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Supplementary table 1: Description of articles included in the additional secondary analysis

Reference	Country of research	Location and period	Study aim / objective	Study population and sample	Temperature variable	Outcome measure	Methodology	Seasonality and lag effects	Study outcomes	Sub-group analysis
Asamoah et al.[1]	Ghana	Ghana 2004-2007	To use an existing maternal health database to test the hypothesis that maternal heat exposure during pregnancy in hot regions is associated with increased prevalence of spontaneous abortions or stillbirths, and to develop an analytical strategy to use existing data from maternal health surveys and existing data on historical heat levels at a global grid cell level.	1136 women with pregnancy experiences between 2004 and 2007, out of which 141 cases had a pregnancy that terminated in miscarriage or stillbirth.	Wet-bulb globe temperature (WBGT).	Miscarriage and stillbirths	Cross-sectional	Not applicable	Using the yearly WBGT averages, the crude odds ratio indicated a 15% increase (OR 1.15, 95% CI 0.92–1.42) in the odds of having an adverse pregnancy outcome (stillbirth or miscarriage) with each additional degree increase in atmospheric heat exposure level, although this was not statistically significant.	Women resident in rural areas have reduced likelihood of adverse pregnancy outcomes related to miscarriage or still birth
Amegah et al.[2]	Sub-Saharan Africa	Relevant literature on PubMed, Scopus and Ovid Medline till December 2014	To systematically review all studies investigating temperature variability and non-vector borne morbidity and mortality in SSA to establish the state and quality of available evidence, identify gaps in knowledge, and propose future research priorities.	Not applicable	Ambient temperature	Morbidity and mortality	Systematic review	Not applicable	Moderate evidence exists to associate temperature variability with cholera outbreaks, cardiovascular disease hospitalization and deaths, and all-cause deaths in the region.	The quality of evidence on child undernutrition is low, and for diarrhoea occurrence, meningitis, Ebola, asthma and respiratory diseases, and skin diseases, very low.
Paz[3]	Multi-country	Uganda, Kenya, Rwanda, Burundi, Tanzania, Malawi, Zambia, and Mozambique, 1971-2006	Analyse the possible association between the cholera rates in southeastern Africa and the annual variability of air temperature and sea surface temperature (SST)	8 country cholera cases (actual number unreported)	Ambient (air) temperature	Cholera cases	Time series	Lag effects, no seasonality reported	Associations have been found between the annual increase of the air temperature and cholera incidence increase. Linkages have been detected having exp(b1) = 1.87 (P = 0.18) for the current year and exp(b1) = 2.78 (P = 0.03)—the impact of the previous year. This means that when, in a	

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									specific year, the annual mean air temperature increases by 0.1°C, the expected annual number of cholera cases will be multiplied by 1.87 for that year and by 2.78 for the previous year.	
Dukić et al.[4]	Ghana	Navrongo, 1998-2008	Assess the association between number of reported meningitis cases and relative humidity, rain sunshine, wind, maximum and minimum temperature adjusted for air quality	Unreported	Ambient temperature	Laboratory confirmed meningitis cases	Modelling	Included both seasonality and lag effects	For every °C increase in monthly average maximum temperature, the log of the mean number of meningitis cases increases by 0.181—or equivalently, the mean number of cases increases approximately by 20 %. Consequently, a 10 °C increase in the monthly average maximum temperature is associated with the 6-fold increase in the mean monthly number of meningitis cases.	
Trærup et al.[5]	Tanzania	Nationwide, 1998-2004	To estimate the relationship between climate variables and cholera in Tanzania and use the results for projections of future burden cholera attributable to climate change by 2030	Unreported	Ambient temperature	Cholera cases	Time-series	Lag effects, no seasonality reported	Cholera cases are positively correlated with minimum temperature, maximum temperature and their one-month lags. For a 1-°C temperature increase the initial relative risk of cholera increases by 15 to 29 %.	
