

## Supplementary File

### Excess burden of non-communicable disease years of life lost from heat in rural Burkina Faso: a time-series analysis of the years 2000-2010

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#### Nouna life table development with R software

Vital statistics including the unique identifying number (ID), date of birth, date of immigration into the HDSS, date of death, date of emigration from the HDSS and gender were used to calculate age standardized death rates (ASDR) separately for males and females. The gender-specific ASDRs were used to generate mean additional survival time for each respective age band.

**Supplementary Table 1:** Male life table for the Nouna population.

Age group	Male ASDR	Conditional probabilities of death in age interval (Initial)	Number of people having Xth birthday	Total number of deaths in age interval	Total number of person years spent in age interval	Total number of persons years lived by those aged x and over	Male mean additional survival time at age X	max--- Initial	Interval
[0-1]	0.05174	0.0493	100000	4934	95362	5801098	58.0	0.06	1
[1-5)	0.02025	0.0773	95066	7349	362877	5705736	60.0	1.634	4
[5-9)	0.00271	0.0135	87717	1181	435636	5342858	60.9	2.500	5
[10-14)	0.00169	0.0084	86537	728	430865	4907223	56.7	2.500	5
[15-19)	0.00213	0.0106	85809	908	427128	4476357	52.2	2.888	5
[20-24)	0.00197	0.0098	84901	834	422516	4049229	47.7	2.614	5
[25-29)	0.00268	0.0133	84067	1121	417549	3626714	43.1	2.513	5
[30-34)	0.00375	0.0186	82947	1540	410920	3209164	38.7	2.525	5
[35-39)	0.00670	0.0329	81406	2682	400487	2798244	34.4	2.560	5
[40-44)	0.00718	0.0353	78724	2779	386943	2397757	30.5	2.597	5
[45-49)	0.01037	0.0506	75945	3844	370750	2010814	26.5	2.665	5
[50-54)	0.01373	0.0666	72101	4799	349454	1640064	22.7	2.697	5
[55-59)	0.01989	0.0951	67302	6401	321795	1290611	19.2	2.701	5
[60-64)	0.02682	0.1263	60901	7694	286842	968815	15.9	2.704	5
[65-69)	0.03897	0.1787	53208	9508	244007	681974	12.8	2.683	5
[70-74)	0.06415	0.2786	43699	12175	189788	437966	10.0	2.642	5
[75-79)	0.09484	0.3858	31524	12163	128247	248179	7.9	2.585	5
[80-84)	0.13669	0.5099	19361	9873	72223	119932	6.2	2.510	5
85+	0.19889	1.0000	9489	9489	47709	47709	5.0	2.351	5

**Supplementary Table 2: Female life table for the Nouna population.**

Age group	Female ASDR	Conditional probabilities of death in age interval (Initial)	Number of people having Xth birthday	Total number of deaths in age interval	Total number of person years spent in age interval	Total number of persons years lived by those aged x and over	Female mean additional survival time at age X	max--- Initial	Interval
[0-1]	0.04829	0.0462	100000	4619	95658	6151128	61.5	0.06	1
[1-5)	0.01761	0.0676	95381	6449	366267	6055469	63.5	1.634	4
[5-9)	0.00253	0.0125	88932	1116	441872	5689203	64.0	2.500	5
[10-14)	0.00154	0.0077	87817	672	437402	5247331	59.8	2.500	5
[15-19)	0.00231	0.0115	87144	1002	433606	4809928	55.2	2.888	5
[20-24)	0.00221	0.0110	86143	948	428451	4376323	50.8	2.614	5
[25-29)	0.00407	0.0201	85194	1715	421707	3947872	46.3	2.513	5
[30-34)	0.00449	0.0222	83479	1854	412808	3526165	42.2	2.525	5
[35-39)	0.00463	0.0229	81625	1868	403569	3113358	38.1	2.560	5
[40-44)	0.00555	0.0274	79758	2182	393543	2709789	34.0	2.597	5
[45-49)	0.00589	0.0291	77575	2255	382609	2316245	29.9	2.665	5
[50-54)	0.01040	0.0508	75320	3823	367794	1933636	25.7	2.697	5
[55-59)	0.01283	0.0623	71496	4454	347242	1565842	21.9	2.701	5
[60-64)	0.01747	0.0840	67042	5631	322284	1218600	18.2	2.704	5
[65-69)	0.03271	0.1520	61412	9337	285425	896316	14.6	2.683	5
[70-74)	0.05247	0.2335	52075	12157	231707	610891	11.7	2.642	5
[75-79)	0.08025	0.3361	39918	13417	167186	379184	9.5	2.585	5
[80-84)	0.10647	0.4208	26500	11151	104736	211998	8.0	2.510	5
85+	0.14310	1.0000	15349	15349	107261	107261	7.0	2.351	5

The mean additional survival time from the life table was matched by age and sex to calculated NCD YLL. An excerpt of the R code is given here:

```
## Calculate NCD male YLL
data$yllncd[age<1 & sex=="M" & broadgroup=="NCD"] <-58.0
data$yllncd[age>=1 & age<=5 & sex=="M" & $broadgroup=="NCD"] <-60.0
data$yllncd[age>5 & age<=10 & sex=="M" & $broadgroup=="NCD"] <-60.9
data$yllncd[age>10 & age<=15 & sex=="M" & $broadgroup=="NCD"] <-56.7
data$yllncd[age>15 & age<=20 & sex=="M" & $broadgroup=="NCD"] <-52.2
data$yllncd[age>20 & age<=25 & sex=="M" & $broadgroup=="NCD"] <-47.7
data$yllncd[age>25 & age<=30 & sex=="M" & $broadgroup=="NCD"] <-43.1
data$yllncd[age>30 & age<=35 & sex=="M" & $broadgroup=="NCD"] <-38.7
data$yllncd[age>35 & age<=40 & sex=="M" & broadgroup=="NCD"] <-34.4
data$yllncd[age>40 & age<=45 & sex=="M" & broadgroup=="NCD"] <-30.5
data$yllncd[age>45 & age<=50 & sex=="M" & broadgroup=="NCD"] <-26.5
data$yllncd[age>50 & age<=55 & sex=="M" & broadgroup=="NCD"] <-22.7
data$yllncd[age>55 & age<=60 & sex=="M" & broadgroup=="NCD"] <-19.2
data$yllncd[age>60 & age<=65 & sex=="M" & broadgroup=="NCD"] <-15.9
data$yllncd[age>65 & age<=70 & sex=="M" & broadgroup=="NCD"] <-12.8
data$yllncd[age>70 & age<=75 & sex=="M" & broadgroup=="NCD"] <-10.0
data$yllncd[age>75 & age<=80 & sex=="M" & broadgroup=="NCD"] <- 7.9
data$yllncd[age>80 & age<=85 & sex=="M" & broadgroup=="NCD"] <- 6.2
data$yllncd[age>85 & sex=="M" & broadgroup=="NCD"] <- 5.0

## Calculate NCD female YLL
data$yllncd[age< 1 & sex=="F" & broadgroup=="NCD"] <-61.5
data$yllncd[age>=1 & age<= 5 & sex=="F" & broadgroup=="NCD"] <-63.5
data$yllncd[age> 5 & age<=10 & sex=="F" & broadgroup=="NCD"] <-64.0
data$yllncd[age>10 & age<=15 & sex=="F" & broadgroup=="NCD"] <-59.8
data$yllncd[age>15 & age<=20 & sex=="F" & broadgroup=="NCD"] <-55.2
data$yllncd[age>20 & age<=25 & sex=="F" & broadgroup=="NCD"] <-50.8
data$yllncd[age>25 & age<=30 & sex=="F" & broadgroup=="NCD"] <-46.3
data$yllncd[age>30 & age<=35 & sex=="F" & broadgroup=="NCD"] <-42.2
data$yllncd[age>35 & age<=40 & sex=="F" & broadgroup=="NCD"] <-38.1
data$yllncd[age>40 & age<=45 & sex=="F" & broadgroup=="NCD"] <-34.0
```

```

data$yllncd[age>45 & age<=50 & sex=="F" & broadgroup=="NCD" ] <-29.9
data$yllncd[age>50 & age<=55 & sex=="F" & broadgroup=="NCD" ] <-25.7
data$yllncd[age>55 & age<=60 & sex=="F" & broadgroup=="NCD" ] <-21.9
data$yllncd[age>60 & age<=65 & sex=="F" & broadgroup=="NCD" ] <-18.2
data$yllncd[age>65 & age<=70 & sex=="F" & broadgroup=="NCD" ] <-14.6
data$yllncd[age>70 & age<=75 & sex=="F" & broadgroup=="NCD" ] <-11.7
data$yllncd[age>75 & age<=80 & sex=="F" & broadgroup=="NCD" ] <- 9.5
data$yllncd[age>80 & age<=85 & sex=="F" & broadgroup=="NCD" ] <- 8.0
data$yllncd[age>85 & sex=="F" & broadgroup=="NCD" ] <- 7.0

```

### Exploratory analysis

Exploratory analysis of NCD deaths and YLL stratified by year indicates that 2010, 2008 and 2001 recorded the highest number of NCD deaths and YLL.

