

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
1	35516	11	0	0	0	0	I would like to direct the authors to a book that Merrill Singer, also an IPCC Expert Reviewer, and I published in 2009 and which was favourably reviewed in Health Sociology Review by Tony McMichael, a world renowned pioneer on climate change and health who is cited in this chapter. In Global Warming and the Political Ecology of Health, we employ the concept of eco-syndemic in analysing the impact of global warming or climate change on health (Baer and Singer 2009). First of all, syndemic, a term which is now widely use in the public health literature as well as by the Centers for Disease Control in the United States, refers to adverse interactions between two or more diseases or other health-related conditions (e.g., stress, malnutrition), often promoted by social inequality and subordination, that increase the total disease burden in a population. Furthermore, ecosyndemic refers to disease interactions caused by human restructuring of the environment (e.g., anthropogenic climate change enables vector-borne diseases to spread to new areas and interact with other diseases found in new locations. Given the health consequences of climate change, we can speak of diseases of climate change or global warming. These would not necessarily be new diseases, although they might be, but would include any "tropical" disease (e.g., malaria and dengue fever) that spreads to new places and peoples because of climate change as well as diseases linked to poor nutrition due to desertification of pastoral areas or flooding of agricultural areas". Ecosyndemics are likely to concentrate among the poor and other marginal communities, who are least able to obtain adequate nutrition, sanitation, adequate shelter, low-stress life experiences, and access to preventive and curative health care (Also see Singer 2009:177-196). (Hans Baer, University of Melbourne)	Noted, but not convinced that the new term "ecosyndemics" warrants inclusion
2	35517	11	0	0	0	0	would not necessarily be new diseases, although they might be, but would include any "tropical" disease (e.g., malaria and dengue fever) that spreads to new places and peoples because of climate change as well as diseases linked to poor nutrition due to desertification of pastoral areas or flooding of agricultural areas". Ecosyndemics are likely to concentrate among the poor and other marginal communities, who are least able to obtain adequate nutrition, sanitation, adequate shelter, low-stress life experiences, and access to preventive and curative health care (Also see Singer 2009:177-196). (Hans Baer, University of Melbourne)	Noted, but not convinced that the new term "ecosyndemics" warrants inclusion. Very unlikely to have entirely new psychiatric disorders, despite an example of 'climate change psychosis' in Melbourne, in which the patient would not drink for fear of using up water. CC is more likely to result in an increase in psychiatric disorders because it will amplify existing risk patterns and exposures. It is for this reason that it does and will affect vulnerable people and places the most.
3	35518	11	0	0	0	0	(e.g., malaria and dengue fever) that spreads to new places and peoples because of climate change as well as diseases linked to poor nutrition due to desertification of pastoral areas or flooding of agricultural areas". Ecosyndemics are likely to concentrate among the poor and other marginal communities, who are least able to obtain adequate nutrition, sanitation, adequate shelter, low-stress life experiences, and access to preventive and curative health care (Also see Singer 2009:177-196). (Hans Baer, University of Melbourne)	Noted, but not convinced that the new term "ecosyndemics" warrants inclusion. Results are speculative.
4	35519	11	0	0	0	0	References for above comments: (Hans Baer, University of Melbourne)	Noted
5	35520	11	0	0	0	0	Baer, Hans A. and Merrill Singer. 2009. Global Warming and the Political Ecology of Health: Emerging Crises and Systemic Solutions. Walnut Creek, CA: Left Coast Press. (Hans Baer, University of Melbourne)	Review paper with out primary data
6	35521	11	0	0	0	0	Singer, Merrill. 2009. Introduction to Syndemics: A Critical Systems Approach to Public and Community Health. San Francisco: Jossey-Bass. (Hans Baer, University of Melbourne)	Noted
7	35765	11	0	0	0	0	It is clear that the incidence of major vector-borne diseases such as dengue and malaria is sensitive to climate via effects on vector abundance and pathogen transmission. It is also clear that there are multiple climate-independent determinants of the risk from these diseases, many of which are based on population vulnerability and the capacity to respond in terms of prevention and control (i.e. to adapt). So there are two problems associated with understanding the effects of climate change on these diseases which are poorly explored in the current text. (Nicholas Ogden, Public Health Agency of Canada)	No change - agree with the statement, but the chapter already acknowledges the importance of factors such as health service performance, housing conditions and literacy in determining a population's vulnerability to climate-sensitive conditions such as malaria
8	35766	11	0	0	0	0	First, only by searching in long, retrospective time series are we going to be able to see the fingerprint of climate change (versus other factors) on the incidence of these diseases. Some studies have been able to associate climate change and vector-borne diseases but these have been vector-borne zoonoses (see below). Also, some studies have identified associations between risk and climate, but in general it is too soon to reasonably expect to be able to show associations between climate change and increasing/changing incidence of these diseases. (Nicholas Ogden, Public Health Agency of Canada)	Agree with the statement. The point about time scales is accepted, and the new version of the chapter aims to be more explicit about the challenges of detection and attribution
9	35767	11	0	0	0	0	Second, identifying effects of climate rather than socio-economic factors (I include in this prevention and control efforts) is difficult so we would not expect to be able to identify effects of climate change on these diseases at present. What has been missing from many assessments in the past has been that while there may be direct effects of climate and climate change on the ecology of these diseases, there have been few efforts to assess the effects of climate change on those socioeconomic factors that constrain malaria and dengue (as much as the direct biological effects) as have been discussed by critics of previous assessments (Reiter 2001; 2008; Reiter et al., 2004). For example, most sub-saharan African economies are agriculture-based and are likely to be negatively affected by climate change (see Africa regional section). This will have knock-on effects: i) local incidence of vector-borne disease will likely rise (due to increased abundance of infected vectors and decreased capacity for control efforts); ii) people will migrate as economic migrants or disaster refugees and have the propensity to spread the diseases across the globalised world (as described in Reiter 2001 for malaria spread by migrants into northern Russia, and as happened recently with Chikungunya: Angelini et al., 2008); iii) climate change will increase the possibility for migrant-spread vector-borne diseases to be transmitted and maintained in parts of the world where they are currently considered exotic (Berrang-Ford et al., 2009). These latter effects can be very significant as the case-fatality rate can be very high for vector-borne disease in regions where they are currently exotic (Berrang-Ford et al., 2009). (Nicholas Ogden, Public Health Agency of Canada)	An important point: climate change may affect the risk of VBDs and other conditions following "upstream" impacts such as economic disruption and displacement of populations. This is already mentioned in the FOD - will strive to emphasize the point more effectively in the SOD.

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10	35768	11	0	0	0	0	The effect of climate change on zoonoses is a paradigm for One Health, and these two words are not mentioned at all. Clearly climate change is an environmental change that is going to affect human health by direct and indirect effects on wild and domesticated animal health and diseases and this is completely lacking from the report. The section on vector-borne diseases focusses on human-to-human transmitted mosquito-borne diseases, with a small section on tick-borne diseases, but completely ignores the plethora of vector-borne zoonoses across multiple continents (ranging from west Nile virus, Eastern & Western & Venezuelan Equine Encephalitis viruses, LaCrosse virus, Powassan virus, Japanese Encephalitis, Rift Valley Fever, Chagas, Plague, Tularaemia, Leishmaniosis to Crimean Congo Haemorrhagic Fever, Babesiosis, Anaplasmosis, Ehrlichiosis, Rickettsiosis, Ross River etc etc). Individually these diseases are not comparable to the big two/three but together they comprise a significant impact on human health and are likely going to be impacted by climate change in a very significant way, particularly as many are maintained in natural transmission cycles that are much less impacted or controlled by those socioeconomic (prevention and control) drivers that determine geographic and temporal occurrence of malaria and dengue risk. Thus the risk from these diseases is much more likely to change due to direct effects of climate change on the ecology of their transmission amongst their wild animal hosts and their vectors, than is the risk from human-to-vector-to-human transmitted diseases such as malaria. (Nicholas Ogden, Public Health Agency of Canada)	Noted, but the FOD already includes discussion of selected zoonoses (eg Ross River Virus). No stronger statement is made because there is no conclusive primary data set to support this concept, in our view. By the time the sixth report is prepared there should be more evidence to support this concept.
11	35769	11	0	0	0	0	Individually the risk from these diseases will change with climate change in time and space in an idiosyncratic fashion that awaits further elucidation of their ecology and understanding of effects of climate and climate change. (Nicholas Ogden, Public Health Agency of Canada)	Agree. See response to comment 10.
12	35770	11	0	0	0	0	In general though climate change is a huge environmental change that will impact the emergence and re-emergence of zoonoses whether or not they are vector-borne, and some of these events may have effects on human populations that range from the banal to the profound. While variable climate and climate extremes may drive re-emergence epidemics of flood-borne zoonoses such as leptospirosis (Vijayachari et al., 2008) and vector-borne zoonoses such as WNV (Artsob et al., 2009), climate change is likely to drive the emergence of new pathogens or new variants of pathogens by altering the environmental landscape of transfer of genetic material and pathogen fitness. For example, at the 'profound' end of the scale, climate change may alter the opportunities for, and processes of, genetic reassortment of influenza viruses that may give rise to pandemic strains of influenza by changing bird migration patterns and the patterns of exchange of wild animal viruses with those maintained by humans and livestock (Shaman & Lipsitch 2012). (Nicholas Ogden, Public Health Agency of Canada)	References noted. More primary data are required, rather than speculative inferences.
13	35771	11	0	0	0	0	Consequently, while it may in general be correct to say that "The most important effect of climate change is to multiply current risks to health" the AR4 assertion that "Climate change does not create new diseases.." is likely incorrect. (Nicholas Ogden, Public Health Agency of Canada)	Agree - we do not rule out the emergence of novel pathogens.
14	35772	11	0	0	0	0	Also lacking in the human health section is a crosswalk to animal diseases (vector-borne or otherwise) and their impact indirectly on human health via economic and food security effects (please see recent World Bank report on this). (Nicholas Ogden, Public Health Agency of Canada)	Animal health is not the subject of this chapter: there are many possible causes of poverty and food insecurity (which are covered here as sources of vulnerability of human populations to climate-related threats to health). More primary data is required to support this "multiplier effect" concept.
15	35773	11	0	0	0	0	There are multiple typos that need addressing and I will do this if the section is not going to be dramatically changed from its current form. (Nicholas Ogden, Public Health Agency of Canada)	Editing undertaken.
16	35774	11	0	0	0	0	Angelini P, Macini P, Finarelli AC, Pol C, Venturelli C, Bellini R, Dottori M. Chikungunya epidemic outbreak in Emilia-Romagna (Italy) during summer 2007. (2008) Parassitologia. 50, 97-98. (Nicholas Ogden, Public Health Agency of Canada)	Noted
17	35775	11	0	0	0	0	Artsob H, Gubler DJ, Enria DA, Morales MA, Pupo M, Bunning ML, Dudley JP. (2009) West Nile Virus in the New World: trends in the spread and proliferation of West Nile Virus in the Western Hemisphere. Zoonoses Public Health. 56, 357-369. (Nicholas Ogden, Public Health Agency of Canada)	Noted
18	35776	11	0	0	0	0	Berrang-Ford L, Maclean JD, Gyorkos TW, Ford JD, Ogden NH. (2009) Climate change and malaria in Canada: a systems approach. Interdiscip Perspect Infect Dis 385487. Epub 2009 (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks
19	35777	11	0	0	0	0	Shaman J, Lipsitch M. (2012) The El Niño-Southern Oscillation (ENSO)-pandemic Influenza connection: Coincident or causal? Proc Natl Acad Sci U S A. Jan 17. (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks
20	35778	11	0	0	0	0	Reiter P. (2008) Climate change and mosquito-borne disease: knowing the horse before hitching the cart. Rev Sci Tech. 27(2):383-98. (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks
21	35779	11	0	0	0	0	Reiter P. (2001) Climate change and mosquito-borne disease. Environ Health Perspect. 109 Suppl 1, 141-161. (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks
22	35780	11	0	0	0	0	Reiter P, Thomas CJ, Atkinson PM, Hay SI, Randolph SE, Rogers DJ, Shanks GD, Snow RW, Spielman A. (2004) Global warming and malaria: a call for accuracy. Lancet Infect Dis. 4, 323-324. (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks
23	35781	11	0	0	0	0	Vijayachari P, Sugunan AP, Shriram AN. (2008) Leptospirosis: an emerging global public health problem. J Biosci. 33, 557-569. (Nicholas Ogden, Public Health Agency of Canada)	Noted with thanks

