Electronic Supplementary Materials

A. HEALTH LOCUS OF CONTROL

Health Locus of Control Questionnaire

Internal HLC
1. If you are sick, do you think that the things that you do will quickly return you to health?
6. You think you can control your state of health.
8. When you are sick, you think that it is your fault or responsibility.
12. You think that the things you do for your health are the things that most affect whether you are healthy or sick.
13. You think that if you take care of yourself, you can avoid sickness.
17. You think that if you do things right, you can maintain your health.

Chance HLC
2. You think that it doesn't matter what you do, if you are going to be sick you will be sick.
4. You think that the majority of things that affect your health happen by accident.
9. You think that luck is important in whether you quickly recuperate from illness.
11. You think that your good health is a result of your good luck.
15. You think that it doesn't matter what you do, it is probable that you will become sick.
16. You think that you will stay healthy if you have to be healthy.

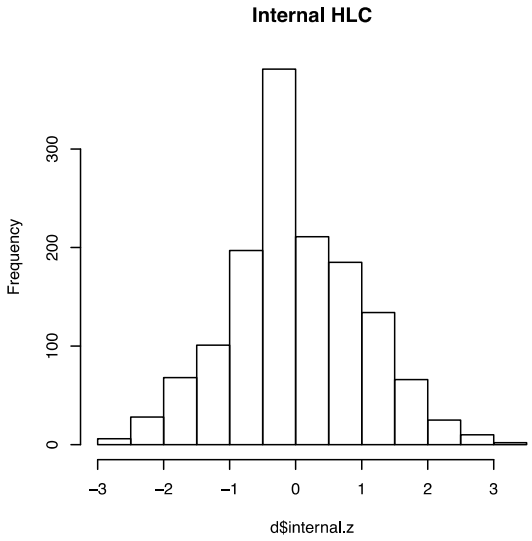
Powerful Others HLC (Doctors and family control health)
3. You think that frequently visiting doctors is the best way to avoid being sick.
5. When you don't feel well, you think you should look for a doctor.
7. You think that your family heavily influences whether you are a sick or healthy person.
10. You think that doctors can control your health.
14. You think that when you recuperate from an illness, it is because other people such as doctors, friends, and family members took good care of you.
18. You think that the only thing that can improve your health is what your doctor tells you to do.

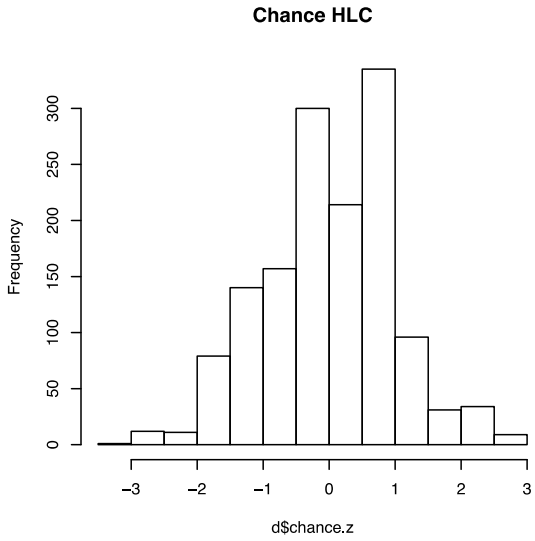
God HLC
19. If my health worsens, it is up to God if I get better again.
21. God is in control of your health.

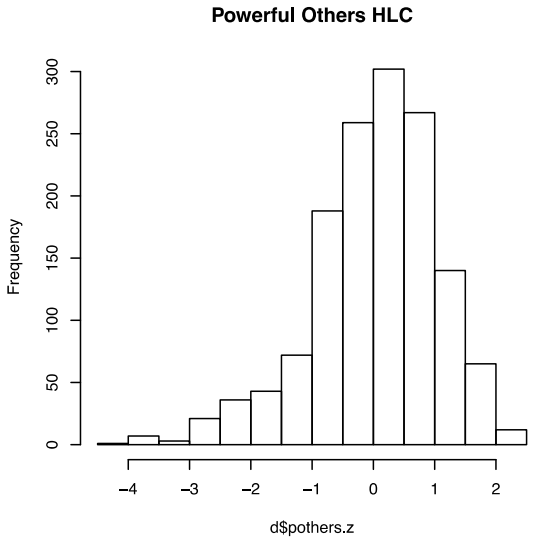
Spirits HLC
20. If my health worsens it's the spirits who can make me feel better again.
22. The spirits control your health.

