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## Connecting Forests and Human Health Using the Demographic and Health Surveys (DHS)

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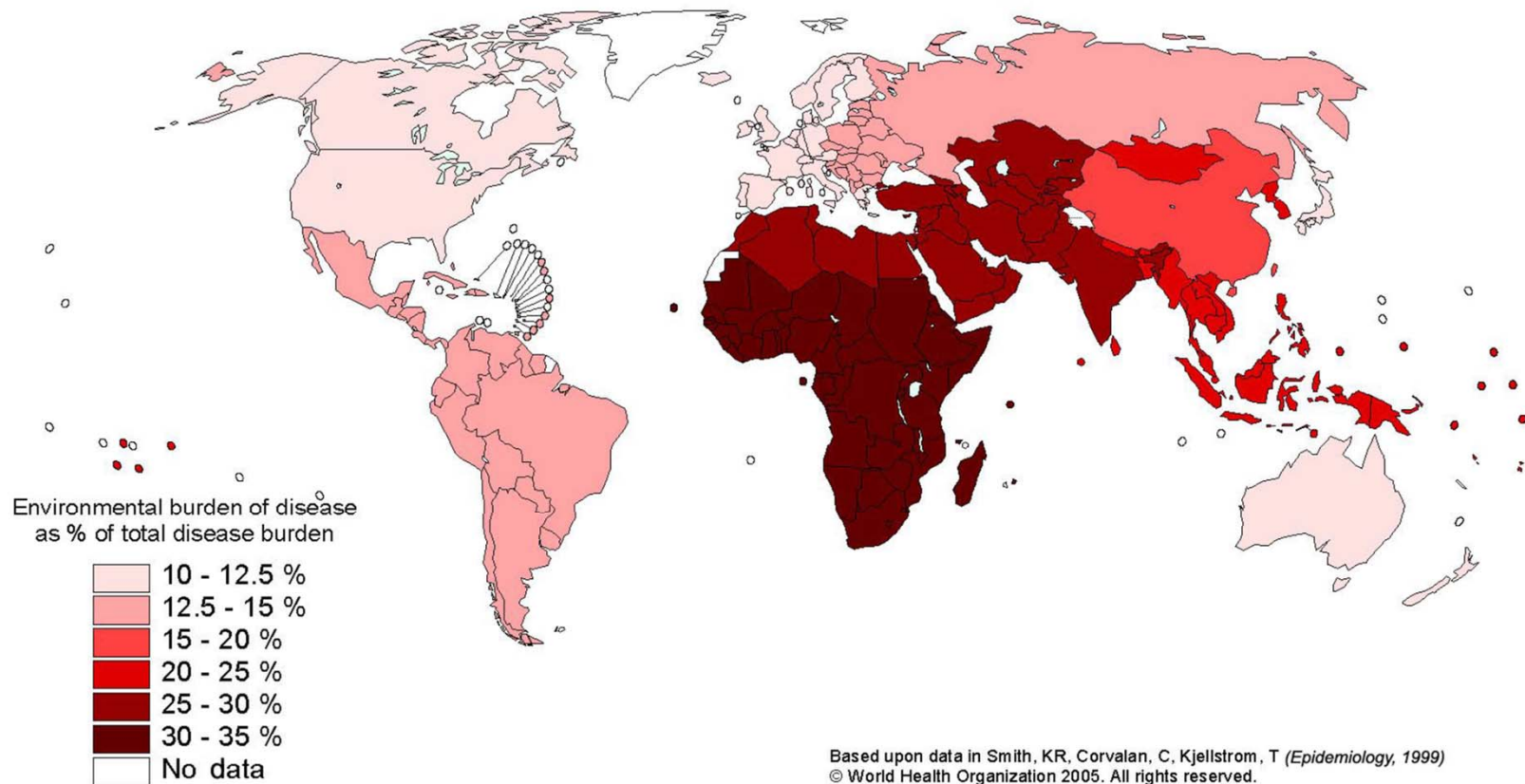
# **Connecting forests and human health using the Demographic and Health Surveys (DHS)**