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24	37303	11	0	0	0	0	The executive summary (page 3, lines 13-14) refers to the potential health impacts from migration due to extreme events, such as droughts. However, the chapter never really explores this topic. This omission is striking, given that historically the greatest mortality and morbidity during and after extreme weather and climate events has arisen from abrupt rural-to-urban migration and the resulting spread of epidemic diseases, particularly where social services have been overly concentrated in urban areas. For an excellent comparative, quantitative historical case study see Post, John D. Food Shortage, Climatic Variability, and Epidemic Disease in Preindustrial Europe. Ithaca: Cornell University Press, 1985. This historical dynamic seems particularly pertinent to developing countries already struggling with rapid migration and large disparities between rural and urban social services. (Samuel White, Oberlin College)	Noted - recent references on migration and health are included
25	37554	11	0	0	0	0	I find the health section very deficient in terms of the potential effects of climate change on vector-borne and zoonotic infectious diseases. In part this is due to a very linear approach to accounting only for a very limited range of known direct effects of climate on these diseases. Clearly vector-borne disease has been a contentious area for the IPCC report in previous iterations, but that should not prevent pragmatic, informed and intelligent qualitative analyses of the potential effects of climate change on risk to the global public from emergence and re-emergence of vector-borne and zoonotic diseases. (Nicholas Ogden, Public Health Agency of Canada)	New text included on VBDs. We use an evidence based approach rather than report of climate and disease without strong evidence. By the time the 6th report is prepared these zoonotic diseases etc may have the required evidence for inclusion.
26	37736	11	0	0	0	0	The chapter seems to focus in many places on "disease and injury", with the implication that death/mortality is not a consideration. Just a couple of examples include the Section 11.2.2 and 11.2.3 headings. Where relevant, such as for those two sections, it would be better to start the titles with (and frame the associated assessment around) "Disease and death" or "Morbidity and mortality". The latter pair are correctly used, for example, on Page 4, line 34, and, ironically, in the first line of Section 11.2.2. (Paul Beggs, Macquarie University)	not accepted - no change
27	37737	11	0	0	0	0	There are instances of inconsistent use of terminology in the chapter. Just a couple of examples include "...due to..." and then "...resulting from..." in the Section 11.2.2 and 11.2.3 headings respectively, and "...positive outcomes..." and then "...negative effects..." on Page 3, line 28. Other instances will be detailed in my other comments. (Paul Beggs, Macquarie University)	Draft has been edited to deal with these and other infelicities.
28	37738	11	0	0	0	0	The framing of the Section 11.2 subheadings seems inconsistent, with some "disease" focussed (e.g., 11.2.2, 11.2.3, 11.2.4) and some "health" focussed (e.g., 11.2.6, 11.2.7, 11.2.8, 11.2.9). Could the latter be retitled, such as "Malnutrition" for Section 11.2.6, "Occupational Disease" for Section 11.2.7, "Air Pollution" for Section 11.2.8, and "Mental Disease or Illness" for Section 11.2.9? Indeed, this has been done in several corresponding Section 11.5 subheadings: 11.5.1 Malnutrition, 11.5.5 Air Pollution. (Paul Beggs, Macquarie University)	Section 11.2 will be reorganized and the section headings modified
29	37739	11	0	0	0	0	Given this chapter uses the term "Climate Altering Pollutants (CAPs)", I assume this term has officially been adopted by the IPCC for the AR5 and will be used consistently through the reports of WGI, WGII, and WGIII. If so, it should be defined in the IPCC Glossary. There is also some inconsistency in its use in this chapter: see Page 3, line 41 "climate altering pollutants", and Page 4, line 3 "climate active pollutants". (Paul Beggs, Macquarie University)	text altered so that the use of CAP is consistent
30	37762	11	0	0	0	0	The chapter has numerous pre-2006 references. Surely the chapter can be written focussing on research from 2006 onwards and providing context for it if need be without referring to research from the first few years after 2000 or indeed pre-2000 research. Couldn't many of the sections start by providing background and context and referring readers to the equivalent sections in previous Assessment Reports (particularly AR4) for further details and pre-2006 references? (Paul Beggs, Macquarie University)	Pre-2006 reference removed except those that have enduring significance.
31	37793	11	0	0	0	0	Cryptosporidium and cryptosporidiosis do not seem to have been mentioned in the chapter. Is there really absolutely no new research on climate and these? A quick database search for the search terms Cryptosporidium and climate reveals there are many, just two (which refer specifically to climate change) of which are: B. J. KING and P. T. MONIS. Critical processes affecting Cryptosporidium oocyst survival in the environment. Parasitology (2007), 134, 309–323. doi:10.1017/S0031182006001491 and Jyotsna S. Jagai, Denise A. Castronovo, Jim Monchak, Elena N. Naumova. Seasonality of cryptosporidiosis: A meta-analysis approach. Environmental Research (2009) 109:465–478. doi:10.1016/j.envres.2009.02.008 (Paul Beggs, Macquarie University)	There is not space to cover all climate-sensitive infections; we have chosen those that cause the greatest burden of ill-health, are most sensitive to shifts in weather and climate, and illustrate important points about risks under climate change.
32	38032	11	0	0	0	0	The authors did a nice job. The chapter reads quite well. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Thank you.
33	38219	11	0	0	0	0	The chapter mentions increased access to reproductive services. This is important to include but it deserves more attention given the controversial nature of different ethical assessments of contraceptives and abortions. For instance, it might be worth mentioning findings from the American Psychological Association's review of the psychological consequences of abortions It would also be important to delineate that post pregnancy and abortions are included in reproductive services, that cultural factors involving religion, women's rights and rolls, and the value and expectations cultures have about children, etc. (Janet Swim, The Pennsylvania State University)	Balance of section remains - not convinced that there should be changes
34	38224	11	0	0	0	0	The Human Health chapter is a well crafted and assembled chapter that is easy to follow and interpret. It considers important climate-sensitive health outcomes, vulnerability to such health outcomes, current and future impacts of climate change on human health outcomes, as well as implementable adaptation options and opportunities for health co-benefits. (Caradee Wright, Council for Scientific and Industrial Research)	thank you
35	38225	11	0	0	0	0	It makes several important points that are generally the accepted view among the science (public health) community: the number of studies linking climate change and human health is small; it is complicated to find clear-cut associations and / or prove causation for several health outcomes influenced by climate factors given a range of other factors; and there are knowledge gaps in, for example, understanding of the role of non-climatic factors that may modify future climate influences on health outcomes. (Caradee Wright, Council for Scientific and Industrial Research)	no change needed

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36	38226	11	0	0	0	0	The most up-to-date and available literature is applied well and, as is usually the case (and is mentioned in the chapter) there is (sadly) a dearth of information from Africa. (Caradee Wright, Council for Scientific and Industrial Research)	Where possible, information on Africa is included
37	38577	11	0	0	0	0	The importance of infrastructure for health (e.g. clean water) and the vulnerability of infrastructure to climate change deserve mention. (Richard Wright, Retired, U.S. National Institute of Standards and Technology)	Accepted, already included
38	38706	11	0	0	0	0	1. General comment - more discussion on governance as a determinant of vulnerability (and adaptive capacity): The chapter identifies a limited number of determinants of vulnerability, but does not mention governance and decision-making as important factors that can impact on the development of policies to respond to the health effects of climate change. This work comes predominantly from the social science literature (earth system governance work), but the following paper discusses the health perspective: Bowen, K.J., Friel, S., Ebi, K., Butler, C.D., Miller, F., & McMichael, A.J. (2012). Governing for a Healthy Population: Towards an Understanding of How Decision-Making Will Determine Our Global Health in a Changing Climate. International Journal of Environmental Research and Public Health, 9, 55-72. (Kathryn Bowen, Australian National University)	Accepted - new references added to the section on vulnerability
39	38707	11	0	0	0	0	2. General comment - new paper on Indigenous connection to land and understanding health effects: Willox, A.C., Harper, S.L., Ford, J.D., Karen, L., Houle, K., & Edge, V.L. (2012). "From this place and of this place:" Climate change, sense of place, and health in Nunatsiavut, Canada. Social Science & Medicine, 75, 538-547. This paper would fit well in the mental health section (11.2.9) (Kathryn Bowen, Australian National University)	Agree that the reference is relevant but space is limited.
40	38708	11	0	0	0	0	3. General comment - discussion on the influx of funding for adaptation measures, and how the health community can strategically access this to address current underlying health concerns (as is mentioned as important in FAQ 11.3 and 11.4) would be very useful to include - see Bowen, K., & Friel, S. (2012). Climate change adaptation: Where does global health fit in the agenda? Globalization and Health, 8, 10. (Kathryn Bowen, Australian National University)	relevant reference, but again, limited space.
41	38710	11	0	0	0	0	overall the perception is that the climate warms up, and the issue of extreme cold spells seems to be getting overlooked. Its important to remember that although overall temperatures are rising, this does not exclude having extreme cold spells. (Patrick Goodman, Dublin Institute of Technology)	New text added on cold events
42	38975	11	0	0	0	0	The chapter deals very well with the disease patterns in populations that we expect will result from global warming and climate change. Here and there the chapter authors draw attention to how dependent those projections are on how fast it will get warmer, e.g. page 24 lines 15-19 and page 31 line 23. In the beginning of the chapter it might therefore be helpful : 1) to emphasize that dependency and 2) to explain that e.g. the AR4 scenarios that various authors have assumed in the literature, as reviewed in the chapter, are not necessarily the same. Some authors assume one scenario, others another scenario, and some do not clarify their assumptions. (Ole Faergeman, Aarhus University Hospital)	The Executive Summary highlights the importance of rate of change
43	39297	11	0	0	0	0	I have made a large number of comments and the authors may accuse me of my own confirmational bias. I am the first to admit that the issue is a difficult one; we all have our point of view and it is not easy to escape them. In 1852, Christopher Mackay summed this up in his book Extraordinary popular delusions and the madness of crowds: "WHEN MEN WISH TO CONSTRUCT OR SUPPORT A THEORY, HOW THEY TORTURE FACTS INTO THEIR SERVICE!". The nearest thing to a solution may be to (1) review ALL the literature that has come out during the relevant period; (2) tabulate all the articles articles together with a brief synopsis of their content, perhaps based on their abstracts; (3) group the table according to the relative section in the text; (4) make a rigorous for and against analysis of the groups. In addition, I believe that the 5-year time period is too short; science cannot be separated from the past in this manner; literature should go back at least ten years, preferably more, but not with reference to previous AR; these have been rightly criticised by many people. I also suggest their should be more cross-referencing between WGI and WGII so that statements on issues like sea level rise and severe storms are synchronized. It is most important that the IPCC get it right this time;criticism is increasingly strong and large sections of the public are becoming increasingly sceptical, particularly in the United States, Australia and some other countries. This is a serious subject, it is based on science, we know that there are huge gaps in our knowledge and we have a duty to admit it. We must anticipate AR6. (PAUL REITER, INSTITUT PASTEUR)	The structure of the chapter and the scope of the review are fixed by IPCC. New text has been added on how the literature was searched and the selection of papers for commentary.
44	39707	11	0	0	0	0	This is one of the worst-presented chapters I have reviewed in the WGII draft. I have major concerns with the text in this chapter, particularly the referencing and general proof editing. If this chapter has not been proof-checked it should have been prior to being sent out for review. If it has been proof checked there are many issues to raise about the quality of the process! The referencing style is inconsistent (and wrong in places) and matches what I would expect to see from a poor calibre undergraduate student. Some references are in alphabetical order, others in chronological order and others in a random order. In some cases the reference is placed after the full stop at the end of the sentence, in others full stops are missing altogether! The italicisation of et al. is also inconsistent (and in some cases multiple author details are given in full). There are inconsistencies in presenting taxonomic details. I know that as reviewers we are asked not to flag these types of issue, so I have largely ignored the referencing problems, but reporting them is part of the review process: I would not expect to see these problems in a document of this type and at this stage, and their presence makes the task of reviewing the text much harder as they detract from the scientific message. Further, in my experience as a reviewer/editor/teacher, issues of this type cumulatively often result in the quality of the science being called in to question. I am not sure that this is the case here, although the material presented in Section 11.2.11, especially, does raise this concern. Were this chapter submitted as a journal paper I would reject it, and I recommend that the whole chapter is checked thoroughly for reliability. (Peter Burt, University of Greenwich)	The SOD is closely edited.

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45	40327	11	0	0	0	0	Great chapter. • Found the Co-Benefits and Co-Pollutants sections most interesting and well presented. • Like the FAQ approach – good vehicle to drill down to simple issues that are generally on peoples’ minds. • Public health – some public health type activities do get mentions in a few places, but in general, given that it is specifically identified as an important ‘adaptation strategy’ in FAQ 11.4, it would be good to weave in more specific descriptions of general public health actions (beyond surveillance) and their implications in order to make this FAQ response more impactful and meaningful. There is a large role for Public Health practitioners (governments at all levels) to play in promoting and enhancing adaptive capacity to climate change impacts on physical and mental health and well-being. Public Health are also well placed politically to speak to complexity of issues and need to address many of these challenges in a more holistic and long-term way. • Would have been interesting to see the concept of ‘Ecosystem Health’ or ‘Ecohealth’ or ‘multi-disciplinary+participatory’ approaches woven in to addressing various health challenges. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	No changes required. Agree to a degree with respect to the comment on mental health. The underlying drivers of most mental health problems are societal.
46	40543	11	0	0	0	0	Cite: Barata, M., E. Ligeti, G. De Simone, T. Dickinson, D. Jack, J. Penney, M. Rahman, R. Zimmerman, 2011: Climate change and human health in cities. Climate Change and Cities: First Assessment Report of the Urban Climate Change Research Network, C. Rosenzweig, W. D. Solecki, S. A. Hammer, S. Mehrotra, Eds., Cambridge University Press, Cambridge, UK, 179–213 . (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	We will consider these references
47	42308	11	0	0	0	0	Overall good sequence/structure. My suggested word changes are shown in bold Text contains (inevitably) many minor grammatical, extra-word, etc. glitches (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	editing carried out
48	42338	11	0	0	0	0	Note that in the following, where suggestions for specific edits are made, capitalization indicates INSERTS. Unfortunately, I am unable to show strike-outs. (Indur Goklany, Independent)	editing has been undertaken
49	42569	11	0	0	0	0	It is a good overview written by a strong team. The following points, however, may improve the clarity of presentation: Climate and the many natural processes influenced by climate are a fundamental component of Earth’s life-supporting mechanisms. It is axiomatic, to a biologist, that a change in climate would influence the prospects for health and survival of every species in the ecosystems affected. Accordingly, it is reasonable to anticipate that the health and survival of Homo sapiens - notwithstanding its unique capacity to develop and transmit culture and thereby to control environments – would be affected by global climate change.1 This issue needs to be highlighted in the revised chapter. It has been increasingly recognised that global climate change has direct and indirect and predominantly adverse effects on human health.2 Direct health impacts of climate change include adverse effects from temperature and weather extremes (e.g., heatwaves, floods and cyclones) and from sea-level rise. Some key direct health effects of climate change (e.g., heat and birth outcomes) were not mentioned in the current draft.3 A number of indirect impacts are also likely to arise from changes in precipitation and temperature patterns, which may disturb natural ecosystems, change the ecology of infectious diseases, harm agriculture and freshwater supplies, exacerbate air pollution levels, and cause large-scale reorganisation of plant and animal communities. These indirect impacts may have greater cumulative effects on human health than the direct impacts. (Shilu Tong, Queensland University of Technology)	no change required
50	42570	11	0	0	0	0	(Tong continued) The most direct health effects would be those caused by heatwaves, storms, bushfires and floods. Stressful weather extremes are a known cause of short-term mortality and morbidity excesses. For example, two recent systematic reviews clearly indicate that both cold and hot temperatures can increase mortality and morbidity.4,5 People at greatest risk of dying from hot or cold weather were those with medical illnesses who were socially isolated and did not have access to air conditioning. It is anticipated that climate change will increase the heat-related mortality but reduce the cold-related mortality. There is some evidence about the “winter/summer mortality tradeoffs under a changing climate”. Nearly all previous studies indicate that increases in heat-related mortality may outweigh reductions in cold-related mortality as climate change continues.6-9 However, this issue hasn’t been well addressed in the current draft. In addition to more frequent heat waves, global climate change is expected to result in greater weather variability overall.10 Relatively small changes in the average global climate could produce large changes in the frequency of extreme weather events, such as hurricanes (cyclones and typhoons), violent thunderstorms, and windstorms. Evidently, these disasters have already had a substantial impact on the human society. If the frequency of extreme weather events increases, the deaths, injuries, stress-related disorders and the many adverse health effects associated with the social disruption, enforced migration and settlement that these events entail, would also increase.1,2,11 Climate change could influence air pollution profiles – and the health effects that come from exposure to polluted air – by altering the rate of chemical reactions in the atmosphere that form or destroy pollutants, or by influencing the factors such as wind and precipitation that regulate how pollutants accumulate or disperse.12,13 Climate change would accelerate the atmospheric chemical reactions that produce the secondary air pollutants known as photochemical oxidants, and thus increase the incidence of associated health effects, such as cardiovascular and respiratory disorders. Higher temperature would also increase the evaporation of volatile liquids such as gasoline or organic solvents, adding to the urban smog problem. (Shilu Tong, Queensland University of Technology)	New text added on "heat/cold tradeoffs"

