

Can locally available foods fulfill the requirements of the major essential nutrients of a typical household in Rohtas, Bihar?

– A Cost of Diet Assessment

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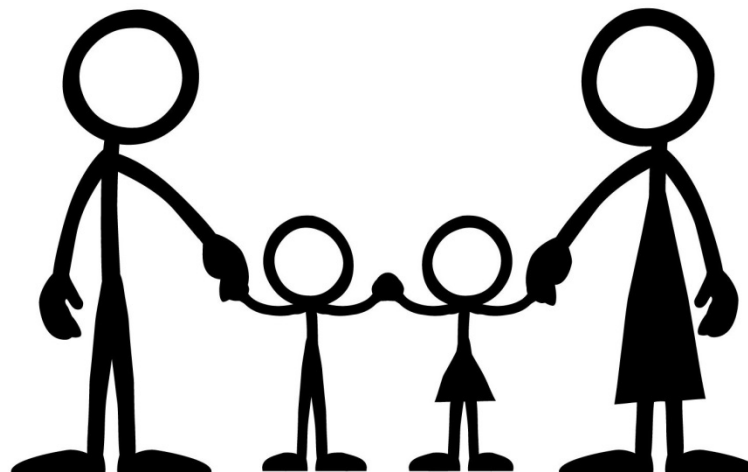
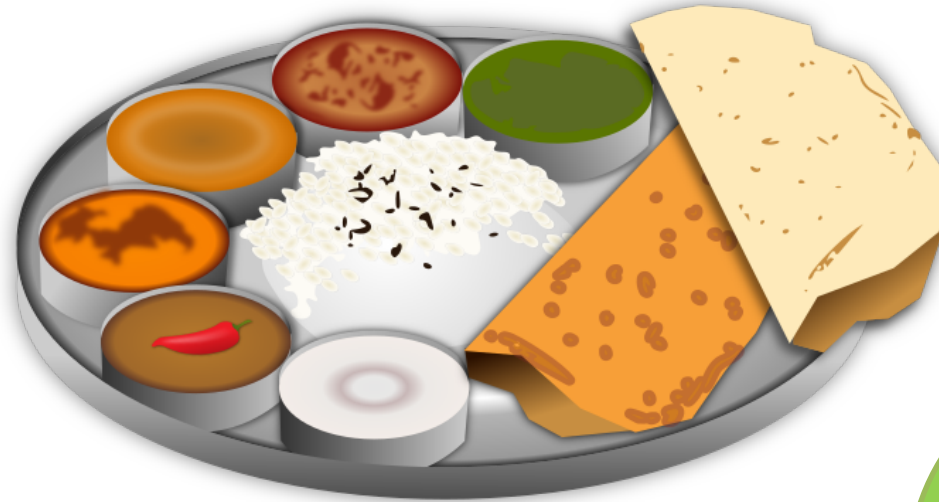
- Undernourished (BMI<18.5 kg/m²)
 - 30% women (15-49 yrs)
- Underweight (<2SD,WAZ)
 - 44% children (12-23mo)
- Anaemia (P:Hb<11.0 g/dl; NP: Hb<12.0 g/dl)
 - 64% children (<5yrs)
 - 60% women (15-49 yrs)

NFHS 2015-16

**Inadequate diet is the major cause of
undernutrition**

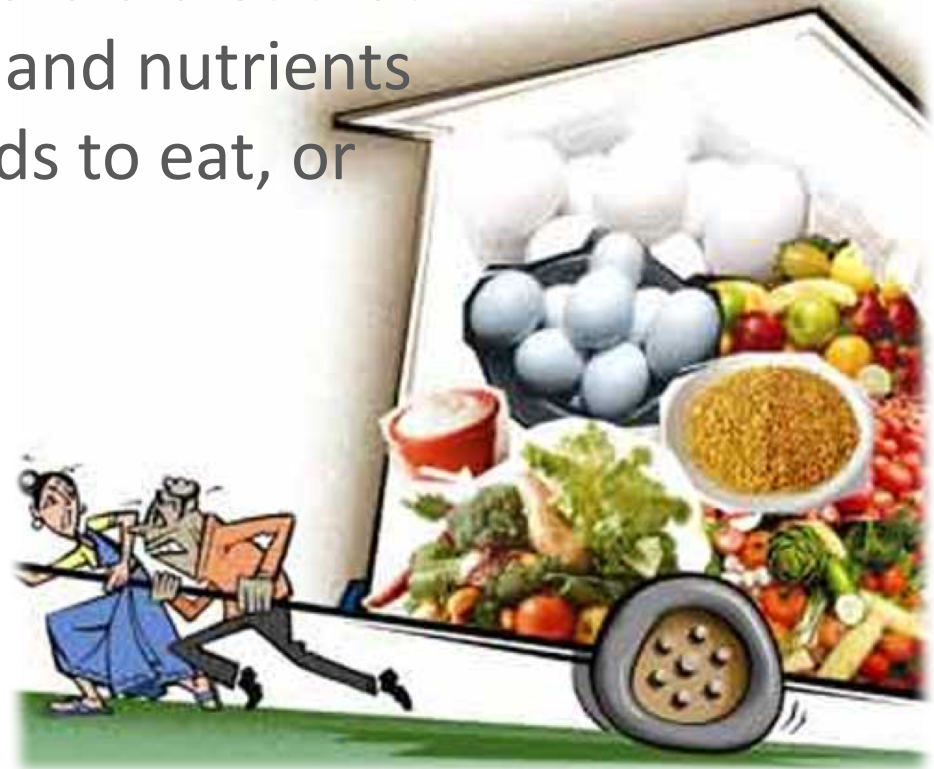


“Household-level food security is determined by both physical access to food and adequate purchasing power.” – FAO (1992)



“When foods are available, the main obstacle to achieve a nutritious and balanced diet, is usually economic:

people may not be able to afford a diet that meets their needs for energy and nutrients even if they know what foods to eat, or aspire to eat”.





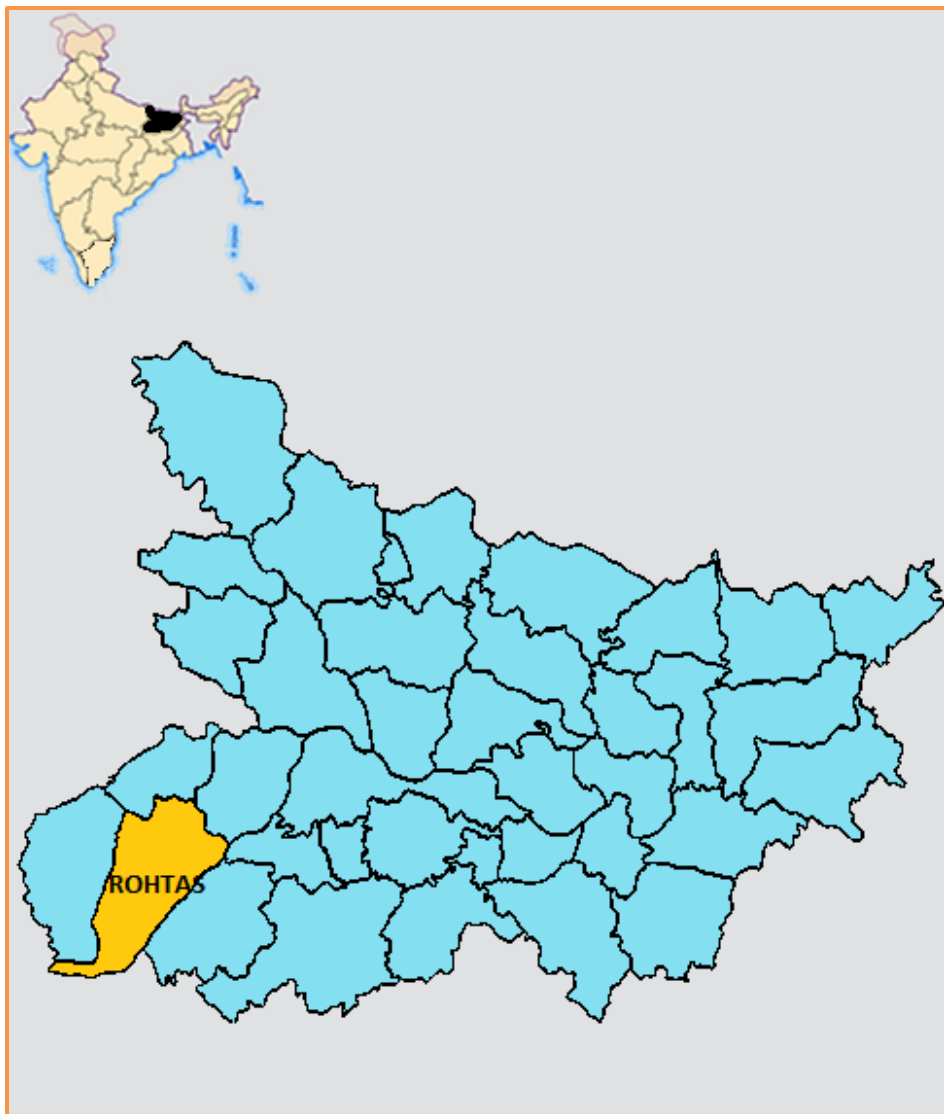
Save the Children



“Any other food basket at the same price will be less nutritious, and any other food basket of the same nutrient value will be more expensive”

