SUPPLEMENTARY MATERIAL:
"Do Public Health Interventions Crowd Out Private Health Investments? Malaria Control Policies in Eritrea"

A Randomization procedures

This section presents the treatment allocation used for the IRS campaing in Eritrea.

A.1 Village lists and treatment allocation

In relation to the implementation of the study and the intervention, we can identify four village lists that were used during the RCT conducted in Eritrea:

1. An initial village list, provided by the NMCP of Eritrea to J. Keating to conduct the initial random allocation to treatment (2008);
2. A village list provided by the NMCP to the spraying teams that conducted the IRS campaign in Gash Barka (Gash Barka) in June-July 2009. This list includes only the names of treatment villages, because spraying teams needed not visit the other villages[2];
3. A village list provided by the NMCP to data collectors (October 2009), including both treatment and control villages;
4. A final village list, provided by the NMCP to The World Bank at the end of all field operations (November 2009).

Comparison between List 1 and List 4 reveals some differences. Out of 116 villages, 82 (71%) have the same name in both lists and another 10 (9%) villages have names that can be matched using additional information. Two villages were replaced with two additional ones in one sub-zone. We are left with 22 (19%) cases of mismatch that we can't explain.

Treatment allocation was altered in 5 instances and we explain possible reasons underlying these changes. 87 (95%) of the 92 villages that we can match from List 1 to List 4 have the correct treatment allocations[3]. Villages included in the RCT, despite not being in the initial list, do not differ significantly from villages initially listed. We find evidence suggesting that some Tigre

[2] Names of control villages were added by hand; this was probably done by NMCP staff in Gash Barka.

[3] Villages 56 and 59 (reallocated to treatment) and 72 and 16 (reallocated to control) have matching names in Lists 1 and 4. Village 19 (reallocated to treatment) may be matched using the sub-zone where it is located.

villages received preferential treatment, which underlines the importance of controlling for this ethnic group in all our regressions.

A.2 Initially identified issues

Differences between village lists may have arisen from a variety of situation-specific problems. Those issues were discussed at length with the NMCP and analysed with the help of local staff. The following are the main issues that we identified for each village list:

1. The initial list was outdated, possibly from the Census of 2002 or 2003. For example, a sub-zone had changed name since then, from Omhajer to Goluj, and village sizes do not correspond to the current situation (e.g., Omhajer had only 70 household at the time, while some 1,200 households lived there in 2009). Some villages switched from a sub-zone to another (e.g., Hawashait moved from sub-zone Dighe to sub-zone Laelay Gash) and some became part of another country (Sudan or Ethiopia). Existence and location of treatment and control villages were not checked or recorded prior to the beginning of the study. However, notice that, in a setting like ours, the problem of missing some migrant villages could be expected. Due to a sustained process of villagization, several villages may have merged into a new one. Villages may also have changed name or may even have several names, so that the same village could be recorded in two lists under very different names. We were able to reconcile some, but not all, of these cases.

2. When spraying teams tried to reach the treatment villages in List 2, sometimes they could not find one or a village may have moved abroad and be out of reach. Migrant villages were followed whenever possible and missing treatment villages were replaced with the closest available village.

3. The minimum distance between villages had to be >5km. After randomisation some villages were found to be adjacent, so they were replaced to ensure the minimum distance would be kept. In fact, this issue should have been identified before the random treatment allocation.

4. Some treatment and control villages are located in the highlands, where there is no malaria thanks to altitude. Two such instances in sub-zone Mulki were reported, whereby one treatment and one control village were replaced with two new villages, located nearby, moving down to the lowlands. The new villages were chosen by NMCP staff in Gash Barka. We check if preference was given to the Tigre tribe, which is over-represented in the treatment

group. The new treatment village is number 43 and the new control is number 46. No Tigre households resides in either village, suggesting that no active effort was put to offer treatment to Tigre villages.

5. Once the existence of treatment villages had been ascertained by spraying teams, the Table was updated accordingly. The number of villages in List 1 was 116, but this was reduced to 115 in Lists 3 and 4. A possible reason could be found in the process of villagization, if two listed villages merged into one. We cannot conclusively answer this question.

6. New issues arose when enumerators went to the field to conduct the survey. Issues occurred when data collectors could not find some of the control villages, some of which had moved abroad and could not be reached. Missing control villages were replaced with the nearest available village. We compare List 3 to List 4 and the problem concerns the following villages: 3 controls in sub-zone Goluj (villages 4, 5, 7); 1 control in sub-zone Tesseney (52), and 2 controls in sub-zone Shambko (93, 95). We analyse the determinants of such changes in Table B1. We do not find evidence of differential treatment for Tigre-populated villages. The negative coefficients estimated in models 4 and 6 suggest that replacement control villages were less wealthy than the other villages surveyed in the same sub-zone. Notice that we are comparing replacement control villages to all (treatment and control) villages surveyed in the same sub-zone, and treatment villages may have become wealthier following the IRS intervention.