**Supplementary Table 3:** Breakdown of NCD deaths and YLL by year.

Year	All-age		Male		Female		65+ Years	
	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL
2000	45	1180.2	29	688.9	16	491.3	19	192
2001	86	2130.1	49	1253.1	37	877	38	405.3
2002	51	1229.9	24	565.7	27	664.2	23	236.1
2003	67	1697.6	34	864.1	33	833.5	28	278.9
2004	57	1141.8	32	640.1	25	501.7	31	313.9
2005	71	1618.7	34	598.9	37	1019.8	29	280.6
2006	77	1758.6	41	897.8	36	860.8	40	413.5
2007	71	1807.6	42	1076.5	29	731.1	29	288.5
2008	86	1894.2	52	1222.9	34	671.3	43	440.3
2009	75	1632.6	45	987.7	30	644.9	28	307.2
2010	104	2275.2	52	1036.5	52	1238.7	48	455.2
<b>Total</b>	<b>790</b>	<b>18366.5</b>	<b>434</b>	<b>9832.2</b>	<b>356</b>	<b>8534.3</b>	<b>356</b>	<b>3611.5</b>

Further stratification of NCD deaths and YLL by month shows that NCD-YLL are the greatest between November and April.

**Supplementary Table 4:** Breakdown of NCD deaths and YLL by month.

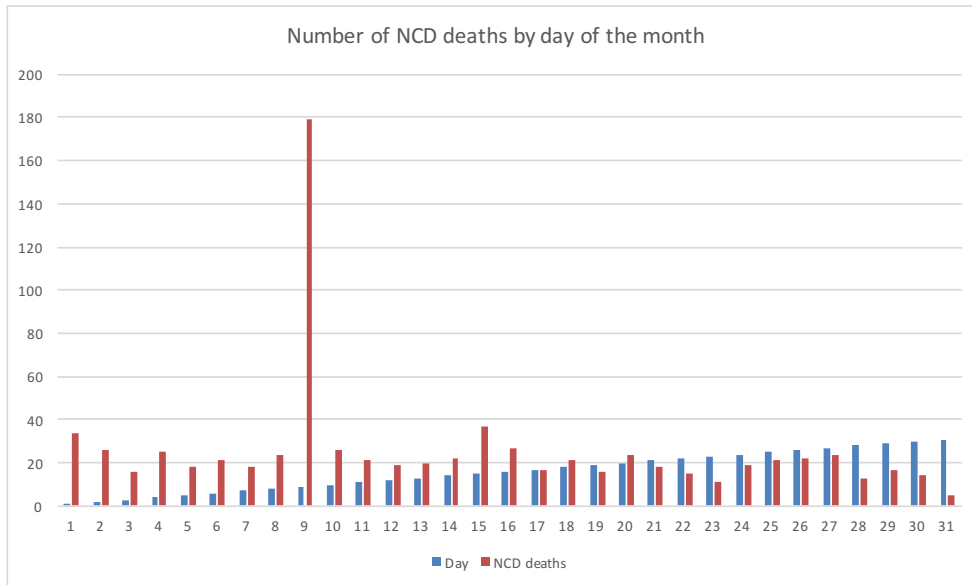
Month	Total		Male		Female		65+ Years	
	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL
Jan	71	1606.3	32	683.1	39	923.2	36	387
Feb	75	1492.5	42	855	33	637.5	38	414.5
Mar	62	1157.2	32	536.9	30	620.3	32	298.4
Apr	73	1420.1	39	726.1	34	694	42	408.1
May	66	1619.4	44	1010.1	22	609.3	26	232.3
Jun	69	1913.9	37	964.6	32	949.3	25	243.8
Jul	58	1456.2	30	710.4	28	745.8	26	275.9
Aug	59	1536.6	31	842.3	28	694.3	21	229.8
Sep	65	1641.6	34	796.6	31	845	23	241.2
Oct	52	1252.3	31	790.4	21	461.9	24	242
Nov	59	1414.1	37	886	22	528.1	29	315.2
Dec	81	1856.3	45	1030.7	36	825.6	34	323.3
<b>Total</b>	<b>790</b>	<b>18366.5</b>	<b>434</b>	<b>9832.2</b>	<b>356</b>	<b>8534.3</b>	<b>356</b>	<b>3611.5</b>

A heaping effect can be found on the 9<sup>th</sup> day of every month.

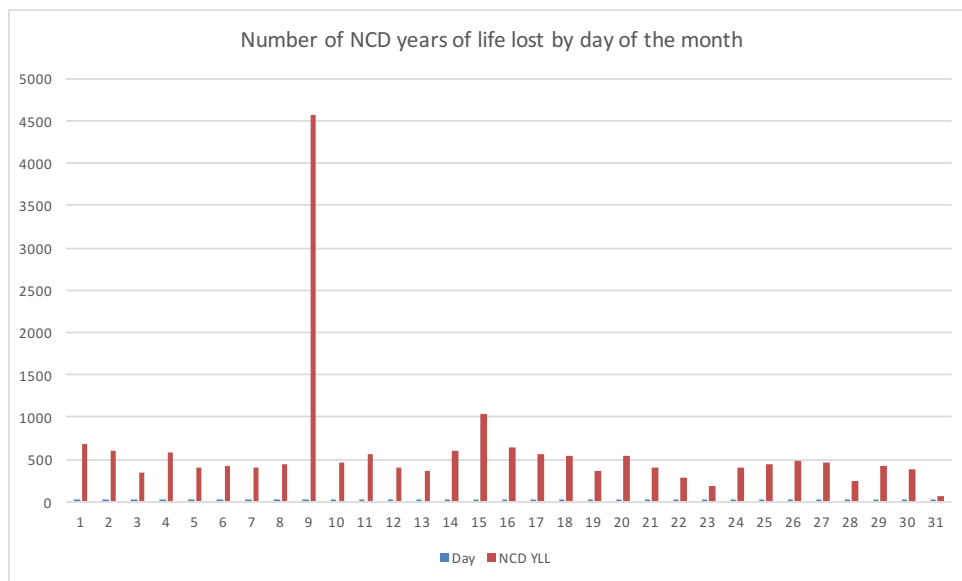
**Supplementary Table 5:** Breakdown of NCD deaths and YLL by day.

Day	Total		Male		Female		65+ Years	
	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL	NCD deaths	NCD YLL
1	34	677.6	19	326.5	15	351.1	15	165.1
2	26	602.7	8	183.4	18	419.3	13	143.2
3	16	337	10	199.5	6	137.5	7	59.8
4	25	591.7	10	230.2	15	361.5	10	100.5
5	18	408.7	13	220.5	5	188.2	8	78.8
6	21	430.2	11	257.9	10	172.3	12	115
7	18	409.1	9	196	9	213.1	8	79.7
8	24	442.9	16	333.2	8	109.7	13	114.9
9	179	4559	96	2325.4	83	2233.6	77	763.2
10	26	471.6	15	274.2	11	197.4	14	140.7
11	21	560.2	7	120.8	14	439.4	10	99.2
12	19	408.3	14	271.9	5	136.4	10	117.2
13	20	374	12	209.2	8	164.8	12	106.9
14	22	607.5	12	387.5	10	220	9	112.4
15	37	1033.6	25	733.1	12	300.5	6	47.8
16	27	646	16	385.4	11	260.6	7	71.4
17	17	569.4	10	361.5	7	207.9	4	36
18	21	533.7	13	302.1	8	231.6	9	107.4
19	16	364.6	6	203.3	10	161.3	7	79
20	24	543.5	10	224.6	14	318.9	13	159.9
21	18	402.8	11	244.5	7	158.3	11	108.5
22	15	280.6	10	221.4	5	59.2	11	113.4
23	11	181.8	8	107.8	3	74	7	68.1
24	19	414.2	11	179.9	8	234.3	9	79
25	21	448.2	10	214.1	11	234.1	11	100.7
26	22	486.1	13	306	9	180.1	6	63.9
27	24	458.7	14	293.1	10	165.6	12	116.5
28	13	243.2	6	95.6	7	147.6	9	101.4
29	17	423.7	7	130.9	10	292.8	6	57.5
30	14	386.8	10	282.7	4	104.1	6	65.2
31	5	69.1	2	10	3	59.1	4	39.2
<b>Total</b>	<b>790</b>	<b>18366.5</b>	<b>434</b>	<b>9832.2</b>	<b>356</b>	<b>8534.3</b>	<b>356</b>	<b>3611.5</b>

The histogram of number of NCD deaths and corresponding NCD-YLL stratified by day of the month reveals a heaping effect on 9<sup>th</sup> of every month. We control for this effect in the statistical modeling.



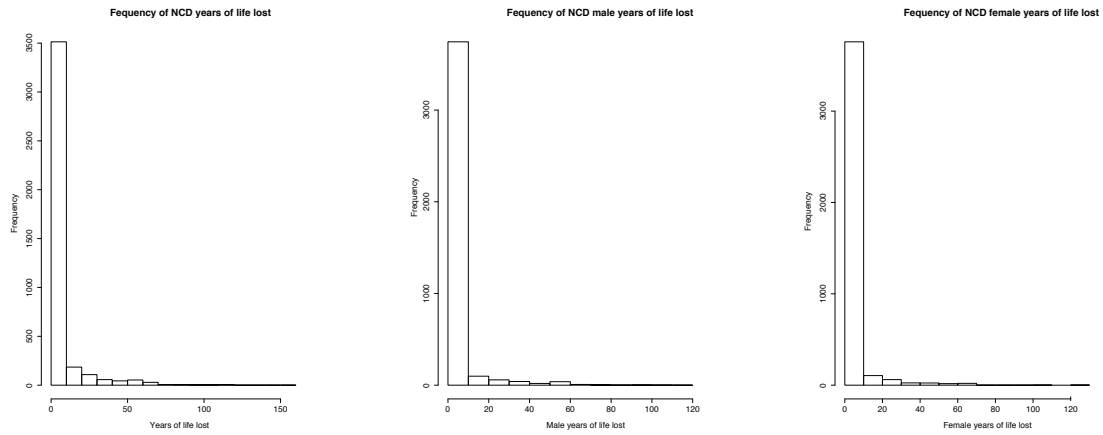
**Supplementary Figure 1:** Count of NCD deaths by day.