- **Is it possible to meet the nutrient requirements of an individual or a household using locally available foods?**
- **What are the locally available foods that can help meet the major nutrient requirements ?**
- **What is the cost of such a diet ?**





- Rohtas, Bihar - 125 HH
- SPANDAN (System of Promoting Appropriate National Dynamism for Agriculture and Nutrition)
- Agri-Nutrition Linkage
- Collaboration:
 - National Institute of Nutrition (NIN), Hyderabad
 - Indira Gandhi Institute of Developmental Research (IGIDR), Mumbai
- Time: 8th – 24th June, 2015

BASIC CHARACTERISTICS

VARIABLE	PERCENTAGE (%) N=125
RELIGION	
Hindu	100
TYPE OF COMMUNITY	
Scheduled Tribe	27.2
Scheduled Caste	0.8
Backward Caste	47
General (Forward Caste)	25
TYPE OF HOUSE	
<i>Kutch</i> a (made with mud, thatch,etc)	11
<i>Pucca</i> (strong-built walls, floors and roof)	72
Others	17
EDUCATIONAL STATUS OF HEAD OF HOUSEHOLD	
Illiterate	48
1-4 Stand	9.2
5-8 Stand	20.8
9-12 Stand	19.2
College	3.3

BASIC CHARACTERISTICS

VARIABLE	PERCENTAGE (%) N=125
OCCUPATION OF HEAD OF THE HOUSEHOLD	
Farmers	40
Agricultural Labourers	4
Non-Agricultural Labourers	37
Service	10
Business	5
Unemployed/No work	2
Others	2
LAND OWNED (Acres)	
Nil	47
<1	26
1-2.5	11
2.5-5.0	7
>5	9
FAMILY SIZE	
1-4	24
5-8	58
9 & Above	18

Representative Household, Rohtas, Bihar

Characteristics	No.
Male, 30-59y, 65kg, moderately active	1
Female, 30-59y, 55kg, moderately active	1
Child, 12-23 mo	1
Child, 4-5 y	1
Child, 8-9 y	1
Male, >60y, 60kg, light activity	1
Females, >60y, 60kg, light activity	1
Total no. of members in the HH	7

- **Food List**
 - All Locally consumed foods
 - Alcoholic beverages removed
 - Foods consumed $\geq 0.1\text{g}$
- **Market Price (per 100g)**
- **Food Consumption Data**
 - Food Frequency
 - 24 hour Diet Recall
- **Nutrient intakes** calculated using Indian food composition tables
(Nutritive Value of Indian Foods 1987 & Indian Food Composition Tables 2017)

Diet	Characteristics
Energy Only Diet	Meets recommended average energy requirements
Macronutrient Diet	Meets recommended intakes of energy, protein & fat
Nutritious Diet	Meets recommended intakes of energy, protein, fat & 13 micronutrients
Food Habits Diet	Meets recommended intakes of energy, protein, fat & 13 micronutrients, using constraints based on the food habits of the community

MEDIAN INTAKES OF FOOD GROUPS

	Children 1-2 yr (g)	Children 2-5 yr (g)	Adult 30-59 yr		Adult >60 yr	
			Male (g)	Female (g)	Male (g)	Female (g)
Cereals & Cereal Prod	29	79	249	208	184	177
Pulses & Legumes	5	14	21	23	20	12
Green Leafy Veg	0	20	65	78	47	78
Other Vegetables	26	35	105	99	89	75
Roots & Tubers	13	24	68	63	74	54
Nuts & Oil Seeds	0	0	1	1	1	1
Spices & Condiments	0	1	2	1	2	1
Fruits	3	5	27	19	28	25
Fish	0	0	113	84	164	115
Meat & Poultry	0	31	105	72	0	0
Milk & Milk Products	245	187	69	62	81	82
Fats & Edible Oils	2	6	15	14	14	13
Sugars	7	12	13	13	18	15
Others	1	3	2	2	2	3

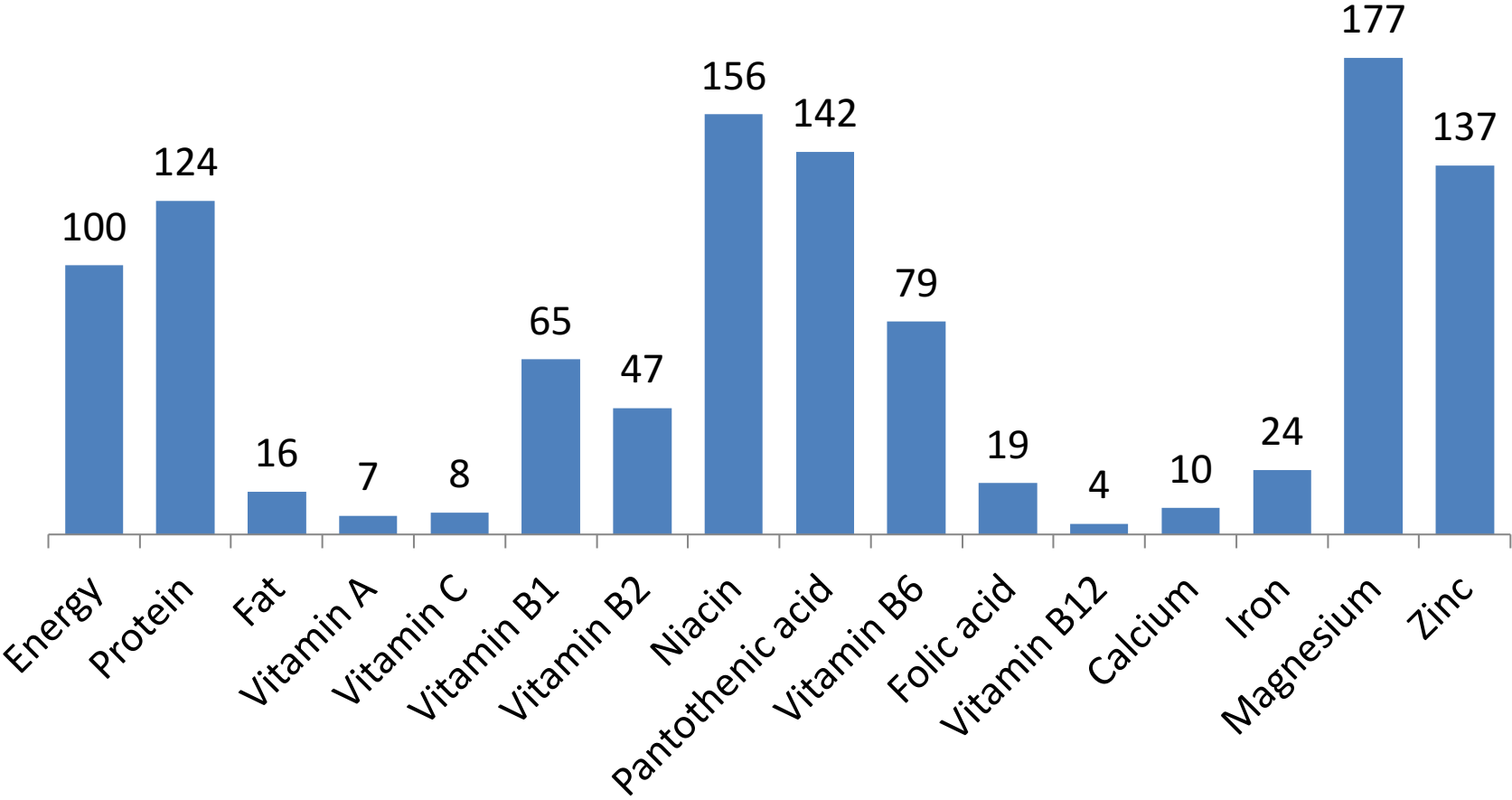
On average, a typical Household of **7 members**
in Rohtas spent **115 INR** on food **everyday...**

Energy Only Diet

- Cost:
 - Daily: 68 INR
 - Monthly: 2074 INR
- Foods: 3
- Food Groups: 2

Food List	Quantity (g)	Cost (INR)	Percent of Nutrients Met															
			Energy	Protein	Fat	Vitamin A	Vitamin C	Vitamin B1	Vitamin B2	Niacin	Pantothenic acid	Vitamin B6	Folic acid	Vitamin B12	Calcium	Iron	Magnesium	Zinc
Rice, grain	2963	56	81	84	6	0	0	27	26	83	118	53	8	0	4	10	94	85
Wheat, flour	661	12	17	38	4	0	0	36	19	71	21	26	9	0	4	15	81	50
Breast milk	532	0	3	2	6	7	8	2	3	3	3	1	2	4	2	0	2	2
% Nutrient Met			100	124	16	7	8	65	47	156	142	79	19	4	10	24	177	137