A.3 Change in number of villages in each sub-zone

The number of villages by sub-zone was different from List 1 to List 4, as shown in Table B2. This can be explained by the fact that, in recent years, the boundaries of certain sub-zones were changed, so that some villages were allocated to a new adjacent sub-zone. The number of treatment villages was finalised when List 2 was drafted for the spraying teams. The total was reduced from 58 to 57. Although, in 6 of the 13 surveyed sub-zones, the number of treatment villages was left unchanged. Column 5 of Table B2 shows that the largest disparities with respect to List 1 appear in sub-zone Haykota (where 3 extra villages were treated) and in sub-zone Mensura (where 3 villages less were treated). In the other sub-zones, the number of treated villages differs from the original figure by at most 1. The number of treatment villages, both in total and by sub-zone, was not changed in the subsequent lists. The number of control villages was left unchanged at 58, from List 1 through List 4. However, column 10 of Table B2 shows that the allocation of control villages across sub-zones changed significantly: in the case of sub-zone Akurdet, it was increased by 3, while it was decreased by 3 in sub-zone Haykota[4]. The problem is less severe in the other sub-zones, in 5 of which the number of controls was left untouched.

A.4 Altered village names

We therefore investigate the characteristics of altered village names and how these might have affected selection into treatment. In Tables B3 and B4 we investigate the presence of any systematic differences between villages whose names were not changed during the operations of the RCT and those villages which instead were changed[5]. Column 1 is analogous to the randomisation checks presented in the paper, while in Column 2 we check if villages with the same name in Lists 1 and 4 differ systematically from those which were changed. We repeat the same analysis in Column 3, where we broaden the definition of *unchanged villages* to include also those villages whose names we were able to match with the original list with the help of information on multiple village names. We find no evidence of systematic differences between villages whose names were the same in List 1 and 4 and villages whose names were different. We find no evidence of any discrimination on grounds of ethnicity or wealth. We only find a significant small age difference between unchanged and replaced villages, but we do not interpret this as a sign of age-based discrimination. In Tables B5-B8 we replicate the analysis of homogeneous treatment effects conducted in the main body of the paper, checking the effect on the parameter of interest of adding a dummy variable equal to 1 if the name of the village was left unchanged and 0 otherwise. Estimates do not change appreciably, either in terms of magnitude or in terms of statistical significance.

A.5 Reallocation of treatment status

The treatment allocation of 5 villages was altered from the original list. We compare List 2 to List 1 to see which control villages were reallocated from control to treatment group. In sub-zone Haykota, this happened for 2 villages, i.e. Biet Hama (56) and Akyeb (59). In sub-zone Laelay Gash, this possibly[6] happened for one village, i.e., Amir/Uguma (19). We cannot identify any other instance in which this problem occurred. We compare List 3 to List 1 to see which treatment villages were reallocated from treatment to the control group. In sub-zone Dighe, one village was re-allocated to serve as control, i.e. Aflanda (72). In sub-zone Forto, the same happened to one

[4]Notice that in sub-zone Haykota the problem is severe for both treatment villages (+3) and control villages (-3).

[5]Notice that we compare villages with altered name or treatment allocation, to all other villages in Gash Barka.

[6]Names do not match perfectly.

village, i.e. Grgr (16). In fact, no household was reportedly sprayed in Grgr and only one was in Aflanda.

We investigate the possibility that preference for treatment was given to villages with better infrastructure or other specific characteristics. In Tables B9 and B10 we investigate the presence of any systematic differences between these villages and those whose treatment allocation was left unchanged. Column 1 reports, for each variable, the estimated difference between villages whose treatment allocation was changed to the ones whose treatment allocation was not changed[7]. Columns 2 and 3 report the same difference, but restricting the sample to the treatment group and the control group respectively[8]. In Column 2 we compare villages that were originally allocated to treatment group with the villages that were originally in the control group, but were in fact allocated to treatment. Similarly, in Column 3 we compare villages that were originally allocated to control group with the villages that were originally in the treatment group but were mistakenly allocated to control group. We would be particularly worried of opposite signs in Columns 2 and 3, which would suggest that some variables were used as grounds for preferential treatment allocation. We find evidence suggesting that Tigre villages were reallocated into treatment and away from the control group, which could possibly explain the imbalance in Tigre presence across treatment groups. The differences estimated along other dimensions are quite similar in Columns 2 and 3, suggesting that treatment allocation was not altered based on those characteristics.

B Additional data

B.1 Wealth

Finally, we checked whether treatment effects varied depending on households' wealth. Following the Filmer-Pritchett (FP) procedure (Filmer and Pritchett, 2001), we split all categorical variables into sets of dummy variables (we exploit information on households' main water source, toilet type, fuel used for cooking, wall and roof material, presence and type of any windows, access to electricity, ownership of electronics and any vehicles, the number of persons per room of the dwelling and ownership of any livestock) and we use Principal Components Analysis (PCA) to assign the indicator weights. We use only the first factors produced by PCA to represent our wealth index, as suggested by McKenzie (2005). Figure B1 shows the resulting index distribution.