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
51	42571	11	0	0	0	0	(Tong continued) Climate change would tend to alter the geographic distribution (altitude and latitude) of disease vectors and to affect the behaviour, seasonal activity and life-cycle dynamics of vectors and infectious parasites. These effects could amplify the transmission of many vector-borne diseases in many parts of the world. For example, in Australia, several studies indicate that the changes in climate may have significant impacts on the distribution and transmission of dengue and other infectious diseases.14-17 There is abundant evidence indicating that climate variability may have substantial impacts on the transmission of infectious diseases in China.18-20 The range of health effects of climate change would be diverse, complex, often unpredictable in magnitude, and sometimes controversial. Although global warming may have some beneficial effects (eg, decrease in winter deaths, enhanced crop yields in some regions, and increased mortality of mosquitoes in hot zones), adverse effects are likely to outweigh beneficial effects substantially.1,2,8 In page 41, “Key uncertainties and research recommendations” is an important section but is not supplied in the current draft. In order to quantify the relationship between climate change and human health, more rigorous and sophisticated scientific studies are clearly needed. Additionally, more research funding is urgently required to tackle this important challenge. Finally, a coherent and improved connection between this Chapter and other regional Chapters should be developed. (Shilu Tong, Queensland University of Technology)	New text included on "key uncertainties and research recommendations"
52	42578	11	0	0	0	0	Tong References: 1. McMichael AJ. Insights from past millennia into climatic impacts on human health and survival. Proc Natl Acad Sci U S A. 2012;109(13):4730-7. 2. Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, et al. Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. Lancet2009;373:1693-733. 3. Strand L, Barnett A, Tong SL. Maternal exposure to ambient temperature and the risk of preterm birth and stillbirth in Brisbane, Australia. Am J Epidemiol 2012;175:99-107. 4. Yu WW, Mengersen K, Guo YM, Ye XF, Pan XC, Tong SL. Daily average temperature and mortality among the elderly: A meta-analysis and systematic review of epidemiological evidence. International Journal of Biometeorology 2012;56:569-81. 5. Turner L, Connell D, Barnett A, Tong SL. Ambient temperature and cardiorespiratory morbidity: A systematic review and meta-analysis. Epidemiology 2012;23(4):594-606. 6. Donaldson GC, et al. Heat- and cold-related mortality and morbidity and climate change. Health Effects of Climate Change in the UK, 2001; Department of Health, London, pp. 70-80. 7. Guest CS, et al. Climate and mortality in Australia: retrospective study, 1979-1990, and predicted impacts in five major cities in 2030. Climate Res 1999; 13: 1-15. (Shilu Tong, Queensland University of Technology)	Noted.
53	42579	11	0	0	0	0	Tong References (continued): 8. Huang C, et al. The impact of temperature on years of life lost in Brisbane, Australia. Nature Climate Change 2012; 2:265-70. 9. Kalkstein LS, Greene JS. An evaluation of climate/mortality relationships in large US cities and the possible impacts of a climate change. Environ Health Perspect 1997; 105: 84-93. 10. Schiermeier Q. Climate and weather: extreme measures. Nature2011;477:148-9. 11. McMichael C, Barnett J, McMichael AJ. An ill wind? Climate change, migration, and health. Environ Health Perspect. 2012;120(5):646-54. 12. Post ES, Grambsch A, Weaver C, Morefield P, Huang J, Leung LY, Nolte CG, Adams P, Liang XZ, Zhu JH, Mahoney H. Variation in Estimated Ozone-Related Health Impacts of Climate Change due to Modeling Choices and Assumptions. Environ Health Perspect. 2012 Jul 12. [Epub ahead of print] 13. Liao KJ, Amar P, Tagaris E, Russell AG. Development of risk-based air quality management strategies under impacts of climate change. J Air Waste Manag Assoc. 2012;62(5):557-65. 14. Hu W, Clements A, Williams G, Tong SL, Mengersen K. Spatial pattern and socio-ecological drivers of dengue fever transmission in Queensland, Australia Environ Health Perspect 2012;120(2):260-6. 15. Suchithra Naish, Hu W, Mengersen K, Tong SL. Wetlands, climate zones and Barmah Forest virus disease in Queensland, Australia. Transactions of the Royal Society of Tropical Medicine and Hygiene, in press. 16. Wenbiao Hu, Gail Williams, Hai Phun, Frances Birrell, Shilu Tong. Did socio-ecological factors drive the spatiotemporal patterns of pandemic influenza A (H1N1)? Environment International 2012;45:39-43. 17. Hu W, Clements A, Williams G, Tong SL, Mengersen K. Bayesian spatiotemporal analysis of socio-ecologic drivers of Ross River virus transmission in Queensland, Australia. Am J Trop Med Hyg 2010;83(3):722-8. 18. Hong-Wei Gao, Li-Ping Wang, Song Liang, Yong-Xiao Liu, Tong SL, Jian-Jun Wang, Ya-Pin Li, Xiao-Feng Wang, Hong Yang, Jia-Qi Ma, Li-Qun Fang, Wu-Chun Cao. Change in rainfall drives malaria re-emergence in Anhui Province, China. PLoS ONE in press. (Shilu Tong, Queensland University of Technology)	Noted
54	42580	11	0	0	0	0	Tong References (continued): 19. Li-Qun Fang, Li-Ping Wang, Sake J de Vlas, Song Liang, Shilu Tong, Yan-Li Li, Ya-Pin Li, Quan Qian, Hong Yang, Mai-Geng Zhou, Xiao-Feng Wang, Jan Hendrik Richardus , Jia-Qi Ma, Wu-Chun Cao. Distribution and risk factors of 2009 pandemic influenza A (H1N1) in mainland China. Am J Epidemiol 2012;175:890-7. 20. Wen-Yi Zhang, Wei-Dong Guo, Li-Qun Fang, Chang-Ping Li, Peng Bi, Gregory E. Glass, Jia-Fu Jiang, Shan-Hua Sun, Quan Qian, Wei Liu, Lei Yan, Hong Yang, Shilu Tong, Wu-Chun Cao. Climate variability and the transmission of hemorrhagic fever with renal syndrome in northeastern China. Environ Health Perspect 2010;118:915-20. 21. Kasia Alderman, Lyle Turner, Shilu Tong. Floods and human health: A systematic review. Environment International 2012;47:37-47 (Shilu Tong, Queensland University of Technology)	Noted
55	42599	11	0	0	0	0	A general comment: while individual areas are dealt with well, links between human health, and the direct and indirect effects could be drawn together into a more cohesive summary. For example if the most important effect of CC is to multiply existing health risks, should this be stated first? Also while primary (direct) effects and secondary (indirect -flowon effects) are mentioned, tertiary (our ability to respond/adapt in a CC world) is not mentioned. What will the impact of CC be on health and emergency services? (MARGARET LOUGHNAN, MONASH UNIVERSITY)	New text included to acknowledge the possibility of service disruption caused by climate extremes, and subsequent risks to health. Greater attention to variability, interactive effects etc.
56	43493	11	0	0	0	0	The effects of the arrival of air masses of different origin on human health in a sector of the Spanish Mediterranean coast have been analyzed by Olcina and Martin (2012), based on a study of hospital admissions for heart, pulmonary and cerebral disease. They found a direct relationship between the presence of air masses that generate conditions of hypoxia and increased of hospital admissions for this type of disease. (Olcina Jorge, University of Alicante)	no change made

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
57	44279	11	0	0	0	0	The chapter seems to diverge from the outline approved by the IPCC; the subsection on "Water quality, availability and sanitation" seems to be left out, but it is a highly climate sensitive field and a huge challenge to human health. (Dominik Reusser, Potsdam Institute for Climate Impact Research)	no change - water-borne and water-related infections are included already
58	44513	11	0	0	0	0	Section 11.5.2: Reference is made to the IPCC AR5 A1B scenario – unclear what this is as there are no IPCC AR5 scenarios.... Should this be a reference to the AR4 of WGI or to AR5 of WGI where the SRES scenarios will be compared to the more recently developed RCPs? Please correct and/or clarify. (Thomas Stocker, IPCC WGI TSU)	references to IPCC scenarios are updated
59	44514	11	0	0	0	0	Section 11.5.5 on Air Pollution – suggest to consult the relevant sections on air pollution in WGI Ch11. (Thomas Stocker, IPCC WGI TSU)	accepted
60	44660	11	0	0	0	0	" this chapter present the different effects and impacts of climate on human health, it is a good synthesis of various studies that have been done in this topic* But it don't show out studies on early warnings systems against diseases outbreaks or upsurge, who is it working, and how to deal with that. This part of investigation is very important for adaptation and disease control in case of climate variability, change and environmental mutation. Some effort should be done to integrate more information on that. There are not enough information on airborne disease (any title on that if then asthma and some respiratory disease have been mentioned). Anything about meningitis that is a very worst airborne disease particularly in West African countries and many tropical countries in this chapter. Meningitis have strong link with climate and environmental variability and change. Some interesting work have been on that by Pascal YAKA and al, (see on Internet) and MERIT project Team. It will be interesting to make this chapter more consistent by including some information on meningitis relationships and control with climate, environmental factors. " (Dieudonné Pascal YAKA, Burkina Meteorological Authority (B.M.A.) ; University of Ouagadougou (U.O.))	no change - text included already on early warning systems
61	45222	11	0	0	0	0	Chapter covers the issues related to climate changes and health. However, chapter needs major revision in structure and content presentation. Major differences between chapters in terms of clarity, completeness and critical reviewing. In general, there is a lack of a transparency in the methods of searching, of selection and synthesis of the relevant information throughout chapter 11. It is not clear how the evidence is synthesised. It seems that it relies on the expert judgement of the authors leading to a researcher bias. This approach is in my opinion not sufficient. Assessment of the quality of the evidence is essential and is missing in this chapter. The amount of literature has been enormous meanwhile and it is extremely difficult to be managed without a systematic approach. Therefore, a systematic review approach should be followed. A systematic approach would provide an assessment of the quality of the evidence via a synthesis process and this is in the light of the heterogeneity, variability and complexity of the evidence urgently needed. Systematic reviews have been established in biomedical literature and should be a fundamental part element of the present chapter report. Such approach would strengthen the quality of the report and increase its robustness substantially. The systematic review should follow all requirements as they have been determined many time in the biomedical literature e.g. http://www.cochrane.org/cochrane-reviews/ . See also Petticrew M, et al. , Using systematic reviews to separate scientific from policy debate relevant to climate change, American Journal of Preventive Medicine, 2011: 40: 576-578. Selection of references seems arbitrary. Little critical review of the evidence is reported. Structure of the content needs second thought. e.g. sections 11.2.4 and 11.2.5 should be restructured to vector, water and food borne diseases and then other infectious diseases. What makes vibrio so much different that the authors spend one more subsection on vibrio (11.2.5.1)? Wouldn't that be sufficient to keep it in the water borne diseases section/ Similar discrepancies can be found throughout the chapter e.g. 11.5 future risks. The risks listed could be grouped. Authors jump back and forth with the same risks in different chapter (e.g. 11.2.4 and 11.5, 11.2.8 and 11.5). A more systematic and coherent structure of the chapter should be provided. Overall, a major effort to a more structured and evidence based approach is needed. I provide only a few comments now since I feel that the chapter needs major revision based on a systematic review approach for each subsection. (Nikolaos Stilianakis, European Commission)	New text included on search methods. However note this is not a critical review, but an assessment, and therefore includes only a fraction of the relevant evidence, and is based on judgement and synthesis. Section 11.2 has been re-organized to reduce overlaps and avoid repetition.
62	45229	11	0	0	0	0	Numerous references in figures are missing e.g. Figure 11-8, 11-7, 11-4 (Nikolaos Stilianakis, European Commission)	editing carried out
63	46451	11	0	0	0	0	Chapter 11. Human health (items: 11.2. Major Climate-Sensitive Health Outcomes up to 11.2.8. Air Quality. Also 11.2.11. Aeroallergens and Diseases, 11.2.12. Ozone, UV, and Skin Cancer and 11.5.9. UV-Induced Skin Cancers). (Rubén Piacentini, Institute of Physics Rosario (CONICET - National University of Rosario))	reference noted
64	47995	11	0	0	0	0	One thing that seems to be missing from this chapter is reference to the Lancet Report looking at climate change and health lead by Costello in 2009. This seems like a key publication to be absent from this chapter, and is certainly one that people use to justify their climate change and health work. And of course, he most famously stated that climate change was the biggest threat to public health of the 21st Century. Costello, A. et al. (2009). Managing the health effects of climate change. The Lancet, 373, 1693-7333. (Ashlee Cunsolo Willox, McGill University)	no change
65	48747	11	0	0	0	0	The subsections in this Chapter are well organized into mutually exclusive categories. The topics within the categories are well structured, presenting a comprehensive overview on major effects on human health and adaptation – much more so than in previous Assessment Reports. In the subsections, the research findings are balanced with support and opposition to the impacts of climate change at the appropriate level of detail. The use of qualifiers on the confidence of assessments in the Executive Summary is very useful and would be a value added feature throughout, and would resonate favorably by some communities of readers of the final report. The report does not fully address the gaps in our knowledge on the topic of climate change impacts on human health. If there is such a place to do so, a discussion of a priority framework for fulfilling data gaps would be of value to researchers and policy makers, alike. (Jonathan Davis, Science Applications International Corporation)	new text included on research needs