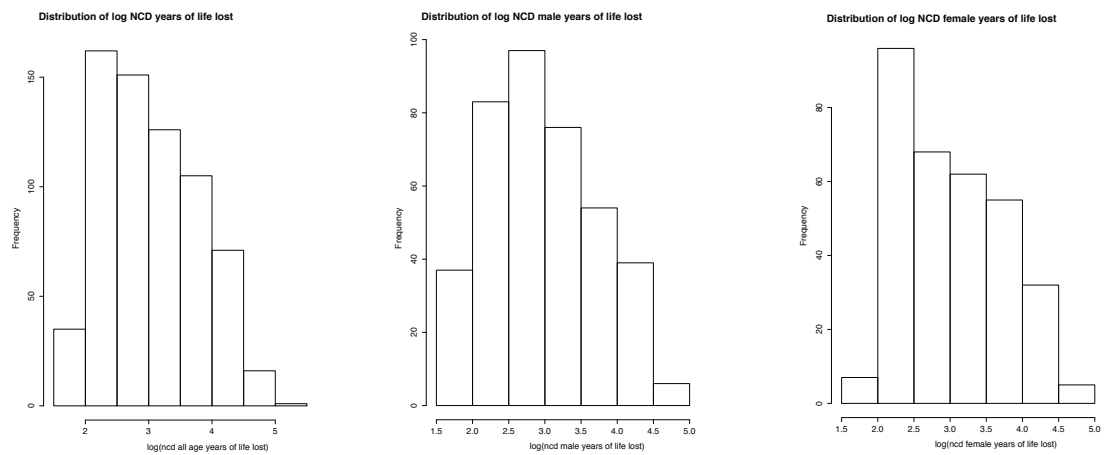
**Supplementary Figure 2:** Count of NCD-YLL by day.

### Statistical modeling

The histogram reveals that for most days (represented by 'Frequency' on the y axis) there were no NCD-YLL.

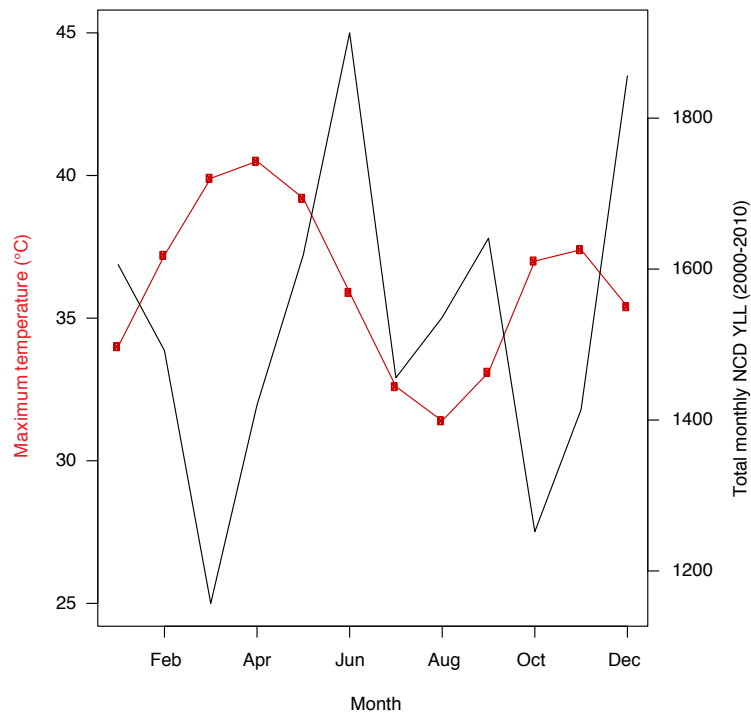


**Supplementary Figure 3:** Frequency of NCD-YLL for all-age, males and females.



**Supplementary Figure 4:** Distribution of log NCD-YLL for all-age, males and females.

The plot of monthly maximum temperature and NCD YLL (2000-2010) shows that the peak in maximum temperature is associated with a trough in NCD YLL.

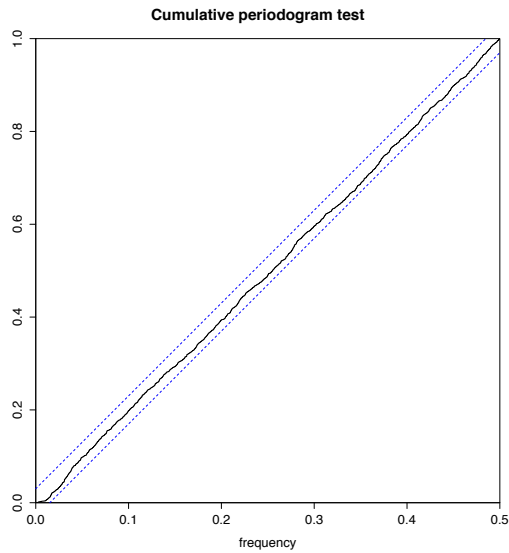


**Supplementary Figure 5:** Correlation between monthly maximum temperature and NCD mortality (2000-2010).

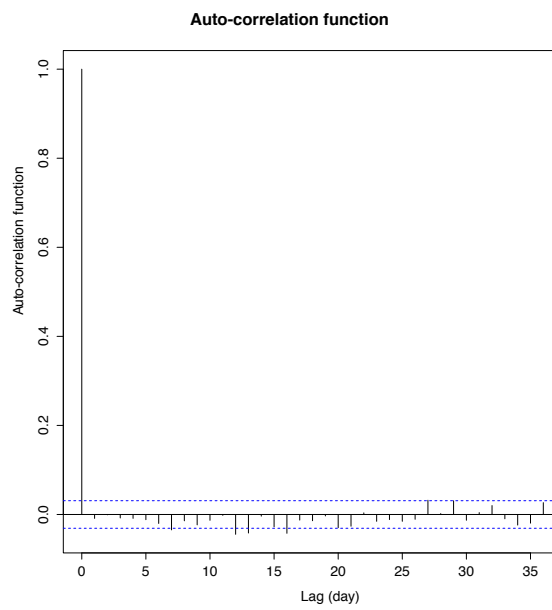
### Model validation

The cumulative periodogram test assessed whether the residuals were independent over time. The black diagonal line did not cross the confidence bounds (represented by the blue dotted lines) indicating that the residuals were independent (Supplementary Figure 6). Autocorrelation is that observations close in time are more likely to be alike than those separated by time. Because the short-term (day-to-day) association of temperature and NCD-YLL are of interest, it is important to control for season and long-term trends, which can make the short-term associations difficult to detect<sup>1</sup>. The presence of vertical spikes within the confines of the confidence bounds (blue dotted lines) also indicate that autocorrelation was removed in the autocorrelation function plot (Supplementary Figure 7). There was no evidence of autocorrelation after controlling for seasonality and long-term trends in the analysis.

<sup>1</sup> Bhaskaran K, Gasparri A, Hajat S, Smeeth L, Armstrong B (2013) Time series regression studies in environmental epidemiology. *Int J Epidemiol* 42:1187–1195.

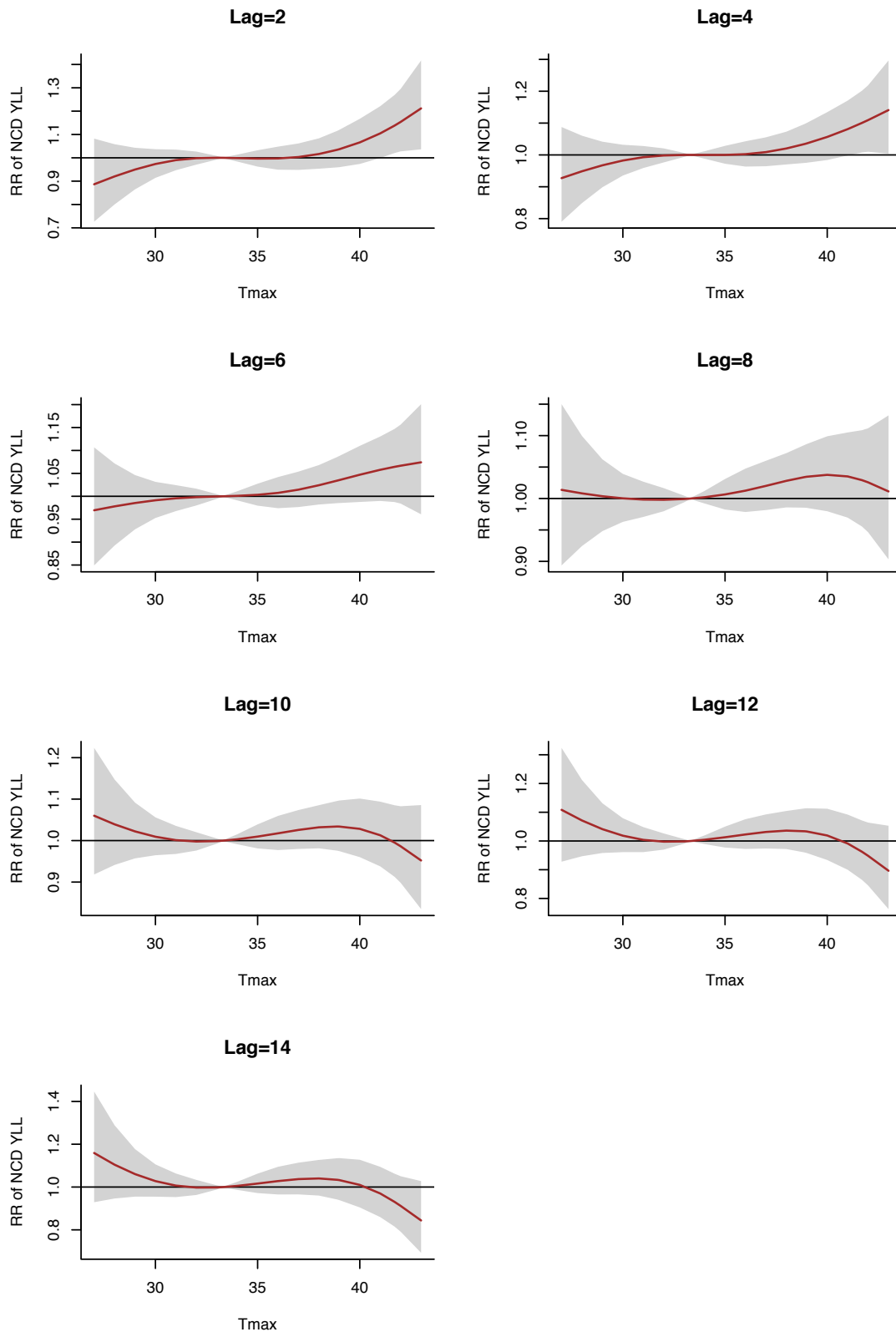


**Supplementary Figure 6:** Cumulative periodogram test determines the independence of residuals over time. The blue dotted lines are the confidence intervals.

