

**Supporting Information: Patterns and drivers of maternal personal exposure to PM<sub>2.5</sub> in informal settlements in Nairobi, Kenya**

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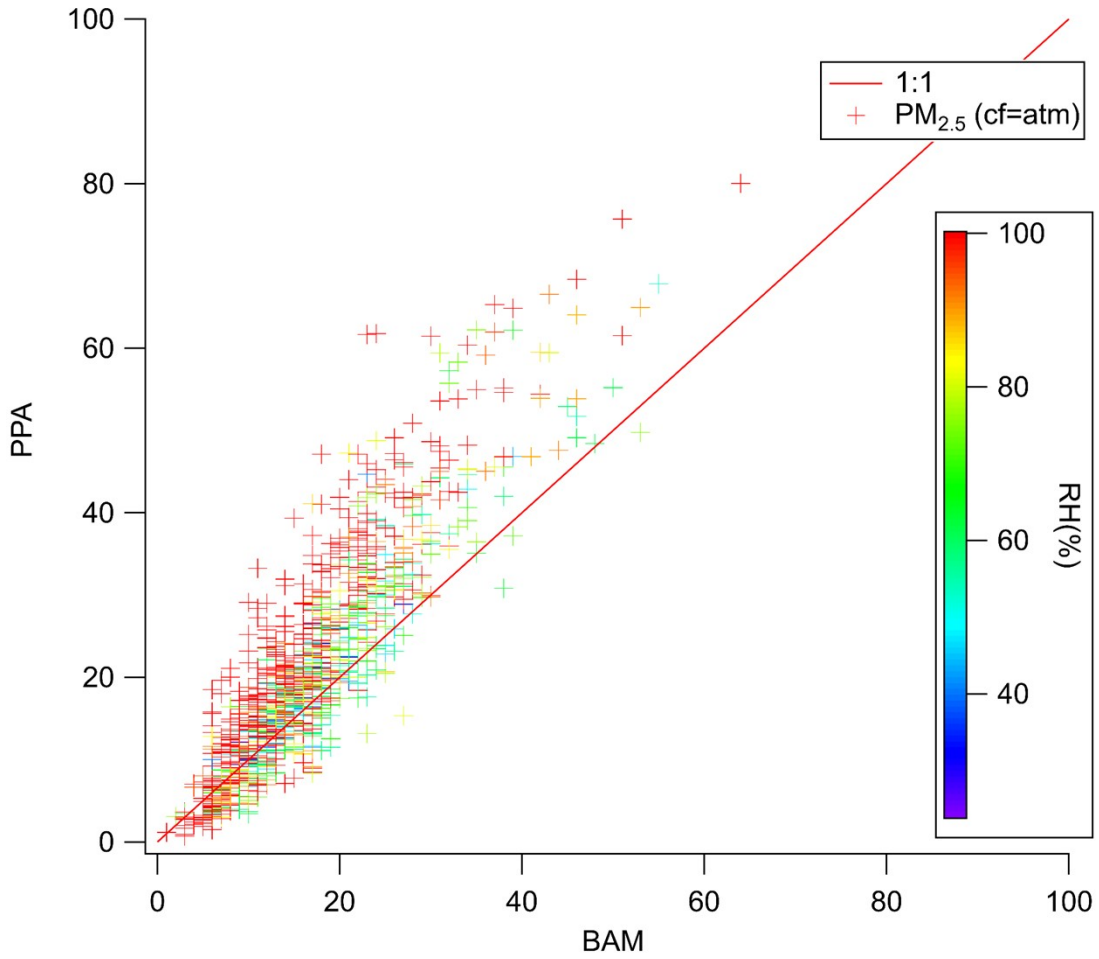


Figure S1. Scatter plot of uncorrected PurpleAir response versus the BAM at the University of Nairobi.