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
66	50628	11	0	0	0	0	1) Overall -- In preparing the 2nd-order draft, the chapter team should prioritize making each section of the chapter a polished, comprehensive treatment of topics considered. From these sections, the chapter team is then encouraged to maximize the utility of its findings, ensuring that they are robust, compelling, and nuanced. Themes to consider informing in constructing findings include decisionmaking under uncertainty, risks of extreme events and disasters, avoided damages, and limits to adaptation. To these ends, the chapter team has prepared a solid 1st-order draft. To inform further chapter development, I provide some general and specific comments below. (Katharine Mach, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
67	50629	11	0	0	0	0	2) Highlighting key findings -- In developing the 2nd-order draft, the chapter team should aim to present key findings throughout the chapter, using calibrated uncertainty language to characterize its degree of certainty in these conclusions. In this way, a reader of the chapter will be able to understand how the literature reviews and syntheses in the chapter sections--the traceable accounts--support the conclusions of the chapter, especially those presented in the executive summary. Additionally, identification of key findings throughout the chapter will enable the author team to increase specificity in characterizing key trends and determinants in the context of the executive summary. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
68	50630	11	0	0	0	0	3) Usage conventions for calibrated uncertainty language -- Where used, calibrated uncertainty language, including summary terms for evidence and agreement, levels of confidence, and likelihood terms, should be italicized. In addition to incorporating these terms directly into sentences, the author team may find it effective to present them parenthetically at the end of sentences or clauses. Casual usage of the reserved uncertainty terms should be avoided, as has been finding some specific comments throughout the chapter. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
69	50631	11	0	0	0	0	4) Specificity of described observations and projections -- The author team is very much encouraged to continue presenting observed and projected vulnerabilities, impacts, and trends with high levels of specificity and conciseness. This specificity includes indicating the relevant time periods, geographic areas, etc. for observations; indicating relevant time frames, climate/socio-economic scenarios, geographic regions, or other assumptions for projections; and characterizing key driving factors where ranges of outcomes are presented. In particular, where supported by the literature, the author team is encouraged to indicate differences in outcomes across varying scenarios of change in the climate. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
70	50632	11	0	0	0	0	5) Conditional constructions -- The chapter team has also done a nice job of using conditional constructions that explicitly separate physical changes from corresponding conditional impacts. The chapter team is encouraged to continue using such constructions, also separately characterizing the degree of certainty for a physical change and for the corresponding conditional impact where appropriate. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
71	50633	11	0	0	0	0	6) Coordination across the Working Group 2 contribution -- In developing the next draft of the chapter, the author team should consider treatment of topics not only in this chapter, but also across the report as a whole. For each topic, the chapter team should ensure that treatment here is reduced to the essence of what is relevant to the chapter, with cross-references made to other chapters as appropriate, also minimizing overlap in this way. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
72	50634	11	0	0	0	0	7) Harmonization with the Working Group 1 contribution to the AR5 -- At this stage of chapter drafting, the author team should carefully consider the working group 1 contribution. Wherever climate, climate change, climate variability, and extreme events are discussed, the chapter team should ensure that their treatment is harmonized with the assessment findings of working group 1. (Katharine Mach, IPCC WGII TSU)	Noted - changes made where warranted
73	52394	11	0	0	0	0	Overall I find this chapter quite well written for a FOD, and well organised. I admire the effort to identify useful adaptations (or mitigations). My main criticism is that the chapter is unacceptably vague in terms of quantifying the risks associated with present and future climate change. I understand this is difficult, but there is much information in the WGI report that should be helpful, and quantitative statements are essential for the WGII report to have value in my opinion. I have given some specific examples, but my comment applies to the whole chapter (and probably to the whole FOD though I haven't read most of it). If the published research remains inadequate to quantify impacts, this itself should be an executive summary conclusion in my opinion. (Steven Sherwood, UNSW)	New text included on attribution and present effects
74	53329	11	0	0	0	0	Statements of projected changes could more uniformly include consideration of multiple stresses and describe assumptions, including scenarios and time slices (Kristie L. Ebi, IPCC WGII TSU)	new information included, where possible
75	53330	11	0	0	0	0	Several sections do not appear to be up-to-date, with no references in the last five years (Kristie L. Ebi, IPCC WGII TSU)	Recent references added where possible.
76	53331	11	0	0	0	0	Consideration of possible health risks is uneven, with, for example, more attention paid to dengue than to malaria (Kristie L. Ebi, IPCC WGII TSU)	New text on malaria added.
77	53332	11	0	0	0	0	There are quite a few undefined acronyms as well as the introduction of acronyms not used elsewhere in the report. You could put these into a text box to facilitate ease of reading. (Kristie L. Ebi, IPCC WGII TSU)	editing undertaken
78	53333	11	0	0	0	0	It is good to see consideration of quite a few figures. Figures need to be easily understood and should have a clear take-away message. Perhaps not so many figures showing research findings. (Kristie L. Ebi, IPCC WGII TSU)	figures improved

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
79	54423	11	0	0	0	0	GENERAL COMMENTS: I would like to thank the authors for their work on the FOD. When considering the expert review comments received on your chapter and the next round of revisions, I suggest several overall priorities. (1) Keep in mind that the preparation of the SOD is the time to ensure that each section of the chapter presents a comprehensive treatment of relevant literature, and that the Executive Summary presents findings that capture the key insights that arise from the chapter assessment. (2) This is also the time to focus on distilling the chapter text, not just fine-tuning wording but editing with a critical eye to improving quality by making discussions succinct and synthetic, while still being comprehensive. (3) Cross-chapter coordination is also important at this stage, as it should now be possible to identify topics that overlap with other chapters and to coordinate with other chapter teams to minimize that overlap. (4) Cross-Working Group coordination is important as well, and relevant chapter sections should cross-reference chapters from the other Working Groups, particularly in the case of statements about changes in mean or extreme climate conditions that are assessed in the contribution of Working Group I. (Michael Mastrandrea, IPCC WGII TSU)	noted
80	54424	11	0	0	0	0	EXECUTIVE SUMMARY: The author team has made a good start on the Executive Summary, including attention to providing traceable accounts (see separate comment on this) and in some cases calibrated uncertainty language. For the SOD, I suggest considering ways to increase the specificity of the Executive Summary findings, providing further details in various findings to enrich the general points currently being made. See comments on specific findings for suggestions. There may also be opportunities to add additional findings that capture other insights from the chapter's assessment. I also suggest adding calibrated uncertainty language for each finding, in this case either levels of confidence, or likelihood where there is quantitative information is available upon which to base a probabilistic assignment. We in the TSU are also available to discuss these issues if that would be use. (Michael Mastrandrea, IPCC WGII TSU)	noted
81	54425	11	0	0	0	0	TRACEABLE ACCOUNTS: The author team has made a good start to providing traceable accounts for assessment findings and highlighting the location of those traceable accounts in the Executive Summary. In general, I would recommend the author team continue to strengthen the linkage of the Executive Summary findings with the underlying chapter text. Section 11.8 currently matches the Executive Summary text, and this section may provide a location where synthesis across chapter sections can be presented and explained more fully, which then forms the basis for at least some of the findings presented in the Executive Summary (that present the key insights from this synthesis). There are also other summary and conclusions sections in the chapter that would provide locations for summarizing findings from specific sections. In general, I would recommend the author team consider ways to clearly identify assessment findings in the chapter text to link with the Executive Summary, not just in 11.8 but elsewhere as appropriate. In the context of linking chapter text with Executive Summary findings, I would also suggest providing some explanation of the calibrated uncertainty language used in the Executive Summary (once it is fully developed) in the corresponding chapter section(s) where the traceable account appears for each finding. For example, in situations where confidence in a finding is not high, it would be useful to understand why the author team has made this judgment--what are the factors that limit confidence. In situations where confidence is high, what is the evidence that forms the basis for these assignments. Succinct descriptions in the chapter text of this type will both highlight the basis for ES findings and help explain the author team's assessment of the literature. We in the TSU are also available to discuss these issues if that would be of use. (Michael Mastrandrea, IPCC WGII TSU)	noted
82	54871	11	0	0	0	0	The chapter team should cross refer to relevant chapters (e.g. 2, 12, 14, 15, 16, regional chapters). (Monalisa Chatterjee, IPCC WGII TSU)	noted
83	54872	11	0	0	0	0	The author team should update the reference list and remove citation inconsistencies between in text citations and full citations given in the reference list. Please see supplementary document named WG2AR5-Chap11_Reference Checks.pdf at https://ipcc-wg2.gov/AR5/author/FOD/SuppMat (Monalisa Chatterjee, IPCC WGII TSU)	changes made in the reference list
84	52584	11	1	1	61	42	As a general comment, theAR5 draft is well researched, well presented comprehensive document. It places correct relevant information at the disposal of the policy maker to enable him/her make informed decision. There is also adequate information in it for the general intelligent segment of the public. As is expected of work of such anticipated depth and the varied background of the very large number of contributors, variation in standards is inevitable. Some contributors from the developing world are encouraged to produce their best so that the contrast between the quality of tables 11.1 [page 62] and 11.6 [page 67] is reduced more substantially. (Etim Essien, University of Uyo)	editing undertaken
85	43720	11	1	5	1	19	I am a bit confused by the titles for section 11.3 and 11.4. I understand "sources" of vulnerability to include exposures such as those that arise from meteorological hazards - yet these seem to be listed under "impacts" on health - 11.4.1. This would seem to go against the generally accepted definition of vulnerability which is a function of sensitivity, exposure and adaptive capacity. (IPCC, 2001; Smit and Wandel, 2006) This may be confusing for the reader (Peter Berry, Health Canada)	changes made - now includes the standard IPCC AR5 definition of vulnerability
86	42309	11	1	37	0	0	Disease, Deaths and Injury. (Why be coy about this?) (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	accepted - change made
87	42310	11	1	42	0	43	Section 11.2.4.2 is headed 'Other Infectious Diseases'. That, logically, would include section 11.2.5. Headings need re-wording (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	section 11.2 has been reorganised; headings have been altered
88	37740	11	2	2	2	2	Insert the word "Stratospheric" before "ozone". (Paul Beggs, Macquarie University)	agree - change made

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89	43721	11	2	4	2	13	Perhaps slightly more descriptive subsection titles could be used here. The title under 11.3.1.1 is a bit longer but all others are one word and leave much to the imagination e.g., "Neighborhoods" I assume it is something about particular neighborhoods that make people vulnerable or else virutally everyone living in some type of community has increased vulnerability to climate change health impacts, which seems odd. (Peter Berry, Health Canada)	no change
90	43722	11	2	13	0	0	Do you mean "Projections of Vulnerability Sources"? As per your discussion in section 11.3. If you mean projections of actual vulnerability, how can you make these projections without first discussing or integrating projections of future risk which occurs two sections later? This is unclear. (Peter Berry, Health Canada)	standard IPCC definition of vulnerability has been included
91	37741	11	2	15	2	19	Consistency and accuracy of section titles, if not the entire text, is essential. "Impacts" is the correct and internationally accepted term. As such, at least change the section titles for Sections 11.4.1, 11.4.2, and 11.4.3 to "Impacts of..." or "Current Impacts of..." instead of "Effects of...". (Paul Beggs, Macquarie University)	no change
92	43723	11	2	21	2	31	The items listed under "Future Risks" include both diseases (malaria) and environmental conditions (air pollution). This may be confusing for the reader. (Peter Berry, Health Canada)	no change
93	37742	11	2	22	2	30	Order these in the same order as the corresponding sections of Section 11.2. (Paul Beggs, Macquarie University)	note that the SOD has been substantially reorganised, in response to reviewers' comments, to reduce overlap and improve the cohesion and flow of the chapter
94	37743	11	2	22	2	30	A further subsection on "Aeroallergens" should be added. Content for that section is covered in the comment below for Page 30, line 19. (Paul Beggs, Macquarie University)	no change - space is greatly restricted
95	37744	11	2	29	2	29	Change this title to "Work-Related Heat Disease" or similar. The word "Stress" is not mentioned in any of the Section 11.2.7 titles. (Paul Beggs, Macquarie University)	accepted - title changed
96	43724	11	2	33	2	39	You may consider reversing the order of Vulnerability Mapping and Early Warning Systems. In Canada, the development of early warning systems (eg Heat Alert and Response Systems) has generally been preceded by some form of vulnerability assessment which often involves mapping. Vulnerability mapping helps you target your warnings and response measures. I also wonder why you only include vulnerability mapping and not vulnerability assessment? If you accept that acquiring information about vulnerability is a form of adaptation then assessment provides you with a much broader suites of knowledge tools and activities (e.g., stakeholder consultation etc) than does simple mapping (Peter Berry, Health Canada)	no change
97	40821	11	3	0	0	0	The summary of chapter 11 is much less outspoken in regard to the negative health effects of Climate Change than was the summary of the respective chapter of AR4. Where AR4 stated that (health) "... effects are projected to progressively increase in all countries and regions.." AR5 states (p 3 line 10) only that "...health ... is sensitive to .. climate .." AR4 makes firm statements saying "... - will increase malnutrition ... - will increase the number of people suffering from death, disease - will increase the burden of diarrhoeal diseases ... - will increase cardio-respiratory morbidity and mortality..." . AR 5 in contrast finds only that health " ... may be damaged.." (p 3 l 12) Similarly AR4 predicts an increase in morbidity and mortality in many respects while AR5 talks of "Increased risk ..." only (p3 l 25). AR5 also mentions "Greater incidence of injury and disease .. (p 3 l 26) but then again talks about "Increased pressure on disease control systems" (p3 l 30) - which is not wrong but is shifting the attention form human suffering to vague "disease control systems". This tendency of the summary is neither supported by the contents of paragraph "11.1.3 Developments since AR4", nor by the scientific details given in the remaining chapter. (Winfried Zacher, Germanwatch)	The Executive Summary has been modified to match the body of the chapter, taking account of the revisions that have been made in the SOD
98	42572	11	3	8	0	0	1. In Executive Summary, tow different phrases "very high confidence" and "highly likely" were used, but the difference between them is unclear. (Shilu Tong, Queensland University of Technology)	confidence terms are used in accord with IPCC conventions
99	50635	11	3	8	0	0	Executive Summary -- In subsequent work on the executive summary, there are several aspects of development for the author team to consider further: 1st, to an even greater extent, the author team should use calibrated uncertainty language to characterize its degree of certainty in the key findings presented. Assignment of calibrated uncertainty language should reflect the author team's evaluation of evidence and agreement for the topic, with presentation of levels of confidence where possible and of likelihood terms where a probabilistic basis for assignment is available. 2nd, throughout the executive summary, the author team may wish to enhance specificity, indicating as much as possible the specific trends that have emerged or are projected, along with the key determinants. For instance, there may be further opportunity for trends identified to indicate more specifically where, when, why (what specific drivers are relevant), illustrating with nuance where the current state of understanding lies. (Katharine Mach, IPCC WGII TSU)	Foley et al added as reference; word "trivial" changed to "minor". There is substantial evidence for this, not presented due to lack of space. (eg more than 30% of global grain and soy production is fed to animals; 40% of US maize is used for biofuels.)
100	53334	11	3	8	0	0	The Executive Summary could include findings related to impacts and adaptation intimately intertwined with other sectors. There also could be a finding on the costs of adaptation. (Kristie L. Ebi, IPCC WGII TSU)	text changed to : "these non-climatic baseline factors"
101	49084	11	3	8	3	8	Please include the following text and some other concrete findings from section 11.2 in the executive summary; "Epidemiological studies have reported relationships between UV levels, maximum summertime day temperatures and the prevalence of non-melanoma skin cancers. Higher temperatures in the northern countries and countries with temperate climates may result in an increase in the time which people spend outdoors and, thus in additional UV-induced-adverse effects. [11.2]" (Oyvind Christophersen, Climate and Pollution Agency)	text changed to: "there is growing speculation (Aufhammer, 2011) that it has been contributed to by extreme weather events, especially floods, droughts (Williams and Funk 2011) and heatwaves."