Nutrients Met (%)

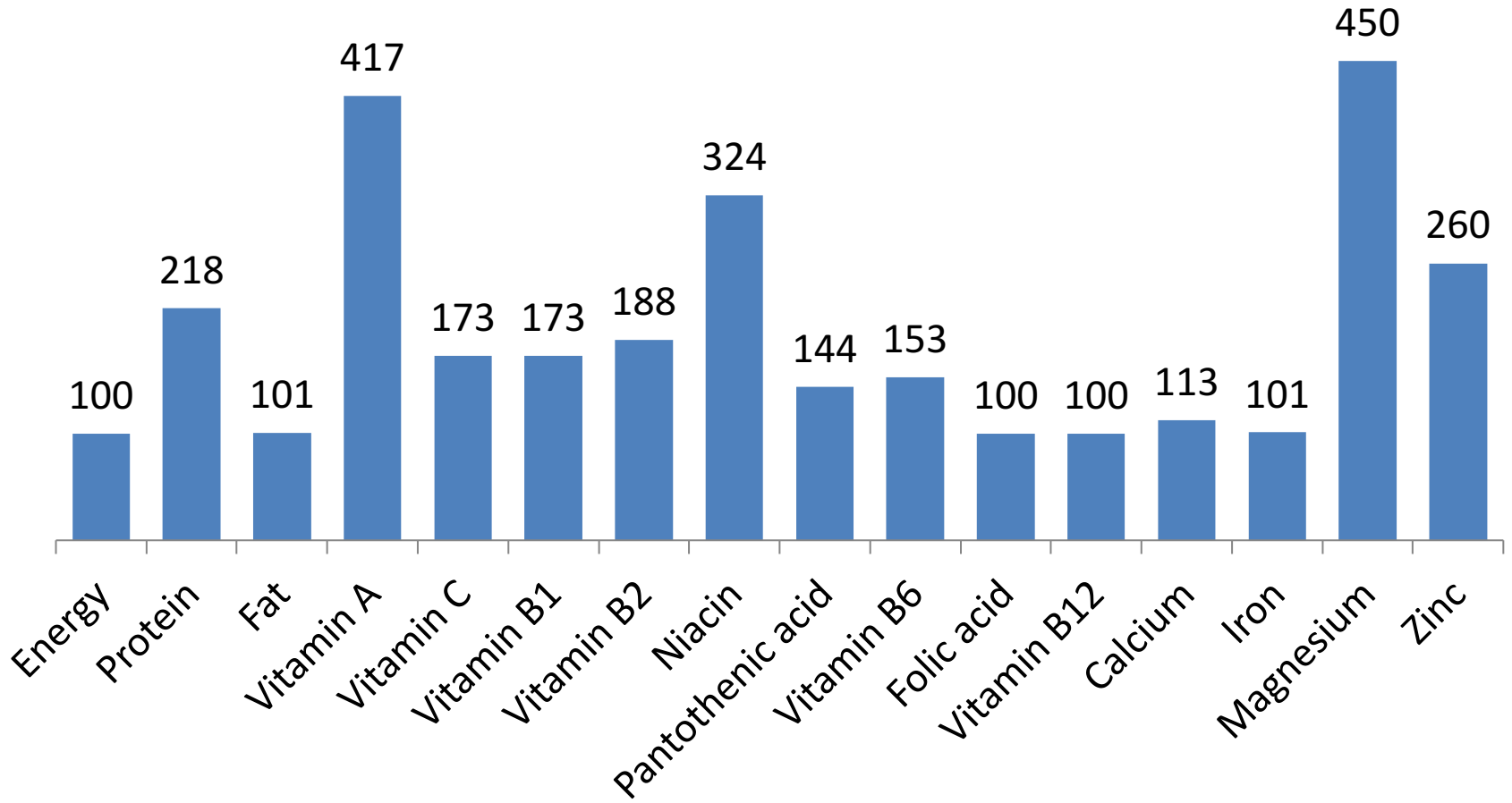


Nutritious Diet

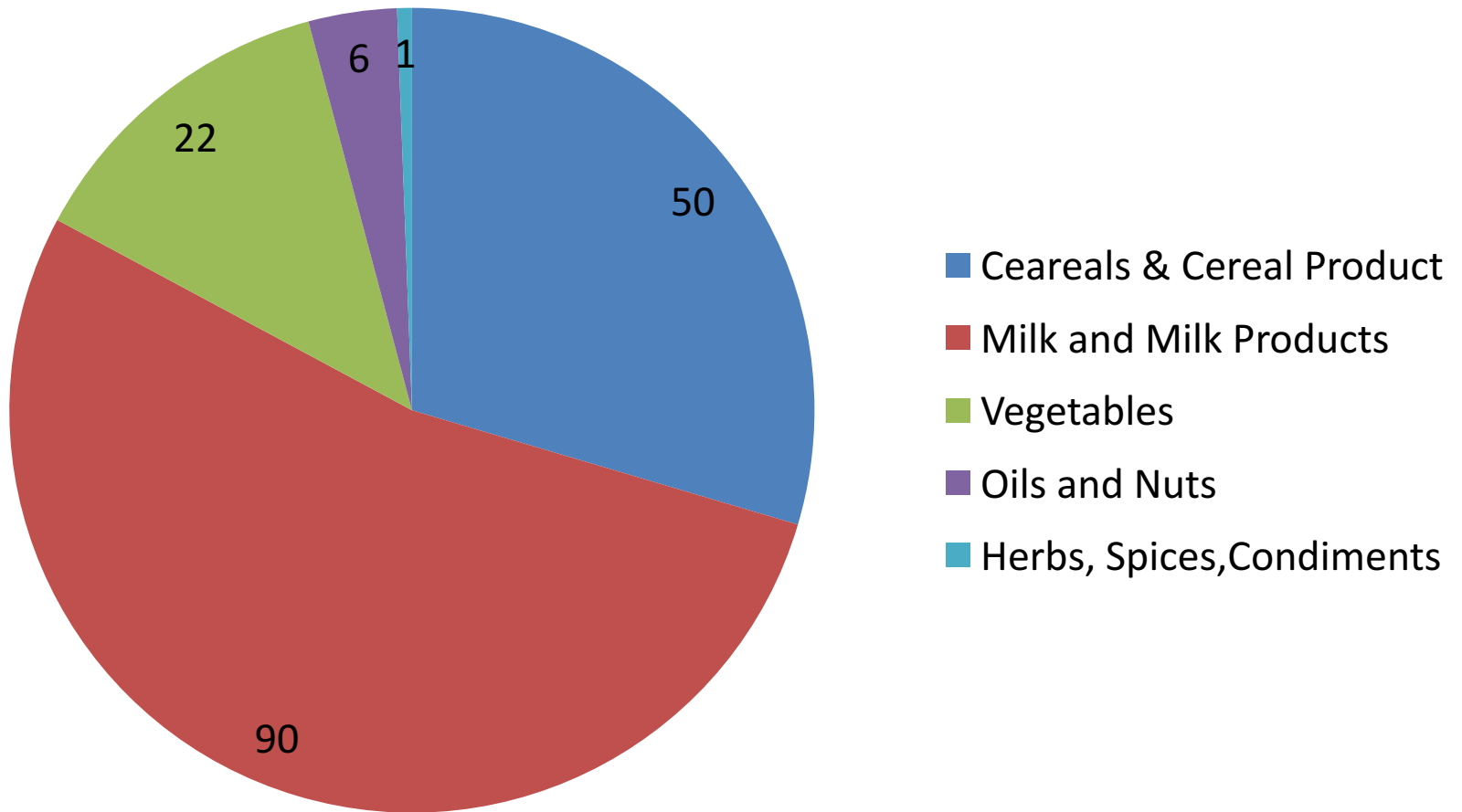
- Cost:
 - Daily: 169 INR
 - Monthly: 5128 INR
- Foods: 10
- Food Groups: 6

