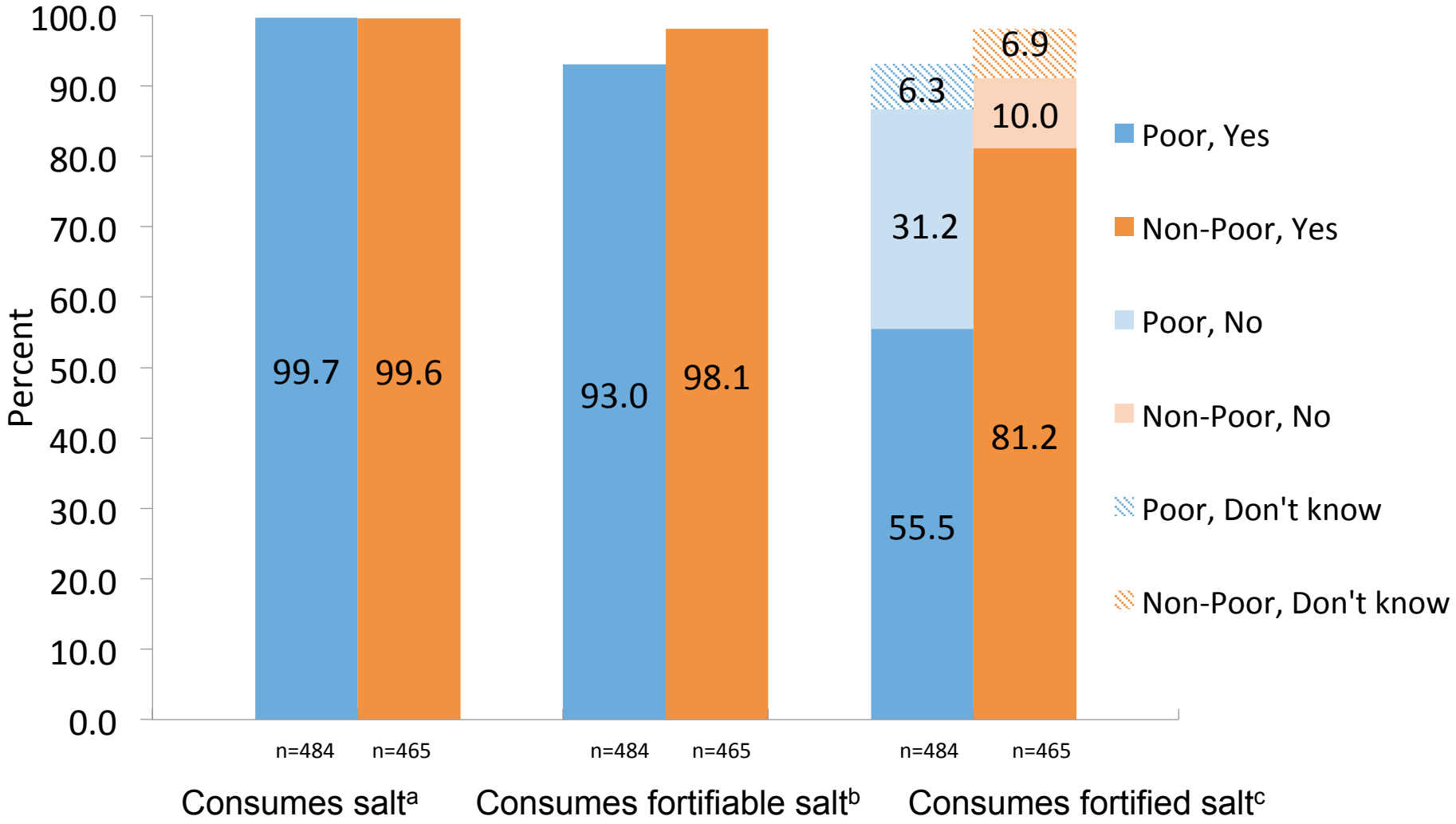
Salt coverage at household level by poverty risk