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
102	42339	11	3	8	3	48	The Executive Summary is severely deficient. It excludes numerous critical facts. First, the health effects which climate change would exacerbate are more sensitive to other factors, specifically economic development and public health measures (as noted in this chapter itself on page 25, lines 48-52, and page 28, lines 1-7; also see: Goklany 2007a, 2007b, 2009d, 2012a; van Vuuren et al. 2011; Beguin et al. 2011; Bosello et al. 2006). Over decades and longer time frames, they are also more sensitive to technological change (Goklany 2007a, 2007b, 2009d, 2012a). Second, over the long term, global deaths and death rates from weather- and climate-sensitive health conditions have declined regardless of any climate change. Specifically, they have declined 93%-98% globally for all extreme weather events since the 1920s (Goklany 2009c); death rates for malaria have declined over 90% since 1900 (WHO 1999, page 50; World Malaria Program 2011); and at least 50% for diarrheal diseases since 1980 (Keusch et al. 2006, figure 19.2). In addition, hunger and malnutrition rates have declined (Goklany 2007b; World Bank 2011; FAO 2010, figure 2, page 9), which indicates that death rates from these causes should also have declined. Third, comparing the declines in mortality from climate-sensitive causes with the increases in mortality from all causes indicates that humanity is coping better with the former than it is with far more important health and safety problems (Goklany 2012b). Fourth, if economic growth continues as is assumed under the various scenarios, and secular technological change continues as it has over the past century or more, adaptive capacity should continue to increase and deaths and death rates from climate-sensitive health outcomes should continue to decline (Goklany 2009c, 2009c, 2012a; Bosello et al. 2006; van Vuuren et al. 2011; Beguin et al. 2011). (Indur Goklany, Independent)	Noted. The chapter explores the relation of economic development to climate change resilience.
103	38245	11	3	10	3	11	Executive Summary. "The health of human populations is sensitive to shifts in weather patterns and other aspects of climate change (very high confidence)." Question: Globally, is the human health more sensitive to climate change in urban areas or rural areas? Does this sensitivity vary on a regional scale? (Abdalah Mokssit, Direction de la Météorologie Nationale (DMN))	words changed; eg "attributed" now "ascribed"; "likely" changed to "considered"
104	42340	11	3	10	3	11	Modify the sentence on these lines as follows: "ALTHOUGH the health of human populations is sensitive to shifts in weather patterns and other aspects of climate change, IT IS MUCH MORE SENSITIVE TO ECONOMIC DEVELOPMENT, TECHNOLOGICAL CHANGE, AND PUBLIC HEALTH MEASURES (very high confidence) (IPCC AR5, page 25, lines 48-52; page 27, lines 13-15; page 28, lines 1-7; Table 11-1 on page 62; Bosello et al. 2006; van Vuuren et al. 2011; Goklany 2007a, 2007b, 2009a, 2009d, 2012a; Beguin 2011)." (Indur Goklany, Independent)	words changed; eg "attributed" now "ascribed"; "likely" changed to "considered"
105	44993	11	3	11	3	12	I miss effects occurring due to changes in UV radiation. In addition, you refer to "temperature and humidity extremes". I suppose you want to address heat-waves with this. For a heat related health impacts not only temperature and humidity are relevant, but also wind (low wind velocity) and radiation. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	"increasing doubt" here refers to the controversy over CFE. Text changed to: "Concern over future climate change and crops is amplified by growing concern that increasing doubt over the benefits and strength of the carbon fertilization effect (CFE), especially for C4 plants has been overstated (Leakey et al., 2008; Long et al., 2006)."
106	43725	11	3	16	0	0	"non-linearities in response". What response? Health outcomes in response to climate change. The example in brackets would imply this but would be helpful to be clear here. (Peter Berry, Health Canada)	text has been re-written
107	50636	11	3	16	3	17	For the phrase "as climates become more extreme," the author team may wish to clarify more specifically what is meant, also adopting a more conditional framing to reflect differences across types of "extreme climate." (Katharine Mach, IPCC WGII TSU)	Yes, ok
108	49085	11	3	18	3	18	Please consider to include the following text into the executive summary; "There are some factors (such as education, income, health status and responsiveness of government) that might be described as generic causes of vulnerability. Low levels of parental education, for example, are consistently associated with higher child mortality in times of stress, whether it is military conflict, famine, or other natural disasters. [11.3]", cut from page 23 line 10-13. (Oyvind Christophersen, Climate and Pollution Agency)	Noted, but tight for space with the ES
109	42311	11	3	19	0	0	the phrase 'global health' is problematic. Does 'global' mean worldwide, or does it refer to a special category of health problem (e.g. those that are transboundary in scale and in their dynamics)? More specifically, in this sentence the phrase 'global health effects' is quite ambiguous. In general I would caution against use of this (increasingly degraded) phrase. See also your p4, L7 use of 'world-wide' --- which reads much better. (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	A term of art in the field now, but we will consider carefully when using - here changed just to "global burden of ill-health"
110	48660	11	3	19	0	0	I understand this sentence to concern the IPCC convention of "climate change" being a sustained change in the climate, irrespective of the cause. Also, without some indication of time scale I assume this is a general statement that applies e.g. similarly to the past few decades and past few millennia. Is this what you mean? (Dáithí Stone, University of Cape Town)	Good point, have sharpened
111	48115	11	3	19	3	19	"highly likely" needs to be replaced by a statement consistent with the guidance on uncertainty In this case, I would feel that "very likely" could probably be appropriate, but the statement would benefit from a clarification of the words "contributed to global burden of disease" so that it would be more easy to identify the evidence that makes it "very likely" (can we conclude that the net burden of disease increased, even when reductions in some regions and seasons are taken into account ?) (Philippe Marbaix, Université catholique de Louvain)	We have sharpened and made consistent with general IPCC terminology
112	49086	11	3	19	3	19	Please use the common phrasing for likelihood, ref chapter 1 page 9 line 4-11. I assume that you in this case mean "very likely" instead of "highly likely". (Oyvind Christophersen, Climate and Pollution Agency)	yes, see above
113	50637	11	3	19	3	19	For the phrase "highly likely," the chapter team should consider and use the specific likelihood terms available in the guidance for authors. (Katharine Mach, IPCC WGII TSU)	yes, see above

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
114	54429	11	3	19	3	19	"Highly likely" is not a calibrated term. This should be replaced by "very likely" or another likelihood term as appropriate. In addition, the basis for this likelihood assignment is not completely clear. The conclusion is based on quantitative information discussed in the chapter text, but the connection between this quantitative evidence and the probabilistic likelihood assignment is not explicit. Further explanation of this would be helpful. (Michael Mastrandrea, IPCC WGII TSU)	yes, see above
115	42341	11	3	19	3	20	Modify the sentence on these lines as follows: "To date, THE CONTRIBUTION OF climate change to THE global burden of disease HAS BEEN RELATIVELY TRIVIAL compared with other stressors." Rationale: per WHO estimates, global burden of disease attributed to climate change for 2004 amounted to 0.4% of total global burden of disease (Goklany 2012a, based on WHO 2009). (Indur Goklany, Independent)	we have sharpened and made consistent with general IPCC terminology
116	54426	11	3	19	3	22	This is an example where further specificity would be useful, both here in the Executive Summary and in the corresponding chapter text, which would also improve the traceable account for this finding. Section 11.4 discusses the contribution of climate change to the global burden of disease, and provides quantitative estimates. But it does not discuss the size of the climate change contribution relative to other stressors, what other stressors are important, nor why the climate change contribution is not well quantified when quantitative estimates are presented. It would be useful to include these explanations in the chapter text to support the existing Executive Summary finding, and to further specify in the ES finding what other stressors are important and why the climate change contribution is not well quantified. A further option would be to present the quantitative estimate of the climate change contribution (perhaps relative to other contributions). (Michael Mastrandrea, IPCC WGII TSU)	we have sharpened and made consistent with general IPCC terminology
117	42312	11	3	20	0	0	I suggest: 'effects, at this early stage, are relatively small compared with other environmental and social stressors and are not well quantified (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	Agree - changes made
118	40328	11	3	20	3	20	Not sure what is meant by 'global health effects' is this a recognized term? (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	have changed to global burden of ill-health, a more recognized term
119	44994	11	3	21	3	22	there are also places with an increase in food production (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	accepted, but no space for this detail in the executive summary; the point that CC lifts yields in some places at higher latitudes is in the food chapter
120	42591	11	3	22	3	37	some note should be made that food production is also affected by CC in developed countries as such supply to the World Food Bank is also in jeopardy. i.e. recent events in USA. (MARGARET LOUGHAN, MONASH UNIVERSITY)	Agree, though there is no space for this detail in the executive summary
121	42313	11	3	24	0	0	If climate change continues (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	changed
122	42342	11	3	24	0	0	Add a new paragraph on line 24, which reads as follows: "Through at least 2085, the contribution of climate change to the global burden of mortality is likely to be relatively small compared with other stressors (Goklany 2009a, 2011, 2012a; IPCC AR5 Section 11.5.1, page 27, lines 13-15; page 28, lines 1-7, van Vuuren et al. 2011; Beguin et al. 2011; Bosello et al. 2006)." (Indur Goklany, Independent)	disagree with the detail of this claim. Chapter does say that the impacts of climate change, so far, are small by comparison with immediate health problems.
123	42343	11	3	24	0	0	Insert a new paragraph that parallels the paragraph starting on line 24 and reads as follows: "If economic development occurs in the future as assumed in the various scenarios used to project climate change, the health effects of climate change should be much smaller than they are today, at least through 2085 (Goklany 2007b, 2009a, 2012; IPCC AR5, Section 11.5, page 27, lines 13-15 and page 28, lines 1-7; van Vuuren et al. 2011; Beguin et al. 2011; Bosello et al. 2006). Moreover, the reductions in health burden from increases in economic development should be compounded by reductions due to secular technological change (Goklany 2007b, 2009a, 2009d, 2012)." (Indur Goklany, Independent)	Proposed statements assume linear change, overstate certainty. Most references are non peer-reviewed, auto-citations by the reviewer.
124	40825	11	3	24	3	25	"...will be: increased risk of undernutrition ... " contradicts the statement p 27 line 21 ff "In summary ..climate change ... will have a substantial negative impact on childhood malnutrition and on malnutrition-related child deaths." An increased risk is not the same as the probability of increased diseases. (Winfried Zacher, Germanwatch)	accept that it is impossible to predict the future - all statements about what lies ahead are risk statements. Changes made to the text.
125	43726	11	3	24	3	31	You may wish to include some level of confidence with this statement (e.g very likely) etc as per statements of findings above (Peter Berry, Health Canada)	accepted
126	47979	11	3	24	3	31	This is a nice, succinct summary of future projected scenarios of climate change on health. After reading the rest of the chapter, however, the impacts on mental health and well-being that show up further down are not reflected here. Many scholars from organizations such as the American Psychological Association are predicting that the mental health impacts of climate change may be one of the largest health impacts (see for example: Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., Stern, P., & Weber, E. (2010). Psychology and global climate change: addressing a multifaceted phenomenon and set of challenges. A Report of the American Psychological Association Task Force on the Interface between Psychology and Global Climate Change; Swim, J., Stern, P.C., Doherty, T., Clayton, S., Reser, J., Weber, E., Gifford, R., & Howard, G. (2011). Psychology's contributions to understanding and addressing global climate change. American Psychologist, 66(4), 241-250; Doherty, T., & Clayton, S. (2011). The psychological impacts of global climate change. American Psychologist, 66(40), 265-276). (Ashlee Cunsolo Willox, McGill University)	reference made to mental health
127	52388	11	3	24	3	31	This bullet falls short in failing to make any quantitative or at least semi-quantitative (e.g. comparative) statement about the expected severity of any of the changes. The previous bullet makes a useful comparison between climate-induced changes to date and those from other factors; cannot a similar comparison be made between future changes anticipated by, say, 2050 (and preferably later years) and human perturbations? If not it is not really a useful conclusion. I realise that saying anything about other stressors in the future may be impossible, but best available estimates of future climate impacts should be compared with present-day stressors to give some sense of proportion. (Steven Sherwood, UNSW)	we have rewritten to be as specific as possible and there is now a section on longer term effects