[7]We conduct the same randomisation checks used to compare treatment and control villages, but this time to compare villages with altered treatment status to those with unaltered treatment status.

[8]Altered villages in Column 2 were moved from the control to the treatment group. Altered villages in Column 3 were moved from the treatment to the control group.

In the Eritrean setting, the construction of a wealth index with PCA might face the problems of clumping and truncation (Vyas and Kumaranayake, 2006).[9] In Gash Barka, asset ownership is very limited and the range of owned asset is quite narrow, most dwelling are similar, most households do not have toilets and almost no one has electricity. To address this issue, we make use of all available information on assets contained in our dataset.

We divided households by asset index quintile and we checked whether ownership of assets with socio-economic status. From Tables B11-B12 we can generally observe that, as wealth increases: water sources improve; households have better toilets and use bushes less often; they use not only firewood to cook, but also electricity and fuels; they have more solid walls (not made in wood or cane but more often in cement, bricks or stone) and roofs (made in cement or stone rather than leafs); own electronics, especially a radio, and hence have better access to information; they also have some vehicles, mainly bikes and carts. Finally, the number of persons per room does not change much.

These results show that the simple wealth index obtained from PCA does a pretty good job in terms of explaining variation in socio-economic status among sampled households, even if the index explains only 5% of the variance in asset ownership. In other cases, ownership initially increases and then decreases as households become wealthier, while monotonicity is expected. The main explanation lies in that the FP procedure works with dichotomous variables only and does not exploit the ordinal information available in the data.

References

Filmer, D. and L. H. Pritchett (2001). Estimating Wealth Effects without Expenditure Data Or Tears: an Application to Educational Enrollments in States of India. *Demography 38*(1), 115–132. B.1, B1, B11, B12

McKenzie, D. J. (2005). Measuring Inequality with Asset Indicators. *Journal of Population Economics 18*(2), 229–260. B.1

Vyas, S. and L. Kumaranayake (2006). Constructing socio-economic status indices: how to use principal components analysis. *Health Policy and Planning 21*(6), 459–468. B.1

[9] Clumping (or clustering) occurs when the wealth index groups households into a limited number of groups. Truncation arises from limited variation in asset ownership, which may makes it hard to distinguish groups with small wealth differences.

Table B1: Choice of replacement control villages

	Tigre			Wealth		
Sample restricted to sub-zone:	Goluj	Tesseney	Shambko	Goluj	Tesseney	Shambko
village 4	-0.17			-2.45**		
	(0.15)			(0.78)		
village 5	-0.17			-2.23**		
	(0.15)			(0.78)		
village 7	-0.17			-1.71*		
	(0.15)			(0.78)		
village 52		0.38		-0.59		
		(0.20)		(0.41)		
village 93			-			0.25
						(0.13)
village 95			-			-0.68***
						(0.13)
Constant	0.24	0.62**	-	2.22**	0.38	0.09
	(0.15)	(0.20)	-	(0.78)	(0.41)	(0.13)
Observations	73	88	90	72	87	90

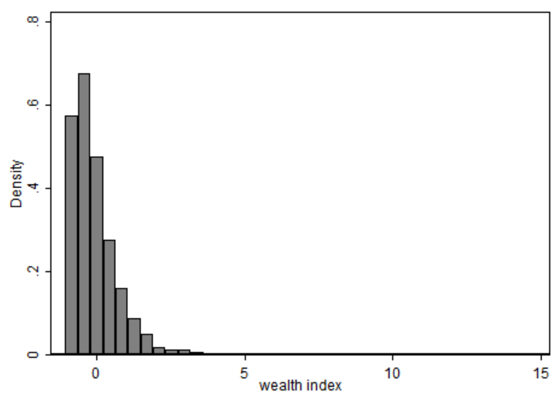
Note: one observation per household. This Table presents the coefficients β_1 estimated from LS regression $Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$, with standard errors in parentheses. In models (1)-(3), Y_i is an indicator variable =1 if household i belongs to the Tigre tribe, and =0 otherwise. In Columns (4)-(6) Y_i is an asset index for household i. Samples restricted to the sub-zones where listed villages are located, shown in each header. Notice that no Tigre households were surveyed in sub-zone Shambko. Observations clustered at village level. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B2: Number of villages in Lists 1, 2 and 4

	List 1			List 2		List 4						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sub-zone	Total	Treatment	Control	Treatment	D1	Total	D1	Treated	D1	D2	Control	D1
Akurdet	6	3	3	4	1	10	4	4	1	0	6	3
Barentu	2	2	0	2	0	3	1	2	0	0	1	1
Dighe	12	6	6	5	-1	11	-1	5	-1	0	6	0
Forto	9	6	3	5	-1	9	0	5	-1	0	4	1
Gogne	11	5	6	5	0	10	-1	5	0	0	5	-1
Goluj (Omhajer)	7	2	5	2	0	5	-2	2	0	0	3	-2
Haykota	16	9	7	12	3	16	0	12	3	0	4	-3
Laelay-Gash	15	7	8	8	1	15	0	8	1	0	7	-1
Mensura	15	6	9	3	-3	12	-3	3	-3	0	9	0
Mogolo	7	4	3	3	-1	8	1	3	-1	0	5	2
Mulki	4	2	2	2	0	4	0	2	0	0	2	0
Shambko	6	2	4	2	0	6	0	2	0	0	4	0
Tesseney	6	4	2	4	0	6	0	4	0	0	2	0
Total	116	58	58	57	-1	115	-1	57	-1	0	58	0