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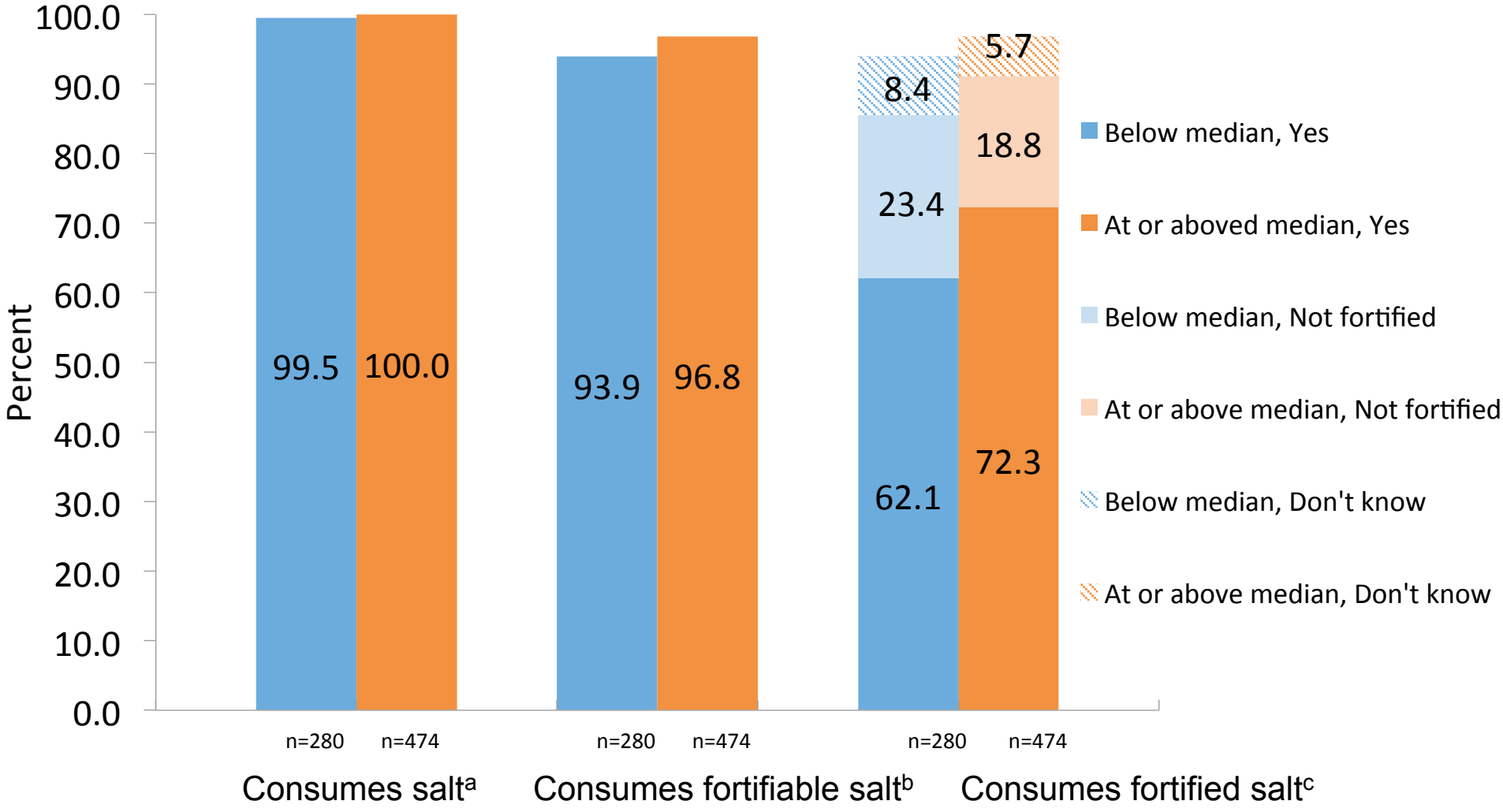