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128	54427	11	3	24	3	31	This is another example where the specificity of the finding could be improved. The introduction to 11.5 mentions that most literature focuses on the period through 2050, and this time horizon is important to communicate in the Executive Summary. Also, each of these bullets could be enhanced by providing information, to the extent possible, on the magnitude of projected impacts globally and regionally (highlighting regions where impacts are projected to be important), characteristics affecting vulnerability and/or populations that may be more vulnerable to specific types of impacts, and perhaps even adaptation options and challenges for addressing certain risks (although these could also be presented separately). If such information is not available, the reasons for this could also be explained. Calibrated uncertainty language should also be added here. (Michael Mastrandrea, IPCC WGII TSU)	we have rewritten to be as specific as possible
129	50638	11	3	25	3	31	For these effects, the author team should use calibrated uncertainty language to indicate its degree of certainty in the projections. In doing so, the author team should also consider further ways to reflect conditionality. That is, for the 2nd example, levels of confidence regarding projections for heat waves, storms, floods, and fire differ, which may also differ from the author team's evaluation of increased injury and disease IF a given change in a type of climate extreme occurs. I would encourage the author team to consider ways to clearly communicate these substantial, yet crucially important complexities. (Katharine Mach, IPCC WGII TSU)	we have attempted to communicate these complexities
130	43728	11	3	26	0	0	"floods" - I recall the IPCC SREX indicating that due largely to current monitoring and surveillance it is not possible with confidence to indicate that floods have increased as the climate has changed. Are we still confident that we can expect significant health impacts from floods under a changing climate as this sentence would suggest - similar to what we would expect from heat and storms? (Peter Berry, Health Canada)	the projections for increased rainfall intensity are robust, therefore we judge that risk statements about the health effects of flooding are defensible.
131	40329	11	3	26	3	26	increased incidence of injury in Inuit – due to poor / different ice conditions, late freeze up, - speak to this later on in document and ref Ford et al. Worth indicating here too? (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	note but no space in summary
132	42314	11	3	27	0	0	Greater incidence of injury, disease and death ... Ditto L 27, and (later) in Section 11.8 (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	death added
133	43727	11	3	27	3	29	This statement ends off with reference a general statement that the positive health outcomes of climate change will be exceeded by the negative impacts. May therefore wish to put this one last in the list (Peter Berry, Health Canada)	this refers just to the subsection on heat/cold
134	38033	11	3	28	3	28	"more variable climate" - If one splits the climate response into a mean state change and variability change, there is little evidence of the climate becoming more variable. I suggest changing "more variable" to "warming". (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	will ensure consistency with WG1
135	40826	11	3	30	0	0	Why change the systematic of enumeration of health effects from real problems ("injury and disease") to "...pressure on disease control systems ..." This change of perspective inadequately diminishes the threat posed by the "... food- and waterborne diseases and dengue and other vector-borne infections." (Winfried Zacher, Germanwatch)	removed
136	42315	11	3	30	0	0	Increased pressure on infectious disease control systems due to more climatically favourable conditions (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	removed
137	43729	11	3	30	0	0	How is increased pressure on disease control systems an effect on health? And if you are saying there are more favourable conditions for these diseases and increased pressure on "disease control systems" does this not mean that there are increased health impacts? Is the health care system not part of the disease control system. It would be helpful to clarify this. Decision makers won't know how to plan based on this statement. (Peter Berry, Health Canada)	removed
138	44995	11	3	31	3	31	I would suggest: "... water-borne diseases, as well as vector-borne infections such as dengue." (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	we have rewritten this section
139	49087	11	3	32	3	32	Please consider to insert the following text in the executive summary; "Much of the adaptation to climate change to protect health happens at the neighbourhood and community levels. Information, education and engagement of populations is essential to mobilizing community resources and responding appropriately to natural disasters. [11.6]" (Oyvind Christophersen, Climate and Pollution Agency)	This is not well enough established to place in Exec Summary, but is found in the text
140	40891	11	3	33	0	0	[Add to header] "...climate changeis to exacerbate existing vulnerabilities by multiplying current risks to health" (Lynn Wilson, SeaTrust Institute)	think this would unnecessarily confound concepts
141	42344	11	3	33	0	0	This sentence is misleading, to put it mildly. It currently states, "The most important effect of climate change is to multiply current risks to health." It would be more correct to say, "The most important effect of climate change is to fractionally increase current risks to health" because climate change would increase health effects by a small fraction (Goklany 2009a, 2012; IPCC AR5 Section 11.5, page 27, lines 13-15, and page 28, lines 1-7). The use of the term "multiply" will suggest to many, if not most, readers that health risks from climate change would be a multiple (e.g., twice, thrice, etc.) of the risk in its absence. (Indur Goklany, Independent)	do not accept there is anything misleading about "multiply"
142	50639	11	3	33	3	33	The author team may wish to adopt a more qualified phrasing for "the most important effect of climate change." For example, is this the most important effect in the realm of health or in the context of climate change overall? Also, how is "most important" being defined here? (Katharine Mach, IPCC WGII TSU)	as this is the exec summary of the health chapter, we would rather not have to add unnecessary wordage each time to specify we are speaking of health
143	52389	11	3	33	3	37	I believe research showing new threats that will emerge is being overlooked or minimised here. At some point the increase in incidence of some problem is severe enough that it should be considered a new threat rather than simply a multiplication of an existing problem. For example there will be tenfold or more increases in exceedence rates of some heat-stress thresholds (as reported in the main text. (Steven Sherwood, UNSW)	agree that, when threats reach a threshold, the risk and necessary response increases exponentially. Have attempted to accommodate this point in the main body of the chapter

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144	54428	11	3	33	3	37	This finding provides a clear message, but it could be made clearer by explaining further why improvements in public health and health care are important in this context, and what kinds of improvements are meant. (Michael Mastrandrea, IPCC WGII TSU)	Need to keep the ES crisp, but we have added a bit
145	42316	11	3	36	0	0	heaviest burden of climate-sensitive disease (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	changed
146	49088	11	3	36	3	36	Please consider to include after "..... disease" some text that concretizes what group of humans that carry the heaviest burden. For example ", such as poor and disenfranchised groups, and especially poor children.", adopted from the FAQ 11.3 section. (Oyvind Christophersen, Climate and Pollution Agency)	rewritten
147	42317	11	3	39	0	0	I don't think this is as clear as it could be (and nor does one 'mitigate against'). It is worth making this point very clear, and being explicit that it is an add-on benefit. I suggest: There are opportunities to mitigate against climate change, and improve health at the same time Many of the proposed actions to mitigate climate change will also provide direct health co-benefits to the community or population that takes that action – in addition to the health benefits that will subsequently flow to populations worldwide from climate change abatement. (And what is a 'co-benefit action?') (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	rewritten
148	44981	11	3	39	0	48	There are opportunities to mitigate against climate change, and improve health at the same time. These co40 benefit actions include:: Reducing local pollution and emissions of climate altering pollutants (CAPs) from energy production through better combustion, energy efficiency, and shifting to renewables. Reducing rising trends of livestock production, particularly of ruminants, by shifting diets in rich countries to less red meat and dairy products. Reducing CAP emissions by redesigning communities to rely on more public transport and promote physical activity. Providing access to reproductive services reducing population growth over time and improving child and maternal health through increased birth spacing (11.7) In addition to the above, attempt must be made to reduce poverty and inequalities in access to basic amenities and facilities, sanitation, and safe drinking water in developing countries. (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	not sure what the suggestion is here. In any case, this has been rewritten
149	41918	11	3	39	3	48	An emphasize on also "adaptation" in the last bold subheading may be fair. "... and improve health sector adaptation" may be enough. (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	Not sure the meaning here
150	43730	11	3	39	3	48	The sentence on 39-40 suggests that actual health co-benefits will be listed below (e.g., lower risk from cardiovascular diseases etc). However, the mechanisms through which the co-benefits are achieved are listed - these are not the co-benefits. Also, why are efforts to reduce the urban heat island not included in this list? There are significant health co-benefits (fewer heat deaths) associated with such actions which can have significant impacts on reducing GHG emissions (Peter Berry, Health Canada)	rewritten focusing on the action. Also made clear the list is not exhaustive
151	54430	11	3	39	3	48	Regarding the traceable account for this finding, five categories of health co-benefits are introduced at the beginning of section 11.7, but only four are mentioned here in the Executive Summary, and only three are discussed in detail in the chapter section. The reasons for this diversity are not completely clear, given that relevant literature is listed for all five categories in Table 11-7. Calibrated uncertainty language should also be added here. (Michael Mastrandrea, IPCC WGII TSU)	a decision related to saving space, but we have rewritten to be consistent and added uncertainty language
152	42346	11	3	39	11	48	Add to this list, "Ensuring economic growth (see IPCC AR 5 page 25, lines 48-52; page 28, lines 1-7) and technological change (Goklany 2007a, 207b, 2009d, 2012a)" (Indur Goklany, Independent)	too disconnected from health impacts to fit in this chapter, but of course important
153	42318	11	3	41	0	0	local air pollution (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	reworded
154	37320	11	3	41	3	42	I would caution using CAPs to mean "climate altering pollutants". In the US, CAPs typically refers to "Criteria Air Pollutants" meaning those pollutants that the US EPA regulates through ambient air quality standards – ozone, PM, SO2, NOx, CO, Pb. In this sentence, CAPs is used to distinguish greenhouse gases from air pollutants, but for a part of the audience, CAPs are air pollutants. (J. Jason West, University of North Carolina)	this is an international document and CAPs is the agreed term in AR5
155	50640	11	3	41	3	48	For these co-benefits as possible, the author team should consider using calibrated uncertainty language to characterize its degree of certainty in the statements. (Katharine Mach, IPCC WGII TSU)	done
156	42345	11	3	42	0	0	Delete "and shifting to renewables". As a general matter shifting to certain renewables, specifically biofuels, could increase adverse health consequences (Goklany 2011). (Indur Goklany, Independent)	added "clean" to renewables
157	42319	11	3	43	0	44	This dotpoint could be expressed better; and it should indicate the relevant type(s) of health risk (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	Not sure there is space in ES for this
158	38227	11	3	44	0	0	...and dairy products and promoting what? (Caradee Wright, Council for Scientific and Industrial Research)	not sure there is a need to suggest alternatives
159	40875	11	3	45	3	48	"Reducing CAP emissions by redesigning communities to rely on more public transport, to promote physical activity and to lower the portion of overweight/obese people" (Birgit Kuna-Dibbert, German Aerospace Center, Project Management Agency)	we had to relegate some CB categories to a summary table to save space and thus cannot put in ES
160	44784	11	3	47	0	0	This should say "reproductive health services" rather than just "reproductive services." Reproductive services is not a term that is much used by those working in reproductive health. (Karen Hardee, Futures Group)	done
161	41919	11	3	49	3	0	A final sentence may mention Reducing vulnerabilities, linked particularly to water and sanitation, housing, urban heterogeneity, urban planning, early warning systems. (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	these are important, but are not co-benefits -- do not reduce emissions directly
162	47980	11	3	51	4	8	Climate change health impacts will be more than just 'disease' and 'disorders', although those indeed are very important aspects. There are also significant implications for well-being and wellness as well. Perhaps a more inclusionary language of the spectrum of 'health' would provide a more holistic introduction to this section. (Ashlee Cunsolo Willox, McGill University)	More inclusive wording is now used in section 11.1
163	44996	11	3	54	3	54	What about the diseases and disorders that are sensitive to weather? See also Page 3 Line 10 (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	"weather" included
164	37745	11	4	1	4	1	Should the word "susceptible" be changed to "vulnerable"? (Paul Beggs, Macquarie University)	no change

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
165	44997	11	4	1	4	1	"due to variations in climate" AND WEATHER (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	change made
166	43731	11	4	2	4	3	it is not clear why only one (or I guess 2) of the types of co-benefits that are mentioned on page 3 is mentioned here. Are these the most important - this would seem to be the implication. (Peter Berry, Health Canada)	no change required
167	40892	11	4	3	0	0	[Add after "climate active pollutants"] ...and to improve human and environmental conditions (Lynn Wilson, SeaTrust Institute)	no change
168	42320	11	4	3	0	0	climate-altering pollutants. (I would use a hyphen, even though it has become fashionable to drop them ... and thus, regrettably, allow ambiguities.) (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	changes made in accordance with standard use of the term Climate Active Pollutants
169	53335	11	4	3	4	3	Please define a climate active pollutant. (Kristie L. Ebi, IPCC WGII TSU)	as above
170	43732	11	4	8	0	0	"and projections for the remainder of this century". Projections based on the impacts of climate change or not? It would be helpful to provide more information here. (Peter Berry, Health Canada)	add "health" to make this clear
171	37751	11	4	11	0	0	Section 11.1.1. This section on the present state of global health does not seem to make any explicit mention of obesity and diabetes etc. My understanding is that these are massive public health problems both now and into the future and in both developed and (at least some) developing countries. (Paul Beggs, Macquarie University)	reference to chronic diseases already included
172	42573	11	4	11	0	0	2. In Introduction, there is a section about "Definitions" (para 3, p 4). It only briefly mentioned the definition of health without any references. Because this section is under the sub-heading: Background – Present State of Global Health, this reviewer thinks that the definition of global health should be provided as well. Only DALY was referred to as the most commonly cited of the quality of life metrics (para 5, p4), but QALY and YLL have also widely been used in the literature. (Shilu Tong, Queensland University of Technology)	the citation has been added for the standard WHO definition of health
173	50641	11	4	13	0	0	Section 11.1.1.1. Even for this introductory section, it would be preferable to provide citations to background sources, in support of statements made. (Katharine Mach, IPCC WGII TSU)	as above
174	47981	11	4	15	4	16	As with the comment above, an inclusion of other terms of health, such as spiritual and cultural, will also be important here, as many of the individuals currently experiencing the strongest impacts of climate change (and likely the strongest related health impacts), such as Indigenous or resource-dependent populations, would categorize 'health' beyond physical, social, and psychological. (Ashlee Cunsolo Willox, McGill University)	noted but no change thought necessary
175	43733	11	4	17	0	0	"development". Individual development or development of the country or nation? The Population Health Approach in Canada discusses the importance of early child development in influencing later health outcomes. You may wish to provide more information in this regard. (Peter Berry, Health Canada)	accepted - text changed
176	39708	11	4	20	4	20	, required after 'however' (Peter Burt, University of Greenwich)	change made
177	43734	11	4	21	0	0	"However, there is less..." this sentence is unclear (Peter Berry, Health Canada)	sentence is deleted
178	53336	11	4	25	4	28	You could use climate-sensitive health outcomes as examples, such as asthma and malaria. (Kristie L. Ebi, IPCC WGII TSU)	changes made
179	53337	11	4	35	4	35	Another benefit is that DALYs can be compared across countries. (Kristie L. Ebi, IPCC WGII TSU)	no change
180	42574	11	4	40	0	0	3. Under the sub-heading: Trend in Health (p4), the sentence "It is important to bear in mind ...substantial reductions in mortality" is awkward because China has also achieved a substantial reduction in mortality during the 20th century and the 1st decade of the 21st century. (Shilu Tong, Queensland University of Technology)	no change
181	42347	11	4	40	6	3	There should be a sub-section on "Trends in Climate-Sensitive Health Outcomes" which should discuss long term trends in deaths and death rates from weather- and climate-sensitive health conditions. It should note that regardless of any climate change, global deaths and death rates from weather- and climate-sensitive health conditions have declined 93%-98% for all extreme weather events since the 1920s (Goklany 2009c); over 90% for malaria since 1900 (WHO 1999, page 50; World Malaria Program 2011); and at least 50% for diarrheal diseases since 1980 (Keusch et al. 2006, figure 19.2). It should also note that the area in which malaria due to Plasmodium falciparum—the deadliest of the parasites that cause malaria—is endemic has been reduced substantially since 1900 (Gething et al., 2010), and that hunger and malnutrition rates have declined (Goklany 2007b; World Bank 2011; FAO 2010). Additional details are furnished in the comment for page 3, lines 8-48 (above). This sub-section should also discuss the fact that WHO (2002, 2009) estimates of the global burden of death and disease indicate that climate change doesn't currently rank among the top twenty global health risks (Goklany 2009a, 2012a), and that even in the future, factors other than climate change should have a greater influence on mortality from climate-sensitive health risks (Goklany 2009a, 2012). (Indur Goklany, Independent)	no change required - reference is made already to the changes that have been observed in the distribution of malaria.
182	37746	11	4	42	4	45	The phrasing of the sentence in lines 44 and 45 is a bit confusing. This sentence seems to follow on from the first sentence of the section, however, the first half of the second sentence made this reviewer, at least, think that the last part of the second sentence was going to say the opposite of what it says. Is the second sentence of the section actually needed? We are not told what the "global averages" are (and we don't need to be), so saying China has swayed them does not mean much. (Paul Beggs, Macquarie University)	text changed to improve clarity
183	42321	11	4	46	0	0	no need for those two hyphens (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National	change made
184	37747	11	4	46	4	46	"sizable and avoidable inequalities" in what? Should it read "sizable and avoidable inequalities in life expectancy"? (Paul Beggs, Macquarie University)	change made