Note. For List 1, this Table reports in columns 1-3 the number of villages for each sub-zone, divided by treatment allocation. Column 4 reports the number of treatment villages that NMCP included in List 2, to be used by the spraying teams. Column 5 reports the difference between the previous column and the corresponding column for List 1: (5) = (4) - (2). Columns 6-12 refer to List 4. Column 6 shows the total number of villages for each sub-zone according to the final list. Column 7 reports the difference between the previous column and the corresponding column for List 1: (7) = (6) - (2). Column 8 reports the number of treated villages. The following columns 9-10 report the difference between that and the figure for Lists 1 and 2. Column 11 reports the number of control villages by sub-zone: (11) = (6) - (8). Column 12 reports the difference between the previous column and the corresponding column for List 1: (12) = (11) - (3).

Figure B1: Distribution of wealth in Gash Barka



Note: Author's calculations. Wealth index is determined using the Filmer-Pritchett procedure (Filmer and Pritchett, 2001) and using information about main water source, toilet type, fuel used for cooking, wall and roof material, presence and type of any windows, access to electricity, ownership of electronics and any vehicles, the number of persons per room of the dwelling and ownership of any livestock.

Table B3: Which villages were replaced? - Individual Variables

	(1)	(2)	(3)
Variables (Y)	Treatment status	Same name	Matched name
ALL HOUSEHOLD MEMBERS			
1. Female	-0.0040	-0.0070	-0.0063
	(0.0113)	(0.0117)	(0.0140)
2. Usually lives here	0.0062	-0.0015	-0.0027
	(0.0049)	(0.0059)	(0.0070)
3. Stayed here last night	0.0137	-0.0096	-0.0046
	(0.0086)	(0.0093)	(0.0115)
4. Age	0.3456	1.4140***	1.3255**
	(0.4924)	(0.4870)	(0.5558)
RESPONDENTS ONLY			
5. Age	0.6157	1.8343*	1.5235
	(0.8926)	(0.9829)	(0.1459)
6. Ever attended school	0.0072	-0.0239	-0.0778*
	(0.0339)	(0.0372)	(0.0426)
7. Only primary school	-0.0373	0.0508	0.0565
	(0.0527)	(0.0544)	(0.0569)
8. Literate	-0.0151	-0.0286	-0.0905**
	(0.0321)	(0.0369)	(0.0422)
9. Muslim religion	0.0601	0.0639	0.1442
	(0.0678)	(0.0780)	(0.0961)
10. Tigre tribe	0.1666*	0.0387	0.1418
	(0.0843)	(0.0951)	(0.1061)
11. Married	-0.0125	-0.0143	-0.0057
	(0.0133)	(0.0135)	(0.0160)

Note. Variables 5-11: sample restricted to respondents only. This Table reports, for each variable Y, the coefficient β_1 estimated from LS regression $Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$, with standard errors in parentheses. Column (1) is analogous to the randomisation checks, presented in Tables 1 and 2 in the main body of the paper. In column (1), X_i is an indicator variable =1 if village i is in treatment group, =0 otherwise. In column (2), X_i is an indicator variable =1 if village i has same name in village lists 1 to 4, =0 otherwise. In column (3), X_i is an indicator variable =1 if village i has same name in village lists 1 to 4 or if the name of village i was changed but can be matched, =0 otherwise. Observations are clustered at village level. *** p<0.01, ** p<0.05, * p<0.1.

Table B4: Which villages were replaced? - Household Variables

	(1)	(2)	(3)
Variables (Y)	Treatment status	Same name	Matched name
HOUSEHOLD LEVEL VARIABLES			
12. Household size	0.1844	-0.1634	-0.1378
	(0.1559)	(0.1615)	(0.1734)
13. Household members under 5	0.0214	-0.0711	0.0049
	(0.0566)	(0.0592)	(0.0657)
14. Household members under 18	0.0925	-0.1835	-0.1770
	(0.1279)	(0.1284)	(0.1360)
15. Main source of drinking water:			
15.1.Public tap	-0.0104	-0.0524	-0.1460
	(0.0772)	(0.0887)	(0.1020)
15.2.Unprotected well	0.0195	0.0039	0.0428
	(0.0545)	(0.0571)	(0.0612)
15.3.Unprotected spring	-0.0150	0.0361	0.0646
	(0.0384)	(0.0392)	(0.0423)
16. Has any toilet	-0.0112	-0.0085	0.0096
	(0.0232)	(0.0274)	(0.0300)
17. Has radio	0.0084	-0.0076	-0.0068
	(0.0324)	(0.0348)	(0.0417)
18. Firewood is main fuel	-0.0214	-0.0181	-0.0318*
	(0.0185)	(0.0183)	(0.0178)
19. Has no window	0.0050	-0.0365	-0.0619
	(0.0656)	(0.0712)	(0.0766)
20. Number of separate rooms	0.0225	-0.1434	-0.1389
	(0.1049)	(0.1118)	(0.1215)
21. Number of sleeping rooms	0.0020	-0.0236	-0.0265
	(0.0509)	(0.0523)	(0.0532)
22. Number of sleeping spaces	-0.1641	-0.0582	-0.2794
	(0.1900)	(0.2048)	(0.2172)
23. Asset index	0.0736	-0.0553	-0.1479
	(0.1259)	(0.1417)	(0.1782)