Oloukoi et al.[6]	Nigeria	Oke-Ogun, 2008-2009	To investigate the perceived and observed trends of associated health risks with seasonal climate variability and identify types of and preference for adaptation available at household and community levels.	397 households	Ambient temperature	Skin diseases, malaria and fever	Correlational study encompassing a household survey	Seasonality, no lag effect reported	From the survey and the FGDs analysis, severe heat during the dry season was linked to prevalence of skin diseases, malaria and fever	
McMichael et al.[7]	South Africa	Cape Town, 1996-1999	To characterise systematically the patterns of temperature related mortality in populations from 12 cities in low-and middle-income countries in order to describe current	Unreported	Ambient temperature	All-cause mortality	Time series	Included both seasonality and lag effects	Temperature threshold for heat related mortality was 17 °C (95% CI: 15, 22). Percentage increase in mortality for each 1 °C increase in temperature above the temperature	

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			vulnerability to heat and cold effects.						threshold was 0.47 (95% CI: −0.31 to 1.24).	
Chang et al.[8]	Multi-country	Kenya, Zambia and Zimbabwe 1989-1995	To examine the relationship between variation in three climatic variables and risk of hospitalization for venous thromboembolism (VTE), arterial stroke, and acute myocardial infarction (AMI)	Women aged 15–49 years experiencing cardiovascular events 153, 199 and 4 cases of VTE, AS and AMI	Ambient temperature	Venous Thrombo-embolism (VTE), arterial stroke (AS) and acute myocardial infarction (AMI) cases	Time series	Included both seasonality and lag effects	IRRs for 5 °C change in mean temp. Kenya: VTE, 0.43 (95% CI: 0.14, 1.27); stroke, 0.65 (95% CI: 0.11, 3.89) Zambia: VTE, 1.16 (95% CI: 0.21, 6.47); stroke, 0.89 (95% CI: 0.45, 1.75) Zimbabwe: VTE, 0.70 (95% CI: 0.49, 1.01); stroke, 0.91 (95% CI: 0.62, 1.34). Estimates: VTE, 0.69 (95% CI: 0.49, 0.96); stroke, 0.89 (95% CI: 0.64, 1.24); AMI, 0.96 (95% CI: 0.04, 21.2)	
Jankowska et al.[9]	Mali	Nationwide, 1960-2009	To examine potential relationships between climate change and malnutrition and climate change in Mali and speculate where future climate change could impact malnutrition.	407 DHS clusters with 14 238 children	Ambient temperature	Child under nutrition, stunting, anaemia and underweight	Cluster analysis-modelling	Seasonality, no lag effect reported	Temperature increases of >1.0 °C for the Sudan-Niger-Mali arc during the period and is equal to or greater than the inter-annual standard deviation of 0.65 °C. Combined temperature and precipitation (PPET) index b−100 zone was associated with stunting (β = −0.165, p b 0.001), underweight (β = −0.159, p b 0.001) and anaemia (β = −0.149, p b 0.01) for all clusters.	
Grace et al.[10]	Nationwide	Kenya 2008 DHS data	To determine if climate variables are related to rates of childhood stunting in Kenya	320 clusters consisting of 2255 children aged 1–5 years	Ambient temperature	Child stunting-	Cluster analysis	Seasonality, no lag effect reported	Temperature has no impact on child stunting variation (β = −0.0385, p N 0.1 for average temperature, and β = 0.0878, p N 0.1 for temperature variability)	
Bandyopadhyay et al.[11]	Multi-country	Benin, Cameroon, Ghana, Kenya, Madagascar, Malawi, Mali, Rwanda, Niger, Tanzania, Togo, Uganda, Zambia and Zimbabwe Varied-1991-2000	To explore how rainfall and temperature variation, in their seasonal context, affect the prevalence of diarrhoea in particular sub-national regions in Africa	Children under the age of 3 years Number unreported	Ambient temperature	Diarrhoea	Time series	Included both seasonality and lag effects	Temperature was statistically associated with diarrhoea prevalence. A 1°C increase in average max temp leads to 1% increase in diarrhoea prevalence (β = 1.039, p b 0.01), while a 1°C increase in average mean monthly temp reduces diarrhoea prevalence by 0.7%. (β = −0.460, p b 0.05).	