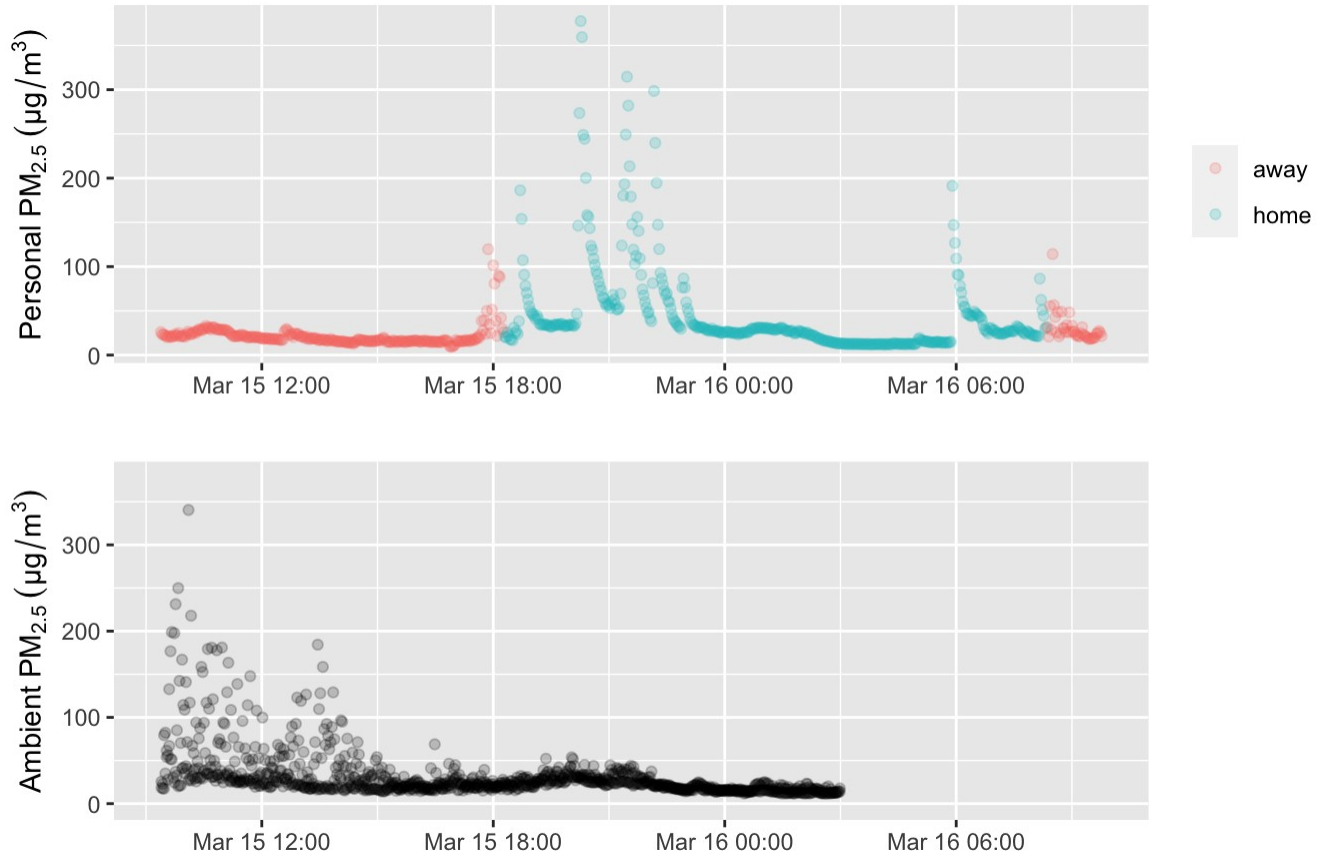


Figure S2. An example time series of the personal exposure at household, with the light blue color representing times when they are categorized as being at home per the GPS data, and red when they are away from home. The corresponding ambient data from this period is shown in the lower panel. The baseline of the ambient data tracks relatively well with the baseline of the personal exposure.