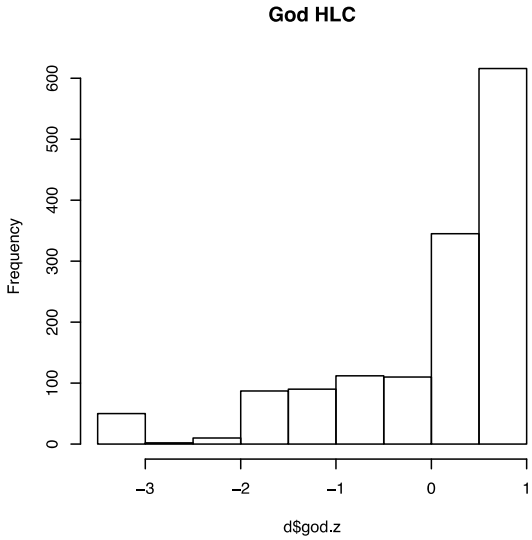
Response options for each item
1. Strongly disagree
2. Moderately disagree
3. Slightly disagree
4. Slightly agree
5. Moderately agree
6. Strongly agree

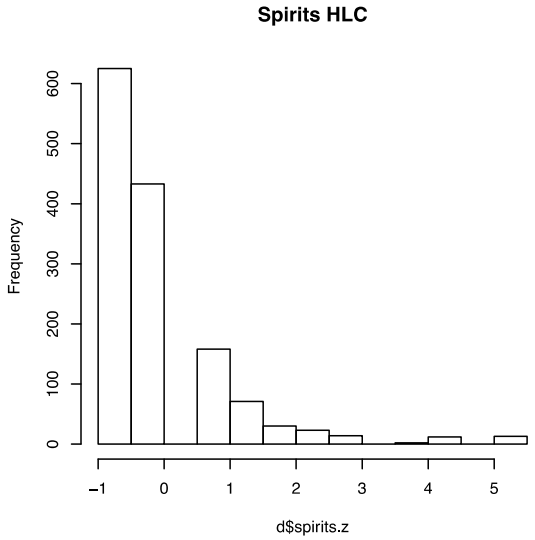
HLC scores (z-scores) distributions



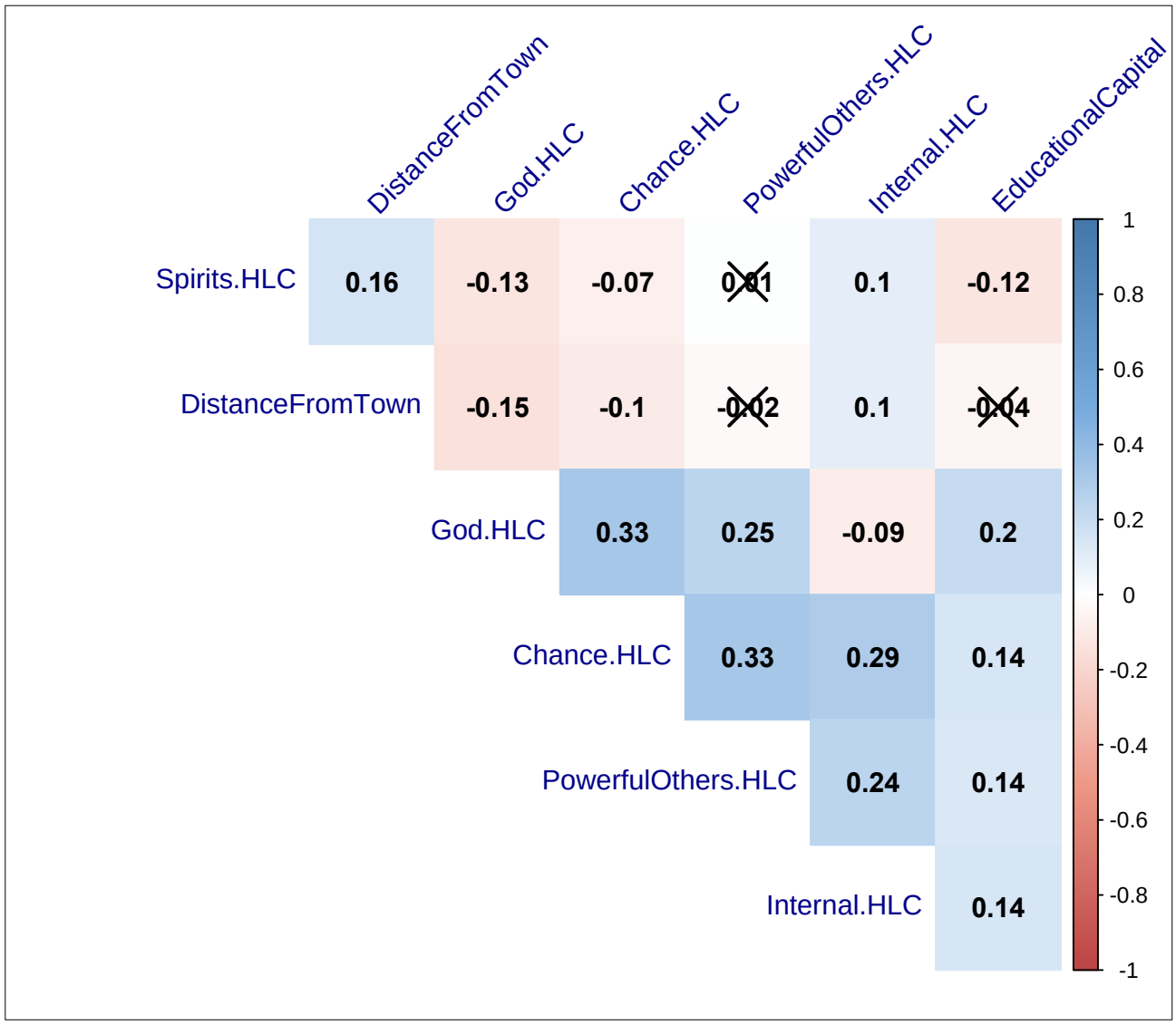








Correlation matrix: HLC and Modernization proxies.



Coefficient of correlation is indicated by the numbers in black and the intensity of the colors. Non-significant figures are crossed out ($p<0.05$).

1. RESPONSE BIAS AND RELIABILITY OF THE HLC SCALE

Controlling for response bias

To control for response bias, we identified the categories shown in the following table. A score was counted as "high" if it was one standard deviation above the mean score for the corresponding HLC scale in our sample, and "low" if it was one standard deviation below the mean. Participants with positive or negative biases were excluded from our statistical analyses.

POSITIVE BIAS	High Internal, high Chance, high powerful Others	N=171 (17.9%)
NEGATIVE BIAS	Low internal, low Chance, low Powerful Others	N=96 (10.0%)
Number of participants prior to controlling for response bias: 957		
Number of participants after controlling for response bias: 690		

Characteristics of participants who were eliminated from the study

	All bias	**Positive bias**	**Negative bias**