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Ahmadalipour and Moradkhani[12]	Multi-country	North African countries in the MENA region	To investigates the impacts of global warming on the mortality risk of people over 65years of age caused by extreme high temperatures.	Elderly above the age of 65 years	Ambient temperature	Mortality	Modelling	Unreported	The highest mortality risk is found in the areas of western Africa below the Sahara. Even if the future global temperature increase is limited to 2°C (RCP4.5), heat related mortality risk in western Africa will be about 10 times higher than that of the historical period. However, following a business-as-usual scenario (RCP8.5), the mortality risk ratio for the same region will be about 30 times higher than the historical risk.	
Wells and Cole[13]	Multi-country	Included 40 African countries	To consider the hypothesis that environmental heat load and birth weight are associated using data from a wide range of populations	Populations in report selected if >200 individuals and temperature data provided	Ambient temperature	Birth weight	Time series		Annual heat index (0-4), drawn from monthly discomfort ratings using temperature and humidity data. Simple linear regression weight (gm) and heat index r=-0.59 (P<0.001). Analysis with 108 populations with full data: 1 unit rise in heat index birth weight decreases 2.7% (P=0.002). Linear relationship	
Green et al.[14]	Multi-country	Included 10 Countries in Sub Saharan Africa and 8 in MENA region	To gather the existing evidence within the literature related to the impact of temperature on human health, specifically in low- and middle-income countries	Not applicable	Heat waves and ambient temperature	Morbidity and mortality	Systematic review	Not applicable	Most studies found a positive association between heat and morbidity/mortality, and only nine (6.2%) either found no association or a negative association between the heat exposure and the health outcome of interest.	It was also generally found that the elderly, women, and those with low socio-economic status were more vulnerable to heat effects.
Burkat et al.[15]	Multi-country	Burkina Faso, Senegal, Tanzania, Kenya, Gambia, Ghana, Nigeria	To identify relevant research studies on seasonal and meteorological effects in the tropics, extracting and synthesizing respective information thus elucidating cause and effect chains.	Not applicable	Ambient temperature	Mortality	Systematic review	Not applicable	Studies conducted in sub-Saharan Africa demonstrated a dominance of heat effects. Heat-related mortality was observed in Burkina Faso, Ghana and Kenya while cold-related mortality was not significant.	

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MacVicar et al.[16]	Uganda	Bwindi Community Hospital, Kanungu District 2012-2015	To examine associations between meteorological factors and birth weight, identify the highest-risk period for exposures during pregnancy and compare effects of exposures on birth weight in Indigenous and non-Indigenous mothers.	3619 women and 3197 hospital birth records	Ambient temperature	Birth weight	Population registry	Seasonality, no lag effects reported	A 1°C increase in mean temperature, BW increased 41.8g in 3rd trimester (95%CI=0.64, 82.92). Other trimesters NS, low point estimates. Entire pregnancy changes a 1°C temperature=26.03 (-95%CI=35.33, 87.40). Driest season (June-Aug), 1°C increase in mean temperature in 3rd trimester =123.06g rise (95%CI=18.95, 227.18; P<0.05). Rainy season (Sept.-Nov) 98.37gm rise per 1°C (95% CI =23.04, 173.7; P<0.05). Other seasons NS.	Higher effects of heat in vulnerable indigenous population. No interaction between sex and temperature
Grace[17]	Multi-country	Burkina Faso, Central African Republic, Ethiopia, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, Zambia, Zimbabwe (19 countries)	To examine relationships between birth weight, precipitation, and temperature in African countries			Birth weight	Time-series		Change in weight (gm) per day >100°F. 3 months pre-conception -0.45 (P<0.1), 1st trimester -0.71 (P<0.01), 2nd trimester -0.85 (P<0.001), 3rd trimester -0.24 (NS). Larger estimates with temperature threshold >105°F. LBW rise with temperature. Regression coefficient for LBW with n days >100°F 3 months preconception -0.17 (NS), 1st trimester -0.20 (P<0.1), 2nd trimester -0.33 (P<0.01), 3rd trimester -0.17 (NS). Also, significant findings with days above 105°F	

Supplementary table 2: Description of articles included in the systematic review