Note. Variables 12-23: one observation per household. This Table reports, for each variable Y, the coefficient β_1 estimated from LS regression $Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$, with standard errors in parentheses. Column (1) is analogous to the randomisation checks, presented in Tables 1 and 2 in the main body of the paper. In column (1), X_i is an indicator variable =1 if village i is in treatment group, =0 otherwise. In column (2), X_i is an indicator variable =1 if village i has same name in village lists 1 to 4, =0 otherwise. In column (3), X_i is an indicator variable =1 if village i has same name in village lists 1 to 4 or if the name of village i was changed but can be matched, =0 otherwise. Observations are clustered at village level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B5: Robustness checks: Information and knowledge about malaria

			$E(Y \mid T=1,X) - E(Y \mid T=0,X)$		
Variables	Treatment	Control	No Regressors	Basic Regressors	Same Name
1. Mosquitoes mentioned among malaria vectors	0.908	0.854	0.0541**	0.0305*	0.027*
	(0.289)	(0.353)	(0.0213)	(0.016)	(0.016)
2. Malaria is a problem in community	0.726	0.670	0.0564	0.035	0.026
	(0.446)	(0.471)	(0.0442)	(0.035)	(0.035)
3. Children mentioned among most affected by malaria	0.863	0.788	0.0744***	0.0679***	0.069***
	(0.344)	(0.409)	(0.0248)	(0.019)	(0.019)
4. Pregnant women mentioned among most affected	0.367	0.365	0.002	-0.0143	-0.015
	(0.482)	(0.482)	(0.0403)	(0.024)	(0.024)
5. In the previous 6 months, heard/saw messages about:					
5a. ITNs	0.484	0.469	0.0152	-0.00050	0.005
	(0.500)	(0.499)	(0.0421)	(0.038)	(0.039)
5b. Early seeking behaviour	0.537	0.501	0.0365	0.019	0.025
	(0.499)	(0.500)	(0.0420)	(0.040)	(0.040)
5c. Environmental management	0.450	0.387	0.0638	0.029	0.033
	(0.498)	(0.487)	(0.0430)	(0.036)	(0.036)

Note: one observation per household (data available for respondents only). Columns 1 and 2 report means for treatment and control groups, with standard deviations in brackets. Columns 3-5 report the difference between treatment and control groups, estimated using LS regression (12) for continuous outcomes and probit regression (13) for binary outcomes. The specification in column 3 does not include any controls. The specification in column 4 includes controls for: Tigre tribe, Muslim religion and sub-zone dummies. In the specification in column 5, controls additionally include a dummy =1 if village name was not changed from List 1 to List 4, and =0 otherwise. In all regressions, observations are clustered at village level and robust standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B6: Robustness checks: Ownership and use of mosquito bed nets

Variables	Treatment	Control	$E(Y\|T=1,X)-E(Y\|T=0,X)$		
			No Regressors	Basic Regressors	Same Name
1. Number of nets owned by household	1.774	1.575	0.200*	0.214**	0.216**
	(1.279)	(1.207)	(0.110)	(0.0996)	(0.099)
2. Number of ITNs owned by household	1.444	1.278	0.166*	0.176*	0.180*
	(1.206)	(1.126)	(0.0963)	(0.0926)	(0.091)
3. Reported net use (of each household member)	0.429	0.380	0.049	0.034	0.028
	(0.495)	(0.486)	(0.035)	(0.033)	(0.030)
4. Number of observed nets used the night before	1.384	1.164	0.220**	0.186**	0.187**
	(1.214)	(1.054)	(0.0990)	(0.0877)	(0.086)
5. Number of observed nets left unused the night before	0.676	0.736	-0.0600	0.0152	0.025
	(0.993)	(1.001)	(0.0763)	(0.0626)	(0.061)

Note: one observation per household for variables 1,2,4,5. One observation per individual for variable 3. In this Table, “nets” refers to any bed nets, irrespective of their treatment status, whereas “ITNs” includes only LLINs and properly treated ITNs, following the definition presented in footnote 15 of the paper. Columns 1 and 2 report means for treatment and control groups, with standard deviations in brackets. Columns 3-5 report the difference between treatment and control groups, estimated using LS regression (12) for continuous outcomes and probit regression (13) for binary outcomes. The specification in column 3 does not include any controls. The specification in column 4 includes controls for: Tigre tribe, Muslim religion and sub-zone dummies. In the specification in column 5, controls additionally include a dummy =1 if village name was not changed from List 1 to List 4, and =0 otherwise. In all regressions, observations are clustered at village level and robust standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B7: Robustness checks: Participation in Larval Habitat Management (LHM)