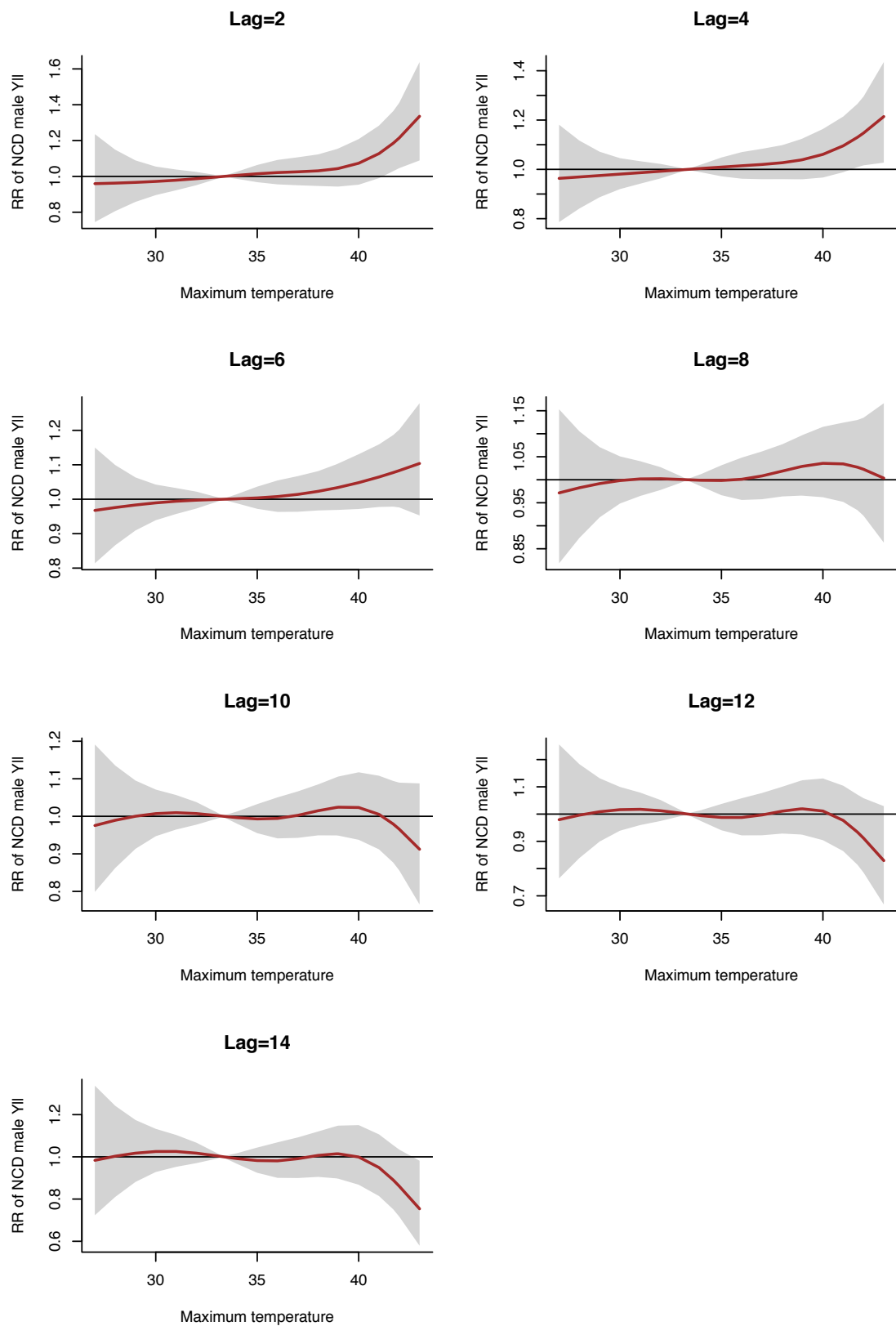


**Supplementary Figure 7:** Autocorrelation function of the base model. Vertical lines or ‘spikes’ are placed along individual lag days ( $x$ -axis). The height of the spike is relative to the magnitude of the autocorrelation function ( $y$ -axis). Autocorrelation at lag one is always one. Blue dotted lines are the confidence intervals.

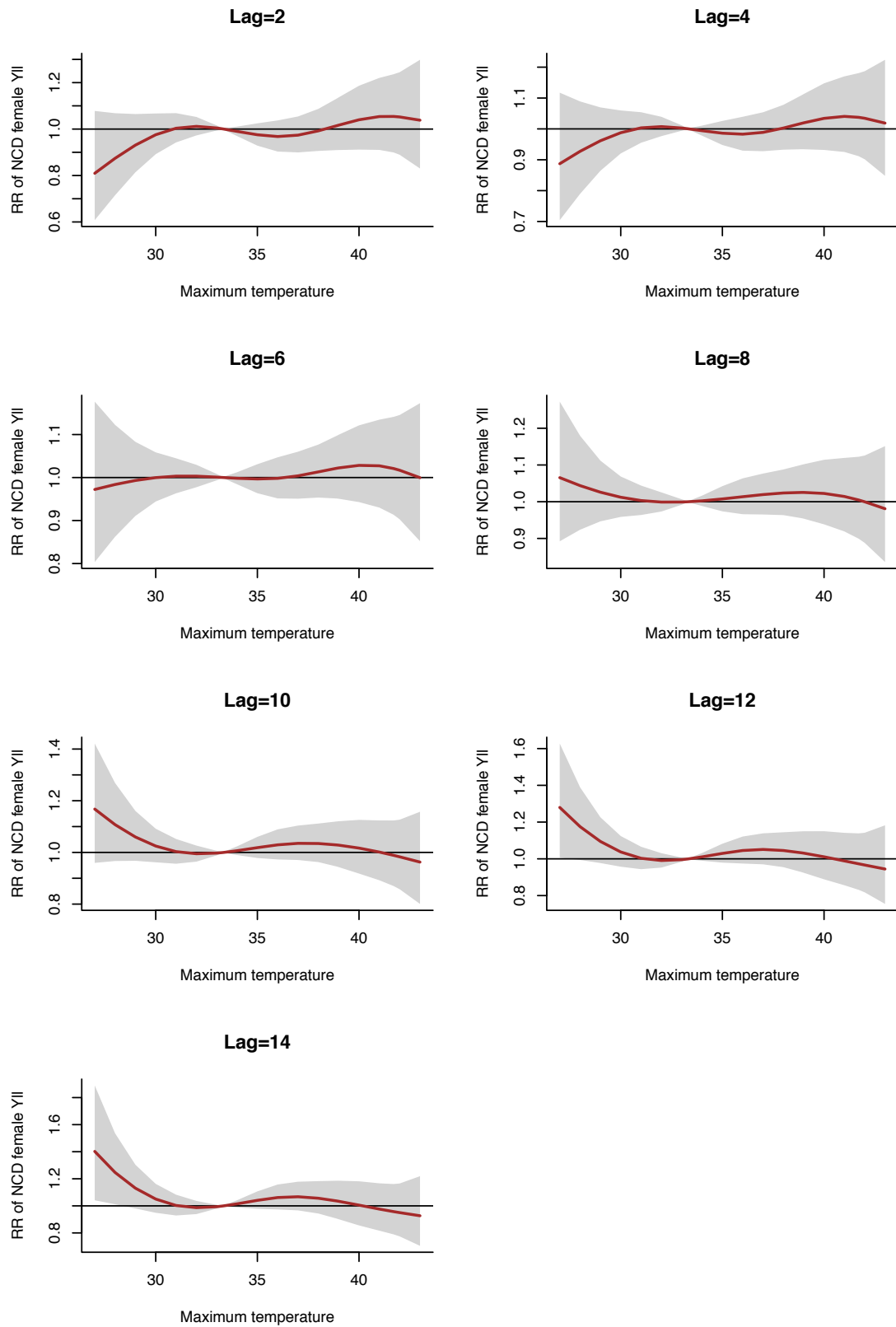




**Supplementary Figure 8:** Plots of the 4-day cumulative relative risk of non-communicable disease years of life lost for all ages stratified by lag days 2-14 (in two day increments).



**Supplementary Figure 9:** Plots of the 4-day cumulative relative risk of non-communicable disease years of life lost for males stratified by lag days 2-14 (in two day increments).



**Supplementary Figure 10:** Plots of the 4-day cumulative relative risk of non-communicable disease years of life lost for females stratified by lag days 2-14 (in two day increments).