Reference	Country of research	Location and period	Study aim / objective	Study population and sample	Temperature variable	Outcome measure	Methodology	Seasonality and lag effects	Study outcomes	Sub-group analysis
Azongo et al.[18]	Ghana	Kasene-Nankana District, 1995-2010	Assess association of daily temperature and precipitation with daily mortality by age and sex	31 144 deaths	Ambient temperature	All-cause mortality	Time series	Included both seasonality and lag effects	A statistically significant association of mean daily temperature with mortality at lag days 0-1 was observed below and above the 25th (27.488°C) and 75th (30.688°C) percentiles (0.19%; 95% confidence interval CI: 0.05%, 0.21%) and (1.14%; 95% CI: 0.12%, 1.54%), respectively for all populations. In addition, a statistically significant association of mean daily temperature above 75th percentile at lag days 2-6 and lag days 7-13 (0.32%; 95% CI: 0.16%, 0.25%) and (0.31% 95% CI: 0.14%, 0.26%), respectively was observed.	The elderly and young children were more susceptible to short-term temperature-related mortality.
Kynast-Wolf[19]	Burkina Faso	Kossi Province, 1999-2003	Evaluate seasonal patterns of cardiovascular disease mortality of adults	11 174 adults aged 40 and above	Ambient temperature	Cardiovascular disease mortality	Modelling	Seasonality, no lag effects	Cardiovascular deaths were higher during the hot dry season (March to May). Cardiovascular mortality was stronger among people older than 65 years (P = 0.05) and it peaked at the beginning of May.	Mean monthly temperature was significantly associated with mortality amongst the elderly (65 years plus)
Wichmann[20]	South Africa	Cape Town, Durban and Johannesburg 2006-2010	Investigate the association between daily apparent temperature and daily all-cause mortality	Over 460 000 deaths across the 3 cities	Ambient temperature	All-cause mortality	Case-crossover	Lag effects, no seasonality reported	The strongest association between all-cause mortality and apparent temperature (TAPP) for all ages combined was found in Cape Town-- 3.3% increase in mortality per IQR increase in Tapp (lag0-1) (3 °C) above the city-specific threshold (18.6 °C). An increase in Tapp (lag0-1) above the city-specific thresholds was insignificantly associated with 2.6% and 2.8% increase in all-cause non-accidental mortality in Durban and Johannesburg. The meta-analysis indicated an overall significant increase of 0.9% in all-cause mortality per 1 °C increase in Tapp (lag0-1) for all age groups combined in the three cities. This translates to 2.7% (95% CI: 1.2–4.2) per IQR increase in Tapp (lag0–1) (3 °C). In the meta-analysis for the ≥65-year group, a significant increase of 2.1% in mortality was observed, which translates to 6.5% (95% CI: 0.5–12.8) per IQR increase in Tapp (lag0-1) (3 °C).	A stronger association was observed in the ≥65-year group in Cape Town, namely 6.5% increase in mortality. Women in the ≥65-year group in Cape Town were significantly more vulnerable than men in this age group. No vulnerable groups were identified in Durban. A stronger association was observed in the ≥65-year group in Johannesburg, namely 10.1% increase in mortality per IQR increase in Tapp (lag0-1) (2 °C) above the city-specific threshold (18.7 °C). Women ≥65 in Johannesburg appeared to be more vulnerable than men in this age group.

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Mrema et al.[21]	Tanzania	Rufiji District, 1999-2010	Assess association between monthly weather on all-cause mortality by age and determine differential susceptibility by age groups	10 116 deaths	Ambient temperature	All-cause mortality	Time-series	Included both lag effects and seasonality	There is a linear temperature-mortality relationship across lags. Negative temperature-mortality association was observed below the threshold temperature of 26°C and 27° C across all ages. Monthly average temperature was associated with all-cause mortality in all age groups. A decrease in temperature to 24 °C from the threshold is associated with an increased in mortality by 80.7%, 65.7% and 74% in age groups 0-4, 5-59, and over 60, respectively. The effects of monthly mean temperature on all-cause mortality are significant at lag 2 in age group 5-59. There are no strong lag effects on the association between mean temperature and mortality in age group 60 years and above	Younger age groups and the elderly population are more susceptible to the Influence of monthly weather.