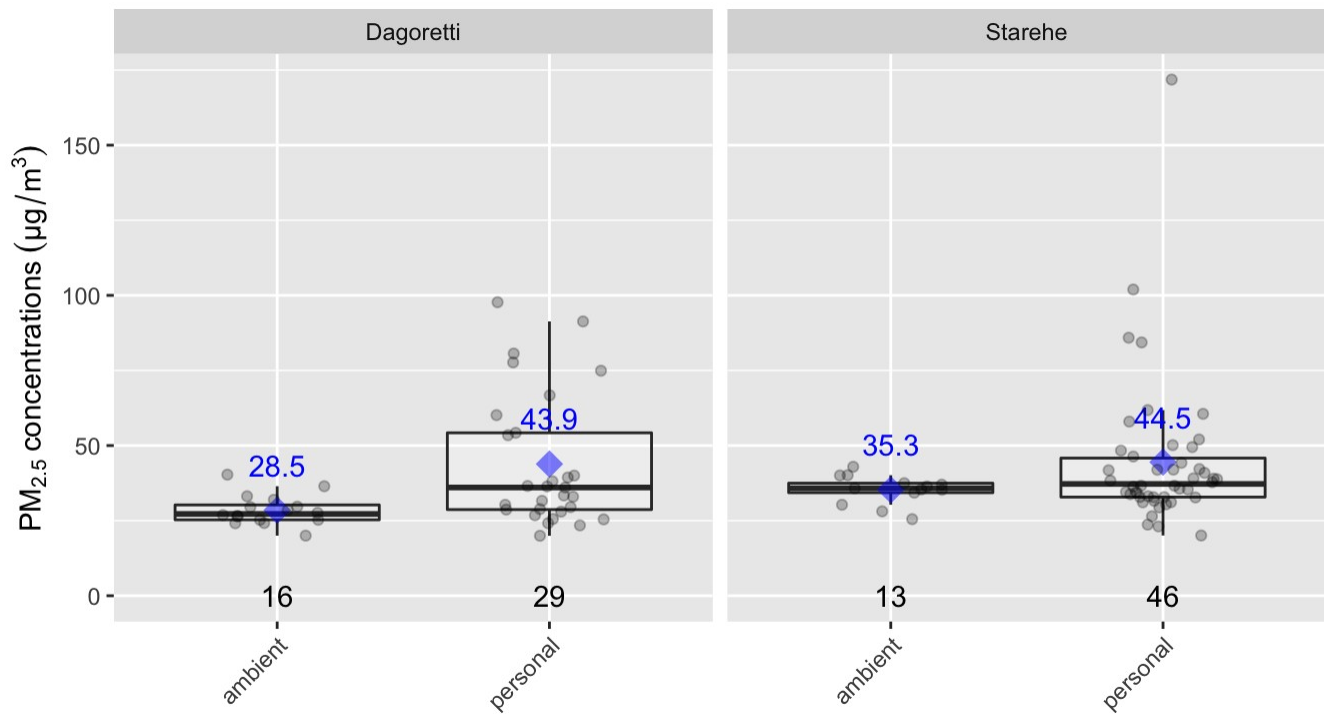


Figure S3. Average concentrations for the personal and ambient samples, separated by subcounty. Boxes represent the 25<sup>th</sup> and 75<sup>th</sup> percentiles, the whiskers are 1.5 times the interquartile range, the black line represents the median, and blue diamonds represent the group averages. The numbers at the bottom are the sample sizes.