**Supplementary Table 6a:** Relative risk (and 95% confidence bounds) of maximum temperature on non-communicable disease all-age years of life lost in Nouna stratified by individual lag days between 2000-2010. Relative risks are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	27.8°C (1st percentile)	30°C (5th percentile)	31.1°C (10th percentile)	33.3°C (25th percentile)	38.9°C (75th percentile)	41.4°C (90th percentile)	41.7°C (95th percentile)	42.8°C (99th percentile)
	34 days below 27.8°C	174 days below 30°C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
<b>lag0</b>	0.88 (0.73 to 1.06)	0.96 (0.89 to 1.04)	0.99 (0.94 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.94 to 1.14)	1.16 (1.02 to 1.31)	1.18 (1.03 to 1.35)	1.27 (1.06 to 1.52)
<b>lag1</b>	0.90 (0.76 to 1.06)	0.97 (0.90 to 1.04)	0.99 (0.94 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.95 to 1.13)	1.14 (1.01 to 1.28)	1.16 (1.03 to 1.31)	1.23 (1.05 to 1.45)
<b>lag2</b>	0.91 (0.79 to 1.06)	0.97 (0.91 to 1.04)	0.99 (0.95 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.96 to 1.12)	1.12 (1.01 to 1.25)	1.14 (1.02 to 1.27)	1.20 (1.04 to 1.39)
<b>lag3</b>	0.93 (0.81 to 1.06)	0.98 (0.92 to 1.03)	0.99 (0.96 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.11)	1.11 (1.01 to 1.22)	1.12 (1.01 to 1.23)	1.17 (1.02 to 1.33)
<b>lag4</b>	0.94 (0.84 to 1.07)	0.98 (0.94 to 1.03)	0.99 (0.96 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.10)	1.09 (1.00 to 1.19)	1.10 (1.01 to 1.20)	1.13 (1.01 to 1.28)
<b>lag5</b>	0.96 (0.86 to 1.07)	0.99 (0.94 to 1.03)	0.99 (0.97 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.98 to 1.09)	1.08 (1.00 to 1.16)	1.08 (1.00 to 1.17)	1.10 (0.99 to 1.23)
<b>lag6</b>	0.98 (0.88 to 1.08)	0.99 (0.95 to 1.03)	1.00 (0.97 to 1.02)	1.00 (1.00 to 1.00)	1.03 (0.99 to 1.09)	1.06 (0.99 to 1.14)	1.06 (0.99 to 1.15)	1.07 (0.97 to 1.19)
<b>lag7</b>	0.99 (0.90 to 1.09)	1.00 (0.96 to 1.03)	1.00 (0.97 to 1.02)	1.00 (1.00 to 1.00)	1.03 (0.99 to 1.08)	1.05 (0.98 to 1.12)	1.05 (0.97 to 1.13)	1.04 (0.94 to 1.16)
<b>lag8</b>	1.01 (0.92 to 1.11)	1.00 (0.96 to 1.04)	1.00 (0.97 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.99 to 1.09)	1.03 (0.96 to 1.11)	1.03 (0.96 to 1.11)	1.01 (0.91 to 1.13)
<b>lag9</b>	1.03 (0.93 to 1.13)	1.00 (0.96 to 1.05)	1.00 (0.97 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.98 to 1.09)	1.02 (0.94 to 1.10)	1.01 (0.94 to 1.10)	0.99 (0.88 to 1.10)
<b>lag10</b>	1.04 (0.94 to 1.16)	1.01 (0.96 to 1.06)	1.00 (0.97 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.98 to 1.10)	1.00 (0.92 to 1.09)	1.00 (0.91 to 1.09)	0.96 (0.85 to 1.08)
<b>lag11</b>	1.06 (0.94 to 1.19)	1.01 (0.96 to 1.07)	1.00 (0.97 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.10)	0.99 (0.90 to 1.08)	0.98 (0.89 to 1.08)	0.93 (0.82 to 1.07)
<b>lag12</b>	1.08 (0.94 to 1.23)	1.02 (0.96 to 1.08)	1.00 (0.96 to 1.05)	1.00 (1.00 to 1.00)	1.03 (0.96 to 1.11)	0.98 (0.88 to 1.08)	0.96 (0.86 to 1.07)	0.91 (0.78 to 1.05)
<b>lag13</b>	1.10 (0.94 to 1.27)	1.02 (0.96 to 1.09)	1.00 (0.96 to 1.05)	1.00 (1.00 to 1.00)	1.03 (0.95 to 1.12)	0.96 (0.86 to 1.08)	0.95 (0.84 to 1.07)	0.88 (0.75 to 1.04)
<b>lag14</b>	1.11 (0.94 to 1.32)	1.03 (0.96 to 1.11)	1.01 (0.95 to 1.06)	1.00 (1.00 to 1.00)	1.03 (0.94 to 1.13)	0.95 (0.84 to 1.08)	0.93 (0.82 to 1.06)	0.86 (0.71 to 1.03)

**Supplementary Table 6b:** Excess all-age average daily NCD-YLL (and 95% confidence bounds) in Nouna stratified by individual lag days between 2000-2010. Relative risks were used to calculate excess average daily NCD-YLL as follows: (Average daily NCD-YLL of all-age\* relative risk) – Average daily NCD-YLL. NCD-YLL are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	27.8°C (1 <sup>st</sup> percentile)	30°C (5th percentile)	31.1°C (10th percentile)	33.3°C (25th percentile)	38.9°C (75th percentile)	41.4°C (90th percentile)	41.7°C (95th percentile)	42.8°C (99th percentile)
	34 days below 27.8°C	174 days below 30°C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)
<b>lag0</b>	-0.53 (-1.22 to 0.30)	-0.16 (-0.50 to 0.20)	-0.05 (-0.29 to 0.20)	0.00 (-0.01 to 0.01)	0.16 (-0.27 to 0.63)	0.71 (0.07 to 1.45)	0.81 (0.13 to 1.59)	1.24 (0.28 to 2.38)
<b>lag1</b>	-0.47 (-1.10 to 0.29)	-0.14 (-0.45 to 0.19)	-0.05 (-0.26 to 0.18)	0.00 (-0.01 to 0.01)	0.16 (-0.23 to 0.58)	0.64 (0.06 to 1.29)	0.72 (0.12 to 1.41)	1.07 (0.23 to 2.07)
<b>lag2</b>	-0.40 (-0.98 to 0.29)	-0.12 (-0.40 to 0.17)	-0.04 (-0.23 to 0.16)	0.00 (0.00 to 0.01)	0.16 (-0.19 to 0.53)	0.57 (0.05 to 1.13)	0.63 (0.09 to 1.24)	0.92 (0.17 to 1.79)
<b>lag3</b>	-0.33 (-0.86 to 0.29)	-0.10 (-0.35 to 0.16)	-0.03 (-0.21 to 0.14)	0.00 (0.00 to 0.00)	0.16 (-0.15 to 0.49)	0.49 (0.04 to 0.99)	0.55 (0.07 to 1.08)	0.77 (0.10 to 1.52)
<b>lag4</b>	-0.25 (-0.75 to 0.30)	-0.08 (-0.30 to 0.15)	-0.03 (-0.18 to 0.13)	0.00 (0.00 to 0.00)	0.16 (-0.12 to 0.45)	0.42 (0.02 to 0.86)	0.46 (0.04 to 0.93)	0.62 (0.03 to 1.28)
<b>lag5</b>	-0.18 (-0.63 to 0.32)	-0.06 (-0.25 to 0.14)	-0.02 (-0.16 to 0.12)	0.00 (0.00 to 0.00)	0.16 (-0.09 to 0.42)	0.35 (-0.01 to 0.74)	0.38 (0.00 to 0.79)	0.47 (-0.05 to 1.06)
<b>lag6</b>	-0.11 (-0.53 to 0.36)	-0.04 (-0.22 to 0.14)	-0.02 (-0.14 to 0.11)	0.00 (0.00 to 0.00)	0.16 (-0.07 to 0.39)	0.28 (-0.05 to 0.64)	0.30 (-0.06 to 0.68)	0.33 (-0.15 to 0.88)
<b>lag7</b>	-0.03 (-0.44 to 0.42)	-0.02 (-0.19 to 0.16)	-0.01 (-0.13 to 0.11)	0.00 (0.00 to 0.00)	0.16 (-0.06 to 0.39)	0.22 (-0.1 to 0.56)	0.21 (-0.12 to 0.58)	0.20 (-0.27 to 0.72)
<b>lag8</b>	0.04 (-0.37 to 0.50)	0.00 (-0.17 to 0.18)	-0.01 (-0.13 to 0.12)	0.00 (0.00 to 0.00)	0.16 (-0.07 to 0.39)	0.15 (-0.17 to 0.49)	0.13 (-0.2 to 0.50)	0.07 (-0.40 to 0.58)
<b>lag9</b>	0.12 (-0.32 to 0.61)	0.02 (-0.16 to 0.21)	0.00 (-0.14 to 0.13)	0.00 (0.00 to 0.00)	0.16 (-0.08 to 0.41)	0.08 (-0.25 to 0.44)	0.06 (-0.30 to 0.44)	-0.06 (-0.54 to 0.47)
<b>lag10</b>	0.20 (-0.29 to 0.74)	0.04 (-0.16 to 0.26)	0.00 (-0.15 to 0.16)	0.00 (-0.01 to 0.00)	0.16 (-0.11 to 0.44)	0.02 (-0.35 to 0.41)	-0.02 (-0.40 to 0.39)	-0.19 (-0.69 to 0.39)
<b>lag11</b>	0.28 (-0.27 to 0.89)	0.06 (-0.17 to 0.31)	0.01 (-0.16 to 0.18)	0.00 (-0.01 to 0.00)	0.16 (-0.15 to 0.48)	-0.05 (-0.44 to 0.38)	-0.10 (-0.51 to 0.36)	-0.31 (-0.85 to 0.31)
<b>lag12</b>	0.36 (-0.26 to 1.07)	0.08 (-0.18 to 0.36)	0.01 (-0.18 to 0.21)	0.00 (-0.01 to 0.00)	0.16 (-0.18 to 0.52)	-0.11 (-0.55 to 0.37)	-0.17 (-0.62 to 0.33)	-0.43 (-1.01 to 0.25)
<b>lag13</b>	0.44 (-0.26 to 1.25)	0.11 (-0.19 to 0.42)	0.02 (-0.20 to 0.24)	0.00 (-0.01 to 0.00)	0.16 (-0.23 to 0.57)	-0.17 (-0.65 to 0.36)	-0.25 (-0.74 to 0.31)	-0.54 (-1.16 to 0.19)
<b>lag14</b>	0.53 (-0.26 to 1.45)	0.13 (-0.21 to 0.49)	0.02 (-0.21 to 0.28)	0.00 (-0.01 to 0.01)	0.15 (-0.27 to 0.62)	-0.24 (-0.75 to 0.35)	-0.32 (-0.85 to 0.29)	-0.65 (-1.31 to 0.14)