Thompson et al.[22]	South Africa	Musina, Makhado, Polokwane, Tzaneen Bela Bela municipalitie 1999-2010	Examine the impact of climate change on children's health in five municipalities in Limpopo Province	Children aged 0 to 13 years, 7869 cases	Ambient temperature	Morbidity and mortality	Correlational	Unreported	No temperature data available for Makhado Municipality. The R coefficient of variations for each of the cities are 0.50, 0.56, 0.48, and 0.02 respectively for Bela-Bela, Tzaneen, Mussina and Polokwane. The corresponding R coefficients for minimum temperature are 0.004, −0.383, −0.004 and 0.135. Therefore, while maximum temperature tends to increase during the 21-year period, minimum temperature shows a decrease over the same period, thereby indicating tendency towards local warming which is a possible consequence of climate change in the province. The most prevalent diseases in the study area are diarrhoea (42.4%), respiratory infection (31.3%), asthma (6.6%), malaria (6.5%) and meningitis (4.5%). There is also a significant presence of measles (2.4%).	More than half of the children who suffered from climate change related disease were males (54.7%). Also, male children had higher proportion, notably 52.8%, 54.6%, 55.9%, 54.9% and 62%, respectively, for diarrhoea, respiratory infection and malaria. The observed sex variation in incidence of disease is statistically significant, with a p-value of 0.00. This implies that male children are more susceptible to climate change related diseases than their female counterparts. Young children between ages of 1 and 2 are also more susceptible to indoor related diseases.

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Diboulo et al.[23]	Burkina Faso	Nouna, 1999-2009	Study the association between weather patterns and daily mortality in Nouna Health and Demographic Surveillance System (HDSS) area	7402 deaths	Ambient temperature	All-cause mortality	Time-series	Seasonality, no lag effects reported	An approximate linear significant increase with increasing temperature in lag 0-1, and a slightly decreasing mortality (but not significantly) in lag 2-6, and lag 7-13 was estimated for all age mortality. The increase in mortality in lag 0-1 corresponds to an approximate 50% increase in mortality over the range of temperature. The analysis using smooth curves show approximate linear relationships overall. As linear estimates the group of all-ages appear to experience significant elevated risks to temperature increases in lag 0-1 only. This association is particularly apparent in the age group of 0-4.	The short-term direct heat effects lag 0-1 was particularly strong among the younger population, but also apparent in all ages. Childhood mortality seems to be most affected by high temperature and children suffer the most from extreme heat conditions resulting from climate change.
Egondi et al.[24]	Kenya	Korogocho and Viwandani, Nairobi 2003-2008	Describe the relationship between and mortality and evaluate the relationship by cause of death, age and sex	60 146 individuals; 2512 deaths	Ambient temperature	All-cause mortality	Time-series	Included both seasonality and lag effects	A non-linear temperature-mortality relationship was found. Threshold temperature for all-age mortality lies between 18°C and 20°C. The pattern of temperature and mortality association exhibited J-shape for all-ages mortality and U-shape for under-five mortality. At Lag 0-1, a 1 °C increase in temperature above the 75th percentile (threshold = 20 °C) was significantly associated with U5 and non-communicable disease mortality (% change = 1 [95% CI: 0, 2] and 1 [95% CI: 0, 3] respectively). At lag 0-1, a 1 °C decrease in temperature below the 25th percentile (threshold = 17.9 °C) was associated with 3%, 9% and 13% increase in all-cause, 50+ years and acute infections deaths respectively, albeit statistically insignificant.	A significant positive relationship for high temperatures is observed in deaths in the 0-4 age group and among people with NCD.