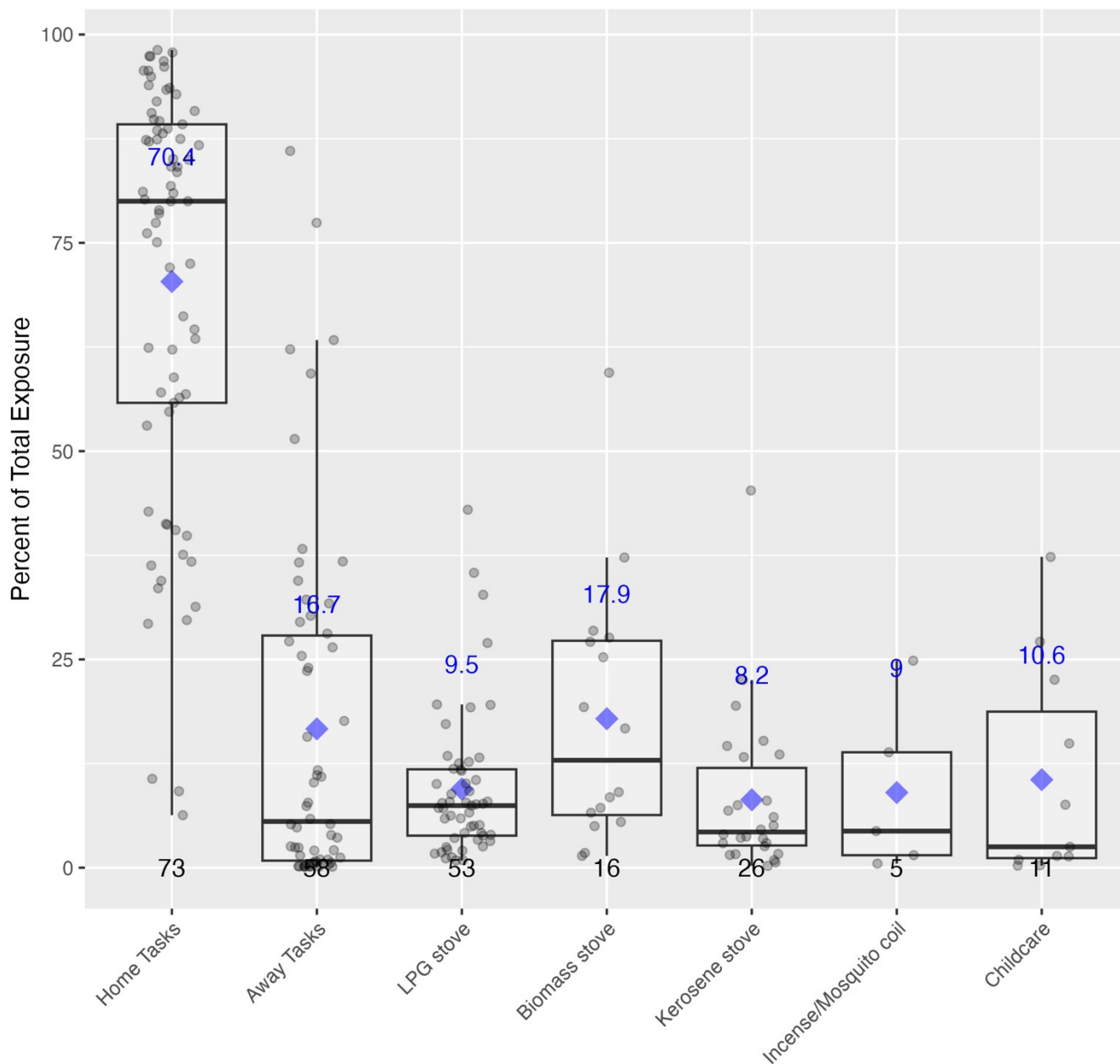


Figure S4: Percent contributions to overall exposure and time by reported activity. Note that the mean percentages across categories do not add up to 100% as these are individual samples with unequal group sizes (e.g. the 15% exposure contribution from charcoal use is only from samples where the participant reported using charcoal). Boxes represent the 25<sup>th</sup> and 75<sup>th</sup> percentiles, the whiskers are 1.5 times the interquartile range, the black line represents the median, and blue diamonds represent the group averages. The numbers at the bottom are the sample sizes. Biomass stoves include wood and charcoal stoves.