			$E(Y\|T=1,X)-E(Y\|T=0,X)$		
Variables	Treatment	Control	No Regressors	Basic Regressors	Same Name
Over the 6 months before the survey:					
1. Respondent participated in LHM	0.322	0.282	0.040	0.012	0.013
	(0.468)	(0.450)	(0.044)	(0.038)	(0.038)
In the last month before the survey:					
2. Days spent by household in LHM	0.632	0.618	0.013	0.025	0.033
	(2.774)	(1.978)	(0.181)	(0.161)	(0.165)
3. Household members who participated in LHM	0.456	0.39	0.066	0.051	0.035
	(1.007)	(0.898)	(0.077)	(0.071)	(0.068)
4. Male household members >15 years old	0.167	0.125	0.042	0.025	0.021
who participated in LHM	(0.462)	(0.399)	(0.031)	(0.027)	(0.027)
5. Female household members >15 years old	0.215	0.219	-0.004	-0.001	-0.004
who participated in LHM	(0.47)	(0.483)	(0.038)	(0.034)	(0.034)
6. Household members <15 years old	0.075	0.046	0.029	0.027	0.018
who participated in LHM	(0.467)	(0.372)	(0.025)	(0.026)	(0.023)

Note: Columns 1 and 2 report means for treatment and control groups, with standard deviations in brackets. Columns 3-5 report the difference between treatment and control groups, estimated using LS regression (12) for continuous outcomes and probit regression (13) for binary outcomes. The specification in column 3 does not include any controls. The specification in column 4 includes controls for: Tigre tribe, Muslim religion and sub-zone dummies. In the specification in column 5, controls additionally include a dummy =1 if village name was not changed from List 1 to List 4, and =0 otherwise. In all regressions, observations are clustered at village level and robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B8: Robustness checks: Behaviours conducive to malaria elimination, other than LHM

			$E(Y\|T=1,X) - E(Y\|T=0,X)$		
Variables	Treatment	Control	No Regressors	Basic Regressors	Same Name
1. Household keeps livestock >100m from home	0.807	0.776	0.031	0.068**	0.066**
	(0.395)	(0.417)	(0.032)	(0.031)	(0.031)
2. Household covers stored water	0.942	0.953	-0.011	-0.027	-0.020
	(0.234)	(0.212)	(0.020)	(0.018)	(0.016)
3. Respondent does anything to prevent mosquito bites	0.834	0.804	0.030	-0.006	-0.011
	(0.372)	(0.397)	(0.031)	(0.025)	(0.025)
4. Respondent mentions using net	0.680	0.649	0.029	0.011	0.005
	(0.467)	(0.478)	(0.039)	(0.029)	(0.028)
5. Respondent mentions burning coils	0.225	0.211	0.015	0.003	0.004
	(0.418)	(0.409)	(0.035)	(0.022)	(0.021)
6. Respondent mentions using spray	0.025	0.021	0.004	0.010	0.011
	(0.156)	(0.143)	(0.009)	(0.008)	(0.008)
7. Respondent mentions burning animal dung	0.058	0.046	0.012	0.005	0.005
	(0.234)	(0.209)	(0.014)	(0.012)	(0.012)
8. Respondent mentions burning herbs	0.048	0.054	-0.006	-0.017	-0.018
	(0.215)	(0.226)	(0.018)	(0.014)	(0.014)
9. Respondent mentions draining stagnant water	0.106	0.120	-0.014	-0.022	-0.022
	(0.309)	(0.325)	(0.021)	(0.018)	(0.017)

Note: Columns 1 and 2 report means for treatment and control groups, with standard deviations in brackets. Columns 3-5 report the difference between treatment and control groups, estimated using LS regression (12) for continuous outcomes and probit regression (13) for binary outcomes. The specification in column 3 does not include any controls. The specification in column 4 includes controls for: Tigre tribe, Muslim religion and sub-zone dummies. In the specification in column 5, controls additionally include a dummy =1 if village name was not changed from List 1 to List 4, and =0 otherwise. In all regressions, observations are clustered at village level and robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B9: Which villages were reallocated across treatments? - Individual Variables