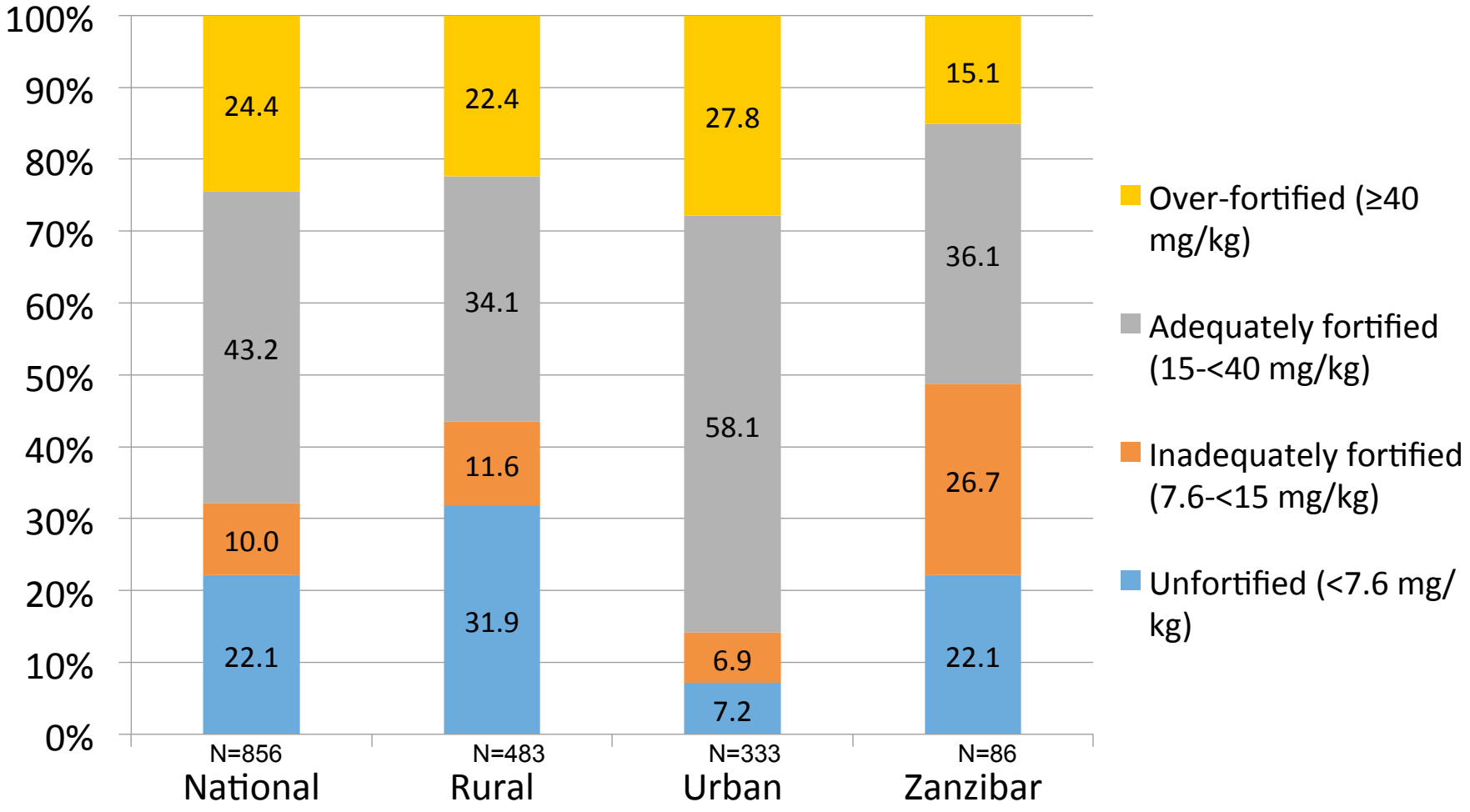
Salt coverage at household level by dietary diversity score