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
185	37748	11	4	46	4	46	Is "ethnicity" correct? It probably is, but unlike education and income where it is easy to understand that high or low levels are directly related to life expectancy, with ethnicity it is less easy to understand such a direct relationship. Could the end of the sentence be modified to something like "...education, income, and extent of ethnic disadvantage."? (Paul Beggs, Macquarie University)	no change
186	53338	11	4	46	4	46	That affect life expectancy. (Kristie L. Ebi, IPCC WGII TSU)	change made
187	38977	11	4	52	4	52	write "reduction" rather than "improvement," since improved mortality can mean both fewer deaths and more deaths, as a general might want for his enemy. (Ole Faergeman, Aarhus University Hospital)	change made
188	43735	11	5	6	5	24	The message in this text box is a bit unclear. It suggests that achievement of the MDGs which is to occur between 2000-2015 will be affected by climate change and then examples of how climate change interacts with MDGs are provided. However, given that the first period for achieving the MDGs is almost up (2015) an important question is whether climate change or climate variability has impacted efforts since 2000 toward achieving these goals? If this can be answered you may wish to do so, if it can't because of a lack of evidence you may wish to acknowledge this. (Peter Berry, Health Canada)	accepted - new text included to acknowledge that substantial climate change impacts will occur after 2015.
189	47982	11	5	6	5	26	I like the linkage to the health aspects of the MDGs, as they provide a nice case study. (Ashlee Cunsolo Willox, McGill University)	Thank you.
190	54874	11	5	12	0	0	Figure 11.1 It may be preferable if ALRI is spelled out. (Monalisa Chatterjee, IPCC WGII TSU)	change made
191	53935	11	5	13	0	14	The following sentence should be included in caption of the figure 11-1. "Each color represents a different child-mortality "disease wedge" with different risk factors and interventions." (Yuka Estrada, IPCC WGII TSU)	change made
192	37749	11	5	13	5	14	The sentence starting at the end of line 13 and finishing towards the end of line 14 should be in the Figure caption only (or as well). It is currently not in the Figure caption. (Paul Beggs, Macquarie University)	change made
193	37750	11	5	17	5	17	I think "directly" should be changed to "indirectly". Malaria, for example, is influenced by the impacts of changes in temperature and rainfall on the mosquito vector. (Paul Beggs, Macquarie University)	no change
194	50642	11	5	17	5	24	For the statements, it would be preferable to provide citations to the literature or cross-references to chapter sections where corresponding analysis can be found. Additionally, the author team may wish to present its degree of certainty in the statements through use of calibrated uncertainty language. Finally, as 3 minor points, "changes in temperature and rainfall" on line 18 could be further qualified--since rainfall patterns projected differ across geographic regions, it could be helpful to specify whether it is increases in extreme precipitation, increases in drought, etc. that are meant here. 2nd, casual usage of "likely" on line 20 should be avoided, as it is a reserved likelihood term. 3rd, the acronyms presented on line 24 should be defined. (Katharine Mach, IPCC WGII TSU)	reference to the relevant chapter sections is included
195	38034	11	5	24	5	24	"major wedges, ALRI" I have no idea what this means. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	ALRI is explained
196	38978	11	5	24	5	24	Spell out ALRI: "acute lower respiratory infection" (Ole Faergeman, Aarhus University Hospital)	as above
197	44998	11	5	24	5	24	What is the meaning of ALRI? (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	as above
198	53339	11	5	24	5	24	Please define ALRI. (Kristie L. Ebi, IPCC WGII TSU)	as above
199	42348	11	5	25	0	0	It should be noted that some mitigation policies could be counterproductive. These include policies that subsidize or mandate biofuel production. Goklany (2011) estimates that such policies, by increasing hunger and poverty, may have increased deaths in developing countries by at least 192,000 in 2010. In addition, Tsao et al (2012) indicate that health effects of PM2.5 and CO from biomass burning associated with sugarcane cropping, normally considered to currently be the most efficient method of producing biofuels, may have been significantly underestimated. Also, policies that would increase the price of energy could inadvertently increase the health consequences from extreme weather events if, for example, they reduce air conditioning during heatwaves, heating during coldwaves, or reduce the ability to evacuate or increase the cost of response measures during emergencies such as hurricanes, tornados, etc. Also, noting that more people die during the colder months in developed countries and even in many developing countries (Goklany 2009a, 2012a, and references therein), increases in the price of energy may inhibit adaptation measures and exacerbate this chronic problem, which incidentally is responsible for more deaths than the WHO (2002, 2009) estimates of deaths attributable to climate change (Goklany 2012a). (Indur Goklany, Independent)	Poorly chosen mitigation strategies may have negative effects on health - this is acknowledged in section 11.7, but the emphasis lies on opportunities to select strategies that have positive outcomes both for the environment and for human health.
200	43736	11	5	40	0	0	"reported declines in total number of cases world-wide must be treated with caution" - should indicate why and if you are encouraging caution about these stats why do you feel encouraged by them? This is a bit unclear. (Peter Berry, Health Canada)	the reason being that definition of a malaria "case" is not standardized, nor are the reports around the world published in a consistent fashion - new text will be added
201	38035	11	5	40	5	42	malaria cases decreasing - This seems in conflict with other statements in the chapter projecting that malaria cases will expand/increase in the future. More explanation is needed here and in the projection section. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	as above
202	53340	11	5	42	5	42	You might want to refer to the recent Indian study questioning the WHO estimates of malaria deaths. (Kristie L. Ebi, IPCC WGII TSU)	noted - will seek the reference
203	43737	11	5	45	5	46	"child under-nutrition...has become more common since 2005". Between what years? If say 2005-2008 (the stat above reports to 2008) then perhaps this is a blip and may not be a trend? (Peter Berry, Health Canada)	text changed to "increased in some countries between 2005 and 2008"
204	43738	11	5	48	5	50	This is a bit confusing. If one of the key reasons in China that these diseases are increasing is the ageing of the population why are they decreasing in high income countries that also have ageing populations. Something else is going on here that may need to be discussed. Maybe the Chinese population is ageing faster? (Peter Berry, Health Canada)	In China, there are high levels of cardiovascular risk factors (very high prevalence of smoking in men, for instance). In most high income countries all the risk factors (except body weight) are lower than before, and continue to decline

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
205	42322	11	6	6	0	0	Why not Health Projections in the 21stCentury – and get rid of the ambiguous word 'Global'? (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	accepted
206	38036	11	6	8	6	8	"most commentators" - References? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Loathe to put in references for such an uncontentious statement
207	43739	11	6	8	6	8	"Commentators" sounds a bit like television analysts or newscasters. Do you mean somebody else here like researchers? You may wish to be more specific. (Peter Berry, Health Canada)	Change commentator to researcher
208	38228	11	6	15	0	0	Crashes better written as injuries? (Caradee Wright, Council for Scientific and Industrial Research)	changed to "road crash injuries"
209	50643	11	6	21	0	0	Section 11.1.2. For the findings characterized in this section, it would be preferable to specify the supporting chapter sections much more specifically, also presenting any calibrated uncertainty language that was assigned in the 4th assessment report. (Katharine Mach, IPCC WGII TSU)	references provided
210	52390	11	6	21	7	16	My view is that it is not useful to have a separate secton dedicated to summarising the findings of AR4. It would be better to simply note throughout the chapter when giving key conclusions, whether and how they differ from those of AR4. At least, this is what we are doing in my chapter of WGI and most others I have seen; and I see it is indeed done in at least some places in this chapter now. Also, although the material in 11.1.3 is useful I believe it could be shorter and might sit better in the introduction to the chapter rather than here. If any of the other reviews provide more detail on particular topics in this chapter it would be useful to cite them there. (Steven Sherwood, UNSW)	these suggestions will be borne in mind as the FOD is edited (and shortened)
211	40827	11	6	26	0	0	".. AR 4 listed threats " to health that may be aggravated by climate change ... " This statement is not correct as AR4 much more frequently used the affirmative "will" instead of the vague "may". (Winfried Zacher, Germanwatch)	AR4 used both "may" and "will"
212	43740	11	6	37	6	38	Perhaps this statement that climate change does not create new health risks applies much more to developing countries than to developed countries. For example, in Canada, while health outcome data is uncertain, it is thought that many more people die from extreme heat than from other natural hazards. Also, to the extent that heat interactions with air pollution to produce synergistic impacts on health these could be considered "new" risks. Also, would one consider risks from wildfire smoke, dust storms or perhaps aeroallergens that never really before affected an urban area creating new risks or simply multiplying existing ones. I think a very strong argument could be made that for the populations in question, these are new risks. (Peter Berry, Health Canada)	changed to "seldom creates new risks"
213	43741	11	6	40	6	41	"ameleorate the risk" A bit unclear - the risk of what? Also, these two sentences seem to conflate vulnerability and risk. (Peter Berry, Health Canada)	new text added - "the risk of disease and injury resulting from rapid climate change"
214	38979	11	6	47	0	0	Section 11.1.3 on Developments since AR4 is more about what has been written than what has been learned. Indeed, the key reference is by Hosking and Campbell-Lendrum who write that they made no attempt to synthesize the results of the 40 recent original studies that they reviewed. Would it be possible for the authors of Section 11.1.3 to do that synthesis? If not, the reader would be helped by a frank statement to the effect that, despite a proliferation of papers, we know little more about how climate change can endanger human health than we did in 2007. The part of Section 11.1.3 devoted to the INDEPTH Network (page 7, lines 23-51) should be shortened, since the results of this study have apparently not been published. (Ole Faergeman, Aarhus University Hospital)	It is true this section says more about what has been published than the contents of the papers and reports that have appeared since 2008. However, we feel this is useful background for readers. We are not sure what is meant by a "synthesis" of the publications. Our assessment of what recent publications have added to knowledge of climate change and health makes up the remainder of the chapter (11.2 onwards). It is not true that "we know little more than we did in 2007", but doubt it is necessary to say so in the chapter, given the wealth of literature that is cited. The INDEPTH work will be published early 2013.
215	38976	11	6	49	6	51	Coming right after a sentence about number of papers and reports about climate change and health, the PubMed MeSH listing of papers dealing with both issues (n = 501 as of 24 July 2012) is probably more relevant than the listing of all papers dealing with climate change (n = 13,500 as of April 2012). (Ole Faergeman, Aarhus University Hospital)	Point taken. We have changed the text here, and refer not to the Pub Med numbers, but to Medline citations as illustrated by Figure 3 from the paper by Hosking and Campbell-Lendrum.
216	42323	11	6	50	0	51	not clear whether this refers to all climate change publications, or those addressing health risks. It seems to be the former. (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	accept this criticism, changes made
217	37752	11	6	50	6	50	The PubMed result reported in this line is misleading. It is implied that all PubMed publications are health and medicine related. This is not the case. There are some publications in PubMed that have nothing to do with health and medicine. The PubMed search should be redone using the search terms climate change AND health. This results in 2782 publications (at least in my Institutions version of PubMed on 26 July 2012), far fewer than indicated in this line. The first sentence of the section is, however, still correct: the numbers of publications on climate change and health have grown considerably since the publication of the AR4. Perhaps also noteworthy is the apparent plateauing of the number of such publications since 2009. (Paul Beggs, Macquarie University)	changes made (using Medline citations)
218	37753	11	7	1	7	2	The point being made in the sentence in these lines is not clear. One could read it to mean that reviews and commentaries are less useful and less important than quantitative studies. This of course is not the case. Indeed, it would be interesting to know how many of the quantitative studies are "me too"/"cookie cutter" studies. Further, it might be useful, if a discussion of the types of peer-reviewed publications remains, to include a fourth category: theoretical. (Paul Beggs, Macquarie University)	text altered to make the point more clearly; there is no judgement made here about the value of the different kinds of publications.
219	50644	11	7	3	7	3	It would be helpful to clarify if the "40 studies" on this line are all quantitative studies--this seems to be what is implied, but it may be worth clarifying the point. (Katharine Mach, IPCC WGII TSU)	text changed to make this point more clearly
220	43742	11	7	4	0	0	I understood that the Hosking and Campbell-Lendrum paper focussed on adaptation and not simply quantitative studies linking climate change and health. If this is the case, you may wish to clarify this. (Peter Berry, Health Canada)	no, the paper is not concerned only with adaptation - the authors searched for literature on all 5 WHO climate change and health priority areas