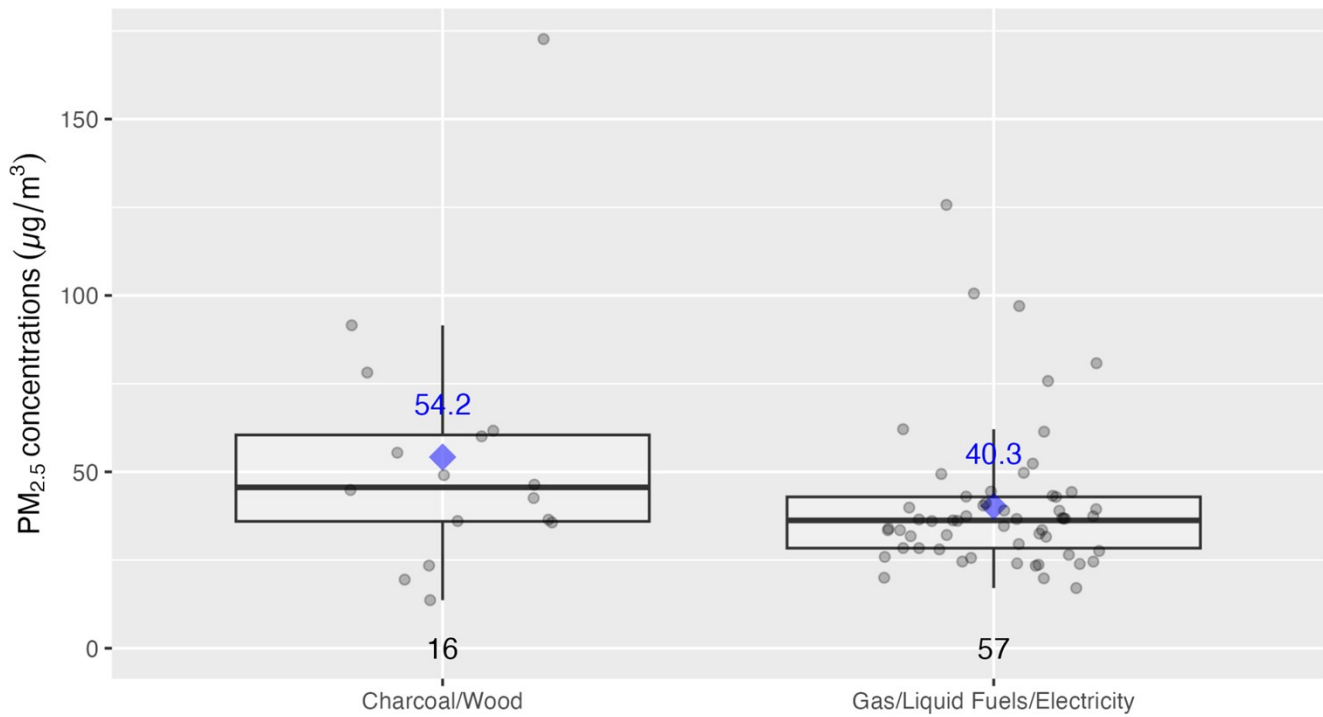


Figure S5: Daily PM<sub>2.5</sub> exposures of participants using biomass fuels and those using gas, liquid fuels, or electricity. Boxes represent the 25<sup>th</sup> and 75<sup>th</sup> percentiles, the whiskers are 1.5 times the interquartile range, the black line represents the median, and blue diamonds represent the group averages. The numbers at the bottom are the sample sizes.

Table S1. Demographic characteristics of sample population.