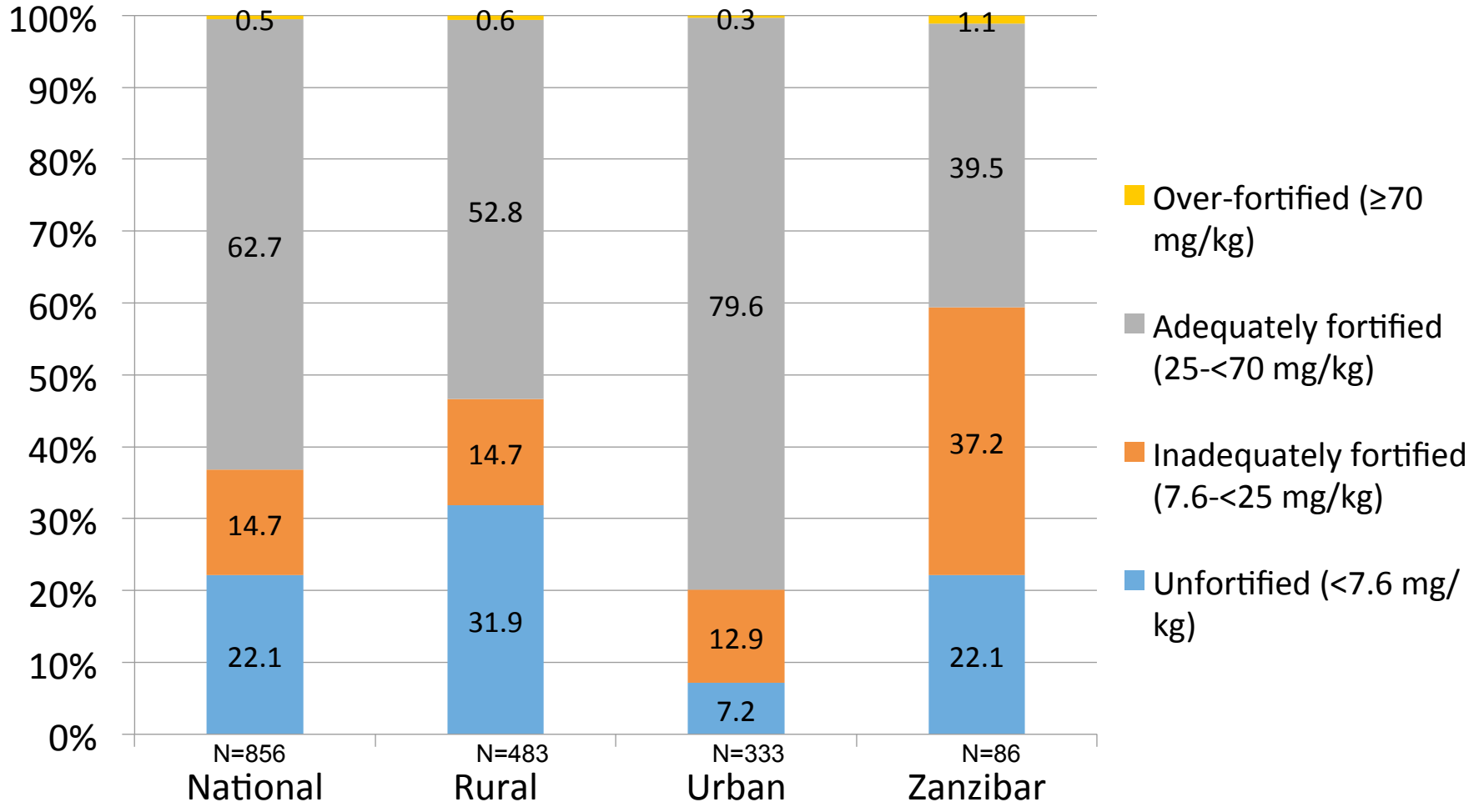
[a]Reported; [b]Fortifiable refers to a food that was not made at home and is assumed to be industrially processed; [c]Households were classified as fortified if they provided a sample or reported consuming a brand that was confirmed to be fortified by quantitative analyses; Don't know refers to a household that could not be classified because no food sample was available and no brand was reported.