Scovronick et al.[25]	South Africa	Nationwide-52 districts 1997-2013	To analyse the association of temperature and mortality using a national dataset.	8,814,625 recorded deaths; 8,509,130 records from 52 districts included	Ambient temperature	All-cause mortality	Time-series	Included both seasonality and lag effects	The study found an association between daily maximum temperature and mortality. The relative risk for all age all-cause mortality on very cold and hot days (1st and 99th percentile of the temperature distribution) was 1.14 (1.10,1.17) and 1.06 (1.03,1.09), respectively, when compared to the minimum mortality temperature. This "U" shaped relationship was evident for every age and all-cause group investigated, except among 25–44-year	There was evidence of elevated risks from cardiovascular and respiratory diseases and in the oldest and youngest age groups. There was definitive evidence for heat effect on mortality among infants <5 years.

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									olds. The strongest associations were in the youngest (< 5) and oldest (> 64) age groups and for cardiorespiratory causes. Heat effects occurred immediately after exposure but diminished quickly.	
Alexander et al.[26]	Botswana	Nationwide, 1974 to 2003	Evaluate monthly reports of diarrheal disease among patients presenting at public health facilities and compared this to climatic variables	Diarrheal patients at public facilities, number of cases unreported	Ambient temperature	Diarrheal incidence	Time series	Included both seasonality and lag effects	Minimum temperature has a bidirectional influence on diarrheal case incidence by season. Elevated minimum temperature was positively associated with increased diarrhoea incidence in the dry season (proportion deviation from yearly seasonal mean [Pmy] = 0.074) but negatively associated with diarrhoea in the wet season (Pmy = −0.0071). Increases in maximum temperature are not related to increased diarrhoea prevalence.	
Heunis et al.[27]	South Africa	Cape Town, 1978-1985	Examine the possible effect of short-term temperature changes during winter on cardiovascular disease mortality	Elderly whites and coloureds of 60 years and above	Heat events (extreme cold and hot temperature)	Cardiovascular disease mortality	Cross-sectional	Lag effects, no seasonality reported	There is an association between cold and cardiovascular mortality. Average deaths per day following extreme heat were 8.27 (2.66), 8.97 (2.54), 10.3 (3.13), 8.7 (2.72) and 8.67 (3.10) for lag days 0, 1, 2, 3 and 4, respectively. 2-day lag between occurrence of extremely hot temperatures and CVD mortality was statistically significant (p b 0.1 and 0.005 respectively). The highest mean daily CVD mortality was recorded on days with the largest July temperature range.	
Kovats et al.[28]	South Africa	Cape Town, 1996-1999	Investigate and quantify the effect of daily temperature variability on mortality in order to identify the most vulnerable groups	About 76 000 deaths	Ambient temperature	All-cause and cause-specific, namely cardiovascular, infectious, external and other mortality	Time series	Unreported	Low temperature influenced all-cause mortality. The greatest effects of low temperature were seen for infectious and cardiovascular diseases which increased by 4.42% (95% CI: 3.13, 5.73) and 2.53% (95% CI: 1.25, 3.83) respectively per 1 °C decrease	At a threshold of 15 °C, a 1 °C decrease in temperature resulted in a 3.14% (95% CI: 1.86, 4.43) and 1.77% (95% CI: 0.5, 3.3) increase in deaths among the elderly and children respectively. A small heat effect was apparent in the elderly at daily mean temperatures above 18°C.
Tchidjou et al.[29]	Cameroon	Yaunde, 2007-2007	Investigate the association between climatic factors and Acute Respiratory infections (ARI) in children using data from	1306 children of 18 years and below	Ambient temperature	Acute respiratory infections	Time series	Seasonality, no lag effects reported	Significant associations were seen for maximum (1.94: 1.34, 2.81) and minimum temperatures (0.72: 0.59, 0.87). When malaria cases were excluded, the results were Tmax IRR = 1.43 (95% CI: 1.12, 1.84), Tmin IRR = 0.84 (95% CI: 0.74, 0.95)	Weather associated ARI affects children under 18 years of age.