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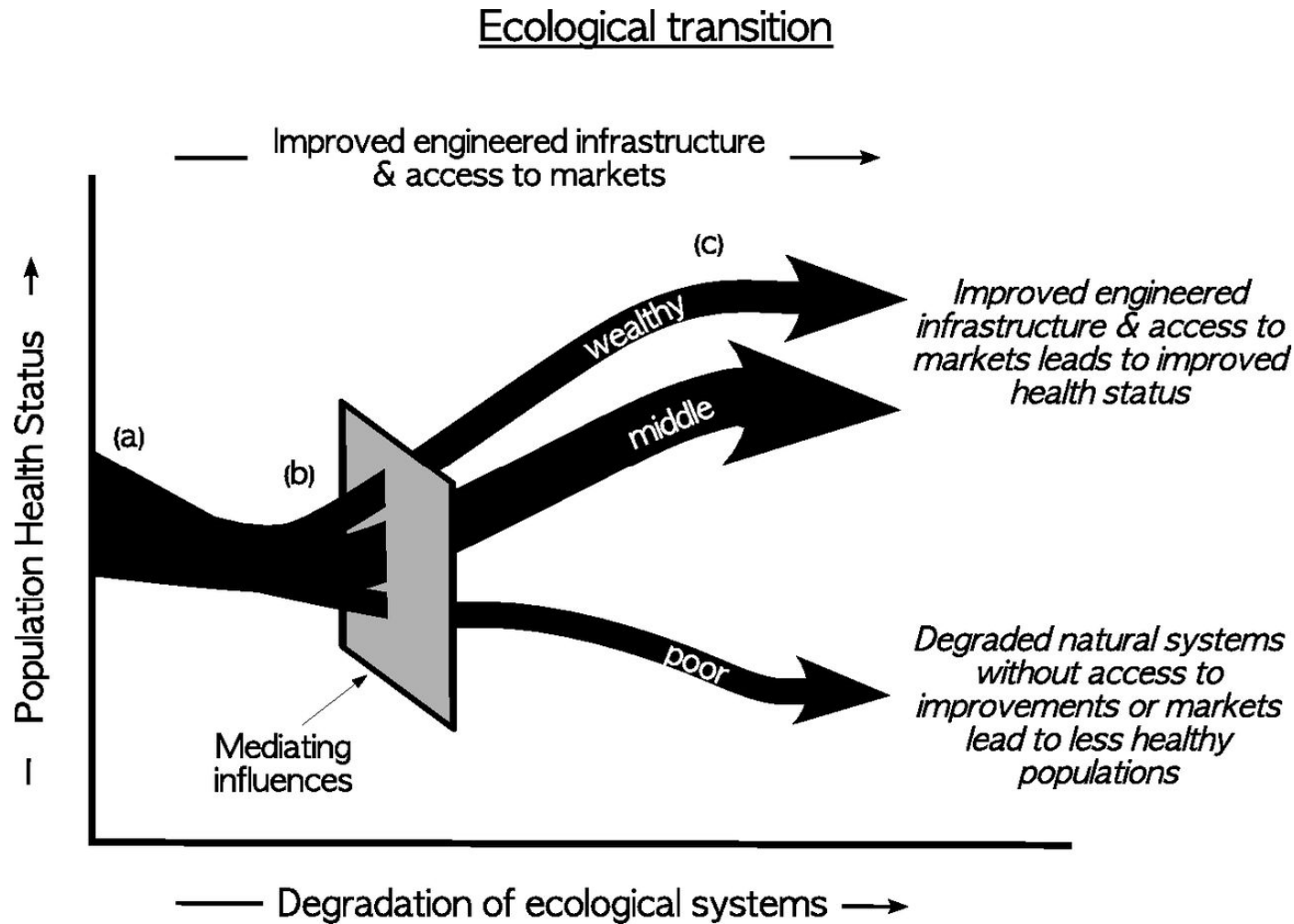
# Environment and health