Adherence to standards

Fortification quality of household samples using World Health Organization international standard for household samples: Salt quantitative analyses of iodine levels



Fortification quality of household samples using Tanzania National Standards for household samples: Salt quantitative analyses of iodine levels



Micronutrient contribution

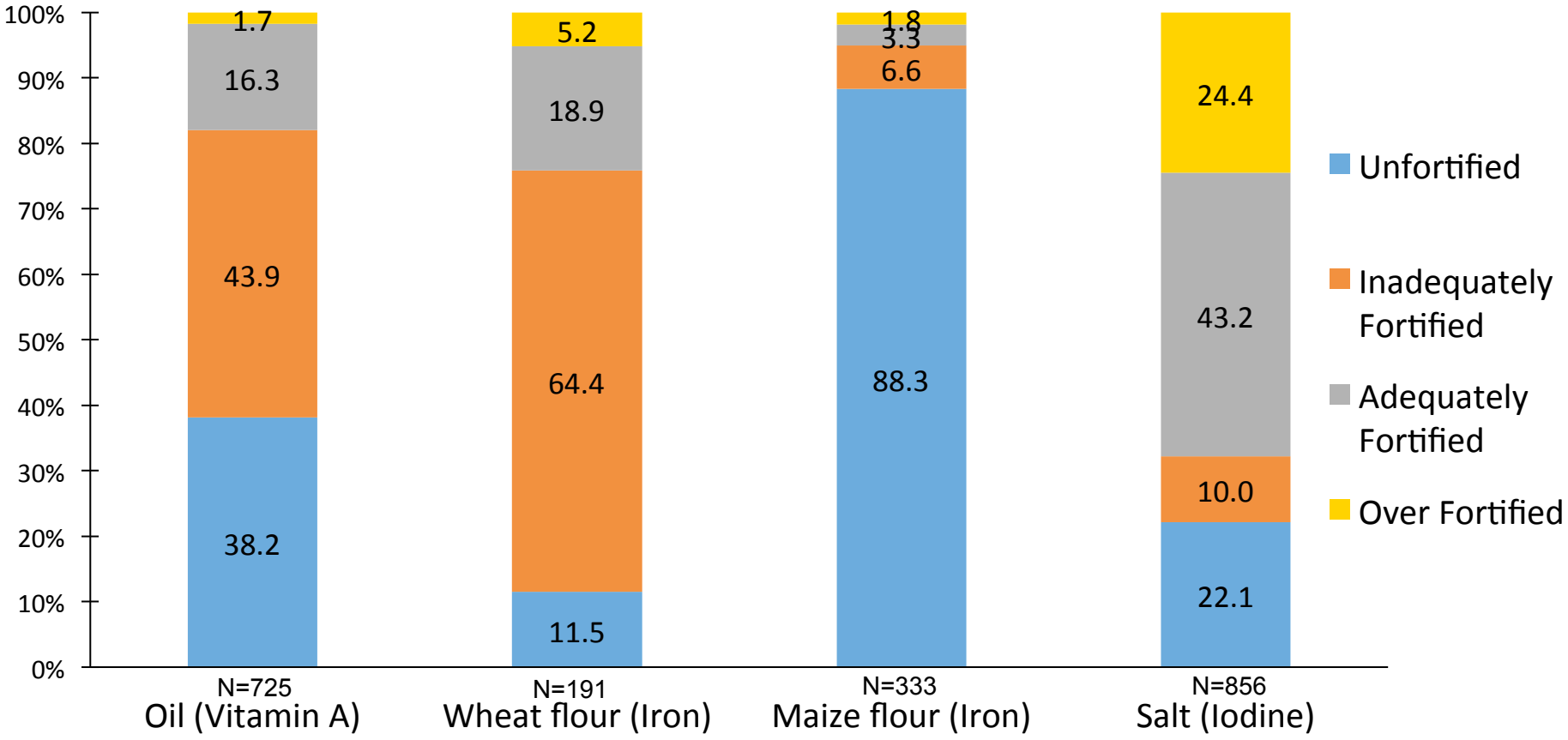
Daily consumption and iodine contribution from salt by WRA among households that reported consuming salt in Tanzania1,2