**Supplementary Table 7a:** Relative risk (and 95% confidence bounds) of maximum temperature on non-communicable disease male years of life lost in Nouna stratified by individual lag days between 2000-2010. Relative risks are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	<b>27.8 °C</b> <b>(1st percentile)</b>	<b>30 °C</b> <b>(5th percentile)</b>	<b>31.1°C</b> <b>(10th percentile)</b>	<b>33.3°C</b> <b>(25th percentile)</b>	<b>38.9°C</b> <b>(75th percentile)</b>	<b>41.4°C</b> <b>(90th percentile)</b>	<b>41.7°C</b> <b>(95th percentile)</b>	<b>42.8°C</b> <b>(99th percentile)</b>
	34 days below 27.8°C	174 days below 30°C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
<b>lag0</b>	0.96 (0.75 to 1.21)	0.96 (0.87 to 1.07)	0.97 (0.90 to 1.04)	1.00 (1.00 to 1.00)	1.05 (0.92 to 1.19)	1.2 (1.02 to 1.42)	1.24 (1.04 to 1.48)	1.43 (1.13 to 1.80)
<b>lag1</b>	0.96 (0.77 to 1.19)	0.97 (0.88 to 1.06)	0.98 (0.92 to 1.04)	1.00 (1.00 to 1.00)	1.04 (0.93 to 1.17)	1.18 (1.02 to 1.37)	1.21 (1.04 to 1.42)	1.37 (1.11 to 1.69)
<b>lag2</b>	0.96 (0.79 to 1.16)	0.97 (0.90 to 1.05)	0.98 (0.93 to 1.04)	1.00 (1.00 to 1.00)	1.04 (0.94 to 1.15)	1.16 (1.01 to 1.33)	1.19 (1.03 to 1.36)	1.31 (1.08 to 1.58)
<b>lag3</b>	0.96 (0.81 to 1.14)	0.98 (0.91 to 1.05)	0.98 (0.93 to 1.03)	1.00 (1.00 to 1.00)	1.04 (0.95 to 1.14)	1.14 (1.01 to 1.28)	1.16 (1.02 to 1.31)	1.25 (1.06 to 1.49)
<b>lag4</b>	0.97 (0.83 to 1.13)	0.98 (0.92 to 1.05)	0.99 (0.94 to 1.03)	1.00 (1.00 to 1.00)	1.04 (0.96 to 1.12)	1.11 (1.00 to 1.24)	1.13 (1.01 to 1.27)	1.20 (1.03 to 1.40)
<b>lag5</b>	0.97 (0.85 to 1.12)	0.99 (0.93 to 1.04)	0.99 (0.95 to 1.03)	1.00 (1.00 to 1.00)	1.04 (0.97 to 1.11)	1.09 (0.99 to 1.20)	1.10 (1.00 to 1.22)	1.15 (0.99 to 1.33)
<b>lag6</b>	0.97 (0.86 to 1.11)	0.99 (0.94 to 1.04)	0.99 (0.96 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.10)	1.07 (0.98 to 1.17)	1.08 (0.98 to 1.19)	1.10 (0.96 to 1.26)
<b>lag7</b>	0.98 (0.86 to 1.11)	0.99 (0.95 to 1.05)	1.00 (0.96 to 1.03)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.10)	1.05 (0.96 to 1.15)	1.05 (0.96 to 1.16)	1.05 (0.92 to 1.20)
<b>lag8</b>	0.98 (0.86 to 1.11)	1.00 (0.95 to 1.05)	1.00 (0.97 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.97 to 1.10)	1.03 (0.94 to 1.13)	1.03 (0.93 to 1.13)	1.01 (0.88 to 1.16)
<b>lag9</b>	0.98 (0.86 to 1.13)	1.00 (0.95 to 1.06)	1.01 (0.97 to 1.05)	1.00 (1.00 to 1.00)	1.03 (0.96 to 1.10)	1.01 (0.92 to 1.11)	1.00 (0.91 to 1.11)	0.96 (0.83 to 1.12)
<b>lag10</b>	0.99 (0.85 to 1.15)	1.01 (0.95 to 1.07)	1.01 (0.97 to 1.06)	1.00 (1.00 to 1.00)	1.02 (0.95 to 1.10)	0.99 (0.89 to 1.10)	0.98 (0.88 to 1.09)	0.92 (0.78 to 1.09)
<b>lag11</b>	0.99 (0.84 to 1.17)	1.01 (0.94 to 1.08)	1.01 (0.96 to 1.07)	1.00 (1.00 to 1.00)	1.02 (0.94 to 1.11)	0.97 (0.87 to 1.09)	0.96 (0.85 to 1.08)	0.88 (0.74 to 1.06)
<b>lag12</b>	0.99 (0.82 to 1.20)	1.02 (0.94 to 1.10)	1.02 (0.96 to 1.08)	1.00 (1.00 to 1.00)	1.02 (0.93 to 1.12)	0.95 (0.84 to 1.09)	0.93 (0.81 to 1.07)	0.85 (0.69 to 1.03)
<b>lag13</b>	1.00 (0.81 to 1.23)	1.02 (0.93 to 1.12)	1.02 (0.96 to 1.09)	1.00 (1.00 to 1.00)	1.02 (0.91 to 1.13)	0.94 (0.81 to 1.08)	0.91 (0.78 to 1.06)	0.81 (0.65 to 1.01)
<b>lag14</b>	1.00 (0.79 to 1.26)	1.03 (0.93 to 1.13)	1.02 (0.95 to 1.10)	1.00 (1.00 to 1.00)	1.01 (0.90 to 1.15)	0.92 (0.78 to 1.08)	0.89 (0.75 to 1.06)	0.78 (0.61 to 0.99)

