

DIET QUALITY FOR WOMEN: RELATION TO ADVERSE BIRTH OUTCOMES IN TANZANIA

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WHAT DO WE KNOW?

- Sub-optimal diets are the number one risk factor for mortality [Murray, 2020]
- 3 Billion people cannot afford a healthy diet [Herforth et al, 2020]
- **Women & children have poor diets (LMICs):** monotonous, plant-based, limited animal foods, seasonal fruits and vegetables, poor bioavailability [Arimond et al, 2010; Torheim et al, 2010; Arimond 2004]
- **Micronutrient deficiencies prevalent - Africa, Asia, Latin America:** e.g. anemia, Vit A , zinc
- **Most programs focus on dietary diversity for women**
- **Is diet quality important in LMICs – in the context of global dietary transition?**
- **Diet quality dimensions:** Definitions, measurement [Alkerwi et al, 2014; Trijsburg et al, 2019]
 - 1) nutrient adequacy/food variety or food diversity
 - 2) moderation – saturated fat, sodium, sugar, nutrients associated with excess risk for disease
 - 3) balance - energy-yielding macronutrients



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Maternal dietary diversity and dietary quality scores in relation to adverse birth outcomes in Tanzanian women

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STUDY POPULATION

Parent trial: Perinatal study, double-blind, placebo-controlled

- August 2001 to July 2004, Dar es Salaam, Tanzania
- 8,428 pregnant women
- Multivitamin supplementation (Vit B1, B2, B6, niacin, B12, C, E) vs. placebo up to 6 wks
- Standard of care: IFA, malaria prophylaxis

Inclusion: HIV negative, pregnant; 18-45 years of age or older; 12-27 weeks gestation

Exclusion: >27 weeks gestation

Dietary intake: Multiple 24-hour dietary recalls



Primary Exposure

Introducing the Minimum Dietary Diversity – Women (MDD-W) Global Dietary Diversity Indicator for Women

Washington, DC, July 15–16, 2014



10 Food groups

1. Starchy staples
2. Beans and peas
3. Nuts and seeds
4. Dairy
5. Flesh foods
6. Eggs
7. Vit A rich dark green vegetables
8. Other vit A rich fruits & vegetables
9. Other vegetables
10. Other fruits

• **Gap:**

- MDD-W measures 1 aspect of diet quality (micronutrient adequacy)
- May not capture nutrition transition in LMICs

Prime diet quality score (PDQS)

21 food groups (score range 0-42)

Healthy (14)

dark green leafy vegetables	other vit A rich vegetables
cruciferous vegetables	other vegetables
whole citrus fruits	other fruits
fish	poultry
legumes	nuts
low fat dairy	whole grains
eggs	liquid vegetable oils

Unhealthy (7)

red meat	processed meats
refined grains and baked goods	sugar sweetened beverages
desserts and ice cream	fried foods away from home
potatoes	

PDQS

Healthy food groups:

0–1 serving/week
(0 points)

2–3 servings/week
(1 point)

≥4 servings/week
(2 points)

Unhealthy food groups:

0–1 serving/week
(2 points)

2–3 servings/week
(1 point)

≥4 servings/week
(0 points)

Cardio-vascular disease [Fung et al, 2018; Alvarez-Alvarez et al, 2020]

Gestational diabetes, hypertensive in pregnancy [Gisevic et al, 2018]

TABLE 4: WOMEN IN Q5 OF MDD-W HAD 26% LOWER RISK OF SGA VS. Q1 IN TANZANIA

Clinical Outcome	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P value for trend
	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	
DDS Median (IQR)	2.0 (2.0-2.3)	2.5 (2.5-2.7)	3.0 (3.0-3.0)	3.5 (3.3-3.5)	4.0 (4.0-4.5)	
Preterm birth ² (<37 weeks gestation)						
n/N	252/1550	201/1428	344/1765	149/1362	206/1448	
Univariate	ref	0.87 (0.73,1.03)	1.20 (1.03,1.39)*	0.67 (0.56,0.81)*	0.88 (0.74,1.04)	
Multivariate		0.87 (0.74,1.04)	1.24 (1.06,1.44)*	0.72 (0.60,0.88)*	0.97 (0.82,1.16)	0.24
Small for gestational age ³ (<10th percentile for gest age/sex)						
n/N	245/1400	231/1284	266/1601	207/1221	171/1318	
Univariate		1.03 (0.87,1.21)	0.95 (0.81,1.11)	0.97 (0.82,1.15)	0.74 (0.61,0.89)*	
Multivariate		1.01 (0.86,1.19)	0.95 (0.81,1.11)	0.97 (0.82, 1.15)	0.74 (0.62,0.89)*	<0.01*
Low birth weight ⁴ (<2,500 grams)						
n/N	114/1458	71/1359	107/1641	71/1287	85/1373	
Univariate		0.67 (0.50,0.89)*	0.83 (0.65,1.08)	0.71 (0.52,0.94)*	0.79 (0.60,1.04)	
Multivariate		0.66 (0.50,0.88)*	0.84 (0.65,1.08)	0.70 (0.53,0.94)*	0.80 (0.61,1.04)	0.11
Fetal loss ⁵ (Spontaneous abortion, stillbirth)						
n/N	46/1550	34/1428	72/1765	41/1362	45/1448	
Univariate		0.80 (0.51,1.24)	1.37 (0.96,1.98)	1.01 (0.67,1.53)	1.05 (0.70,1.57)	
Multivariate		0.73 (0.46,1.15)	1.37 (0.95,1.98)	0.90 (0.58,1.40)	0.95 (0.62,1.45)	0.96

