HIV and Socioeconomic Status Revisited: A Time-Varying Empirical Investigation

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1 Introduction

Using longitudinal data from The Malawi Diffusion and Ideational Change Project (MDICP 2004, 2006 and 2008) we tackle a number of questions: i) is there a stylized non-stationary relationship between the HIV epidemics and individual socio-economic status over time? In other words, do we observe a transition from the richest to the poorest over time? ii) what is the association between HIV and labor earnings? iii) what is the effect of HIV on family structure (i.e., marriage, divorce and fertility rates)? In order to answer these questions we compute changes in labor earnings, mortality rates, fertility rates, marriage and divorce rates, HIV infection rates and the rate of progression to AIDS.

2 Data

We use the Malawi Diffusion and Ideational Change Project (MDCIP) panel data conducted by the Population Studies Center at UPENN.[1] This survey is ideal because it tracks the same individual and household member over time, a feature that is essential for the estimation of the transition matrices that represent how an individual evolves over different demographic states. For instance, we can compute the probability of moving from a healthy status to HIV infected, or further to develop AIDS, or also estimate the fertility and mortality rates. We believe that Malawi is a good example of a low-income HIV-mature SSA Economy. It has a rural HIV prevalence of 10.8% (Malawi DHS 2004) and while the Malawian per capita income is below the sub-Saharan average, Malawi is similar to other SSA countries in terms of the World Bank development pyramid, so the proposed experiment, expected findings and policy recommendations will be applicable also to a broader African context. In more detail, the quantitative MDICP data includes five rounds of panel household survey data (1998, 2001, 2004, 2006 and 2008). The initial MDICP sample includes about 1,500 ever-married women and 1,100 spouses of these women. Comparison of the initial sample with the Malawi DHS showed that the MDICP was reasonably representative of the married rural population, and the data therefore allow both couple and intergenerational analyses. In the case of divorce or separation, beginning in 2004, both husband and wife have remained in the MDICP sample and were

[1] Available at http://www.malawi.pop.upenn.edu. We refer the reader to this website for a detailed description of the MDICP sample selection, data collection and data quality. Additional information is provided in the on-line journal Demographic Research that is devoted to the MDICP.

followed. Several studies on data quality and attrition conclude that the quality of MDICP data appears to be high. The most relevant elements of the MDICP for our purposes are: household rosters, including basic demographic information on all members usually residing in the sample households; marriage and partnership histories; intergenerational and intra-familial transfers of money and help; cash income, labor market participation and small business activity of the households; repeated measures of physical assets and economic status (e.g., livestock, household possessions, housing quality, land ownership), providing indicators of wealth, capital accumulation and savings (financial assets are not widespread among MDICP respondents); regional market prices and weather conditions and subjective risk assessments, including respondent's assessment of his/her own and partners current HIV status and expected lifetime HIV risk.

In this paper we use data from 2004, 2006 and 2008. The 2004 wave collects data originate from four different datasets (married men, never married men, married women and never married women). The dataset originally includes 1851 observations for married men in 2004, 2304 observations for married women in 2004, 256 observations for never married women in 2004, 409 observations for never married men in 2004. In 2006 there are 2462 observations for married men, and 2868 for married women. In 2008 there are 2929 observations for married men, and

3731 for married women. We dropped observations for which we do not have a successful HIV test and a successful completion of the interview. This leads to a sample of 11519 observations.

The survey can be completed, not completed because the respondent was away, not completed because the respondent died, not completed for a missing reason. In () we report the number of observations for which we have the HIV test results in 2004, [] the number of tests in 2006 and {}the number in 2008. Figures 1 and 2 show the evolution of the availability of answers to the questionnaire and the availability of HIV test for females (males).

