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FOR
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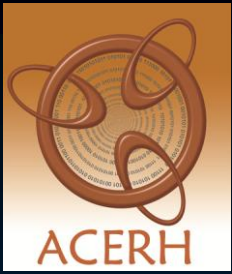
Socioeconomic inequalities in early childhood malnutrition-The case of Pakistani children

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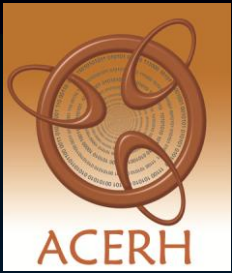
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University of Sydney, NSW-Australia
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Background

- High prevalence of malnutrition among children in South Asia & Sub-Saharan Africa
- High prevalence of malnutrition and inequalities in health are among the major public health concerns in developing countries including Pakistan.
- Health indicators improved over the past two decades but health inequalities still widespread in Pakistan
- Many studies concentrate on SES inequalities in child mortality rates, but inequalities in other serious health conditions may also be very important and should not be overlooked

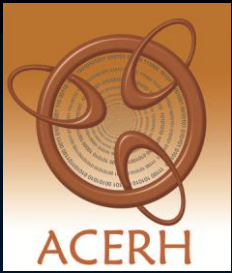


Objectives of study

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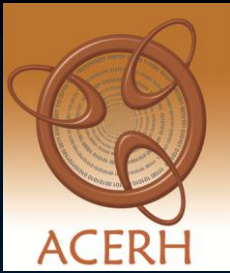
To investigate how socioeconomic inequalities are associated with early childhood malnutrition

To examine the effects of different SES measurers on inequalities in early childhood malnutrition



Data

- **Pakistan Socioeconomic Survey (PSES) conducted in 2001**
- **4022 Households across four provinces**
- **Approximately 30,000 individuals of all ages**
- **Analysis uses data on 2659 children aged 0-59 months**



Methods

Dependent variable

Probability of being stunted ($HAZ < -2$; stunted=1, 0 otherwise)

- Using 2006 WHO growth standard data were excluded if a child's HAZ was below -6 or above $+6$

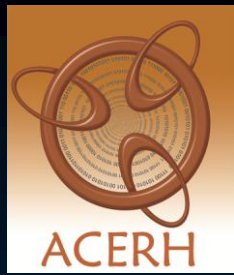
Independent variables

Child gender & age, immunization & illness, household SES, parental education & employment, religion and residence/region

Household SES

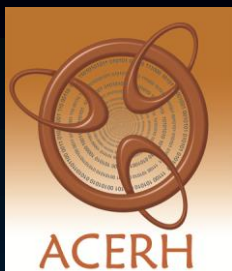
Principal component analysis was used to construct wealth indices
SES measured by wealth indices based on

- a) ownership of durable assets and housing conditions
- b) ownership of durable assets only
- c) housing conditions only
- Per capita household annual expenditures



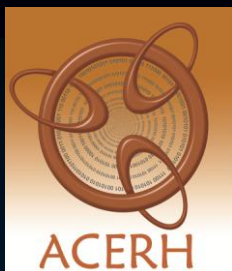
Econometric Model and Estimation Methods

- **Standard logit regression was applied to look at effects of household SES and other determinants on probability of stunting among children aged 0-59 months**



