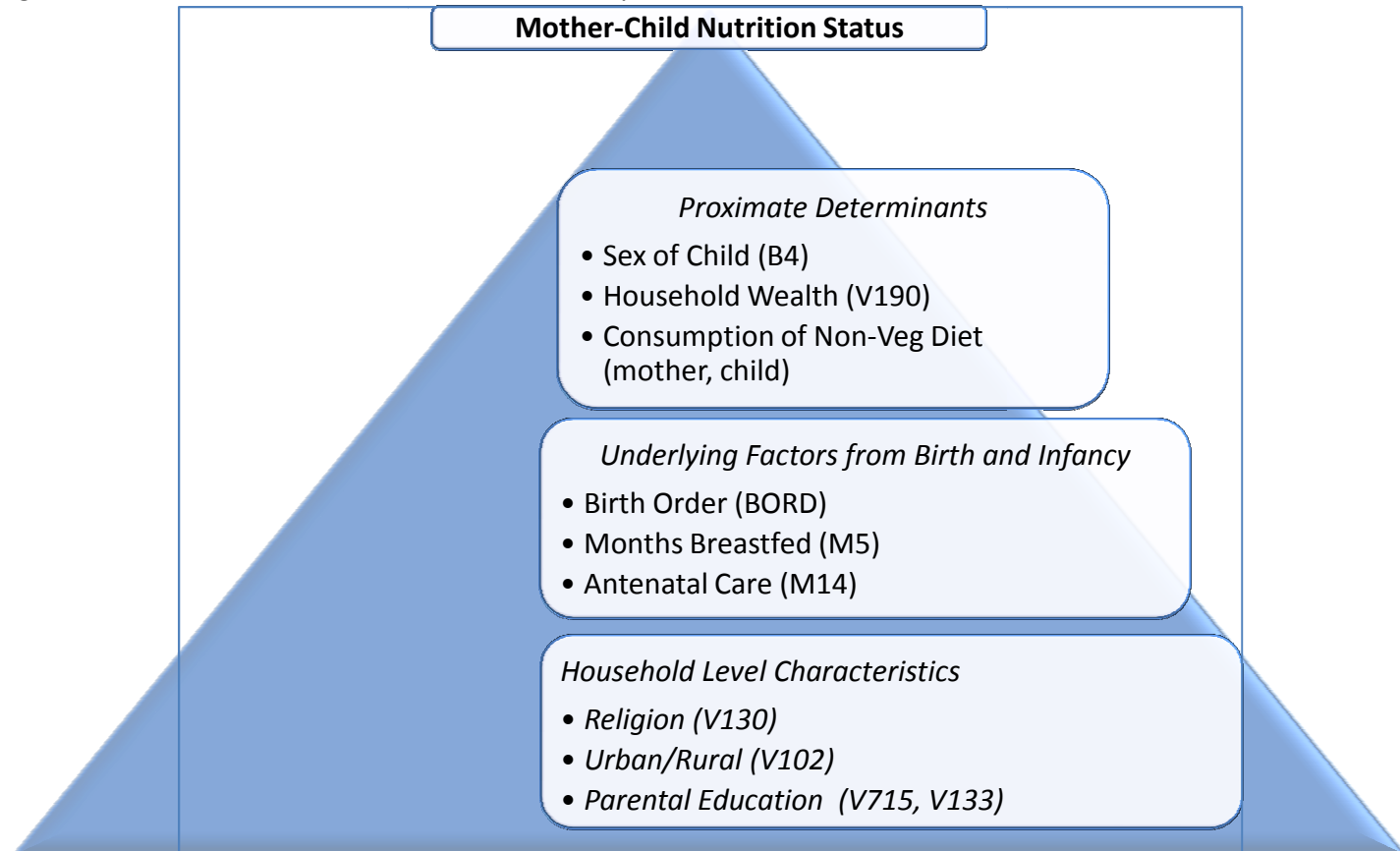Malnutrition in India: A Mother-Child Dyad Approach

India has long had the challenge of poor nutrition outcomes in women and children. More recently, the challenges of overweight and obesity have become of growing concern. The complex issue of under-nutrition occurring along-side overweight and obesity has been termed the nutrition paradox and is seen as the "dual burden of malnutrition". Within the household, the nutrition paradox is often defined in terms of an overweight mother and underweight child. Within India, the traditional multi-generational form of malnutrition found in underweight mother and underweight child (U/U) dyad, the more recent dual burdened household malnutrition of overweight mother and underweight child (O/U) dyad, is being joined by the more recent malnutrition dyad of overweight mother and overweight child (O/O). The purpose of this study is to examine immediate household factors, underlying household factors, and societal-level factors related to poor dyadic nutrition conditions.