	(1)	(2)	(3)
Subsample:	All villages	Treatment group	Control group
Variables (Y)			
ALL HOUSEHOLD MEMBERS			
1. Female	0.0157	0.0201	0.0096
	(0.0391)	(0.0579)	(0.0334)
2. Usually lives here	0.0149***	0.0076	0.0254***
	(0.0046)	(0.0057)	(0.0039)
3. Stayed here last night	0.0079	0.0173***	-0.0139
	(0.0110)	(0.0042)	(0.0106)
4. Age	4.1418***	3.3682***	5.3807***
	(0.4620)	(0.3959)	(0.3977)
RESPONDENTS ONLY			
5. Age	0.1662	2.5454	-3.4066
	(2.6551)	(1.8592)	(4.9482)
6. Ever attended school	-0.1374***	-0.1263***	-0.1556***
	(0.0293)	(0.0411)	(0.0352)
7. Only primary school	0.2397***	0.2603***	0.2192***
	(0.0263)	(0.0356)	(0.0400)
8. Literate	-0.1209***	-0.1390***	-0.0918
	(0.0434)	(0.0450)	(0.0799)
9. Muslim religion	0.1997***	0.1697***	0.2294***
	(0.0353)	(0.0472)	(0.0527)
10. Tigre tribe	0.0386	0.3009**	-0.3789***
	(0.1958)	(0.1298)	(0.0676)
11. Married	-0.0826***	-0.0525**	-0.1232***
	(0.0205)	(0.0210)	(0.0268)

Note: Variables 5-11: sample restricted to respondents only. For each variable Y, we report the coefficient β_1 estimated from LS regression $Y_i = \beta_0 + \beta_1 \Delta_i + \epsilon_i$, where Δ_i is a dummy =1 if person i lives in a village whose treatment status was changed, and =0 otherwise. Sample restricted to treatment group in column (2) and to control group in column (3). Robust standard errors in parentheses. Observations clustered at village level. *** p<0.01, ** p<0.05, * p<0.1.

Table B10: Which villages were reallocated across treatments? - Household Variables

	(1)	(2)	(3)
Subsample:	All villages	Treatment group	Control group
Variables (Y)			
HOUSEHOLD LEVEL VARIABLES			
12. Household size	-0.8342***	-0.5932**	-1.2288***
	(0.2902)	(0.2295)	(0.4477)
13. Household members under 5	-0.1453	-0.0428	-0.2987**
	(0.0954)	(0.0852)	(0.1343)
14. Household members under 18	-0.8098***	-0.5737***	-1.1750***
	(0.2020)	(0.1506)	(0.2461)
15. Main source of drinking water:			
15.1.Public tap	0.1895	0.1207	0.2919**
	(0.1515)	(0.2349)	(0.1166)
15.2.Unprotected well	-0.2030***	-0.1837**	-0.2362***
	(0.0475)	(0.0699)	(0.0400)
15.3.Unprotected spring	-0.0324	0.0482	-0.1451***
	(0.0674)	(0.0927)	(0.0292)
16. Has any toilet	-0.0325	-0.0060	-0.0680***
	(0.0282)	(0.0409)	(0.0193)
17. Has radio	-0.1080*	-0.0090	-0.2529***
	(0.0607)	(0.0431)	(0.0240)
18. Firewood is main fuel	0.0107	-0.0104	0.0452***
	(0.0419)	(0.0667)	(0.0118)
19. Has no window	0.4261***	0.3127	0.5853***
	(0.1255)	(0.1889)	(0.0496)
20. Number of separate rooms	-0.5183***	-0.5669***	-0.4557***
	(0.0882)	(0.1047)	(0.1507)
21. Number of sleeping rooms	-0.2773***	-0.3001***	-0.2461***
	(0.0472)	(0.0626)	(0.0657)
22. Number of sleeping spaces	-1.1402***	-0.9049	-1.4443***
	(0.4100)	(0.6611)	(0.1808)
23. Asset index	-0.3498***	-0.3021**	-0.4310***
	(0.0994)	(0.1495)	(0.0763)

Note: Variables 12-23: one observation per household. For each variable Y, we report the coefficient β_1 estimated from LS regression $Y_i = \beta_0 + \beta_1 \Delta_i + \epsilon_i$, where Δ_i is a dummy =1 if person i lives in a village whose treatment status was changed, and =0 otherwise. Sample restricted to treatment group in column (2) and to control group in column (3). Robust standard errors in parentheses. Observations clustered at village level. *** p<0.01, ** p<0.05, * p<0.1.