TABLE 5: WOMEN IN Q5 OF PDQS HAD 45% LOWER RISK OF PRETERM AND 47% LOWER RISK OF LBW AND FETAL LOSS VS. WOMEN IN Q1 IN TANZANIA

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P value for trend
Clinical Outcome	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	RR ¹ (95% CI)	
PDQS Median (IQR)	16.0 (15.0-16.0)	18.0 (17.0-18.0)	19.0 (19.0-19.0)	20.0 (20.0-20.0)	22.0 (21.0-23.0)	
Preterm birth ² (<37 weeks gestation)						
n/N	338/1732	347/2194	133/1022	192/1215	142/1390	
Univariate	ref	0.81 (0.71,0.93)*	0.67 (0.55,0.80)*	0.81 (0.69,0.95)*	0.52 (0.44,0.63)*	
Multivariate		0.82 (0.71,0.93)*	0.66 (0.55,0.80)*	0.82 (0.70,0.96)*	0.55 (0.46,0.67)*	<0.001**
Small for gestational age ³ (<10th percentile for gest age/sex)						
n/N	264/1605	338/1971	149/906	187/1110	182/1232	
Univariate		1.04 (0.90,1.21)	1.00 (0.83,1.20)	1.02 (0.86,1.22)	0.90 (0.76,1.07)	
Multivariate		1.04 (0.90,1.21)	0.97 (0.81,1.17)	1.01 (0.85,1.19)	0.91 (0.77,1.08)	0.26
Low birth weight ⁴ (<2,500 grams)						
n/N	145/1606	124/2067	56/962	58/1149	65/1334	
Univariate		0.66 (0.53,0.84)*	0.64 (0.48,0.87)*	0.56 (0.42,0.75)*	0.54 (0.41,0.77)*	
Multivariate		0.67 (0.53,0.84)*	0.63 (0.47,0.84)*	0.55 (0.41,0.74)*	0.53 (0.40,0.71)*	<0.001**
Fetal loss ⁵ (Spontaneous abortion, stillbirth)						
n/N	68/1732	71/2194	38/1022	30/1215	31/1390	
Univariate		0.82 (0.59,1.14)	0.95 (0.59,1.40)	0.63 (0.41,0.96)*	0.57 (0.37,0.86)*	
Multivariate,		0.78 (0.56,1.09)	0.86 (0.57,1.30)	0.62 (0.40,0.95)*	0.53 (0.34,0.82)*	<0.01*

CONCLUSION

- Low maternal dietary diversity and quality may be modifiable risk factors for adverse birth outcomes in Tanzanian mothers.
- PDQS, a measure of maternal diet quality, was inversely associated with PTB, LBW and fetal loss.
- DDS, a measure of dietary diversity was inversely associated SGA.
- In addition to dietary diversity, diet quality should be considered as important in understanding risk factors for poor birth outcomes.
- Further study of these scoring systems in LMICs is warranted.

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THREE TOP FOOD ENVIRONMENT RESEARCH PRIORITIES FOR AFRICA

- Measurement of diet quality, and research linking diet quality to nutrition outcomes
 - Including refinement and validation of tools to measure diet quality
- Research on which food systems interventions and approaches are successful in improving nutrition in LMICs.
 - development of innovative interventions and pilot studies to evaluate the efficacy of interventions and policy to intervene in food systems
- Innovative approaches to improve availability and affordability of healthy diets
 - Increasing agriculture productivity, availability and affordability of nutrient-dense foods such as animal-source foods, legumes, fruits and vegetables
 - Research on new technology including labor-saving agricultural technology and innovation in farm management practices