	Dagoretti (N=28)	Starehe (N=45)	Total (N=73)
<b>Age (years)</b>			
Mean (SD)	30.0 (5.2)	28.5 (4.3)	29.1 (4.7)
Range	20.0 - 45.0	22.0 - 39.0	20.0 - 45.0
<b>Total females</b>			
Mean (SD)	2.2 (1.1)	2.3 (0.9)	2.3 (1.0)
Range	1.0 - 5.0	1.0 - 5.0	1.0 - 5.0
<b>Total males</b>			
Mean (SD)	2.6 (1.3)	2.0 (0.9)	2.2 (1.1)
Range	1.0 - 6.0	1.0 - 4.0	1.0 - 6.0
<b>Sleep (hours)</b>			
Mean (SD)	7.4 (1.5)	6.6 (1.5)	6.9 (1.5)
Range	5.0 - 11.0	3.0 - 9.0	3.0 - 11.0
<b>Head of household</b>			
female	4 (14.3%)	14 (31.1%)	18 (24.0%)
male	24 (85.7%)	31 (68.9%)	55 (75.3%)
<b>Technology access/ownership</b>			
Electricity	27 (96.4%)	42 (93.3%)	69 (94.5%)
Radio	20 (71.4%)	27 (60.0%)	47 (64.4%)
TV	22 (78.6%)	28 (62.2%)	50 (68.5%)
Mobile phone	28 (100.0%)	44 (97.8%)	72 (98.6%)
Nonmobile phone	0%	0%	0%
Refrigerator	3 (10.7%)	2 (4.4%)	5 (6.8%)
Solar power	1 (3.6%)	4 (8.9%)	5 (6.8%)
Table	26 (92.9%)	42 (93.3%)	68 (93.2%)
Chair	19 (67.9%)	39 (86.7%)	58 (79.5%)
Sofa	26 (92.9%)	28 (62.2%)	54 (74.0%)
Bed	27 (96.4%)	42 (93.3%)	69 (94.5%)
Cupboard	19 (67.9%)	24 (53.3%)	43 (58.9%)
Clock/watch	3 (10.7%)	5 (11.1%)	8 (11.0%)
Microwave	0 (0.0%)	2 (4.4%)	2 (2.7%)
DVD player	6 (21.4%)	11 (24.4%)	17 (23.3%)
Cassette	1 (3.6%)	4 (8.9%)	5 (6.8%)
Lantern	4 (14.3%)	6 (13.3%)	10 (13.7%)
Bicycle	5 (17.9%)	5 (11.1%)	10 (13.7%)
Motorcycle	1 (3.6%)	2 (4.4%)	3 (4.1%)
Car	2 (7.1%)	1 (2.2%)	3 (4.1%)
Truck	1 (3.6%)	0 (0.0%)	1 (1.4%)
Boat with motor	1 (3.6%)	0 (0.0%)	1 (1.4%)
Boat without motor	1 (3.6%)	0 (0.0%)	1 (1.4%)
Cart	2 (7.1%)	0 (0.0%)	2 (2.7%)

**Marital status**

Divorced	0 (0.0%)	2 (4.4%)	2 (2.7%)
Living together	0 (0.0%)	1 (2.2%)	1 (1.4%)
Married	23 (82.1%)	31 (68.9%)	54 (74.0%)
Separated	2 (7.1%)	3 (6.7%)	5 (6.8%)
Single (never married)	2 (7.1%)	8 (17.8%)	10 (13.7%)
Widowed	1 (3.6%)	0 (0.0%)	1 (1.4%)

**Education level**

College/university (undergraduate)	2 (7.1%)	7 (15.6%)	9 (12.0%)
No formal education	0 (0.0%)	2 (4.4%)	2 (2.7%)
Primary complete	10 (35.7%)	10 (22.2%)	20 (27.4%)
Primary incomplete	1 (3.6%)	4 (8.9%)	5 (6.8%)
Secondary level complete	7 (25.0%)	11 (24.4%)	18 (24.7%)
Secondary level incomplete	6 (21.4%)	10 (22.2%)	16 (21.9%)
Vocational/technical school	2 (7.1%)	1 (2.2%)	3 (4.1%)

**Income source of primary earner**

Casual labor i.e. construction	14 (50.0%)	14 (31.1%)	28 (38.4%)
Own business i.e. shop owner, taxi driver	5 (17.9%)	12 (26.7%)	17 (23.3%)
Salaried work i.e. teaching, nursing	6 (21.4%)	5 (11.1%)	11 (15.1%)
Selling produce from own farm such as crops and/or milk	2 (7.1%)	0 (0.0%)	2 (2.7%)
Selling products made at home	0 (0.0%)	5 (11.1%)	5 (6.8%)
Working for money on other people's farms/homes	1 (3.6%)	9 (20.0%)	10 (13.7%)