Food List	Quant (g)	Percent of Nutrients Met															
		Energy	Protein	Fat	Vitamin A	Vitamin C	Vitamin B1	Vitamin B2	Niacin	Pantothenic acid	Vitamin B6	Folic acid	Vitamin B12	Calcium	Iron	Magnesium	Zinc
Cereals and Cereal Products																	
Rice, grain	266	7	8	1	0	0	2	2	7	11	5	1	0	0	1	9	8
Wheat, flour	2,471	63	143	15	0	0	135	69	265	78	97	34	0	13	54	302	187
Milk and Milk Products																	
Milk, buffalo	2,823	21	49	58	47	10	21	71	35	39	18	8	96	66	0	33	37
Vegetables (including Green leafy veg)																	
Amaranth	230	1	3	1	269	70	0	6	2	3	6	7	0	12	6	39	5
Bathua leaves	162	0	2	0	24	24	2	12	1	2	4	3	0	5	2	7	4
Cauliflower	224	0	2	0	0	38	1	2	1	5	4	5	0	1	24	5	2
Spinach	624	1	8	1	70	23	10	22	9	3	19	41	0	13	13	48	13
Oils and nuts																	
Mustard Oil	57	4	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0
Herbs, Spices, Condiments																	
Mustard Seeds	14	1	1	2	0	0	0	1	1	0	0	0	0	0	1	7	3
Breast Milk																	
Breast milk	532	3	2	6	7	8	2	3	3	3	1	2	4	2	0	2	2

Nutrients Met (%)



Contribution of Different Food Groups to Cost of Diet (%)



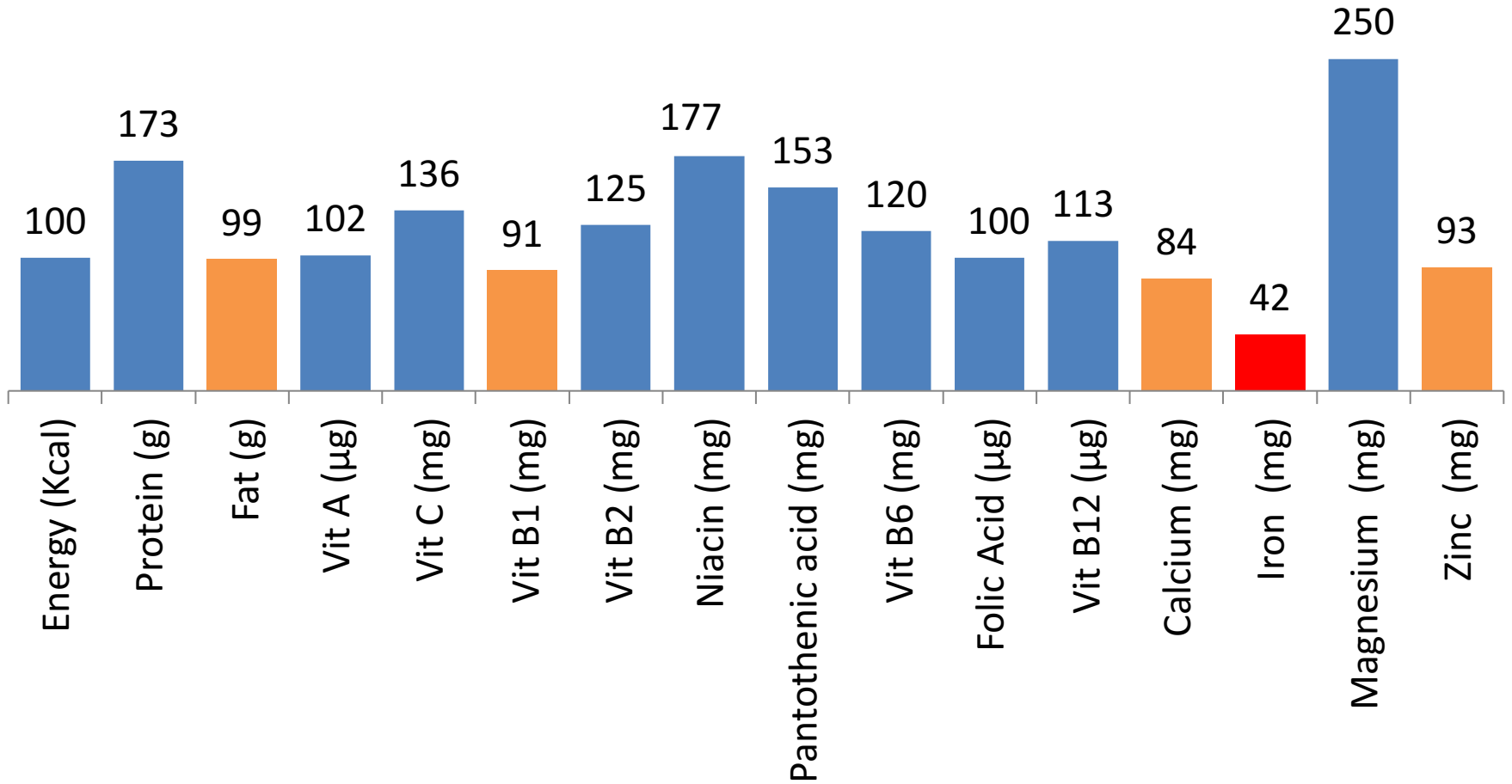
Food Habit Based Nutritious Diet

- Cost:
 - Daily: 245 INR
 - Monthly: 7462 INR
- Foods: 36
- Food Groups: 10

FOOD LIST	QUANTITY (g or ml)	FOOD LIST	QUANTITY (g or ml)
Grains and grain-based products		Vegetables	
Rice, flake	180	Amaranth	111
Rice, grain	1,161	Bathua leaves	331
Vermicelli	66	Bean, French	269
Wheat flour	836	Bottle gourd	303
Semolina	213	Cauliflower	206
Roots and tubers		Ridge Gourd	220
Potato	557	Snake gourd	125
Legumes, nuts and seeds		Jackfruit, raw	178
Groundnut	21	Spinach	654
Bengal gram	15	Ladies Finger (Okra)	526
Soyabean	24	Radish	84
Fish, seafood, amphibians and invertebrates		Herbs, spices and condiments	
Fish	60	Green Chilly	6
Eggs and egg products		Coriander, seeds	9
Egg	214	Cumin, seeds	4
Milk and milk products		Garlic	10
Milk, buffalo	1,229	Ginger	4
Milk, curd	549	Mustard, seeds	8
Fruit and fruit products		Turmeric, dried	7
Indian Gooseberry	1	Fenugreek, seeds	2
Ghee, cow	20	Bay leaf, dry	3
		Breast Milk	
		Breast milk	532