The use of the mother-child dyad is important as studies have documented the intergenerational aspects of malnourishment. Additionally, as mothers and children, especially young children are in close contact, sharing food and other resources, the household dyad is important.

For the purposes of this study, a framework is use that accounts for proximate determinants, underlying factors from the pregnancy, birth, and infancy, and household-level characteristics. Sex is coded 1 for male and 0 for female. Household wealth is reported in quintiles poorest to richest. A strict Hindu vegetarian diet omits all meat products and eggs but allows for dairy. The mother's diet is coded as vegetarian or non-vegetarian based on a series of questions about regularity of meat and egg consumption. Even occasional consumption is classified as non-vegetarian. The child's diet is coded as vegetarian or non-vegetarian based on questions about meat and egg consumption. Birth order is a continuous variable. Months breast fed is recorded in whole months and is a continuous variable. Antenatal care reports the number of antenatal visits. The three most common religions in India are

included in the analysis: Hindu, Muslim, and Christian. Location of residence is classified as rural or urban. Father's education is recorded as the number of years of education and is a continuous variable. Mother's education is reported as the number of years of education completed and is a continuous variable.

Figure 1: Determinants of Mother-Child Nutritional Dyads

Mother-Child Nutrition Status

Proximate Determinants
- Sex of Child (B4)
- Household Wealth (V190)
- Consumption of Non-Veg Diet (mother, child)

Underlying Factors from Birth and Infancy
- Birth Order (BORD)
- Months Breastfed (M5)
- Antenatal Care (M14)

Household Level Characteristics
- *Religion (V130)*
- *Urban/Rural (V102)*
- *Parental Education (V715, V133)*

Data and Methods

Data are from the Indian National Family Health Survey 2005-2006. Analysis is limited to households with children between 13 and 59 months of age. (Child's age mean = 35.94 (sd = 13.54); median = 38). Analysis also limited to 3 categories of malnourished dyads (UU, OU, OO) compared to (NN). The resulting N = 19017 dyads.

Table 1: Prevalence of Malnourished and Nourished Mother-Child Dyads in India

	Frequency	Percent*
Underweight Mother / Underweight Child (UU)	6532	43.3
Overweight Mother / Overweight Child (OO)	1835	9.6
Overweight Mother / Underweight Child (OU)	2094	11.0
Normal weight Mother / Normal weight Child (NN)	8556	45.0

*Not equal to 100 due to rounding.

Table 2: Predictors of Malnourishment in Mother-Child Dyads

	Exp(B)		
	UU	OU	OO
Proximate Determinants			
Sex of Child (B4)			
Male	0.977	0.980	0.917
Female (R)			
Household Wealth (V190)			
Poorest	4.564***	0.654	1.043
Poorer	3.143***	0.755	0.781
Middle	2.202***	0.685*	0.509***
Richer	1.812***	0.888	0.590***
Richest (R)			
Mother Diet			
Veg	1.284**	1.274*	0.969
Non-Veg (R)			
Child Non-Veg Diet			
Veg	1.426***	1.015	0.945
Non-Veg (R)			
Underlying Factors			
Birth Order (BORD)	1.019	1.141***	1.068*
Months Breastfed (M5)	1.016***	1.006	0.989
Antenatal Care (M14)	0.958***	1.057***	1.001
Household Characteristics			
Religion (V130)			
Hindu	3.372***	1.613**	1.891***
Muslim	3.087***	2.430***	2.354***
Christian (R)			
Urban/ Rural (V102)			
Urban	1.060	1.469***	2.515***
Rural (R)			
Partner Years of Education (V715)	0.982*	0.998	0.991
Mother Years of Education (V133)	0.964***	0.987	0.983

Nagelkerke R Square	0.214	0.054	0.087
N	5647	3634	3724

* p < 0.05, ** p < 0.01, *** p < 0.001

Conclusions

- More than half of all mother-child dyads contain at least some form a malnourishment.

- Underweight / underweight is directly related to household wealth. As household wealth increases, the odds of the UU dyad decreases.

- Overweight/ overweight is an urban phenomenon.

- Underweight/underweight is a phenomenon primarily seen in children who follow as vegetarian diet, and it is very common among mother's who follow a vegetarian diet.

- Underlying factors seem to be significant in explaining the odds of overweight mothers with underweight children.