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			Chantal Biya Foundation paediatric hospital							
Reyburn et al.[30]	Tanzania	Unguja, Zanzibar, 2002-2008	Examine the association between climate variability and cholera outbreaks and develop a climate-based forecasting model for cholera in Zanzibar	3245 cholera cases	Ambient temperature	Cholera outbreaks	Time series	Included both seasonality and lag effects	The results of the cross correlations using seasonal differencing of the data showed that cholera outbreaks were significantly positively associated (P < 0.05) with minimum temperature at lags of 2 and 4 months negatively associated with maximum temperature at a lag of 2 months. An increase of 1°C in minimum temperature at a 4-month lag resulted in a 2-fold increase of cholera cases.	
Fernández et al.[31]	Zambia	Lusaka, 2003-2006	Describe the evolution of cholera epidemics in Lusaka between 2003-2006 and explain the association with daily maximum temperature and rainfall	13 069 quarantined cholera patients	Ambient temperature	Cholera outbreaks	Time series	Included both seasonality and lag effects	The results showed a statistically significant association between the increase in the number of cases and the increase in temperature 6 weeks earlier. A 1 °C rise in temperature 6 weeks before the onset of the outbreak explained 5.2% [relative risk (RR) 1.05, 95% CI 1.04—1.06] of the increase in the number of cholera cases (2003—2006). The attributable risks for temperature were 4.9%.	
Ng et al.[32]	Multi-country	Guinea, Gabon, South Sudan, Uganda, DRC, 1976-2014	Investigate association between Ebola virus disease outbreak and climatic conditions in Africa	28 reported Ebola virus outbreaks	Ambient temperature	Ebola virus disease outbreaks	Time series with DLNM-Modelling	Lag effects, no seasonality reported	Lower temperatures were found to log-linearly associate with increased risk of human EVD outbreak onset during each month in the lag periods. Cumulative ORs of EVD outbreaks associated with deviations (−1, −2 and −3 °C) from the mean monthly temperature were all statistically significant with a consistent dose-response relation across the entire lag period ranging from 1.20 to 1.71, 1.43 to 2.93, and 1.71 to 5.00 for the same, first and second month, respectively.	
Bunker et al.[33]	Ghana	Nouna, Kossi Province 2000-2010	Investigate the association of heat exposure on years of life lost from non-communicable diseases	18 367 NCD-YLL corresponding to 790 NCD deaths	Ambient temperature	Non-communicable diseases-years of life lost	Time series	Included both seasonality and lag effects	Moderate 4-day cumulative rise in maximum temperature from 36.4°C (50th percentile) to 41.4°C (90th percentile) resulted in 4.44 (95% CI 0.24 to 12.28) excess daily NCDYLL for all ages, rising to 7.39 (95% CI 0.32 to 24.62) at extreme temperature (42.8°C; 99th percentile). The strongest health effects manifested on the day of heat exposure (lag 0), where 0.81 (95% CI 0.13 to 1.59) excess mean NCD-YLL occurred daily at 41.7°C compared with 36.4°C, diminishing in statistical significance after 4 days.	The effects of heat on NCD-YLL were greater in men in comparison to women. At lag 0, daily excess mean NCD-YLL were higher for men, 0.58 (95% CI 0.11 to 1.15) compared with women, 0.15 (95% CI −0.25 to 9.63) at 41.7°C vs 36.4°C.

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Egondi et al.[34]	Kenya	Korogocho and Viwandani, Nairobi, 2003-2012	Analysed the effect of temperature on years of life lost due to all-cause mortality	66 000 individuals, 4671 deaths	Heat events (heat waves and cold spells)	Years of life lost, all-cause mortality	DLNM-Modelling	Lag effects, no seasonality reported	There were no heat effects on all-cause YLL in Nairobi, Kenya. The exposure-response curve between temperature and YLL was J-shaped, with the minimum mortality temperature (MMT) of 26 °C. An average temperature of 21 °C compared to the MMT was associated with an increase of 27.4 YLL per day (95% CI, 2.7–52.0 years). However, there was no additional effect for extended periods of cold spells, nor did we find significant associations between YLL to heat or heat waves.	