Table B11: Asset ownership, by wealth quintile

	(1)	(2)	(3)	(4)	(5)	Factor loadings
Water source						
Piped into dwelling	0.000	0.000	0.000	0.003	0.006	0.040
Piped into yard	0.003	0.006	0.003	0.003	0.003	-0.008
Public tap	0.000	0.359	0.497	0.583	0.675	0.333
Tube well	0.071	0.097	0.058	0.078	0.068	-0.026
Protected well	0.136	0.094	0.049	0.026	0.026	-0.121
Unprotected well	0.453	0.223	0.208	0.197	0.107	-0.187
Protected spring	0.032	0.013	0.010	0.006	0.032	0.019
Unprotected spring	0.243	0.133	0.143	0.081	0.062	-0.124
Other	0.061	0.074	0.032	0.023	0.019	-0.049
Toilet type						
Flush to PSS	0.000	0.000	0.000	0.000	0.006	0.044
Flush to septic tank	0.000	0.000	0.000	0.000	0.006	0.045
To other byte	0.000	0.000	0.000	0.000	0.010	0.042
Pit latrine	0.000	0.000	0.000	0.006	0.032	0.118
Pit latrine slab	0.000	0.000	0.000	0.003	0.049	0.166
Pit latrine open	0.000	0.000	0.000	0.013	0.153	0.339
Composting	0.000	0.000	0.000	0.003	0.000	-0.001
Bucket	0.000	0.000	0.000	0.000	0.003	0.046
Hanging	0.000	0.000	0.000	0.000	0.010	0.037
Bush	1.000	1.000	1.000	0.971	0.724	-0.406
Other	0.000	0.000	0.000	0.003	0.006	0.034
Main cooking fuel						
Electricity	0.000	0.000	0.000	0.003	0.003	0.012
Kerosene	0.000	0.000	0.000	0.000	0.023	0.181
Coal	0.000	0.000	0.000	0.000	0.019	0.143
Charcoal	0.000	0.000	0.000	0.065	0.198	0.312
Firewood	1.000	1.000	0.994	0.922	0.747	-0.399
Dung	0.000	0.000	0.006	0.010	0.000	-0.002
Other	0.000	0.000	0.000	0.000	0.010	0.205
Electronics and Vehicles						
Electricity	0.000	0.000	0.000	0.000	0.049	0.506
Radio	0.000	0.155	0.244	0.317	0.539	0.362
TV	0.000	0.000	0.000	0.000	0.023	0.486
Phone	0.000	0.000	0.000	0.000	0.023	0.393
Fridge	0.000	0.000	0.000	0.000	0.010	0.481
Bike	0.000	0.000	0.000	0.006	0.097	0.342
Motorbike	0.000	0.000	0.000	0.000	0.006	0.198
Car	0.000	0.000	0.000	0.000	0.010	0.165
Observations	309	309	308	309	308	

Note: Columns 1-5 shows the share of households owning the good or having access to the utility for each of the five wealth quintiles. Wealth quintiles are determined using the sample distribution of the asset index produced using the Filmer-Pritchett procedure (Filmer and Pritchett, 2001) and using all the variables presented in the Table.

Table B12: Asset ownership, by wealth quintile (continued)

	(1)	(2)	(3)	(4)	(5)	Factor loadings
Main wall material						
None	0.010	0.071	0.026	0.016	0.019	0.005
Cane	0.498	0.366	0.224	0.094	0.117	-0.235
Bamboo	0.000	0.087	0.169	0.188	0.127	0.050
Stone wood	0.000	0.071	0.175	0.320	0.299	0.185
Uncovered adobe	0.000	0.000	0.000	0.006	0.006	0.058
Plywood	0.000	0.000	0.006	0.000	0.000	-0.009
Carton	0.006	0.016	0.010	0.010	0.000	-0.028
Cement	0.000	0.000	0.003	0.013	0.023	0.096
Stone cement	0.000	0.000	0.006	0.036	0.097	0.173
Bricks	0.000	0.000	0.036	0.087	0.068	0.083
Cement blocks	0.000	0.000	0.000	0.003	0.110	0.408
Covered adobe	0.000	0.000	0.016	0.013	0.006	0.017
Wood planks	0.424	0.236	0.120	0.074	0.029	-0.235
Other	0.061	0.152	0.208	0.139	0.097	-0.026
Main roof material						
Leaf	0.702	0.680	0.510	0.456	0.386	-0.193
Cane	0.000	0.000	0.003	0.003	0.000	-0.004
Bamboo	0.006	0.000	0.006	0.003	0.003	-0.012
Stone mud	0.100	0.104	0.162	0.139	0.136	0.004
Uncovered adobe	0.084	0.061	0.156	0.178	0.133	0.033
Cement	0.000	0.000	0.000	0.000	0.198	0.396
Stone cement	0.058	0.052	0.091	0.104	0.068	-0.009
Cement blocks	0.000	0.000	0.000	0.000	0.003	0.062
Coverer adobe	0.000	0.000	0.000	0.000	0.010	0.348
Other	0.049	0.104	0.071	0.117	0.062	-0.025
Window type						
Any	0.000	0.078	0.341	0.570	0.513	0.269
Shutters	0.000	0.000	0.029	0.227	0.305	0.360
Glass	0.000	0.000	0.000	0.006	0.006	0.081
Screens	0.000	0.000	0.000	0.000	0.003	0.073
None	0.570	0.518	0.334	0.084	0.097	-0.297
Other	0.430	0.405	0.295	0.113	0.075	-0.237
Other						
Persons per room	3.935	3.972	3.973	4.055	3.794	-0.003
Livestock	0.550	0.553	0.588	0.602	0.539	-0.011
Observations	309	309	308	309	308	

Note: Columns 1-5 shows the share of households owning the good or having access to the utility for each of the five wealth quintiles. Wealth quintiles are determined using the sample distribution of the asset index produced using the Filmer-Pritchett procedure (Filmer and Pritchett, 2001) and using all the variables presented in the Table.