## Environmental burden of disease globally



Based upon data in Smith, KR, Corvalan, C, Kjellstrom, T (*Epidemiology*, 1999)  
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# Heterogeneous impacts



Myers et al. 2013 - PNAS

# Evidence: Ecosystem alteration – human health

- Evidence on relationships between ecosystem alteration and human health is thin.
- Existing evidence is mainly anecdotal or isolated case studies.
- Generating robust evidence is challenging because of confounding factors.

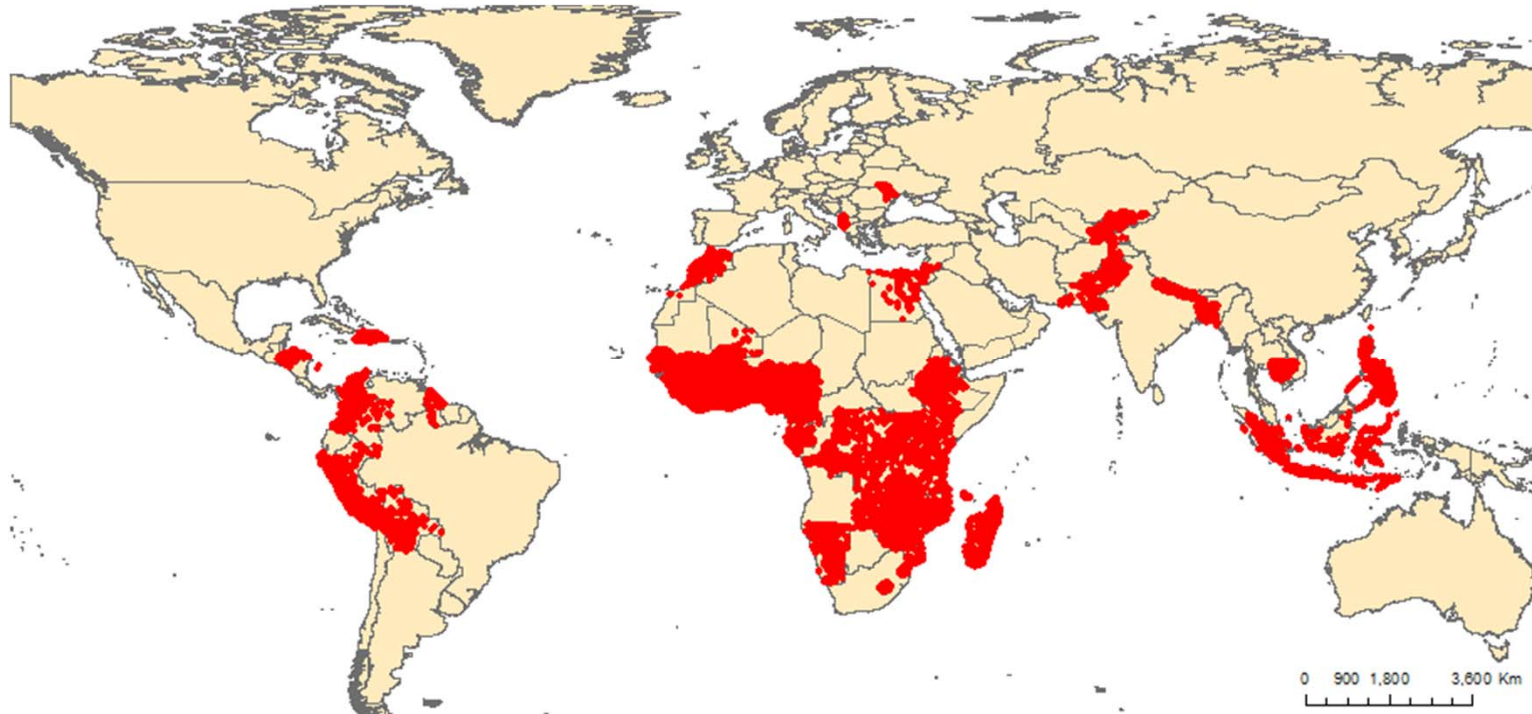