Musengimana et al.[35]	South Africa	Cape Town Metropolitan area November 2012 to May 2013 and November 2013 to May 2014	To explore the possible association between temperature variability and the high incidence of acute diarrhoea in Cape Town	58 617 diarrhoea cases in children under five	Ambient temperature	Diarrhoea incidence	Time series with mathematical modelling	Included both seasonality and lag effects	The mixed effect over dispersed Poisson model showed that a cluster adjusted effect of an increase of 5 ℃ in minimum and maximum temperature results in a 40% (Incidence risk ratio IRR: 1.39, 95% CI 1.31–1.48) and 32% (IRR: 1.32, 95% CI: 1.22–1.41) increase in incident cases of diarrhoea, respectively, for the two periods studied. Autocorrelation of one-week lag (Autocorrelation AC 1) indicated that a 5 ℃ increase in minimum and maximum temperature led to 15% (IRR: 1.46, 95% CI: 1.09–1.20) and 6% (IRR: 1.06, 95% CI: 1.01–1.12) increase in diarrhoea cases, respectively.	Children under five years are affected by diarrhoea
Horn et al.[36]	Mozambique	National 1997-2014	To investigate the associations between temperature and diarrhoeal disease	7 315 738 total diarrhoea cases from 141 districts over 18 years	Ambient temperature	Diarrhoea incidence	Time-series	Included both seasonality and lag effects	The national estimate was that a 3.64% (95% CI: 3.35, 3.93) increase in diarrheal disease for each 1 °C increase in the hottest day of the concurrent week. Regionally, each 1°C increase in maximum temperature was associated with a 1.45% (95% CI: 0.77, 2.13), 1.87% (95% CI: 1.44, 2.30), 5.74% (95% CI: 5.18–6.29), and 2.15% (95% CI: 1.51, 2.80) increase in diarrheal disease in the northern, central, coastal, and southern regions, respectively	
Thiam et al.[37]	Senegal	Mbour Health District January 2011 to December 2014	To statistically assess the relationship between diarrhoea incidence and daily land surface temperature (LSTDay) and night land surface temperature (LSTNight), average temperature	23 385 diarrhoea child visits in 24 health facilities over 4 years	Ambient temperature	Diarrhoea incidence	Time-series	Included both seasonality and lag effects	The unadjusted analysis revealed significant positive associations between diarrhoeal cases and LSTDay, average LST, LST variability. A very high LST Day ≥ 36 ℃, average LST ≥ 28 ℃ and high LST variability ≥12 ℃ were significantly associated with higher number of monthly diarrhoeal cases (+25–95%). The	Children under five years are affected by diarrhoea

Reference	Country of research	Location and period	Study aim / objective	Study population and sample	Temperature variable	Outcome measure	Methodology	Seasonality and lag effects	Study outcomes	Sub-group analysis
			(LST), temperature variability (defined as the difference between temperature LSTDay and LSTNight),						unadjusted analysis revealed that moderate LST Night at lag 0 showed a significant positive association with diarrhoeal incidence. The results from the lagged models showed a significant negative association between diarrhoeal incidence and high average LST ≥ 26 ℃ (IRR: 0.70, 95% CI: 0.58–0.86) and LST Night ≥ 18 ℃ at one-month lag. In the multivariable analysis, association of diarrhoeal incidence with higher levels of LSTDay, LST Night and average LST of the same month (Table 6 and Table S2, respectively) were positive, while we did not find any evidence of an association. High LSTDay ≥32 ℃ and high LST ≥ 26 ℃ showed a significant negative association with diarrhoeal incidence of the following month (IRR: 0.78, 95% CI: 0.66–0.91; IRR: 0.76, 95% CI: 0.66–0.87, respectively). The corresponding results for LST Night were even stronger. Compared to the lowest level, all other levels of LST Night were associated with significantly lower diarrhoeal incidence in the following month.	

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