% female	46%	5%	100%
Mean (sd) age	54.8(10.5)	54.35(11.43)	55.4(9.4)
Mean (sd) distance from town	35.0(11.2)	26.9(14.1)	45.9(14.5)
Mean (sd) educational capital	0.9(1.2)	1.1(1.3)	0.7(1.2)
% Christian	63%	95%	20%

Reliability of the HLC scale after controlling for response bias

HLC scale	**Cronbach's alpha**
Internal	0.51
Chance	0.61
Powerful Others	0.73

2. POPULATION COMPARISON

Means and standard deviations for participants ages 45-74

Population	age	N	Internal (6-36) Mean (SD)	Chance (6-36) Mean (SD)	Powerful Others (6-36) Mean (SD)
Tsimane	45-54	239	19.23 (4.89)	22.40 (4.62)	26.70 (3.75)
	55-64	145	18.97 (4.49)	22.27 (4.84)	26.72 (4.23)
	65-74	81	18.60 (4.84)	22.44 (5.15)	26.86 (4.13)
Caerphilly study	45-54	2324	24.66 (5.64)	17.76 (5.88)	17.76(6.06)
	55-64	2066	24.18 (6.12)	18.48 (6.06)	20.58 (6.78)
	65-74	1787	24.30 (6.06)	19.32 (5.88)	22.86 (6.60)
Miyagi study	45-54	853	25.45 (4.26)	19.65 (5.27)	22.59 (4.17)
	55-64	1609	26.06 (4.18)	21.11 (5.42)	24.50 (4.06)
	65-74	1568	26.94 (3.97)	21.02 (5.46)	25.46 (4.05)

Weighted means and standard deviations for participants ages 45-74

HLC scale Population	Internal (6-36) Mean(SD)[a]	Chance (6-36) Mean(SD)[a]	Powerful Others (6-36) Mean(SD)[a]
Tsimane (n=645)	18.93 (4.74)	22.37 (4.87)	26.76 (4.04)
Caerphilly study (n=6177)	24.44 (5.87)	18.29 (5.93)	19.63 (6.39)
Miyagi study (n=4030)	25.93 (4.18)	20.36 (5.35)	23.74 (4.11)