# Big data



- Nationally representative samples of households in over 90 countries
- Data on health outcomes: diet, diarrhea, stunting, anemia...
- Data on potential confounding factors: socioeconomic data (wealth, education, sanitation and water facilities....)
- Georeferenced data: possibility to be linked to spatial data on ecosystem attributes (forest cover...) and other potential confounding factors (distance to market town...)

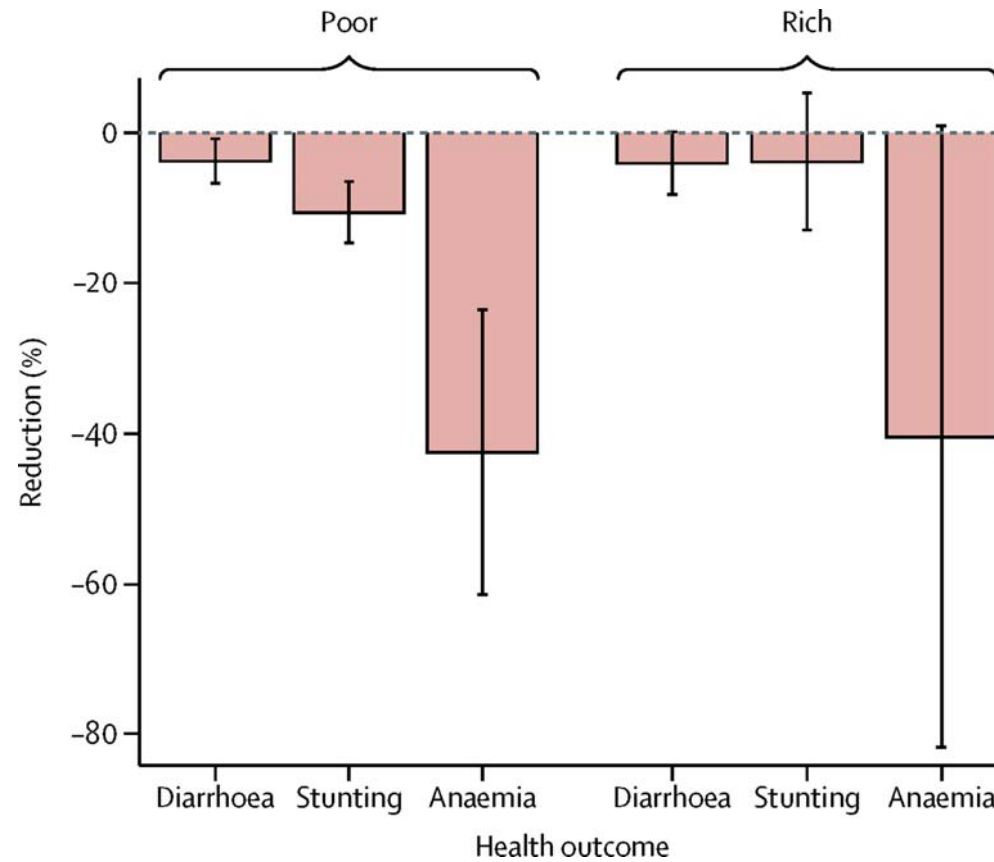


# Big data: working version



- 49 countries, 500Ks households, 800Ks children
- Ecosystem attributes: forest cover, watershed condition