Descriptive statistics of stunted children aged 0-59 months

| Variable | % of N | % stunted | S.D | Variable | % of N | % stunted | S.D |
|---------------------------|--------|-----------|------|----------------------|--------|-----------|------|
| Gender | 100 | 54.0 | 49.9 | Household SES | | | |
| Female | 50.6 | 51.6 | 50.0 | Poorest | 19.8 | 63.4 | 48.2 |
| Male | 49.4 | 56.4 | 49.6 | Poor | 21.2 | 59.7 | 49.1 |
| Religion | | | | Middle | 20.8 | 57.0 | 49.5 |
| Non-Muslim | 2.6 | 60.8 | 49.2 | Rich | 19.8 | 47.3 | 50.0 |
| Muslim | 97.4 | 53.8 | 49.9 | Richest | 18.2 | 40.8 | 49.2 |
| Mother's Education | | | | Region | | | |
| No education | 71.3 | 59.4 | 49.1 | Urban | 32.6 | 46.9 | 49.9 |
| Primary | 10.8 | 46.2 | 49.9 | Rural | 67.4 | 57.4 | 49.5 |
| Secondary | 4.6 | 38.3 | 48.8 | Punjab urban | 14.0 | 42.3 | 49.5 |
| Higher secondary | 8.5 | 34.8 | 47.7 | Sindh urban | 9.2 | 47.0 | 50.0 |
| Degree | 1.8 | 26.9 | 44.8 | K.P urban | 3.7 | 49.1 | 50.2 |
| Father's Education | | | | Balochistan urban | 5.6 | 56.8 | 49.7 |
| No education | 35.5 | 62.1 | 48.5 | Punjab rural | 37.7 | 52.4 | 50.0 |
| Primary | 18.5 | 52.9 | 50.0 | Sindh rural | 14.9 | 60.0 | 49.0 |
| Secondary | 12.7 | 50.1 | 50.1 | K.P rural | 8.8 | 66.3 | 47.4 |
| Higher secondary | 22.4 | 50.3 | 50.0 | Balochistan rural | 6.0 | 69.0 | 46.4 |
| Degree | 6.6 | 38.1 | 48.7 | | | | |

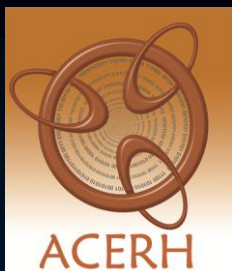


Bivariate Logit regression

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---------------------------------------|-----------------------------|-------|-------------|-------|-------------------|-------|--------------------------------|-------|
| | Assets & housing conditions | | Assets only | | Housing cond only | | Log of per capita expenditures | |
| | Coef | S.E | Coef | S.E | Coef | S.E | Coef | S.E |
| Household SES | | | | | | | | |
| Poorest | 0.923* | 0.124 | 0.742* | 0.121 | 0.883* | 0.125 | | |
| Poor | 0.768* | 0.121 | 0.673* | 0.121 | 0.903* | 0.123 | | |
| Middle | 0.656* | 0.121 | 0.546* | 0.121 | 0.474* | 0.123 | | |
| Rich | 0.265** | 0.122 | 0.264** | 0.118 | 0.311** | 0.125 | | |
| Log of per capita annual expenditures | | | | | | | -0.392* | 0.072 |
| Constant | -0.374* | 0.089 | -0.283*** | 0.086 | -0.378* | 0.092 | 3.652* | 0.643 |

Richest is reference category

* Statistically significant at 1 percent, ** Statistically significant at 5 percent, *** Statistically significant at 10 percent



Determinants of stunting among children aged 0-59 months (Logit estimates)

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|----------------------------|----------|-------|-----------|-------|-----------|-------|-----------|-------|
| | Coef | S.E | Coef | S.E | Coef | S.E | Coef | S.E |
| Mother's education | | | | | | | | |
| <i>No education (Ref)</i> | | | | | | | | |
| Primary | -0.278** | 0.136 | -0.308** | 0.135 | -0.286** | 0.135 | -0.332** | 0.134 |
| Secondary | -0.551* | 0.202 | -0.591* | 0.2 | -0.546* | 0.201 | -0.613* | 0.198 |
| Higher secondary | -0.690* | 0.179 | -0.714* | 0.177 | -0.681* | 0.177 | -0.738* | 0.172 |
| Degree | -0.828** | 0.376 | -0.847** | 0.377 | -0.816** | 0.375 | -0.830** | 0.375 |
| Father's education | | | | | | | | |
| Primary | -0.183 | 0.117 | -0.204*** | 0.117 | -0.197*** | 0.117 | -0.192*** | 0.116 |
| Secondary | -0.215 | 0.137 | -0.248*** | 0.137 | -0.215 | 0.136 | -0.239*** | 0.136 |
| Higher secondary | -0.027 | 0.125 | -0.061 | 0.125 | -0.035 | 0.125 | -0.064 | 0.125 |
| Degree | -0.233 | 0.219 | -0.266 | 0.218 | -0.249 | 0.218 | -0.257 | 0.219 |
| Household SES | | | | | | | -0.12 | 0.094 |
| Poorest | 0.421** | 0.197 | 0.168 | 0.174 | 0.418** | 0.191 | | |
| Poor | 0.328*** | 0.179 | 0.238 | 0.162 | 0.449** | 0.177 | | |
| Middle | 0.271*** | 0.16 | 0.213 | 0.152 | 0.12 | 0.164 | | |
| Rich | -0.028 | 0.147 | -0.065 | 0.139 | 0.114 | 0.148 | | |
| <i>Richest (Reference)</i> | | | | | | | | |