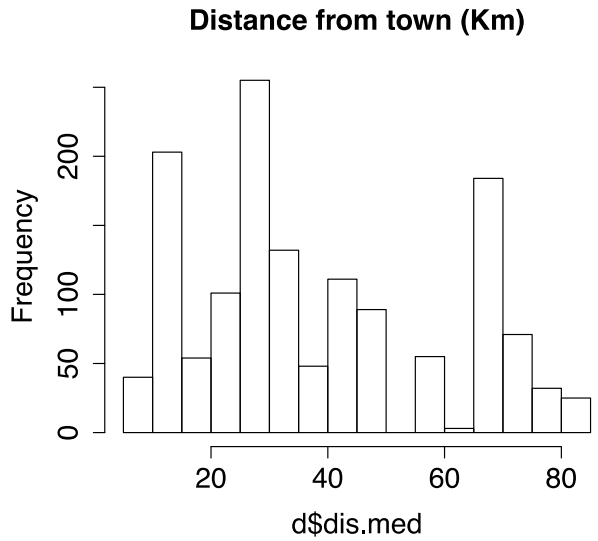
[a]Age-standardized averages and standard deviations for participants ages 45-75, using the Tsimane sample structure as a baseline.

Welch-t-test results

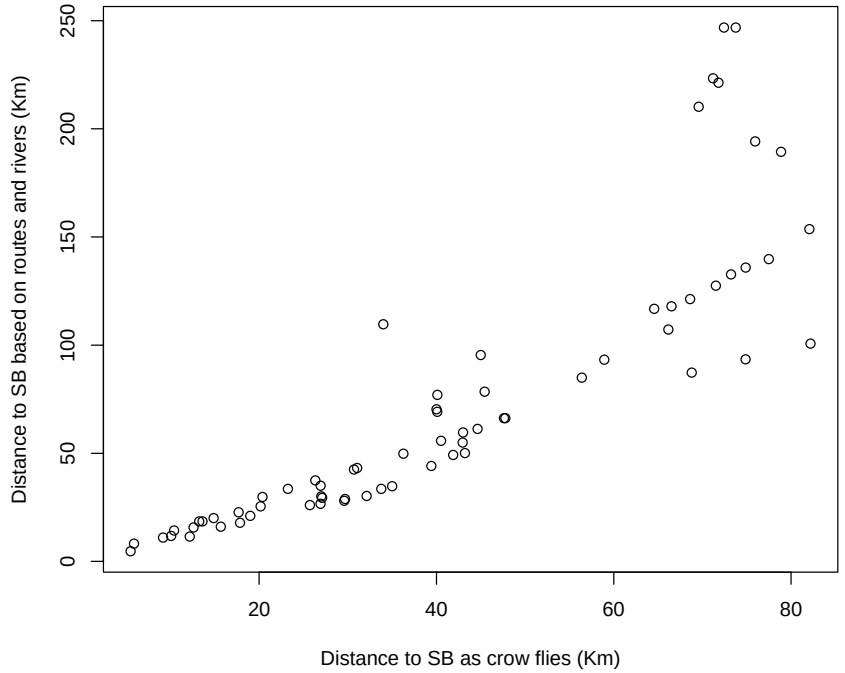
HLC scale	Internal		Chance		Powerful Others	
t-test output	Tsimane-Caerphilly	Tsimane-Miyagi	Tsimane-Caerphilly	Tsimane-Miyagi	Tsimane-Caerphilly	Tsimane-Miyagi
t	-23.734	-30.506	17.135	8.338	34.911	15.235
df	576.745	550.496	572.824	600.880	653.484	580.483
p	0.000	0.000	0.000	0.000	0.000	0.000
P^2	0.000	0.000	0.000	0.000	0.000	0.000

3. DISTANCE FROM TOWN

Distribution of participants by residential distance from town

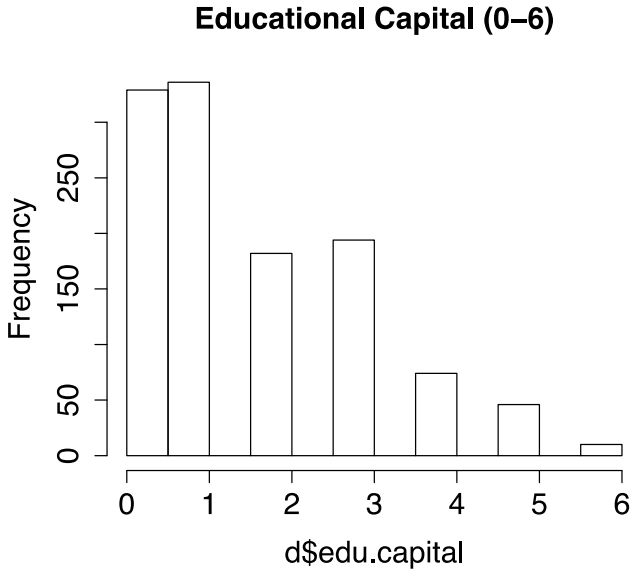


Distance from town measured as crow flies vs. Distance from town based on routes.