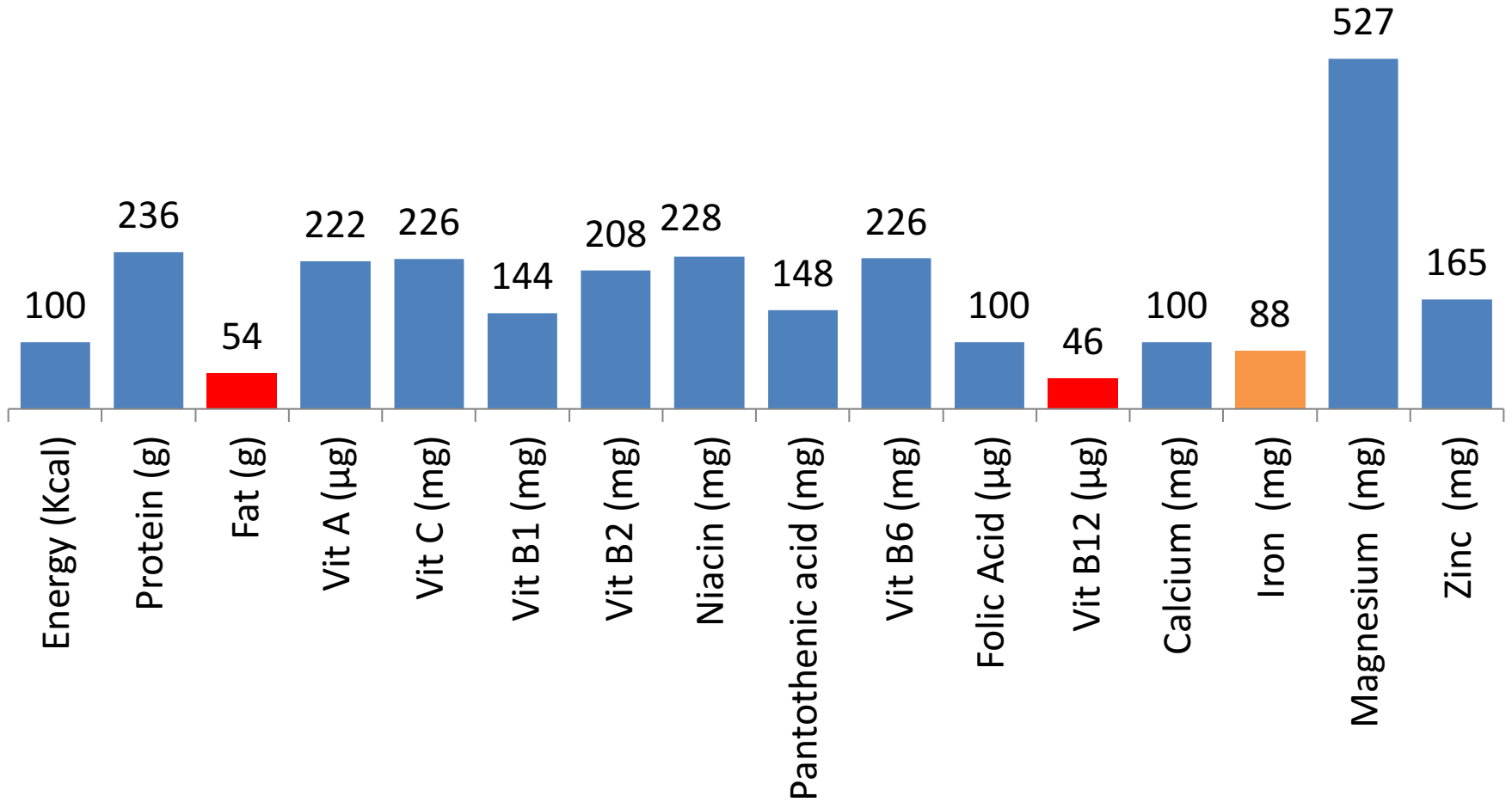
Percentage of Nutrients Met

Child, 12-23 mo



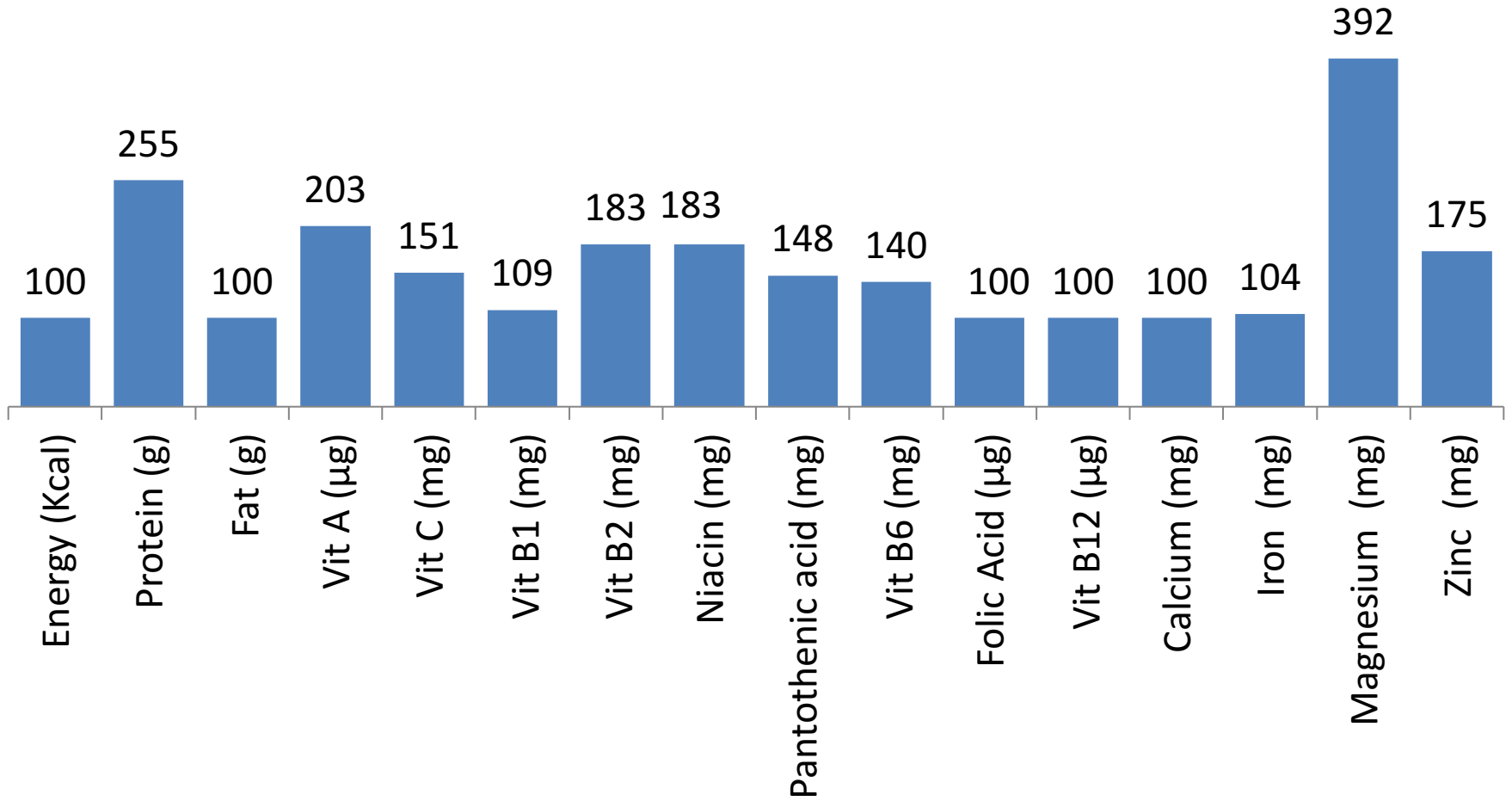
Percentage of Nutrients Met

Child, 4-5 yr



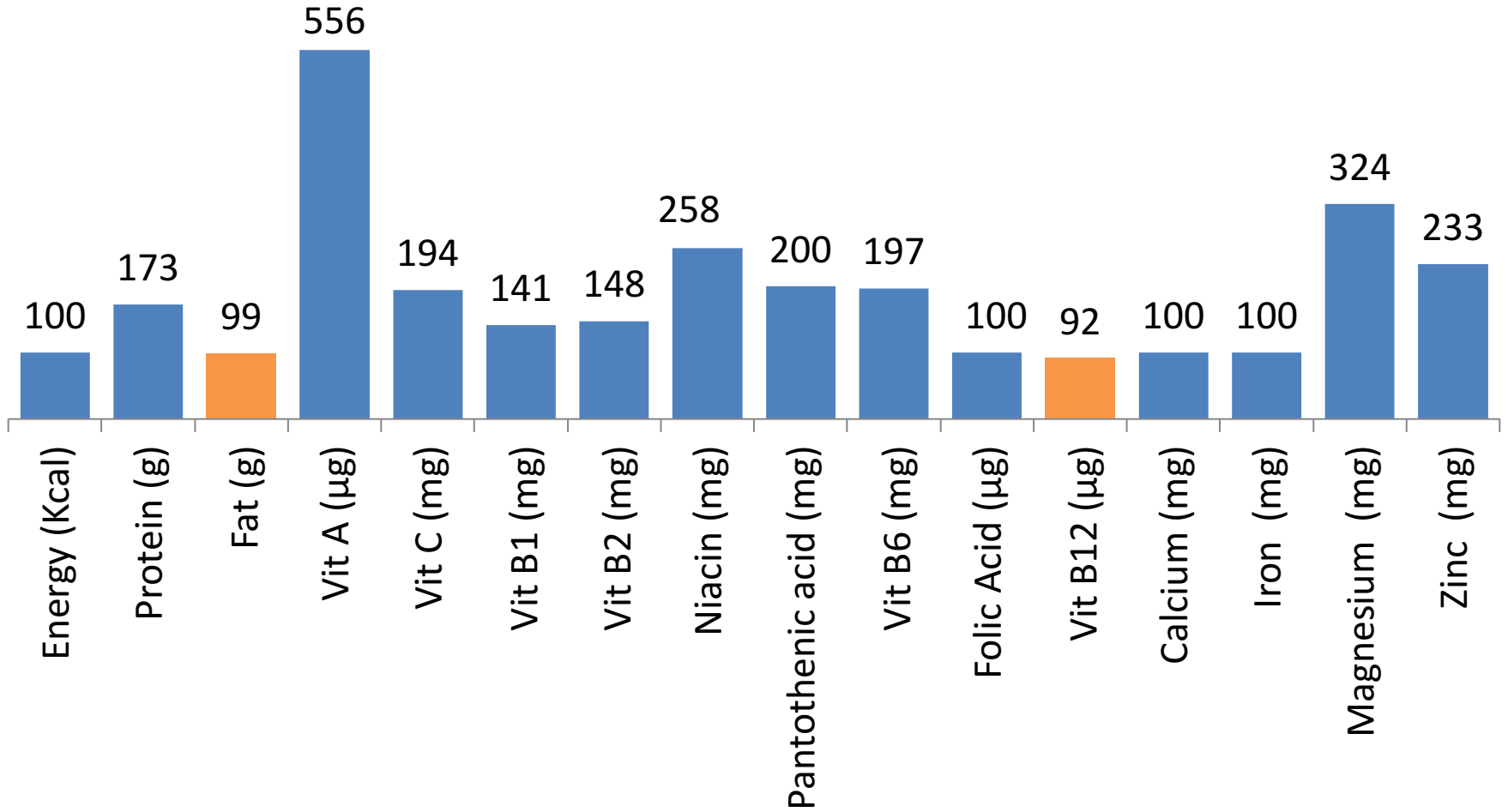
Percentage of Nutrients Met

Child, 8-9 yr



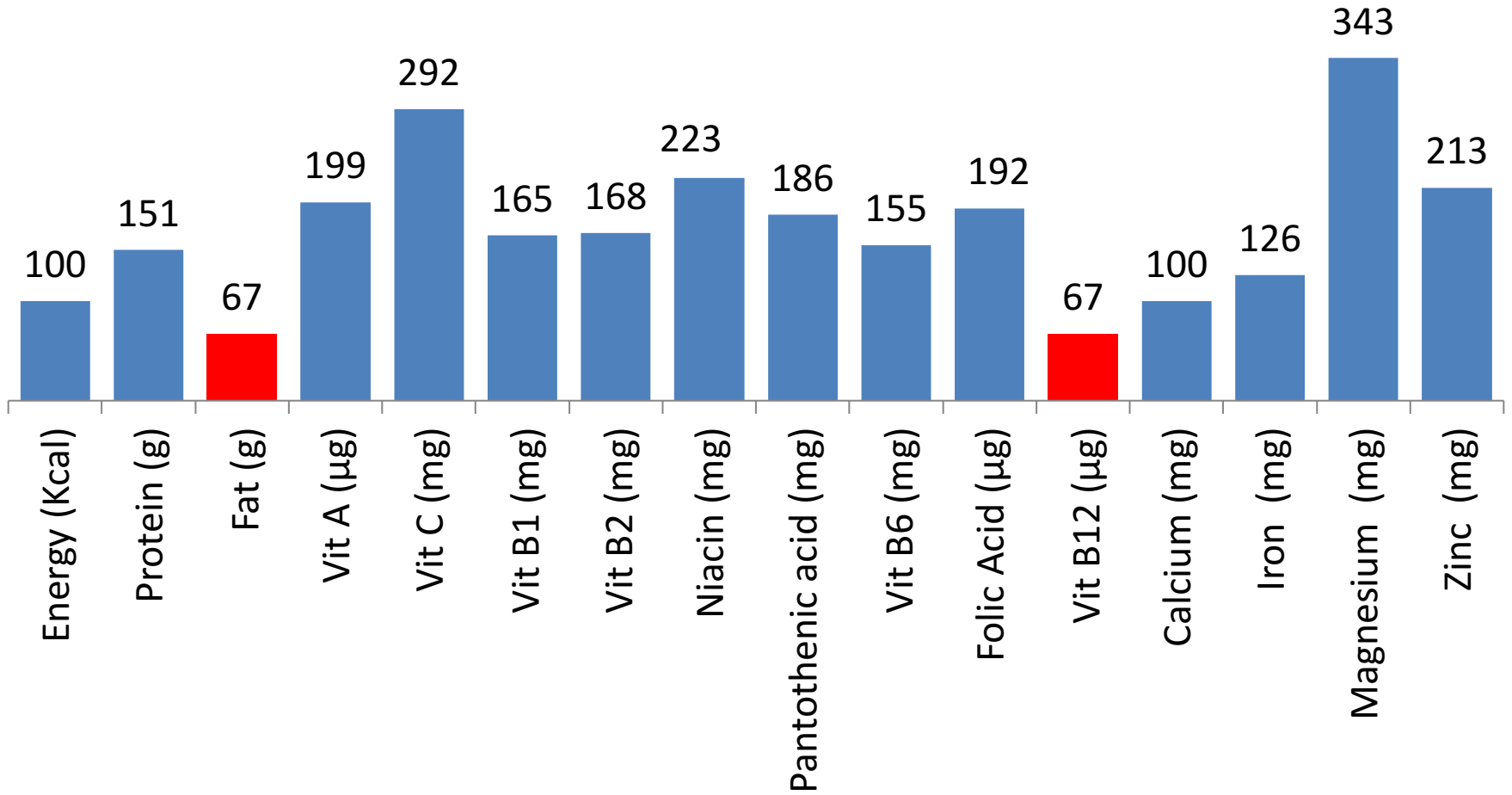
Percentage of Nutrients Met

Man, 30-59 yr, 65 kg, moderate activity



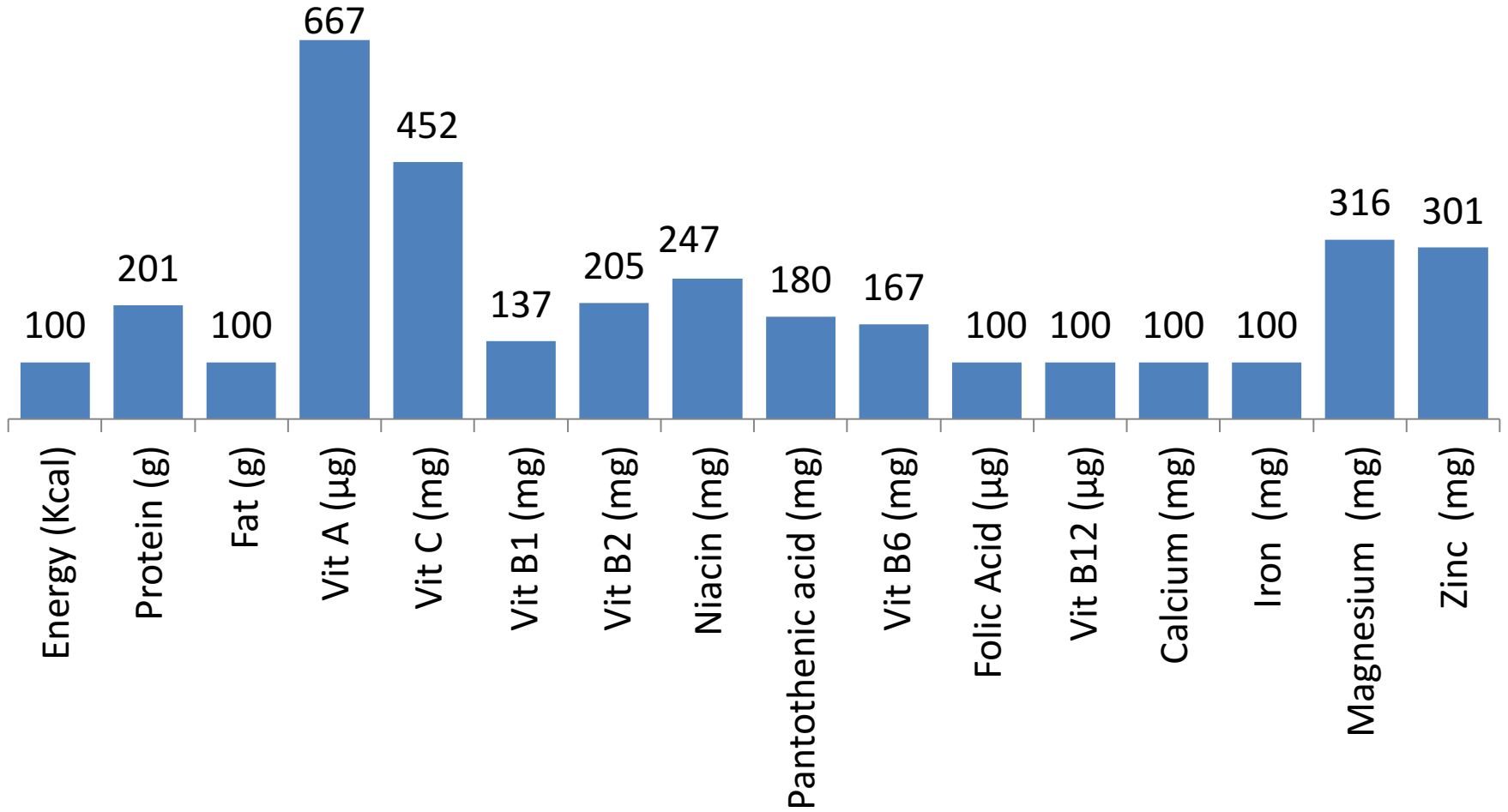
Percentage of Nutrients Met

Man, 60 kg, >60 y, sedentary