**Income source of respondent**

Casual labor i.e. construction	3 (10.7%)	4 (8.9%)	7 (9.6%)
Casual skilled	1 (3.6%)	2 (4.4%)	3 (4.1%)
Employed (clerical/sales/services)	0 (0.0%)	3 (6.7%)	3 (4.1%)
Employed (professional/technical/managerial)	0 (0.0%)	1 (2.2%)	1 (1.4%)
Employed (unskilled manual/domestic services/agriculture)	3 (10.7%)	9 (20.0%)	12 (16.4%)
Self-employed (formal sector/formal trading/agriculture)	6 (21.4%)	7 (15.6%)	13 (17.8%)
Unemployed, looking for work	7 (25.0%)	4 (8.9%)	11 (15.1%)
Unemployed, not looking for work	8 (28.6%)	10 (22.2%)	18 (24.7%)
Work in the informal sector (e.g. hawkker)	0 (0.0%)	5 (11.1%)	5 (6.8%)

**Primary earner**

My husband/partner	21 (75.0%)	30 (66.7%)	51 (69.9%)
Myself	5 (17.9%)	10 (22.2%)	15 (20.5%)
Parent	2 (7.1%)	3 (6.7%)	5 (6.8%)
There is no primary earner we all bring equal amounts into the home	0 (0.0%)	2 (4.4%)	2 (2.7%)



<b>Primary Cooking Fuel</b>			
Charcoal	5 (17.9%)	3 (6.7%)	8 (11.0%)
Electricity	0 (0.0%)	1 (2.2%)	1 (1.4%)
Kerosene	3 (10.7%)	15 (33.3%)	18 (24.7%)
LPG	20 (71.4%)	26 (57.8%)	46 (63.0%)
<b>House type</b>			
Apartment style home in a single structure/building with many homes	1 (3.6%)	25 (55.6%)	26 (35.6%)
Multiple structures (compound-style)	10 (35.7%)	12 (26.7%)	22 (30.1%)
Stand-alone home with no shared walls	1 (3.6%)	1 (2.2%)	2 (2.7%)
Stand-alone home with shared walls	16 (57.1%)	7 (15.6%)	23 (31.5%)
<b>Floor</b>			
Carpet	1 (3.6%)	1 (2.2%)	2 (2.7%)
Cement	23 (82.1%)	39 (86.7%)	64 (84.9%)
Ceramic tiles	4 (14.3%)	2 (4.4%)	6 (8.2%)
Earth/sand/mud	0 (0.0%)	3 (6.7%)	3 (4.1%)
<b>Walls</b>			
Cement	12 (42.9%)	7 (15.6%)	19 (26.0%)
Cement bricks	0 (0.0%)	5 (11.1%)	5 (6.8%)
Iron sheets	12 (42.9%)	14 (31.1%)	26 (35.6%)
Mud	0 (0.0%)	1 (2.2%)	1 (1.4%)
Reused wood	1 (3.6%)	0 (0.0%)	1 (1.4%)
Stone with lime/cement	3 (10.7%)	18 (40.0%)	21 (28.8%)
<b>Roof</b>			
Asbestos sheets	1 (3.6%)	0 (0.0%)	1 (1.4%)
Concrete/cement	1 (3.6%)	11 (24.4%)	12 (16.4%)
Corrugated iron sheets	26 (92.8%)	34 (75.6%)	60 (82.2%)
<b>Socioeconomic index</b>			
Mean quintile	2.9	3.1	3*

\* The 3<sup>rd</sup> quintile is, by definition, the middle of the 5 quintiles for the entire sample.

Table S2. PCA results for the estimation of socioeconomic indices (note that the PCA results for each household are provided as a separate csv file (SES\_data\_with\_score\_by\_hhid.csv).