	National	Rural	Urban	Zanzibar	p-value
	N=857	N=493	N=364	N=122	
Salt consumed (g/day)	8.0 (4.9,12.2)	8.2 (5.3,12.7)	7.5 (4.4,11.1)	7 (3.7,11.4)	0.0006
Iodine from salt (% RNI)[3]	122.5 (64.1,222.6)	105.9 (51.6,192.5)	148.9 (86.4,257.8)	81.1 (38.6,154.9)	<.0001

WRA, Women of reproductive age (15 to 49 years); RNI, Recommended Nutrient Intake
[1]Results based on household assessment and adult male equivalent (AME) methodology
[2]Values shown are median (25%, 75%)
[3]The iodine RNI for women, per the World Health Organization, is as follows: 150 mcg/day (15-18 years), 150 mcg/day (19-50 years), 200 mcg/day (pregnant women), and 200 mcg/day (lactating women).

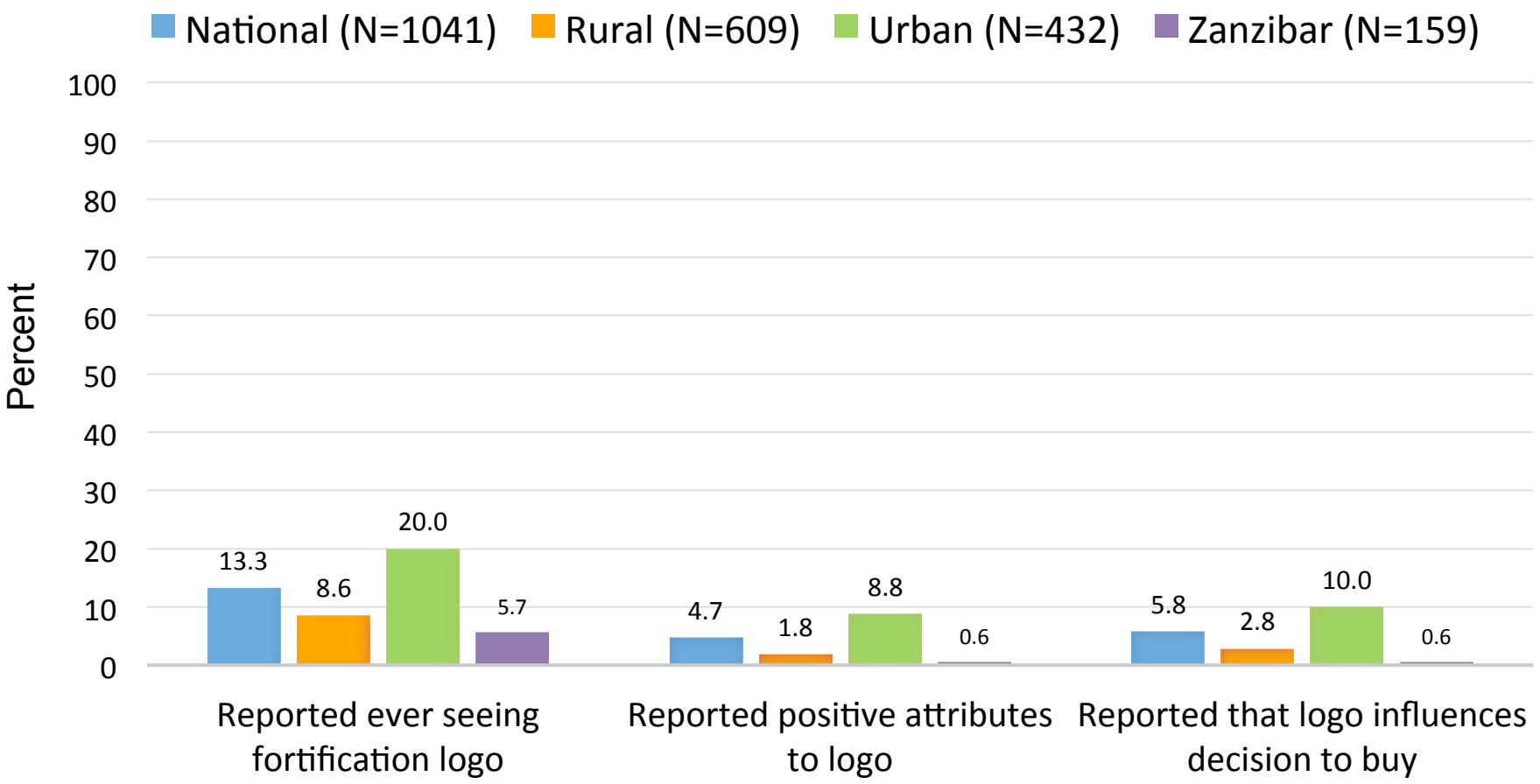
Adherence to standards

Fortification quality of national household samples using Tanzania National Standards



Fortification Awareness

Fortification logo awarene



CONCLUSIONS

Summary of key results

Oil	• There is high coverage of fortifiable oil meaning high potential for impact from fortification. Risk factors such as poverty and dietary diversity have little impact on coverage. Further efforts are required to improve quality and address under fortification, especially in Zanzibar
Wheat flour	• Household wheat flour coverage is low except for Zanzibar where wheat coverage is much higher and most is fortified. There are big difference in coverage with households that are poor with lower dietary diversity consuming much less fortifiable wheat. There is potential for impact among a subset of the population, particularly in urban areas. Improvements in quality of fortification needed.
Maize flour	• Coverage of fortifiable maize flour is much lower than other vehicles due to high levels of home production but there is still potential for impact, particularly in urban areas and in Zanzibar where much of the maize consumed is industrially produced. Fortification quality remains a big challenge as virtually no maize is fortified.
Salt	• Nearly universal coverage of fortifiable salt but there are big differences in coverage to fortified salt by poverty, particularly in rural areas . Further efforts are needed to improve quality and address under fortification.