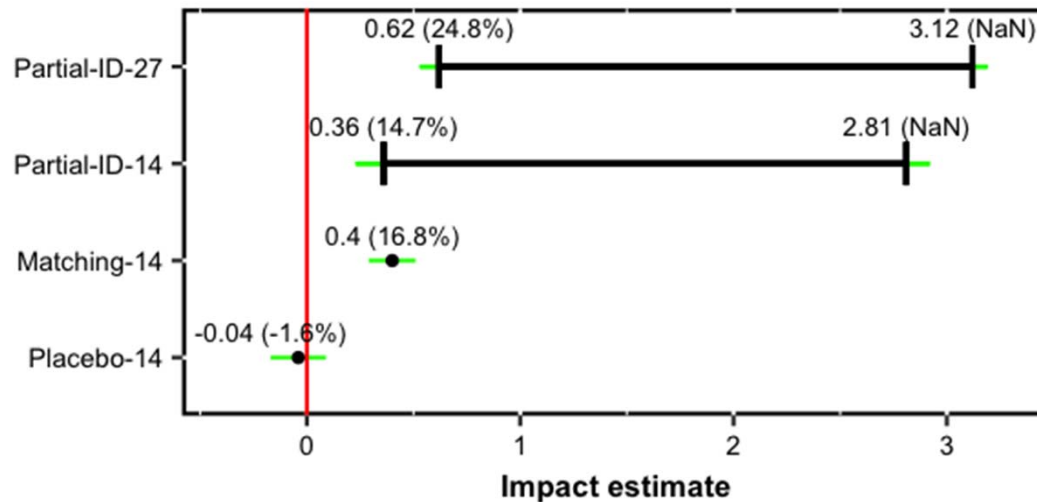
# Forests, childhood diarrhea, stunting, anemia



Reduction in the probability of childhood diarrhea, stunting, and anemia given 30% increase in tree cover across 35 developing countries (Fisher et al. 2019)



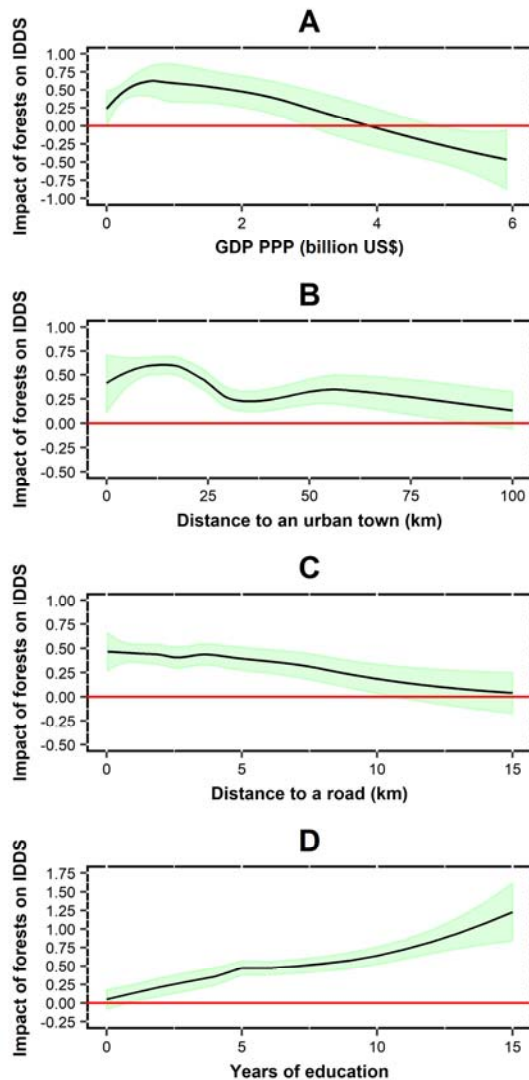
# Forests and children's dietary diversity