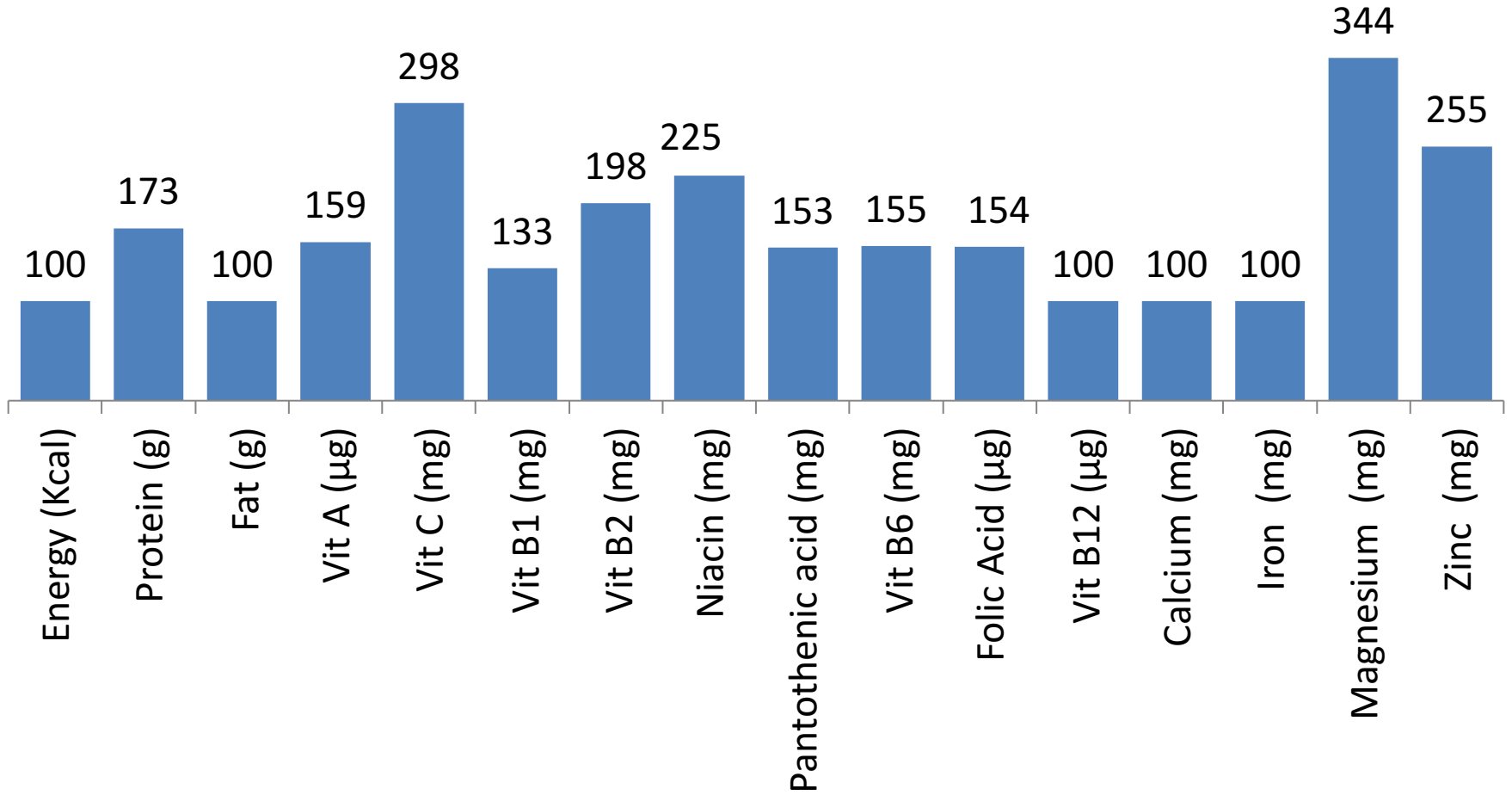
Percentage of Nutrients Met

Woman, 30-59 yr, 65 kg, moderate activity



Percentage of Nutrients Met

Woman, 60 kg, >60 y, sedentary



Conclusion

- A nutritious diet that met **requirements** of all the nutrients was possible using the locally available foods.
- **However**, a nutritious diet based on the existing food habits was not possible for all the members (Standard HH).