Strengths

- The use of a standardized tool, which has undergone a peer-review process to review and refine the research approach, to assess program coverage

- The use of standardized and validated indicators to assess need and risk

Limitations

- Household coverage estimates do not capture foods purchased and consumed outside the household, which may underestimate the potential coverage of the program

- Repacking of food vehicles into unbranded packaging was common, which likely resulted in an underestimation of coverage of fortified foods in these analyses

- The small number of samples collected and analyzed for many brands limits the reliability of brand specific information

- The small number of unfortified wheat and maize flour samples used to estimate intrinsic iron levels in those vehicles

Program implications and recommendations

- The large-scale fortification program is working and making important contributions to dietary intakes of key nutrients, but there is still room for substantial improvement

- Further efforts are required to improve quality control and enforcement of standards to better address under fortification of all food vehicles to maximize impact

- It is critical to know the dietary patterns in the population to be able to estimate the potential impact and to ensure fortification levels are set appropriately and adjusted over time as dietary patterns change

- Investment in regular monitoring and surveillance, and continual feedback for program improvement is critical for impact

Program implications and recommendations cont.

- Maize is the main staple that largely remains unfortified despite legislation. One main reason is that much of the maize is produced at home and only improving access to small scale mills that can fortify will increase access to fortified maize.
- The situation in Zanzibar is distinct for most of the staple foods and further investigation is needed to increase the access to adequately fortified foods

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THANK YOU!