PCA quintile	1 (poorest)	2	3	4	5 (wealthiest)
electricity	1.00	0.93	0.93	1.00	0.87
radio	0.40	0.47	0.87	0.87	0.67
TV	0.33	0.47	1.00	0.80	0.87
mobile	0.93	1.00	1.00	1.00	1.00
refrigerator	0.00	0.00	0.07	0.20	0.13
Solar power	0.00	0.00	0.00	0.00	0.33
Table	0.73	1.00	0.93	0.93	1.00
Chair	0.67	0.73	0.80	0.87	0.87
Sofa	0.33	0.80	0.87	0.93	0.73
Bed	0.73	1.00	1.00	1.00	1.00
Cupboard	0.33	0.73	0.80	0.60	0.53
Clock watch	0.07	0.20	0.20	0.07	0.07
Microwave oven	0.00	0.00	0.00	0.07	0.07
DVD player	0.07	0.07	0.20	0.33	0.53
Cassette	0.07	0.00	0.13	0.00	0.13
Lantern	0.27	0.20	0.00	0.13	0.13
Bicycle	0.00	0.00	0.07	0.00	0.60
Motorcycle	0.00	0.00	0.00	0.00	0.20
Car	0.00	0.00	0.00	0.00	0.20
Truck	0.00	0.00	0.00	0.00	0.07
Boat with motor	0.00	0.00	0.00	0.00	0.07
Boat without motor	0.00	0.00	0.00	0.00	0.07
Cart	1.00	1.00	1.00	1.00	0.87
Carpet	0.07	0.00	0.00	0.07	0.00
Cement	0.80	0.87	0.87	0.87	0.87
Ceramic tiles	0.00	0.13	0.13	0.07	0.07
College/university (undergraduate)	0.00	0.20	0.07	0.07	0.27
Earth/sand/mud	0.13	0.00	0.00	0.00	0.07
No formal education	0.13	0.00	0.00	0.00	0.00
Primary complete	0.27	0.60	0.40	0.00	0.13
Primary incomplete	0.20	0.00	0.07	0.00	0.07
Secondary level complete	0.00	0.00	0.00	0.87	0.33
Secondary level incomplete	0.40	0.13	0.33	0.07	0.20
Vocational/technical school	0.00	0.07	0.13	0.00	0.00
<b>PCA score</b>	<b>-0.94</b>	<b>-0.58</b>	<b>-0.38</b>	<b>-0.08</b>	<b>1.99</b>

Table S3: Stove stacking information

	<i>Dagoretti</i> (N=28)	<i>Starehe</i> (N=45)	<i>Total</i> (N=73)		
<i>Multiple Stove Type Use Reported (yes)</i>	11 (39.3%)	11 (24.4%)	22 (30.1%)		
	<i>Charcoal</i> (N=8)	<i>Electricity</i> (N=1)	<i>Kerosene</i> (N=18)	<i>LPG</i> (N=46)	<i>Total</i> (N=73)
<i>Multiple Stove Type Use Reported (yes)</i>	6 (75.0%)	0 (0.0%)	4 (22.2%)	12 (26.1%)	22 (30.1%)
<i>Charcoal Stacking</i>	-	0	2	6	
<i>Wood Stacking</i>	2	0	4	2	
<i>Kerosene Stacking</i>	3	0	-	7	
<i>LPG Stacking</i>	3	0	3	-	

*Table S4: Percent contributions to overall exposure and time by reported activity. Note that the mean percentages across categories do not add up to 100% as these are individual samples from unequal group sizes (e.g. the 15% exposure contribution from charcoal use is only from samples where the participant reported using charcoal).*

**Comment [HM]:** Fix this

	Home Tasks (N=73)	Away Tasks (N=58)	LPG stove (N=53)	Biomass stove (N=16)	Kerosene stove (N=26)	Incense/ Mosquito coil (N=5)	Childcare (N=11)
<b>Exposure contribution (%)</b>							
Mean (SD)	70.4 (24.5)	16.7 (21.3)	9.5 (8.8)	17.9 (15.7)	8.2 (9.7)	9.0 (10.3)	10.6 (13.0)
Median	80.0	5.6	7.5	12.9	4.3	4.4	2.5
<b>Time Contribution (%)</b>							
Mean (SD)	74.7 (23.0)	16.7 (20.9)	6.9 (5.4)	11.4 (13.2)	5.0 (4.1)	10.9 (11.8)	9.3 (12.2)
Median	84.6	7.0	5.5	7.7	4.1	6.0	1.9