Correlation between distance from town calculated from the village center to San Borja as crow flies, and distance from town calculated based on routes, along rivers or roads between villages and San Borja (r=0.87, p=0.000).

4. EDUCATIONAL CAPITAL



5. METHODS FOR COMPARING MODELS OF TREATMENT.

Given limitations in data collection, our sample size varied with the inclusion of certain variables. For model comparison using AIC, we used our smallest sample size (N=368) with no missing values. The table below shows AIC values for the equivalent models summarized in sections 10-15.

Treatment modality	Models	AIC
Any treatment	Baseline	1609
	Baseline + HLC	1537
	Baseline + Modernization	1277
	Full	1207
Modern treatment	Baseline	1852
	Baseline + HLC	1762
	Baseline + Modernization	1498
	Full	1413
Traditional treatment	Baseline	1638
	Baseline + HLC	1557
	Baseline + Modernization	1297
	Full	1220
Both treatments	Baseline	1624
	Baseline + HLC	1590
	Baseline + Modernization	1485
	Full	1443

6. CO-VARIATES OF TREATMENT UPTAKE

Treatment uptake by sex, age, and modernization indicators

Covariate (n)	% Any treatment	% Modern treatment	% Traditional treatment	% Both treatments
Sex				
All (n=1295)	66.2%	35.0%	37.5%	6.3%
Female (n=722)	64.7%	33.0%	38.1%	6.4%
Male (n=573)	68.1%	37.5%	36.8%	6.3%
Age (years)				
40-44 (n=337)	56.1%	28.2%	31.8%	3.9%
45-54 (n=481)	70.1%	36.8%	41.4%	8.1%
55-64 (n=277)	69.0%	38.6%	37.5%	7.2%
65-74 (n=145)	71.0%	35.2%	40.0%	4.1%
>= 75 (n=55)	67.3%	41.8%	32.7%	7.3%
Distance from town (km)				
< 30 (n=609)	70.1%	39.1%	37.9%	7.0%
30-49 (n=366)	69.7%	43.0%	35.5%	8.7%
50-69 (n=187)	48.7%	20.9%	29.9%	2.1%
>= 70 (n=116)	67.2%	14.7%	55.2%	2.6%
Educational capital (0-6)				
0 (n=304)	65.8%	31.3%	39.8%	5.3%
1 (n=302)	69.2%	37.8%	38.7%	7.3%
2 (n=167)	69.5%	34.1%	39.5%	4.2%
3 (n=143)	56.7%	32.9%	26.6%	2.8%
4 (n=97)	60.9%	42.3%	28.9%	10.3%
5 (n= 40)	67.5%	40.0%	35.0%	7.5%
6(n=9)	66.7%	55.6%	11.1%	0.0%
Christian (yes/no)				
yes (n=859)	66.1%	37.5%	34.8%	6.8%
no (n=428)	66.8%	30.4%	43.2%	6.2%

Age, sex, residential distance from town, and educational capital all are associated with HLC). Men scored higher in *God, Chance, Internal* and *Powerful Others* and lower in *Spirits* than women. A higher *Internal* HLC score may be related to men generally interacting more with

Spanish-speaking Bolivian nationals, involvement in wage labor and other aspects of the market economy than women, although we controlled for levels of education and spoken Spanish (via the educational capital variable). However, that men score higher in *Chance* as well as *Internal* is noteworthy, and may be due to more zealous reporting of scores amongst men in general, and should therefore be interpreted with caution. Another significant determinant is religious identification. Self-identifying Christians scored substantially higher in both *God* and *Chance* HLC. Men score substantially higher than women in all HLC scales except for *Spirits* HLC, where women exceed men.

Treatment uptake by illness type

Illness type (number of observations)	% Any treatment	% Modern treatment	% Traditional treatment	% Both treatments
Respiratory infection (n=554)	60.6%	33.6%	32.3%	5.2%
Trauma (n=151)	73.5%	50.3%	27.2%	4.0%
Gastrointestinal diseases (n=270)	81.9%	28.9%	62.2%	9.3%
Other ailments (n=320)	59.1%	35.3%	30.6%	6.9%
All ailments (n=1295)	66.2%	35.0%	37.5%	6.3%

Percentage of observations in which treatment was received by primary control variables, for each treatment category: any treatment (60.2% of reported illnesses), modern treatment (36.8%), traditional treatment (34.2%) or both treatments (5.8%). Over half of traumas (e.g. accidental machete wounds, snakebites, tree falls) prompt modern treatment (53.9%) while over half of gastrointestinal illnesses prompt traditional treatment (55.3%). Respiratory infections are the least treated illnesses: only 53.9% of such infections received any treatment compared to 69.8% for traumas, 72.7% of gastrointestinal infections and 56.4% for other illnesses.