**Supplementary Table 7b:** Excess male average daily NCD-YLL (and 95% confidence bounds) in Nouna stratified by individual lag days between 2000-2010. Relative risks were used to calculate excess average daily NCD-YLL as follows: (Average daily NCD-YLL of male \* relative risk) – Average daily NCD-YLL. NCD-YLL are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	<b>27.8 °C</b> <b>(1st percentile)</b>	<b>30 °C</b> <b>(5th percentile)</b>	<b>31.1 °C</b> <b>(10th percentile)</b>	<b>33.3 °C</b> <b>(25th percentile)</b>	<b>38.9 °C</b> <b>(75th percentile)</b>	<b>41.4 °C</b> <b>(90<sup>th</sup> percentile)</b>	<b>41.7 °C</b> <b>(95th percentile)</b>	<b>42.8 °C</b> <b>(99th percentile)</b>
	34 days below 27.8°C	174 days below 30°C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)
<b>lag0</b>	-0.11 (-0.59 to 0.51)	-0.09 (-0.31 to 0.16)	-0.07 (-0.23 to 0.11)	0.00 (-0.01 to 0.00)	0.11 (-0.18 to 0.45)	0.49 (0.05 to 1.01)	0.58 (0.11 to 1.15)	1.03 (0.32 to 1.93)
<b>lag1</b>	-0.10 (-0.54 to 0.45)	-0.08 (-0.28 to 0.15)	-0.06 (-0.20 to 0.10)	0.00 (-0.01 to 0.00)	0.11 (-0.16 to 0.41)	0.43 (0.04 to 0.89)	0.51 (0.09 to 1.01)	0.88 (0.26 to 1.65)
<b>lag2</b>	-0.09 (-0.49 to 0.39)	-0.07 (-0.25 to 0.13)	-0.05 (-0.18 to 0.09)	0.00 (0.00 to 0.00)	0.10 (-0.14 to 0.36)	0.38 (0.03 to 0.78)	0.44 (0.07 to 0.87)	0.74 (0.20 to 1.40)
<b>lag3</b>	-0.08 (-0.45 to 0.35)	-0.06 (-0.22 to 0.12)	-0.04 (-0.16 to 0.08)	0.00 (0.00 to 0.00)	0.10 (-0.11 to 0.33)	0.33 (0.02 to 0.68)	0.38 (0.05 to 0.75)	0.61 (0.13 to 1.17)
<b>lag4</b>	-0.08 (-0.41 to 0.31)	-0.05 (-0.19 to 0.11)	-0.03 (-0.13 to 0.08)	0.00 (0.00 to 0.00)	0.09 (-0.10 to 0.29)	0.27 (0.00 to 0.58)	0.31 (0.02 to 0.64)	0.48 (0.06 to 0.96)
<b>lag5</b>	-0.07 (-0.37 to 0.28)	-0.04 (-0.17 to 0.10)	-0.02 (-0.12 to 0.07)	0.00 (0.00 to 0.00)	0.08 (-0.08 to 0.26)	0.22 (-0.02 to 0.49)	0.25 (-0.01 to 0.54)	0.36 (-0.01 to 0.78)
<b>lag6</b>	-0.06 (-0.34 to 0.26)	-0.03 (-0.15 to 0.10)	-0.01 (-0.10 to 0.08)	0.00 (0.00 to 0.00)	0.08 (-0.07 to 0.24)	0.17 (-0.05 to 0.42)	0.19 (-0.05 to 0.45)	0.24 (-0.10 to 0.63)
<b>lag7</b>	-0.05 (-0.33 to 0.26)	-0.01 (-0.13 to 0.11)	0.00 (-0.09 to 0.08)	0.00 (0.00 to 0.00)	0.07 (-0.07 to 0.23)	0.12 (-0.09 to 0.35)	0.12 (-0.1 to 0.37)	0.13 (-0.19 to 0.49)
<b>lag8</b>	-0.05 (-0.33 to 0.27)	0.00 (-0.12 to 0.12)	0.00 (-0.08 to 0.09)	0.00 (0.00 to 0.00)	0.07 (-0.08 to 0.23)	0.07 (-0.14 to 0.30)	0.07 (-0.16 to 0.31)	0.02 (-0.30 to 0.38)
<b>lag9</b>	-0.04 (-0.34 to 0.3)	0.01 (-0.12 to 0.14)	0.01 (-0.08 to 0.11)	0.00 (0.00 to 0.00)	0.06 (-0.10 to 0.24)	0.03 (-0.19 to 0.27)	0.01 (-0.22 to 0.26)	-0.08 (-0.40 to 0.29)
<b>lag10</b>	-0.03 (-0.36 to 0.35)	0.02 (-0.13 to 0.17)	0.02 (-0.08 to 0.13)	0.00 (0.00 to 0.00)	0.06 (-0.12 to 0.25)	-0.02 (-0.25 to 0.24)	-0.05 (-0.30 to 0.23)	-0.18 (-0.52 to 0.21)
<b>lag11</b>	-0.02 (-0.39 to 0.41)	0.03 (-0.14 to 0.20)	0.03 (-0.09 to 0.16)	0.00 (0.00 to 0.00)	0.05 (-0.15 to 0.27)	-0.07 (-0.32 to 0.22)	-0.10 (-0.37 to 0.2)	-0.28 (-0.63 to 0.14)
<b>lag12</b>	-0.02 (-0.42 to 0.47)	0.04 (-0.15 to 0.24)	0.04 (-0.09 to 0.18)	0.00 (0.00 to 0.00)	0.05 (-0.18 to 0.29)	-0.11 (-0.39 to 0.21)	-0.16 (-0.45 to 0.17)	-0.37 (-0.74 to 0.08)
<b>lag13</b>	-0.01 (-0.46 to 0.54)	0.05 (-0.16 to 0.28)	0.05 (-0.10 to 0.21)	0.00 (0.00 to 0.01)	0.04 (-0.21 to 0.32)	-0.15 (-0.46 to 0.19)	-0.21 (-0.52 to 0.15)	-0.46 (-0.84 to 0.03)
<b>lag14</b>	0.00 (-0.50 to 0.62)	0.06 (-0.17 to 0.32)	0.06 (-0.11 to 0.24)	0.00 (0.00 to 0.01)	0.03 (-0.24 to 0.35)	-0.20 (-0.52 to 0.19)	-0.26 (-0.60 to 0.13)	-0.54 (-0.94 to -0.02)

**Supplementary Table 8a:** Relative risk (and 95% confidence bounds) of maximum temperature on non-communicable disease female years of life lost in Nouna stratified by individual lag days between 2000-2010. Relative risks are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	<b>27.8 °C</b> <b>(1st percentile)</b>	<b>30 °C</b> <b>(5<sup>th</sup> percentile)</b>	<b>31.1 °C</b> <b>(10th percentile)</b>	<b>33.3 °C</b> <b>(25th percentile)</b>	<b>38.9 °C</b> <b>(75th percentile)</b>	<b>41.4 °C</b> <b>(90th percentile)</b>	<b>41.7 °C</b> <b>(95th percentile)</b>	<b>42.8 °C</b> <b>(99th percentile)</b>
	34 days below 27.8 °C	174 days below 30 °C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
<b>lag0</b>	0.81 (0.62 to 1.05)	0.96 (0.86 to 1.08)	1.01 (0.93 to 1.09)	1.00 (1.00 to 1.00)	1.01 (0.88 to 1.16)	1.07 (0.89 to 1.29)	1.07 (0.88 to 1.30)	1.06 (0.82 to 1.37)
<b>lag1</b>	0.83 (0.66 to 1.06)	0.97 (0.88 to 1.07)	1.01 (0.94 to 1.08)	1.00 (1.00 to 1.00)	1.01 (0.90 to 1.14)	1.06 (0.90 to 1.26)	1.06 (0.89 to 1.27)	1.05 (0.83 to 1.33)
<b>lag2</b>	0.86 (0.69 to 1.07)	0.98 (0.89 to 1.07)	1.01 (0.95 to 1.07)	1.00 (1.00 to 1.00)	1.01 (0.91 to 1.13)	1.06 (0.91 to 1.23)	1.05 (0.90 to 1.24)	1.04 (0.84 to 1.28)
<b>lag3</b>	0.89 (0.73 to 1.08)	0.98 (0.91 to 1.06)	1.00 (0.95 to 1.06)	1.00 (1.00 to 1.00)	1.02 (0.92 to 1.12)	1.05 (0.91 to 1.20)	1.05 (0.91 to 1.21)	1.03 (0.85 to 1.25)
<b>lag4</b>	0.92 (0.77 to 1.09)	0.99 (0.92 to 1.06)	1.00 (0.96 to 1.05)	1.00 (1.00 to 1.00)	1.02 (0.93 to 1.11)	1.04 (0.92 to 1.18)	1.04 (0.91 to 1.18)	1.02 (0.86 to 1.21)
<b>lag5</b>	0.95 (0.81 to 1.11)	0.99 (0.93 to 1.06)	1.00 (0.96 to 1.05)	1.00 (1.00 to 1.00)	1.02 (0.94 to 1.10)	1.03 (0.92 to 1.15)	1.03 (0.91 to 1.16)	1.01 (0.86 to 1.19)
<b>lag6</b>	0.98 (0.85 to 1.13)	1.00 (0.94 to 1.06)	1.00 (0.96 to 1.04)	1.00 (1.00 to 1.00)	1.02 (0.95 to 1.10)	1.02 (0.92 to 1.14)	1.02 (0.91 to 1.14)	1.00 (0.86 to 1.17)
<b>lag7</b>	1.01 (0.89 to 1.16)	1.01 (0.95 to 1.06)	1.00 (0.97 to 1.04)	1.00 (1.00 to 1.00)	1.02 (0.96 to 1.10)	1.02 (0.92 to 1.13)	1.01 (0.91 to 1.13)	0.99 (0.86 to 1.15)
<b>lag8</b>	1.05 (0.92 to 1.20)	1.01 (0.96 to 1.07)	1.00 (0.96 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.96 to 1.10)	1.01 (0.91 to 1.12)	1.00 (0.90 to 1.12)	0.98 (0.85 to 1.14)
<b>lag9</b>	1.08 (0.94 to 1.24)	1.02 (0.96 to 1.08)	1.00 (0.96 to 1.04)	1.00 (1.00 to 1.00)	1.03 (0.95 to 1.11)	1.00 (0.90 to 1.12)	1.00 (0.89 to 1.12)	0.98 (0.83 to 1.14)
<b>lag10</b>	1.12 (0.97 to 1.30)	1.02 (0.96 to 1.09)	1.00 (0.96 to 1.05)	1.00 (1.00 to 1.00)	1.03 (0.95 to 1.12)	0.99 (0.88 to 1.12)	0.99 (0.87 to 1.12)	0.97 (0.81 to 1.15)
<b>lag11</b>	1.16 (0.98 to 1.36)	1.03 (0.96 to 1.11)	1.00 (0.95 to 1.05)	1.00 (1.00 to 1.00)	1.03 (0.94 to 1.13)	0.99 (0.86 to 1.13)	0.98 (0.85 to 1.13)	0.96 (0.79 to 1.16)
<b>lag12</b>	1.19 (1.00 to 1.43)	1.04 (0.96 to 1.12)	1.00 (0.94 to 1.06)	1.00 (1.00 to 1.00)	1.03 (0.93 to 1.15)	0.98 (0.84 to 1.14)	0.97 (0.83 to 1.14)	0.95 (0.77 to 1.17)
<b>lag13</b>	1.23 (1.01 to 1.51)	1.04 (0.95 to 1.14)	1.00 (0.94 to 1.07)	1.00 (1.00 to 1.00)	1.03 (0.92 to 1.17)	0.97 (0.82 to 1.15)	0.97 (0.81 to 1.15)	0.94 (0.75 to 1.19)
<b>lag14</b>	1.27 (1.02 to 1.60)	1.05 (0.95 to 1.16)	1.00 (0.93 to 1.08)	1.00 (1.00 to 1.00)	1.04 (0.91 to 1.19)	0.97 (0.80 to 1.16)	0.96 (0.79 to 1.16)	0.93 (0.72 to 1.20)



**Supplementary Table 8b:** Excess female average daily NCD-YLL (and 95% confidence bounds) in Nouna stratified by individual lag days between 2000-2010. Relative risks were used to calculate excess average daily NCD-YLL as follows: (Average daily NCD-YLL of female \* relative risk) – Average daily NCD-YLL. NCD-YLL are presented for; heat effects as 38.9°C, 41.1°C, 41.7°C and 42.8°C with reference to 36.4°C; cold effects as 27.8°C 30°C, 31.1°C and 33.3°C with reference to 36.4°C. Results controlled for long-term trends, season, day of the week, and heaping effect.