- Vit B12, Iron, Fat, Vit B1 and Calcium were the **major limiting nutrients** in food habit based nutritious diet.
- Calcium and Vit B12 were the **most expensive nutrients** in the nutritious diet.
- Need for **nutrition advocacy** to modify dietary habits.
- Focus on **improving affordability** of foods through **agricultural and livestock interventions**.

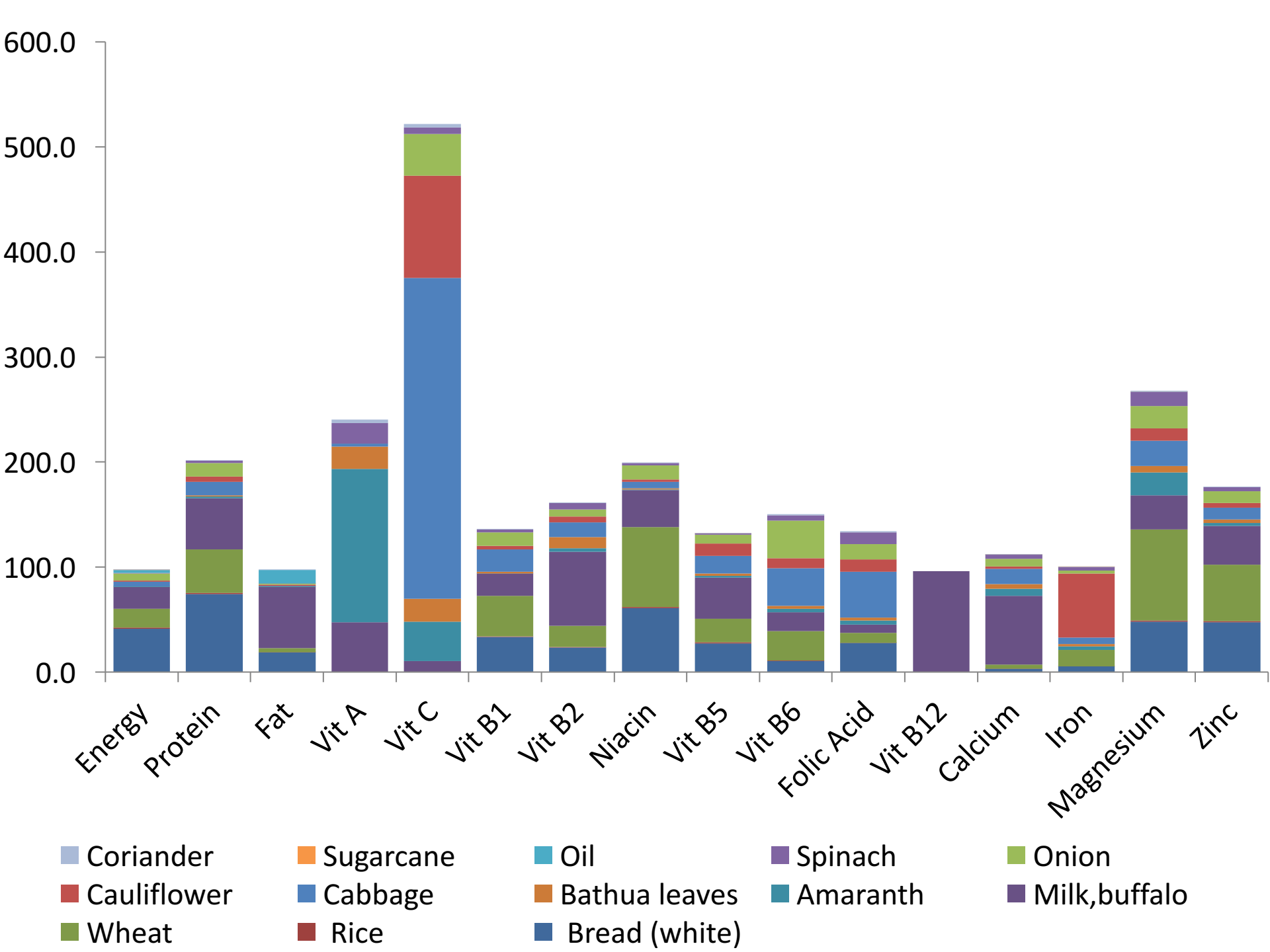
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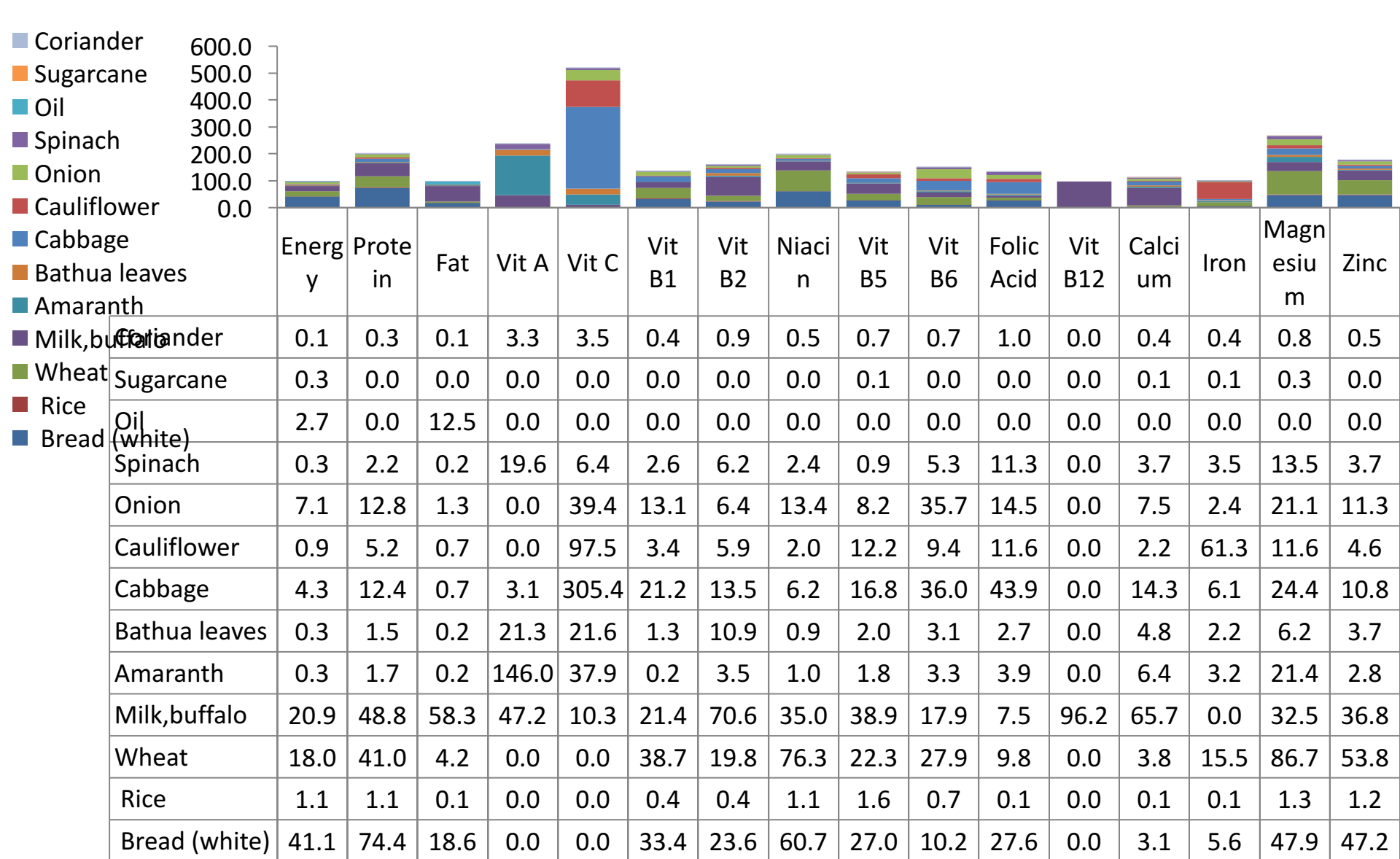