7. MULTILEVEL REGRESSION MODELS OF INTERNAL, CHANCE, POWERFUL OTHERS, GOD, AND SPIRITS HEALTH LOCUS OF CONTROL

HLC scale	**Internal**		**Chance**		**Powerful Others**		**God**		**Spirits**	
Variables	**β**	**p-value**	**β**	**p-value**	**β**	**p-value**	**β**	**p-value**	**β**	**p-value**
Intercept	0.094	0.169	-0.195	0.009	0.058	0.644	-0.633	0.000	0.238	0.001
Male (0-1)	**0.210**	**0.003**	**0.329**	**0.000**	0.251	0.001	**0.156**	**0.021**	**-0.135**	**0.052**
Age (years)	**-0.006**	**0.000**	0.001	0.588	**-0.002**	**0.030**	**0.003**	**0.001**	**-0.003**	**0.000**
Distance from town (km)	**0.002**	**0.012**	**-0.003**	**0.010**	**-0.002**	**0.056**	**-0.002**	**0.006**	**0.001**	**0.011**
Educational Capital (z-score)	**0.113**	**0.000**	0.090	0.074	**0.087**	**0.003**	0.022	0.275	**-0.086**	**0.001**
Christian (no)[a]	-0.024	0.795	**0.212**	**0.005**	0.102	0.162	**0.707**	**0.000**	-0.091	0.151
Observations	1140		1145		1144		1149		1109	
Groups	519		521		522		523		504	

[a]Reference group is given in brackets. Here, non-Christian indicates animistic religious beliefs.

8. ODDS RATIOS OF FULL MODELS FOR ALL TREATMENT MODALITIES.

Treatment type	**Modern treatment**		**Traditional treatment**		**Both treatments**		**Any treatment**	
Variables	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**
Intercept	**0.427**	**0.000**	**1.723**	**0.011**	**0.033**	**0.000**	**4.982**	**0.000**
Male (0-1)	1.060	0.721	1.288	0.171	0.887	0.793	1.380	0.098
Age (years)	1.007	0.303	1.001	0.935	0.982	0.361	1.013	0.107
Respiratory Infection (GI)[a]	1.316	0.119	**0.280**	**0.000**	**0.283**	**0.000**	**0.298**	**0.000**
Trauma (GI)[a]	**2.187**	**0.001**	**0.267**	**0.000**	0.993	0.985	**0.539**	**0.026**
Other illnesses (GI)[a]	1.325	0.151	**0.233**	**0.000**	**0.482**	**0.002**	**0.274**	**0.000**
HLC Internal (z-score)	1.047	0.576	0.899	0.248	1.114	0.615	1.035	0.725
HLC Chance (z-score)	**0.761**	**0.001**	0.900	0.253	**0.502**	**0.002**	**0.770**	**0.008**
HLC Powerful Others (z-score)	**1.332**	**0.000**	**0.840**	**0.045**	1.177	0.498	1.175	0.084
HLC God (z-score)	1.095	0.317	1.054	0.594	**2.043**	**0.015**	1.038	0.716
HLC Spirits (z-score)	1.024	0.737	**1.285**	**0.001**	1.318	0.121	**1.270**	**0.007**
Distance from town (km)	**0.982**	**0.003**	0.997	0.445	0.991	0.380	**0.980**	**0.000**
Educational Capital (z-score)	1.058	0.521	0.925	0.428	1.273	0.290	0.933	0.498
Self-identify as Christian (0-1)[a]	1.018	0.922	**0.697**	**0.068**	**0.382**	**0.054**	0.905	0.640
Observations	1091		990		1031		990	
Groups	497		479		489		479	

[a]Reference group given in brackets. GI: Gastrointestinal diseases.

Variation in treatment uptake by Illness type: We found that treatment decisions depend upon the type of ailment, with physical trauma more likely than respiratory or gastro-intestinal (GI) issues to send people to seek modern treatment, especially close to town

(see section 15 of ESM); this likely reflects the immediacy of the need to handle physical injuries such as broken bones or open wounds from machete or knife cuts, and burns and other injuries associated with fire. Conversely GI problems much more strongly predicted individuals receiving traditional treatment than other medical concerns, possibly reflecting the relative efficacy and ease of access of traditional remedies against relatively minor and common complaints such as diarrhea, indigestion, gastritis and heartburn. Indeed, many of the Tsimane medicinal plant remedies are believed to alleviate symptoms of gastrointestinal discomfort, and are used regularly (e.g. *bejqui'*, *caji'si*, *cashcaria*)[1].