The dataset contains information about i) the demographic characteristics of each member of a household (HH), such as age, gender, education, region, and as for the head of the HH and his/her spouse also reports the ethnicity, religion, and HIV status; ii) the HH characteristics, such as the marital status of the head, number of members, the number of male and female in the HH, and the number of male and female members in working age(aged 15- 50);[2] iii) the HH family structure, such as

[2]In 2006 and 2008 the marital status is directly observed. In 2004 we use the marriage history to infer it. In particular we use the number

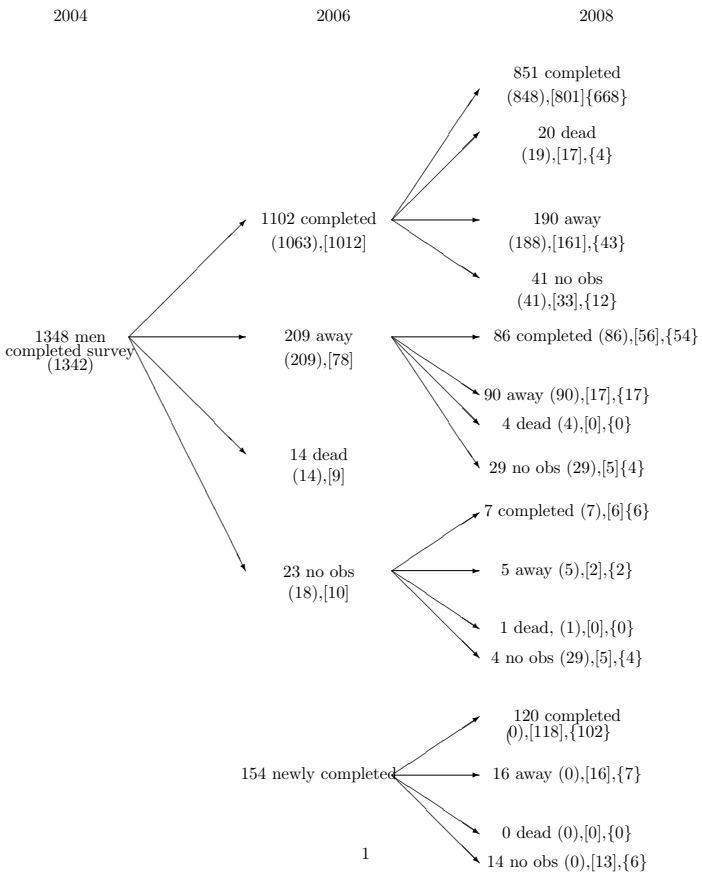

Figure 1: Evolution of the availability of answers to the questionnaire and the availability of HIV test for males.

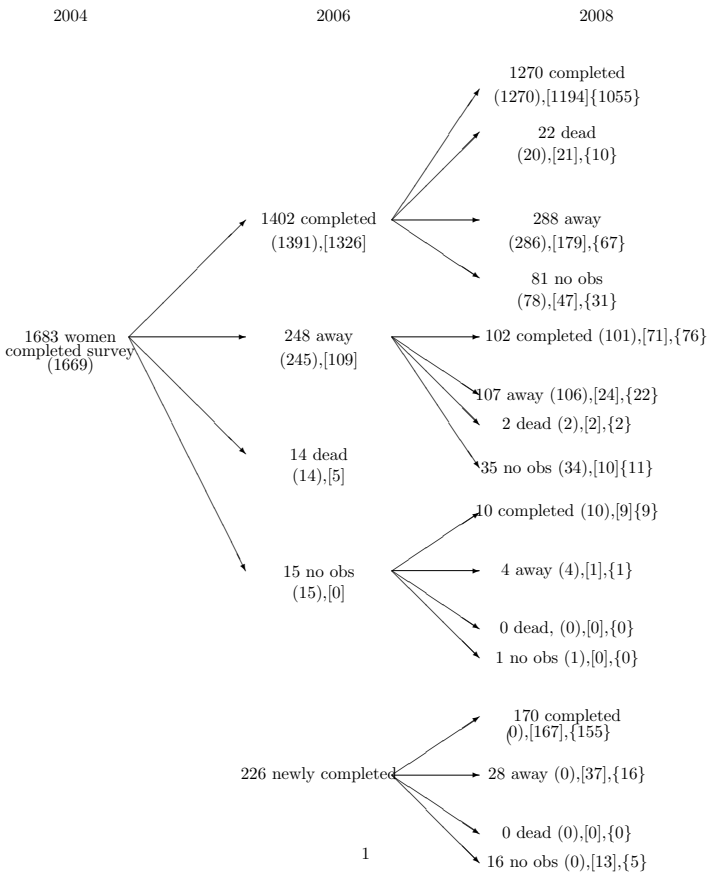

Figure 2: Evolution of the availability of answers to the questionnaire and the availability of HIV test for females.