* Statistically significant at 1 percent, ** Statistically significant at 5 percent, *** Statistically significant at 10 percent



Logit estimates

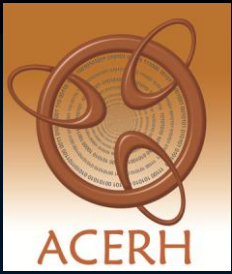
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---------------------------------|-----------|-------|----------|-------|----------|-------|----------|-------|
| | Coef | S.E | Coef | S.E | Coef | S.E | Coef | S.E |
| Religion | | | | | | | | |
| Muslim | -0.558** | 0.27 | -0.555** | 0.27 | -0.556** | 0.27 | -0.567** | 0.271 |
| Region | | | | | | | | |
| <i>Punjab urban (Reference)</i> | | | | | | | | |
| Sindh urban | 0.138 | 0.176 | 0.136 | 0.176 | 0.125 | 0.176 | 0.136 | 0.176 |
| K.P urban | 0.460*** | 0.239 | 0.479** | 0.239 | 0.440*** | 0.241 | 0.459** | 0.239 |
| Balochistan urban | 0.459** | 0.204 | 0.481** | 0.204 | 0.425** | 0.207 | 0.518** | 0.204 |
| Punjab rural | -0.009 | 0.146 | 0.07 | 0.139 | -0.027 | 0.15 | 0.117 | 0.136 |
| Sindh rural | 0.158 | 0.176 | 0.272 | 0.169 | 0.148 | 0.181 | 0.325** | 0.164 |
| K.P rural | 0.680* | 0.196 | 0.752* | 0.191 | 0.660* | 0.201 | 0.762* | 0.191 |
| Balochistan rural | 0.451** | 0.227 | 0.608* | 0.215 | 0.391*** | 0.232 | 0.680* | 0.212 |
| Constant | -0.382 | 0.423 | -0.288 | 0.425 | -0.355 | 0.417 | 0.925 | 0.9 |
| Log likelihood | -1725.648 | | -1727.31 | | -1725.42 | | -1729.9 | |
| χ^2 | 214.06 | | 210.74 | | 214.51 | | 205.65 | |
| Prob > χ^2 | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Pseudo R2 | 0.058 | | 0.058 | | 0.059 | | 0.056 | |
| N | 2659 | | 2659 | | 2659 | | 2659 | |

* Statistically significant at 1 percent, ** Statistically significant at 5 percent, *** Statistically significant at 10 percent



Conclusions

- Prevalence of early childhood malnutrition (stunting among 0-59 months children) is very high (54%) in Pakistan
- Widespread socioeconomic inequalities exist in early childhood malnutrition
- Higher socio-economic status is associated with a statistically significant reduction in stunting
- Children living in poorest households are significantly ($p < 0.05$) more likely to be stunted compared to children living in richest households
- Parental education and child religion are also significantly and negatively associated whereas child age & gender and living in a region are positively associated with ($p < 0.05$) malnutrition



Policy implications

- Targeted development policies and programs need to be instituted that ensure improvement in household economic position
- Parental education is another key area that need to be focussed as parental education has significant association with child malnutrition
- Urban/rural, inter-provincial and intra province gaps exist in child malnutrition
- Public health & infrastructure programs need to target the remote rural areas and reduce the regional disparities in malnutrition among preschool children