[1] Nate, A., Ista, D., Reyes, V., 2001. Plantas útiles y su aprovechamiento en las tierras de la comunidad tsimane' de Yaranda.

9. ODDS RATIOS OF MODELS FOR ANY TREATMENT (MODERN AND/OR TRADITIONAL).

Models	**Model 1: Baseline**		**Model 2: Baseline + HLC**		**Model 3: Baseline+Modernization**		**Model 4: Full**	
Dependent variable	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Variables**	**Exp(β)**	**p-value**	**Exp(β)**
Intercept	2.038	0.074	2.115	0.063	**4.994**	**0.002**	**4.982**	**0.000**
Male (0-1)	1.301	0.073	1.271	0.124	**1.432**	**0.054**	1.380	0.098
Age (years)	**1.015**	**0.027**	**1.014**	**0.043**	1.012	0.152	1.013	0.107
Respiratory Infection (GI)[a]	**0.325**	**0.000**	**0.332**	**0.000**	**0.295**	**0.000**	**0.298**	**0.000**
Trauma (GI)[a]	**0.572**	**0.022**	**0.592**	**0.036**	**0.504**	**0.011**	**0.539**	**0.026**
Other illnesses (GI)[a]	**0.305**	**0.000**	**0.297**	**0.000**	**0.285**	**0.000**	**0.274**	**0.000**
HLC Internal (z-score)			1.014	0.870			1.035	0.725
HLC Chance (z-score)			0.820	0.016			**0.770**	**0.008**
HLC Powerful Others (z-score)			1.207	0.021			1.175	0.084
HLC God (z-score)			1.027	0.739			1.038	0.716
HLC Spirits (z-score)			1.163	0.055			**1.270**	**0.007**
Distance from town (km)					**0.983**	**0.000**	**0.980**	**0.000**
Educational Capital (z-score)					0.875	0.178	0.933	0.498
Self-identify as Christian (0-1)					0.951	0.788	0.905	0.640
Observations	1295		1237		1044		990	
Groups	665		635		505		479	

[a]Reference group given in brackets. GI: Gastrointestinal diseases

10. ODDS RATIOS OF MODELS FOR MODERN TREATMENT.

Models / **Variables**	**Model 1: Baseline**		**Model 2: Baseline + HLC**		**Model 3: Baseline+Modernization**		**Model 4: Full**	
	Exp(β)	**p-value**	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**
Intercept	**0.269**	**0.000**	**0.306**	**0.001**	**0.370**	**0.021**	**0.427**	**0.000**
Male (0-1)	1.186	0.179	1.084	0.551	1.173	0.309	1.060	0.721
Age (years)	1.009	0.146	1.007	0.258	1.008	0.260	1.007	0.303
Respiratory Infection (GI)[a]	1.226	0.175	1.194	0.256	1.373	0.061	1.316	0.119
Trauma (GI)[a]	**2.219**	**0.000**	**2.111**	**0.000**	**2.292**	**0.000**	**2.187**	**0.001**
Other illnesses (GI)[a]	1.168	0.360	1.167	0.375	1.333	0.128	1.325	0.151
Internal HLC (z-score)			0.994	0.935			1.047	0.576
Chance HLC (z-score)			**0.837**	**0.013**			**0.761**	**0.001**
Powerful others HLC (z-score)			**1.306**	**0.000**			**1.332**	**0.000**
God HLC (z-score)			1.072	0.339			1.095	0.317
Spirits HLC (z-score)			1.017	0.801			1.024	0.737
Distance from town (km)					**0.989**	**0.001**	**0.982**	**0.003**
Educational capital (z-score)					1.029	0.734	1.058	0.521
Self-identify as Christian (0-1)					1.163	0.346	1.018	0.922
N observations	1423		1361		1149		1091	
N grouped observations	690		660		523		497	