head's number of spouses, siblings, children, and whether he/she is using or used family planning methods; iv) sexual behavior and head's habits with up to three partners: the type of relationship, the frequency of sexual intercourses, whether they use condoms and how frequently; v) knowledge of the respondent regarding AIDS features and possible ways to protect, how worried he/she is about aids and which possible ways of infection worry him the most. It contains also likelihood assessments of the spouse being HIV positive and information about his behavior changes to avoid become infected; vi) agricultural income and head's market income, assets, HH expenditure in a number of items, and hours spent working in the agricultural sector; whether the head received not financial help from the other HH member, the type of help (farm production, collecting redwood, collecting water, cooking, building or maintenance, care giving, etc.) and the frequency. Market income reported by the head of the HH is directly available in 2006 and 2008. Agricultural income is computed considering the reported production of each crop, the price of crops in each region over time and the CPI index provided by the National Statistical Office of Malawi. As for the head'a labor supply we use data from the diary section, where the activities are grouped in agricultural production in own field, off farm labor, non-agricultural economic activities, and domestic activities. In the analysis we consider only the hours spent in the first two groups of activities.

3 Empirical Analysis

Figure 3 shows the dynamics for men of the HIV status. We start with people for which we have an HIV result in 2004. Given their HIV status 5 things can happen: he dies, he completes the questionnaire but has no HIV test(no test), he completes the questionnaire and his HIV status changes, he completes the questionnaire and the HIV status is the same, he dos not complete the questionnaire(out).

of time the respondent got married and the chronological history of marriages. For example if the respondent reports he got married twice we

check whether the second marriage ended or not, and if so, we look at the reason for termination.

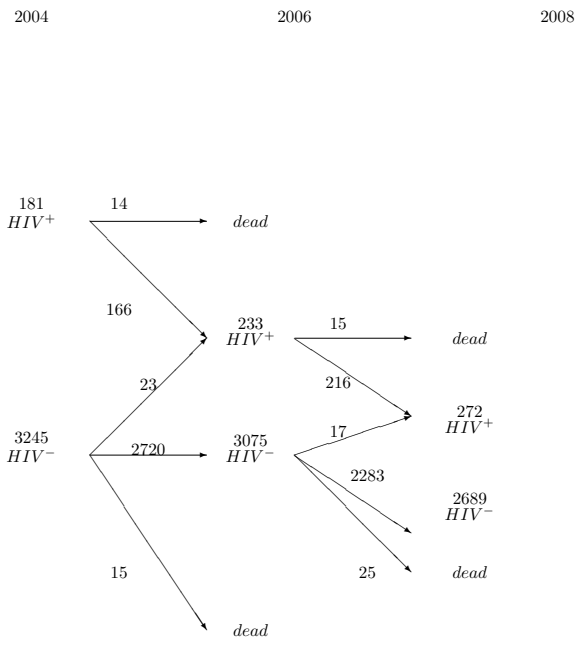

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Figure 3: HIV status dynamics (men)