## Estimated impacts of forests on dietary diversity.

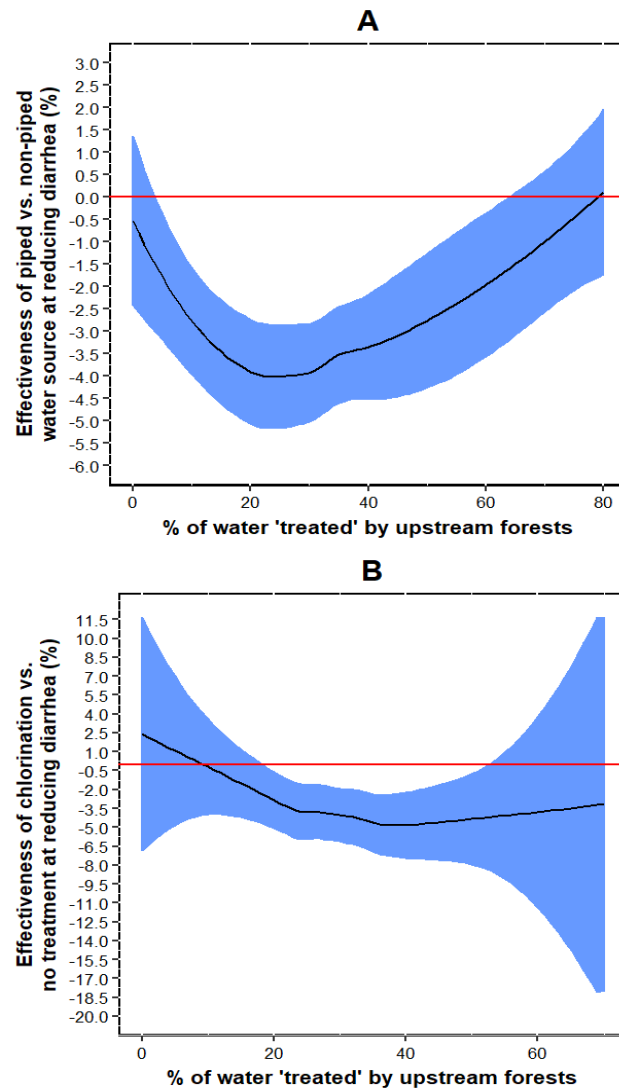
Partial-ID-27: partial identification for 27 countries; Partial-ID-14: partial identification for 14 African countries; Matching-14: matching design for 14 African countries; Placebo-14: placebo test for the matching design for 14 African countries. In parentheses: impact expressed in percent of the average dietary diversity of non-forest households. Green bars: 95% confidence intervals (Rasolofoson et al. 2018)

# Forests and children's dietary diversity



**Heterogeneity of impacts for forests on dietary diversity.** (A) Variation of impact with community GDP; (B) Moderating effect of distance to the nearest urban town; (C) Moderating effect of distance to the nearest road; (D) Moderating effect of the education of the head of household. Y axis represents the difference in dietary diversity (IDDS) between forest and similar non-forest households. Green bands: 95% confidence intervals (Rasolofoson et al. 2018)

# Forests and effectiveness of piped water source at reducing childhood diarrhea



**Specific moderating effects of upstream forests on the effectiveness of piped water source (A) and point-of use chlorination (B) at reducing the prevalence of diarrheal disease. Y-axis: difference in prevalence (in percentage points) of diarrhea between children using piped water source or chlorination and the matched children not using these technologies; blue bands: 95% confidence intervals (Rasolofoson et al. *in prep*)**

# Strengths of DHS Data

- DHS cover more than 90 countries.
- Multiyear data for each country.
- Data are collected at household or child level.
- Multiple potential confounding factors are available: wealth, age, education...
- Communities (clusters) are georeferenced.
- Rich documentation is available.
- Data are mostly uniformly coded across countries

# Weaknesses of DHS Data

- Panel data at country level and for large administrative areas, but not for individual, household, small administrative areas (but see Mapulanga and Naito 2019).
- Locations of communities (clusters) are not precise to maintain privacy of information.
- DHS data are good for investigating correlative associations, but challenging for causal associations (see Mapulanga and Naito 2019).

THANK YOU 😊