	27.8 °C (1st percentile)	30 °C (5th percentile)	31.1°C (10th percentile)	33.3°C (25 <sup>th</sup> percentile)	38.9°C (75th percentile)	41.4°C ( 90 <sup>th</sup> percentile)	41.7°C (95th percentile)	42.8°C (99th percentile)
	34 days below 27.8°C	174 days below 30°C	325 days below 31.3°C	912 days below 33.3°C	883 days above 38.9°C	300 days above 41.4°C	189 days above 41.7°C	28 days above 42.8°C
	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)	YLL (95% CI)
<b>lag0</b>	-0.41 (-0.80 to 0.11)	-0.08 (-0.29 to 0.16)	0.01 (-0.14 to 0.18)	0.00 (0.00 to 0.01)	0.02 (-0.25 to 0.33)	0.15 (-0.24 to 0.61)	0.15 (-0.25 to 0.63)	0.13 (-0.37 to 0.78)
<b>lag1</b>	-0.35 (-0.72 to 0.13)	-0.06 (-0.26 to 0.15)	0.01 (-0.13 to 0.16)	0.00 (0.00 to 0.01)	0.03 (-0.22 to 0.30)	0.13 (-0.22 to 0.55)	0.13 (-0.23 to 0.56)	0.11 (-0.35 to 0.68)
<b>lag2</b>	-0.29 (-0.64 to 0.15)	-0.05 (-0.23 to 0.14)	0.01 (-0.11 to 0.14)	0.00 (0.00 to 0.00)	0.03 (-0.19 to 0.28)	0.12 (-0.2 to 0.48)	0.11 (-0.21 to 0.50)	0.09 (-0.33 to 0.60)
<b>lag3</b>	-0.23 (-0.56 to 0.17)	-0.04 (-0.20 to 0.13)	0.01 (-0.10 to 0.13)	0.00 (0.00 to 0.00)	0.03 (-0.16 to 0.25)	0.10 (-0.18 to 0.42)	0.10 (-0.20 to 0.43)	0.07 (-0.31 to 0.52)
<b>lag4</b>	-0.17 (-0.48 to 0.20)	-0.03 (-0.17 to 0.13)	0.01 (-0.09 to 0.11)	0.00 (0.00 to 0.00)	0.04 (-0.14 to 0.23)	0.08 (-0.17 to 0.37)	0.08 (-0.19 to 0.38)	0.05 (-0.29 to 0.45)
<b>lag5</b>	-0.10 (-0.39 to 0.23)	-0.01 (-0.14 to 0.12)	0.01 (-0.08 to 0.10)	0.00 (0.00 to 0.00)	0.04 (-0.12 to 0.21)	0.07 (-0.16 to 0.33)	0.06 (-0.18 to 0.33)	0.03 (-0.28 to 0.39)
<b>lag6</b>	-0.04 (-0.31 to 0.28)	0.00 (-0.12 to 0.12)	0.01 (-0.07 to 0.09)	0.00 (0.00 to 0.00)	0.05 (-0.10 to 0.20)	0.05 (-0.16 to 0.29)	0.04 (-0.18 to 0.30)	0.01 (-0.29 to 0.35)
<b>lag7</b>	0.03 (-0.24 to 0.34)	0.01 (-0.10 to 0.13)	0.01 (-0.07 to 0.09)	0.00 (0.00 to 0.00)	0.05 (-0.09 to 0.20)	0.04 (-0.17 to 0.27)	0.03 (-0.19 to 0.27)	-0.01 (-0.30 to 0.32)
<b>lag8</b>	0.10 (-0.17 to 0.41)	0.03 (-0.09 to 0.14)	0.01 (-0.07 to 0.09)	0.00 (0.00 to 0.00)	0.05 (-0.09 to 0.21)	0.02 (-0.19 to 0.25)	0.01 (-0.21 to 0.26)	-0.03 (-0.32 to 0.30)
<b>lag9</b>	0.17 (-0.12 to 0.51)	0.04 (-0.08 to 0.17)	0.00 (-0.08 to 0.09)	0.00 (0.00 to 0.00)	0.06 (-0.10 to 0.23)	0.00 (-0.22 to 0.25)	-0.01 (-0.24 to 0.25)	-0.05 (-0.35 to 0.30)
<b>lag10</b>	0.25 (-0.07 to 0.62)	0.05 (-0.08 to 0.19)	0.00 (-0.09 to 0.10)	0.00 (0.00 to 0.00)	0.06 (-0.11 to 0.25)	-0.01 (-0.25 to 0.26)	-0.02 (-0.27 to 0.26)	-0.07 (-0.39 to 0.31)
<b>lag11</b>	0.33 (-0.04 to 0.75)	0.07 (-0.08 to 0.22)	0.00 (-0.10 to 0.11)	0.00 (0.00 to 0.00)	0.06 (-0.13 to 0.28)	-0.03 (-0.29 to 0.27)	-0.04 (-0.31 to 0.27)	-0.09 (-0.44 to 0.33)
<b>lag12</b>	0.41 (-0.01 to 0.90)	0.08 (-0.09 to 0.26)	0.00 (-0.12 to 0.13)	0.00 (0.00 to 0.00)	0.07 (-0.15 to 0.31)	-0.04 (-0.33 to 0.29)	-0.06 (-0.35 to 0.29)	-0.11 (-0.48 to 0.36)
<b>lag13</b>	0.49 (0.02 to 1.07)	0.09 (-0.10 to 0.30)	0.00 (-0.13 to 0.14)	0.00 (-0.01 to 0.00)	0.07 (-0.17 to 0.35)	-0.06 (-0.37 to 0.31)	-0.07 (-0.40 to 0.31)	-0.13 (-0.54 to 0.39)
<b>lag14</b>	0.58 (0.04 to 1.25)	0.11 (-0.11 to 0.34)	0.00 (-0.15 to 0.16)	0.00 (-0.01 to 0.00)	0.08 (-0.20 to 0.39)	-0.07 (-0.42 to 0.34)	-0.09 (-0.44 to 0.34)	-0.14 (-0.59 to 0.43)

Effect estimates withstood changes to model parameters.

**Supplementary Table 9:** Cumulative relative risk (and 95% confidence bounds) of maximum temperature on NCD years of life lost in Nouna between 2000-2010 at 41.7°C with reference to 36.4°C stratified by variations in model parameters. Results controlled for long-term trends, season, day of the week, and heaping effect. df=degrees of freedom.

	Lag structure	RR (95% CI)
<b>Knots for exposure-response: 10th, 50th, and 90th (Base model)</b>	4 day cumulative	2.08 (1.08 to 4.01)
<b>Knots for exposure-response: 10th, 75th, and 90th</b>	4 day cumulative	2.10 (1.07 to 4.13)
<b>Knots for exposure-response: 10th, 25th, 75th and 90th</b>	4 day cumulative	2.11 (1.07 to 4.15)
<b>Cubic B-spline for exposure-response</b>	4 day cumulative	2.11 (0.96 to 4.66)
<b>Df for exposure-response: 3df, and lag-response: 3df</b>	4 day cumulative	2.14 (1.10 to 4.15)
<b>Df for lag-response: 5</b>	4 day cumulative	1.98 (1.02 to 3.87)
<b>Df/year for seasonal control: 5</b>	4 day cumulative	1.47 (0.82 to 2.64)
<b>Df/year for seasonal control: 6</b>	4 day cumulative	1.61 (0.87 to 3.01)
<b>Df/year for seasonal control: 7</b>	4 day cumulative	2.00 (1.06 to 3.80)
<b>Df/year for seasonal control: 10</b>	4 day cumulative	2.14 (1.09 to 4.22)
<b>Log(yll) with Gaussian family</b>	4 day cumulative	1.82 (0.96 to 3.45)*
<b>Extending lag period: 14 days lag</b>	14 day cumulative	1.98 (0.66 to 5.91)
<b>Extending lag period: 28 days lag</b>	28 day cumulative	0.67 (0.11 to 4.24)

\* effect estimate is YLL.

The model applying a natural cubic spline with knots placed at the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile for the exposure-response relationship, and 2 degrees of freedom with equal knot placement for the lag-response relationship along a logarithmic scale presented the lowest Quasi Akaike Information Criterion (QAIC). This was therefore selected as the final model.

**Supplementary Table 10:** Quasi Akaike Information Criterion (QAIC) values used for selecting the optimal model. NS=natural cubic spline, BS=cubic B-spline, tmax=maximum temperature, df=degrees of freedom.

Model	QAIC
NS knots placed at 10, 50, 90th percentile for tmax, 2df lag	4320.82
NS knots placed at 10, 50, 90th percentile for tmax, 3df lag	4324.96
NS knots placed at 10, 50, 90th percentile for tmax, 5df lag	4333.91
NS knots placed at 10, 25, 75, 90th percentile for tmax, 2df lag	4323.75
NS knots placed at 10, 75, 90th percentile for tmax, 2df lag	4320.91
NS equal knots for exposure-response, 2df tmax, 2df lag	4326.68
NS equal knots for exposure-response, 4df tmax, 2df lag	4331.27
NS equal knots for exposure-response, 3df tmax, 2df lag	4328.83
NS equal knots for exposure-response, 3df tmax, 3df lag	4332.39
BS knots placed at 10, 50, 90th percentile for tmax, 4df for lag (2df for lag were too few)	4340.54