Nutritious Diet

Foods	Child, 12-23 mo (g/ml) (serving)	Child, 4-5y (g/ml) (serving)	Child 8-9y (g/ml) (serving)	Man, 30-59y (g) (serving)	Woman, 30-59y (g) (serving)	Man, >60y (g) (serving)	Woman, >60y (g) (serving)	Food Cost (INR)
Bread (white)	-	-	-	698 (3)	552 (3)	416 (3)	341 (3)	0.00
Rice	-	19 (1)	21 (1)	-	-	-	-	0.76
Wheat, flour	130 (3)	244 (3)	331 (3)	4 (1)	-	-	-	12.78
Milk, buffalo	83 (1)	261 (2)	391 (2)	522 (2)	522 (2)	522 (3)	522 (3)	90.32
Amaranth	6 (1)	10 (1)	3 (1)	5 (1)	3 (1)	41 (1)	57 (1)	1.50
Bathua Leaves	67 (1)	32 (1)	45 (1)	-	-	-	-	1.74
Cabbage, raw	-	-	-	757 (3)	598 (3)	500 (3)	439 (3)	0.00
Cauliflower, raw	21 (1)	-	-	95 (1)	271 (2)	103 (1)	79 (1)	18.20
Onion	-	-	-	757 (3)	471 (3)	500 (3)	439 (3)	0.00

Foods	Child, 12-23 mo (g/ml) (serving)	Child, 4-5y (g/ml) (serving)	Child 8-9y (g/ml) (serving)	Man, 30-59y (g) (serving)	Woman, 30-59y (g) (serving)	Man, >60y (g) (serving)	Woman, >60y (g) (serving)	Food Cost (INR)
Onion	-	-	-	757 (3)	471 (3)	500 (3)	439 (3)	0.00
Spinach	12 (1)	59 (1)	104 (1)	-	-	-	-	2.84
Oil	1 (1)	14 (1)	16 (1)	10 (1)	0 (1)	-	-	4.06
Sugar	-	-	-	70 (3)	0	46 (1)	41 (3)	0.00
Coriander leaves	-	-	-	12 (3)	9 (3)	8 (3)	7 (3)	0.00
Breast milk	532	-	-	-	-	-	-	0.00
Diet Cost	6.85	15.93	22.73	20.87	25.41	20.50	19.91	132.20





Food Habit Based Nutritious Diie

Foods	Child, 12-23 mo (g/ml) (serving)	Child, 4-5y (g/ml) (serving)	Child 8-9y (g/ml) (serving)	Man, 30-59y (g) (serving)	Woman, 30-59y (g) (serving)	Man, >60 y (g) (serving)	Woman, >60y (g) (serving)
Bread (white)	0	0	26 (1)	13 (1)	11 (1)	7 (1)	14 (1)
Rice, flake	0	80 (1)	0	100 (1)	0	0	0
Rice, grain	52 (1)	118 (1)	152 (1)	294 (1)	232 (1)	185 (1)	128 (1)
Vermicelli	0	0	0	34 (1)	32 (1)	0	0
Wheat Flour	35 (1)	68 (1)	89 (1)	177 (1)	134 (1)	173 (1)	161 (2)
Semolina	22 (1)	27 (1)	60 (1)	28 (1)	50 (1)	28 (1)	0
Potato	35 (1)	52 (1)	77 (1)	118 (1)	103 (1)	87 (1)	86 (1)
Groundnut	0	0	0	0	25 (1)	0	0
Fish	0	0	28 (1)	0	34 (1)	0	26 (1)
Egg	0	0	0	72 (1)	70 (1)	0	0
Milk, buffalo	23 (1)	119 (2)	215 (2)	193 (2)	181 (2)	252 (2)	154 (2)

Foods	Child, 12-23 mo (g/ml) (serving)	Child, 4-5y (g/ml) (serving)	Child 8-9y (g/ml) (serving)	Man, 30-59y (g) (serving)	Woman, 30-59y (g) (serving)	Man, >60 y (g) (serving)	Woman, >60y (g) (serving)
Spinach	14 (2)	53 (2)	71 (2)	117 (1)	0	214 (2)	159 (2)
Ladies Finger	59 (2)	0	0	0	0	109 (2)	104 (1)
Gooseberry	0	0	0	0	0	1 (1)	0
Oil	0	5 (2)	11 (2)	18 (2)	15 (2)	1 (1)	2 (1)
Ghee, cow	0	1 (1)	17 (1)	10 (2)	0	0	0
Sugar	7	0	0	11 (1)	13 (1)	10 (1)	22 (2)
Chilli, green	0	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Coriander leaf	0	0	0	11 (1)	32 (2)	92 (2)	0
Coriander Seeds	1 (2)	1 (2)	1 (1)	1 (1)	1 (1)	2 (2)	2 (2)
Cumin seeds	0	0	1 (1)	2 (1)	1 (2)	0	0

Foods	Child, 12-23 mo (g/ml) (serving)	Child, 4-5y (g/ml) (serving)	Child 8-9y (g/ml) (serving)	Man, 30-59y (g) (serving)	Woman, 30-59y (g) (serving)	Man, >60 y (g) (serving)	Woman, >60y (g) (serving)
Garlic	1 (1)	1 (1)	2 (1)	2 (1)	2 (1)	1 (1)	2 (1)
Ginger	0	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)
Mustard Seeds	0	1 (1)	1 (1)	2 (2)	1 (2)	1 (1)	1 (2)
Turmeric	0	0	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Salt	1 (1)	2 (1)	0	4 (1)	3 (1)	3 (1)	3 (1)
Fenugreek seeds	0	0 (1)	0	1 (1)	1 (1)	0	0 (1)
Chilli, dry	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Bay leaf	0 (2)	0	0	1 (1)	0	0 (2)	0 (1)
Breast Milk	532 (1)	0	0	0	0	0	0
Diet Cost (INR) (Total:232)	10	15	31	46	44	38	47

Contribution of Different Food Groups to Cost of Diet (%)

