

## **Appendix 2.**

### **Note on time scales of data used in Chitwan ABM parameterization.**

This brief note discusses the potential effects on Chitwan ABM model results of the range of time scales of the key datasets used in parameterizing the Chitwan ABM. The Chitwan ABM is parameterized primarily using datasets from the Chitwan Valley Family Study (CVFS, Axinn et al. 2011). The three datasets used from the CVFS are the Household Registry, Household Agriculture and Consumption, and Land Use Mapping surveys (Table A2.1). While the Household Registry is collected monthly, the Household Agriculture and Consumption and Land Use Mapping surveys are collected approximately every 5 years. Therefore, the timing of vital events (recorded in the household registry) is known with higher precision than the timing of changes in household-level variables and land use.

Given the difference in the temporal scales of data collection, vital events cannot be tied precisely in time to land use changes, or vice versa. If, for example, a couple marries and (after some time lag) moves out of their parental home and establishes a new household following marriage, the data of the marriage will be known within a month, as it is tracked in the monthly household registry dataset. The timing of any accompanying land use change, however, will be known only within a 1-5 year timeframe (depending on the date of the next land use data collection).

Rather than limit the Chitwan ABM to an annual or longer timestep (in accordance with the temporal resolution of the land use data), we have chosen to use a monthly timestep. This allow the model to represent more precisely the timing of demographic processes that occur at a faster rate than land use change (such as fertility, and migration), and for which we have available monthly data. The temporal resolution of the CVFS dataset is unique in this respect –

monthly, longitudinal demographic datasets are relatively uncommon. Given the available data in Chitwan is possible to investigate the effects on model outcomes of parameterizing the model with monthly versus annual or semi-decadal demographic datasets, by degrading the monthly data from the CVFS to a lower temporal resolution, re-parameterizing the model using the degraded data, and comparing the outcomes from different model parameterizations. Land use changes could potentially be examined at a higher temporal resolution (though lower spatial resolution) through use of multi-temporal imagery from sensors such as Landsat or the Moderate Resolution Imaging Spectroradiometer (MODIS). Though beyond the scope of the present paper, this is one area to examine in future work, with important implications for models of land use change in which multiple datasets are used with different temporal timescales.

## REFERENCES

Axinn, W. G., A. Thornton, J. S. Barber, S. A. Murphy, D. J. Ghimire, T. Fricke, S. Matthews, D. R. Dangol, L. D. Pearce, A. Biddlecom, S. Shrehtha, and D. Massey. 2011. *Chitwan Valley Family Study*. University of Michigan, Population Studies Center and Survey Research Center.

**TABLES**

Data Type	Sampling Unit	Notes
Household Registry	Individual	Longitudinal, collected monthly
Household Agriculture and Consumption Surveys	Household	Longitudinal, collected every 4-7 years
Land Use Mapping	Neighborhood	Longitudinal, collected every 5 years

**Table A2.1: Time scales of data collection for the three key CVFS datasets used to parameterize the Chitwan ABM.**