11. ODDS RATIOS OF MODELS FOR TRADITIONAL TREATMENT

Models	**Model 1: Baseline**		**Model 2: Baseline + HLC**		**Model 3: Baseline+Modernization**		**Model 4: Full**	
Variables	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Variables**	**Exp(β)**	**p-value**	**Exp(β)**
Intercept	1.429	0.330	**1.486**	**0.007**	2.135	0.099	**1.723**	**0.011**
Male (0-1)	1.069	0.629	1.201	0.216	1.155	0.401	1.288	0.171
Age (years)	1.003	0.684	**0.286**	**0.000**	0.998	0.808	1.001	0.935
Respiratory Infection (GI)[a]	**0.274**	**0.000**	**0.258**	**0.000**	**0.264**	**0.000**	**0.280**	**0.000**
Trauma (GI)[a]	**0.222**	**0.000**	**0.254**	**0.000**	**0.218**	**0.000**	**0.267**	**0.000**
Other illnesses (GI)[a]	**0.256**	**0.000**	0.947	0.475	**0.230**	**0.000**	**0.233**	**0.000**
HLC Internal (z-score)			0.879	0.096			0.899	0.248
HLC Chance (z-score)			0.911	0.222			0.900	0.253
HLC Powerful Others (z-score)			0.976	0.751			**0.840**	**0.045**
HLC God (z-score)			**1.217**	**0.006**			1.054	0.594
HLC Spirits (z-score)			**1.486**	**0.007**			**1.285**	**0.001**
Distance from town (km)					0.999	0.877	0.997	0.445
Educational Capital (z-score)					0.874	0.144	0.925	0.428
Self-identify as Christian (0-1)					0.724	0.059	**0.697**	**0.068**
Observations	1295		1237		1044		990	
Groups	665		635		505		479	

[a]Reference group given in brackets. GI: Gastrointestinal disease

12. ODDS RATIOS OF MODELS FOR BOTH TREATMENTS (MODERN AND TRADITIONAL)

Models	**Model 1: Baseline**		**Model 2: Baseline + HLC**		**Model 3: Baseline+Modernization**		**Model 4: Full**	
Variables	**Exp(β)**	**p-value**	**Exp(β)**	**p-value**	**Variables**	**Exp(β)**	**p-value**	**Exp(β)**
Intercept	**0.024**	**0.000**	**0.023**	**0.000**	**0.074**	**0.020**	**0.033**	**0.000**
Male (0-1)	1.112	0.746	0.976	0.946	1.115	0.791	0.887	0.793
Age (years)	0.999	0.925	0.998	0.910	0.986	0.464	0.982	0.361
Respiratory Infection (GI)[a]	**0.286**	**0.000**	**0.289**	**0.000**	**0.285**	**0.000**	**0.283**	**0.000**
Trauma (GI)[a]	0.766	0.408	0.831	0.573	0.877	0.715	0.993	0.985
Other illnesses (GI)[a]	**0.466**	**0.000**	**0.48**	**0.001**	**0.463**	**0.001**	**0.482**	**0.002**
HLC Internal (z-score)			1.01	0.958			1.114	0.615
HLC Chance (z-score)			**0.643**	**0.020**			**0.502**	**0.002**
HLC Powerful Others (z-score)			1.187	0.378			1.167	0.498
HLC God (z-score)			1.273	0.224			**2.043**	**0.015**
HLC Spirits (z-score)			1.222	0.218			1.318	0.121
Distance from town (km)					0.988	0.194	0.991	0.380
Educational Capital (z-score)					1.146	0.519	1.273	0.290
Self-identify as Christian (0-1)					0.772	0.537	**0.382**	**0.054**
Observations	1235		1291		1088		1031	
Groups	679		649		515		489	

[a]Reference group given in brackets. GI: Gastrointestinal dise

13. MODEL OF MODERN TREATMENT WITH AN INTERACTION ILLNESS TYPE AND DISTANCE FROM TOWN

Variables	Exp(β)	p-value
Intercept	0.455	0.110
Male (0-1)	1.079	0.647
Age (years)	1.006	0.369
Respiratory Infection (GI)[a]	1.222	0.565
Trauma (GI)[a]	**6.04**	**0.000**
Other illnesses (GI)[a]	0.893	0.765
HLC Internal (z-score)	1.033	0.697
HLC Chance (z-score)	**0.755**	**0.001**
HLC Powerful Others (z-score)	**1.328**	**0.001**
HLC God (z-score)	1.091	0.335
HLC Spirits (z-score)	1.012	0.866
Distance from town (km)	0.989	0.126
Educational Capital (z-score)	1.043	0.632
Self-identify as Christian (0-1)	1.038	0.837
Respiratory infection: Distance from town	1.002	0.809
Trauma: Distance from town	**0.976**	**0.036**
Other illnesses: Distance from town	1.012	0.228
Observations	1091	
Groups	497	

[a]Reference group is given in brackets. GI: Gastrointestinal diseases.

The interaction term between distance from town and Trauma is negative. Distance from town has the greatest effect on participants with Trauma (relative to other types of illnesses), who are very likely to get modern treatment when they are closer to town.