Table 1: Respondent's Descriptive Statistics

	Head of HH			Spouse		
	Mean	Standard Deviation	Sample Size	Mean	Standard Deviation	Sample Size
HIV Positive	0.074	0.263	9585	0.049	0.216	5090
Male	0.447	0.497	11519	0.454	0.498	5084
Age*	35.811	14.670	11501	40.699	12.873	5082
Region1 ???	0.335	0.472	11518	0.365	0.482	5084
Region 2 ???	0.336	0.472	11518	0.294	0.456	5084
Region 3 ???	0.329	0.470	11518	0.340	0.474	5084
Chatolic	0.186	0.389	7866	0.188	0.391	3938
Quadmus	0.230	0.421	7866	0.200	0.400	3938
Ccap	0.195	0.396	7866	0.195	0.396	3938
Indigenous (not Christian)	0.087	0.282	7866	0.081	0.273	3938
Indigenous (Christian)	0.116	0.321	7866	0.156	0.362	3938
Married**	0.783	0.412	9316			
Separated	0.013	0.114	9316			
Divorced	0.196	0.196	9316			
Never Married	0.331	0.331	9316			
Widowed	0.191	0.191	9316			
No School	0.182	0.386	7912	0.183	0.387	4321
Finished School: Standard ???	0.693	0.461	7912	0.719	0.449	4321
Finished School Form???	0.123	0.328	7912	0.095	0.328	4321
Finished School Higher???	0.013	0.035	7912	0.021	0.045	4321
# of hours working in the fields	4.762	3.012	2917	4.917	2.999	1410
# of hours working (market)	5.978	3.479	206	4.774	3.045	1410

Notes: The head of the Household's age ranges from 11 to 101;

** the marital status does not sum up to one because it is time changing

Table 2: Household's Characteristics

	Mean	Standard Deviation	Sample Size
#of HH members:			
Total	10.429	4.890	8412
Alive	8.870	3.073	6259
Males	5.363	2.686	7791
Females	5.367	2.833	7791
In the [15, 50] age	3.404	2.026	8381
Males aged [15, 50]	1.536	1.118	7611
Female aged [15, 50]	1.815	1.187	7706
Member Recently Ill	1.738	2.400	8403
Member Often Ill	1.372	2.228	8210
Member In School	2.115	1.756	2135
Working in the Past	5.025	2.268	6245
Income:			
Agricultural (HH)	33638	1018	8668
Market Income (Head)	21093	47383	5733
Expenditure in:			
Fertilizers	1018	6411	8475
Seeds	112	1113	8474
Hired Labor	1113	8500	8479
Agricultural Tools	142	1426	8474

	Mean	Standard Deviation	Sample Size
Male Head's Labor Supply:			
Agricultural Sector	5.214	3.216	1437
Market Sector	6.493	3.454	148
Receiving help*	0.902	0.297	3219
# of people helping	5.561	4.611	2996
Female Head's Labor Supply:			
Agricultural Sector	4.322	2.729	1480
Market Sector	4.664	3.211	58
Receiving help*	0.906	0.291	4238
# of people helping	5.867	6.426	3528

*Receiving help includes Farming, Collecting firewood, water, cooking, building/maintainance, caregiving

Table 3: HIV Prevalence across Groups

	Mean	Standard Deviation	Clustered Std. Error	Sample Size
Male	0.061	0.241	0.006	4195
Female	0.084	0.278	0.006	5390
Age in [15, 30]	0.047	0.212	0.005	3727
Age in [31, 49]	0.111	0.315	0.008	4009
Age > 50	0.051	0.220	0.008	1838
Region1 ???	0.064	0.244	0.007	3303
Region 2 ???	0.101	0.302	0.009	3134
Region 3 ???	0.059	0.236	0.007	3147
Chatolic	0.058	0.234	0.008	1355
Quadmus	0.067	0.250	0.008	1644
Ccap	0.061	0.240	0.009	1416
Indigenous (not Christian)	0.053	0.224	0.009	659
Indigenous (Christian)	0.056	0.230	0.009	836
Married**	0.057	0.232	0.004	6692
Separated	0.145	0.354	0.034	110
Divorced	0.149	0.356	0.023	343
Never Married	0.012	0.109	0.004	1086
Widowed	0.157	0.365	0.025	330
No School	0.057	0.233	0.009	1305
Finished School: Standard	0.061	0.240	0.005	4956
Finished School Form	0.067	0.250	0.012	853
Finished School Higher	0.333	0.500	0	**9**

Notes: Clustered standard errors of the mean are reported.

