Dietary diversity, consumption of animal source foods, and maternal nutritional status in Bangladesh.

Andrews CE[1], Shrestha R[1], Shibani G[1], Heneveld K[1], Webb P[1], Ausman LM[1], Marino Costello E[1],
[1] Gerald J. Dorothy R. Friedman School of Nutrition Science and Policy, Tufts University, Boston, Massachusetts, USA

Background

- In rural Bangladesh, diets are dominated by rice, and the intakes of nutrient-rich foods, such as animal source foods (ASF), fruits, and vegetables are limited.[1]
- Diets low in nutrients and lacking in diversity, which can be proxied with the Women's Dietary Diversity Score (WDDS), puts women of reproductive age (WRA) (15-49 years) at risk for acute and chronic malnutrition.
- Anthropometric indicators of nutritional status in WRA include underweight, wasting, or anemia.
- WRA are of special concern because pre-pregnancy is an important time period during a woman's life. During pregnancy, nutrient demands increase, putting women from resource-poor areas at even greater risk of malnutrition.[1]
- Underweight, wasting, and anemia have been associated with adverse infant and maternal outcomes, including low birth weight, intrauterine growth restriction, and preterm delivery.[2-4]

Objective

The objective of this study was to examine the association between WDDS and the status of being underweight (BMI <18.5 kg /m^2), wasted (MUAC <24 cm), and/or anemic (Hgb <120 g/L) in WRA in Bangladesh. Additionally, this study examined the associations between consumption of specific food groups, including animal source foods (ASFs), and these same nutritional outcomes.

Methods

This study used data from the Bangladesh Aquaculture and Horticulture for Nutrition Research study, a longitudinal observational cohort study that took place in 105 unions from 3 divisions in Bangladesh, including Khulna, Dhaka, and Barisal.

The present analysis used data from round three, which was collected from February to May of 2017, and included 2,653 WRA.

WDDS was derived from a questionnaire asking about the women's consumption of 41 different foods within the last 24 hours.
ASF consumption was assessed as both a binary (yes/no) and a categorical variable score (0-4 ASF food groups consumed). Food groups included organ meat and blood; meat and fish; eggs; and milk and milk products.

Multivariate logistic regression analysis was used to determine the associations between WDDS and nutritional outcomes and consumption of specific food groups and nutritional outcomes. All analyses were conducted with Stata® IC version 15.1.

Table 1. Association between consumption of specific food groups and mean WDDS with underweight, wasting, and anemia.

Food Group	Underweight OR	Underweight p-value	Wasting OR	Wasting p-value	Anemia OR	Anemia p-value
Starchy staples						
No	Reference		Reference		Reference	
Yes	-	-	-	-	-	-
Dark green leafy vegetables						
No	Reference		Reference		Reference	
Yes	0.92	0.509	0.97	0.809	**0.81**	**0.027***
Vitamin A fruits & vegetables						
No	Reference		Reference		Reference	
Yes	0.74	0.084	0.87	0.435	0.91	0.455
Other fruits & vegetables						
No	Reference		Reference		Reference	
Yes	0.79	0.582	0.54	0.143	1.68	0.203
Organ meat						
No	Reference		Reference		Reference	
Yes	2.76	0.152	**4.57**	**0.017***	0.20	0.15
Meat and fish						
No	Reference		Reference		Reference	
Yes	0.84	0.172	0.96	0.687	1.01	0.92
Eggs						
No	Reference		Reference		Reference	
Yes	**0.75**	**0.047***	0.84	0.103	0.92	0.347
Legumes, nuts, and seeds						
No	Reference		Reference		Reference	
Yes	1.06	0.624	1.15	0.209	1.09	0.275
Milk and milk products						
No	Reference		Reference		Reference	
Yes	1.01	0.937	1.02	0.843	0.99	0.912
WDDS	0.89	0.075	0.97	0.596	0.95	0.233

Table 2. Association between animal source food consumption and underweight, wasting, and anemia.

ASF Consumption	Underweight Odds ratio	Underweight p-value	Wasting Odds ratio	Wasting p-value	Anemia Odds ratio	Anemia p-value
Categorical Model (# of ASF groups consumed)						
0	Reference		Reference		Reference	
1	**0.71**	**0.031***	**0.73**	**0.029***	1.00	0.998
2	**0.58**	**0.013***	**0.66**	**0.015***	1.00	0.983
3	0.83	0.484	1.09	0.697	0.84	0.339
4	-	-	-	-	-	-
Binary Model						
No	Reference		Reference		Reference	
Yes	**0.68**	**0.015***	**0.73**	**0.022***	0.99	0.910

Key Findings

- The prevalence of underweight, wasting, and anemia were 13.4%, 18.2%, and 40.0%, respectively.
- Women who consumed dark green leafy vegetables (DGLV) were less likely to have anemia (OR 0.81) compared to women who did not consume DGLV.
- Women who consumed eggs were less likely to be underweight (OR 0.75) compared to women who did not consume eggs.
- Women who consumed ASF were less likely to be underweight (OR 0.68) or wasted (or 0.73) compared to women who consumed no ASFs.
  - Women who consumed 1 or 2 ASF groups were less likely to be underweight (OR 0.71, OR 0.58) or wasted (OR 0.73, OR 0.66) compared to women who consumed no ASF groups.
- WDDS was not significantly associated with underweight, wasting, or anemia.

Conclusions

- In Bangladesh, ASF consumption was negatively associated with underweight and wasting, DGLV was negatively associated with anemia, and eggs were negatively associated with underweight. Policies and interventions focusing on diversifying diets should encourage consumption of micronutrient and protein rich foods, including DGLV, eggs, and ASFs in WRA in rural Bangladesh.
- Additional analysis using panel or longitudinal data accounting for other factors, including seasonality, is recommended to further examine the association between WDDS and nutritional status in WRA.

References

1. Arimond M, Wiesmann D, Becquey E, et al. *Dietary Diversity as a Measure of the Micronutrient Adequacy of Women's Diets in Resource-Poor Areas: Summary of Results from Five Sites.* Washington, DC: FANTA-2 Bridge FHI 360 2011.
2. WHO. Maternal anthropometry and pregnancy outcomes. In. *A WHO collaborative study.* Vol 73 (Suppl). Bulletin of the World Health Organization.
3. Kader M, Tripathi N. Determinants of low birth weight in rural Bangladesh. In. Vol 2(2): International Journal of Reproduction, Contraception, Obstetrics and Gynecology; 2013.
4. Tang AM, Dong K, Deitchler M, et al. Use of Cutoffs for Mid-Upper Arm Circumference (MUAC) as an Indicator or Predictor of Nutritional and Health-Related Outcomes in Adolescents and Adults: A Systematic Review. In. Washington, DC: FHI360/FANTA; 2013.