Table 4: HIV Prevalence Over Time

	2004	2006	2008
Overall	0.055	0.074	0.096
Male	0.047	0.061	0.081
Female	0.062	0.084	0.107
Age in [15, 30]	0.035	0.041	0.076
Age in [31, 49]	0.084	0.110	0.141
Age > 50	0.038	0.060	0.053
Region1 ???	0.054	0.062	0.075
Region 2 ???	0.071	0.104	0.134
Region 3 ???	0.039	0.058	0.083
Chatolic	0.056	0.068	0.051
Quadmus	0.062	0.069	0.070
Ccap	0.053	0.069	0.063
Indigenous (not Christian)	0.052	0.054	NA
Indigenous (Christian)	0.000	0.058	0.057
Married**	0.063	0.051	0.057
Separated	0.059	0.263	0.105
Divorced	0.128	0.134	0.186
Never Married	0.015	0.006	0.015
Widowed	0.177	0.222	0.123
No School	0.030	0.070	0.060
Finished School: Standard	0.061	0.053	0.071
Finished School Form	0.046	0.071	0.080
Finished School Higher	0.000	0.500	0.400

Table 6: HIV Status and Labor Market Outcomes

	Mean	Standard Deviation	Sample Size	Mean	Standard Deviation	Sample Size
	HIV Status Negative			**HIV Status Positive**		
Male Head:						
Hours Working in Agric.Sector	**5.224**	3.21	1321	**4.9435**	3.102227	62
Hours Working in Mkt Sector	**6.422**	3.21	135	**5.6667**	2.677063	6
Receiving help	0.895	3.495	2729	0.8828	0.322907	128
# of people providing help	5.375	0	2244	6.32	7.452042	100
HH Agricultural Income	**36401.9**	63878.44	3181	**34629**	49933.25	165
Market Income	27413.8	55541.82	1965	38304	68900.44	98
Female Head:						
Hours Working in Agric.Sector	**4.35752**	2.747633	1344	**3.9588**	2.53923	85
Hours Working in Mkt Sector	**4.50909**	3.181967	55	**6.25**	2.474874	2
Receiving help	0.90073	0.299073	3586	0.912	0.283836	284
# of people providing help	5.77638	4.916051	2947	5.2016	6.451062	243
HH Agricultural Income	**30507.8**	57025.9	4268	**38732**	109191.6	335
Market Income	14702.4	34332.36	2801	19352	56852.88	234

Table 7: HH Member providing daily help in the fields

	Mean	Standard Deviation	Sample Size	Mean	Standard Deviation	Sample Size	Mean	Standard Deviation	Sample Size
		Overall			**HIV Status Negative**			**HIV Status Positive**	
tot number									
Frequency by member number:									
member # 2	**0.228**	0.419	3307	**0.233**	0.423	2774	**0.257**	0.438	152
3	0.070	0.255	517	0.067	0.251	432	0.091	0.302	11
4	0.137	0.345	182	0.144	0.352	153	0.091	0.302	11
5	0.202	0.404	84	0.194	0.398	67	0.500	0.577	4
6	0.140	0.349	86	0.125	0.333	72	0.400	0.548	5
7	0.237	0.426	266	0.236	0.426	220	0.286	0.463	21
8	0.305	0.461	223	0.321	0.468	187	0.353	0.493	17
9	0.248	0.433	222	0.254	0.436	189	0.375	0.518	8
10	0.268	0.444	190	0.286	0.453	161	0.375	0.518	8
11	0.271	0.446	181	0.264	0.442	144	0.267	0.458	15
12	0.309	0.464	149	0.303	0.462	122	0.333	0.516	6
13	0.324	0.470	136	0.348	0.478	115	0.111	0.333	9
14	0.330	0.472	109	0.355	0.481	93	0.429	0.535	7
15	0.320	0.470	75	0.333	0.475	63	0.600	0.548	5
16	0.254	0.439	63	0.229	0.425	48	0.400	0.548	5
17	0.231	0.427	39	0.235	0.431	34	0.333	0.577	3
18	0.172	0.384	29	0.190	0.402	21	0.000	0.000	4