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221	37758	11	7	18	0	0	Box 11-2 does not seem to provide much knowledge. It mainly presents methods. It seems to include no peer-reviewed literature (there is a "forthcoming" special volume "sourced" at the end of the box, but it is not clear what content this refers to). The Box could be deleted. (Paul Beggs, Macquarie University)	there are now papers that have been published - these are cited
222	53341	11	7	20	0	0	This text box is about weather and climate variability, not climate change. (Kristie L. Ebi, IPCC WGII TSU)	changes made
223	35118	11	7	29	0	0	I think the term 'long-term' is misleading here as the results discussed are acute impacts. The data may have been collected over a long period, but the relationships being assessed are short-term. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	The INDEPTH project will run long-term, so there will be opportunities to assess relationships over a prolonged time period.
224	53342	11	7	29	7	40	This should be an assessment of the key findings, not a review / description. Please delete information not relevant to the key results, such as additional studies being conducted. The first sentence --- please change "the authors collected" to "information was collected". It is assumed the authors collected the information. (Kristie L. Ebi, IPCC WGII TSU)	text modified
225	37754	11	7	30	7	30	Dates here, and elsewhere in the chapter and report, should be presented in the form "day number, month word, year number", e.g., 1 January 2000. This will eliminate any uncertainty or wrongful interpretation stemming from the inconsistency in the day and month positions around the world. (Paul Beggs, Macquarie University)	changes made
226	38983	11	7	31	7	33	This sentence needs attention. (Ole Faergeman, Aarhus University Hospital)	changes made
227	37755	11	7	32	7	32	This sentence needs rewording, particularly the error in the middle of it "...the death occurred of death...". (Paul Beggs, Macquarie University)	changes made
228	37756	11	7	32	7	34	The daily and monthly aspect seems to be repeated (see end of line 32 and sentence starting at the end of line 33 and continuing in line 34. (Paul Beggs, Macquarie University)	changes made
229	37757	11	7	34	7	36	The two sentences fully contained in these two lines seem a bit general and vague. (Paul Beggs, Macquarie University)	changes made
230	43743	11	7	35	0	0	"revealed potential differences in susceptibility..." Not sure what this means. It would be helpful to state whether differences were indeed found. Presumably potential differences will always exist. (Peter Berry, Health Canada)	changes made
231	44661	11	7	37	7	39	We have to be more precise and more careful in some analysis and assertion. What are the relationships between the risk of dying for the elderly above 60 years and the temperature on the day preceding the death?. They are dying of what? What is the cause of their deaths and what are the relationships with temperature?. Can we related each or most of death in Nouna or its surrounds with temperature particularly this short (daily) effect?. Autor(s) references. (Dieudonné Pascal YAKA, Burkina Meteorological Authority (B.M.A.) ; University of Ouagadougou (U.O.))	changes made
232	45001	11	7	38	7	40	please explain what is shown in Figure 11-3. What are the effects of rainfall? In addition I would suggest to delete Figures 11-2 and 11-3. The chapter is long enough and the additional information of the figures is not substantial. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	changes made
233	40795	11	7	39	7	39	What is the source of these data ? The caption of the figure is not clear enough (Michel Petit, CGIET rue de Bercy)	changes made
234	44662	11	7	39	7	40	We have to be more precise and more careful in some analysis and assertion. What are the relationships between the daily rainfall and daily mortality of diarrheal diseases?. How daily rainfall can have an effect of dying shortly (a period of a day) from diarrhea?. Autor(s) reference?. (Dieudonné Pascal YAKA, Burkina Meteorological Authority (B.M.A.) ; University of Ouagadougou (U.O.))	changes made
235	40796	11	7	40	7	40	What is the source of these data ? The caption of the figure is not clear enough (Michel Petit, CGIET rue de Bercy)	changes made
236	54875	11	7	42	0	0	Figure 11.2 It will be preferable if the figure is further explained. (Monalisa Chatterjee, IPCC WGII TSU)	changes made
237	45002	11	7	42	7	44	Please explain abbreviations. What is the meaning of the red cycle. The reference is missing (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	changes made
238	54876	11	7	46	0	0	Figure 11.3 It will be preferable if the figure is further explained. (Monalisa Chatterjee, IPCC WGII TSU)	changes made
239	45003	11	7	46	7	47	Source / Reference is missing (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	changes made
240	42575	11	8	1	0	0	4. In "New and emerging topics ..." (1st para, p 8), some major research developments should be mentioned. They include the scenario-based risk assessment, heat health warning systems and public health adaptation. (Shilu Tong, Queensland University of Technology)	these are very broad areas of work - not convinced they constitute "new and emerging topics"
241	43744	11	8	1	8	5	Less well studied are the potential health co-benefits of public health adaptations to climate change impacts on health. Health decision makers may however be interested in understanding how they can achieve co-benefits by adapting to the health impacts of climate change so as to maximize the use of limited resources. See Cheng, J and Berry, P (forthcoming) Health Co-Benefits and Risks of Public Health Adaptation Strategies to Climate Change: A Review of Literature. International Journal of Public Health. (Peter Berry, Health Canada)	We will look for this paper when it appears, but would argue that the health effects of adaptation strategies fit under the heading of "co-benefits", as defined in the chapter
242	38037	11	8	1	8	14	This paragraph seems weak and contains no assessment. I would delete it for space. If kept, I do not see the connection of the sentence on corals (lines 6-8) with this chapter. Delete or make connection. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	The paragraph intends to tell interested readers about the growing edges of the relevant literature - we are not sure what is meant by "assessment" in this regard. The reference to corals aims to make the point that we now realise there are important effects of atmospheric pollution with greenhouse gases, other than climate change. But what the health effects might be, is virtually unstudied.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
243	43745	11	8	5	0	0	"Another important...." The content of this sentence does not follow from previous discussion. The previous sentences discussing "emerging" topics based upon some quantity of research to date. This sentence discusses "important" topic that is stated has no research linked to health. You may wish to be clear that you are discussing both emerging and important topics here. (Peter Berry, Health Canada)	text altered
244	37759	11	8	5	8	6	The sentence within these two lines requires rewording, as follows: "Another important, emerging topic is impacts of greenhouse gas emissions themselves other than those resulting from changing climate". (Paul Beggs, Macquarie University)	text altered
245	37760	11	8	6	8	8	The example of a direct greenhouse gas impact given here, ocean acidification, seems an unjustified choice given the authors of the chapter acknowledge the implications of it for human health specifically have not been explored. Surely, a better example would be direct greenhouse gas (CO2) impacts on plants. This would lead into a clear and well-studied discussion on plant food quantity and quality (and indeed food quantity and quality generally given livestock depend on plant food quantity and quality). And in this sense, the topic is not emerging (see line 5). (Paul Beggs, Macquarie University)	We agree - CO2 effects on plant growth are not a "new and emerging topic". Ocean acidification on the other hand is new, and potentially extremely important, although very little researched, so far.
246	40893	11	8	8	0	0	Change "have not been explored" to something like "have only begun to be explored through indirect connections such as 1) starvation and malnutrition in coastal populations that depend upon healthy fish populations which decline as coral reefs disappear in an increasingly acidic ocean and 2) physical harm, drowning, water and sewage issues from storm surges that increase in coastal areas when coral reefs decline" etc. (Lynn Wilson, SeaTrust Institute)	text has been changed
247	43746	11	8	11	8	12	"In general there is more work underway...." This sentence is unclear. "Other health determinants" includes all of them such as the physical environment which has already been discussed. Do you mean the other health determinants, that perhaps relate more closely to socio-economic conditions, like occupation, education etc? (Peter Berry, Health Canada)	sentence deleted
248	43747	11	8	14	0	0	Is the previous section to be a comprehensive review of climate change and health literature developments since AR4. If so, you might wish to discuss that status of adaptation literature. There have been some notable studies, for example, a review of the status of health adaptation in Ontario, Canada. See Paterson, J., Ford, J. D., Ford, L.B. et al., (2012). Adaptation to climate change in the Ontario public health sector. BMC Public Health. (Peter Berry, Health Canada)	new material has been added on adaptation
249	53343	11	8	15	8	15	There should be mention of developments in health adaptation. (Kristie L. Ebi, IPCC WGII TSU)	new material added on adaptation
250	38040	11	8	17	0	0	Section 11.2 is quite long with no/little assessment and nothing in executive summary. Shorten? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Being shortened along with most of the chapter. There is bullet in the ES.
251	47983	11	8	17	18	5	These are excellent examples of the many pathways through which climate change is impacting health and well-being. You also have some strong examples to illustrate to the reader the points at hand. What strikes me as I read through this, however, is that there is a distinct absence in many of the examples of following the example through to the indirect effects, such as chronic stress, fear, anxiety, depression, etc. Many of the issues presented in these sections also lead to long-term and often negative impacts to mental health and individual and community wellness. I would suggest in some of the examples (i.e. 11.2.2 and 11.2.3) the authors indicate that there are often cascading effects of climate-change-related health issues, that go beyond just the injury, or the disease. (Ashlee Cunsolo Willox, McGill University)	Agree. Mental health outcomes typically eventuate at the end of long and complex causal chains, which is, I think, the reviewer's point here. Different outcomes appear to eventuate with different causes, eg, primarily mood disorders with slow-creeping disasters such as drought and anxiety disorders with acute disasters, such as floods and fires (in the immediate aftermath).
252	42206	11	8	29	0	0	Section 11.2.2: Although the section starts out with correctly mentioning the U-shaped relation between temperature and mortality, the rest of the section is focussed on extreme temperature excursion and specific diseases related primarily to high temperatures, plus very limited remarks on low temperatures. Much more exhaustive and quantitative investigations have been made, e.g. by WHO (Heat waves: risks and responses, Regional Office for Europe, Copenhagen 2004) and by J. Diaz and C. Santiago (cCASHh workshop on vulnerability to thermal stresses, Freiburg 2004), and the work has been continued by global and quantitative modelling of the impacts of changes in daily maximum and minimum average temperatures in Chapter 5 of B. Sørensen (Life-cycle Analysis of Energy Systems; Royal Society of Chemistry, RSC Cambridge 2011), with further references. (Bent Sorensen, Roskilde University)	we have retained the focus on heat effects, for a number of reasons. it is necessary to bring in the epidemiological perspective when talking about effects of increased heat (where 5 billion people live) and effects of reduced cold (where maybe 1 billion people live). The heat problems are not totally compensated by reduced cold problems..... in addition, ongoing campaigns in many countries (e.g. UK and NZ) are focusing on improved insulation, heating, etc to create a healthier indoor environment, and this will reduce the cold problem significantly. It is more difficult for people in tropical low income countries to apply air conditioning, etc. (comment 275 refers to this as well).
253	42349	11	8	29	0	0	There should be a sub-section devoted to the phenomenon of excess winter mortality (EWM). This should note that (a) this is a chronic problem not only in developed countries but also in many developing countries, and that global mortality from EWM exceeds the WHO's estimates of deaths from climate change (see Goklany 2009a, 2011, 2012a, and references therein; Deschenes and Moretti 2008). (Indur Goklany, Independent)	extra material added on the balance of cold and heat
254	45004	11	8	29	0	0	Section 11.2.2: The whole section would benefit from rephrasing. It seems that it was written in hurry (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Thanks to the reviewers' comments, this task has been achieved, I believe.
255	45005	11	8	29	0	0	Section 11.2.2: Please make a clear statement about the impact of indoor thermal conditions on human health (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Done
256	45008	11	8	29	0	0	Section 11.2.2: Please state clearly that appart from temperature also other environmental parameters (wind, humidity, radiation) affect human heat balance and effects of cold and heat on health! (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Done
257	45009	11	8	29	0	0	Section 11.2.2: Include a short section about combined events such as the bushfires and the heat-waves in 2012 in Russia (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Done

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
258	40330	11	8	29	9	50	I realize this section is about extremes- but of interest in the Arctic is that a mere 2C can be the difference between frozen and not. Poor ice is related to increased injuries and isolation due to inability to leave the community (no snow, hazardous ice, 'in-between' seasons unable to travel on land or water as neither quite safe) has an impact on mental well-being of communities. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	Added Brubaker's paper to show mental consequence.
259	42350	11	8	29	9	50	This sub-section should discuss the fact that many studies indicate that death rate drops shortly after the initial increase in mortality following a heatwave, whereas following a cold wave, mortality rate continues to increase for a substantial period following the initial spike (Deschenes and Moretti 2008, and references there-in). (Indur Goklany, Independent)	Added Anderson&Bell paper.
260	52391	11	8	29	9	50	Either this section or 11.4.1 should compare more quantitatively the likely impacts of recent warming on mortality from heat and cold extremes. For example, Ballesina et al. show that (increased) heat deaths will respond more strongly to warming than will (decreased) cold deaths, even in Europe -- this is the type of semi-quantitative benchmark lacking in the current draft. (Steven Sherwood, UNSW)	reference to Ballester et al has been included
261	37761	11	8	31	8	37	The sentences in these lines are a really nice introduction to the section. (Paul Beggs, Macquarie University)	Thanks!
262	44982	11	8	31	9	45	In this section efforts should be made to include more case studies on heatwave impacts from developing countries regarding impact of flooding. A reference to the Katrina hurricane disaster in the southern USA in 2005 may be cited. (El Nino related health hazards in India) Rais Akhtar, Current Science, 2010, VOL 98, No. 2, 25 January 2010, pp144-147). (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	As a whole, developing countries were taken care of in FOD p.9, l.15-18.
263	43748	11	8	32	0	0	Basu and Samet, 2002 - I understood that this chapter was to report on results of research since AR4. Not sure then why Basu and Samet, 2002 is included here. (Peter Berry, Health Canada)	New Basu paper was added.
264	42191	11	8	32	8	34	The reason why all-cause mortality is frequently used as the principal outcome of interest appears not only due to the chapter mentioned, but also other reasons, such as health outcome data available, data quality, etc. (Jianguo Tan, Shanghai Meteorological Institute)	Added a sentence.
265	45006	11	8	33	8	34	I would prefer "thermal" extremes, because it is not temperature alone that impacts human health (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	changed temperature to thermal
266	37763	11	8	37	8	39	The sentence in these lines needs a bit more context/information to be useful. (Paul Beggs, Macquarie University)	Revised
267	53344	11	8	38	8	38	Isn't this true elsewhere as well? If so, then it can be a conclusion with the Japanese study as an example. (Kristie L. Ebi, IPCC WGII TSU)	Revised
268	45007	11	8	41	8	42	statement is only true if one departs at the thermal optimum (j-,v- or U-shape dose-response relationship!). This should be clarified. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Revised
269	37764	11	8	41	8	43	Check the terms "physiologically" (start line 41) and "Biological" (start line 43) are being used correctly and consistently here. (Paul Beggs, Macquarie University)	Biology includes non-physiological factors as well. I think the original sentence is fine.
270	38980	11	8	42	8	42	Consider writing "circulatory collapse" rather than "cardiac pump failure" since pooling of blood in the skin does not in itself affect the myocardium. (Ole Faergeman, Aarhus University Hospital)	Revised
271	37765	11	8	43	8	43	Change "weather" to "heat and cold extremes" or just "heat extremes". (Paul Beggs, Macquarie University)	Non-extreme weather can kill people. May, November level temperature can have higher mortality than June, September level temperature does.
272	35119	11	8	45	0	0	The Ishigami paper referenced doesn't look at accidents, and I'm not convinced that the other papers cited here do so either. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	Yes it does! Only Bai et al should be deleted from here.
273	37766	11	8	50	8	51	The sentence starting and ending in these lines does not really make sense. (Paul Beggs, Macquarie University)	Revised
274	38212	11	9	0	0	0	Not sure if it makes sense, but when the author's note the heterogeneity of findings, I wondered whether a meta-analysis would be possible and a way to make sense of the variety of findings. (Janet Swim, The Pennsylvania State University)	Meta-analyses are not the solution here.
275	53345	11	9	2	9	2	There also are questions about the balance of heat / cold-related mortality. (Kristie L. Ebi, IPCC WGII TSU)	extra material added
276	35120	11	9	5	0	0	The 'initial' report cited here is actually 5 years after the event. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	Took "initial" from the sentence
277	38981	11	9	9	9	13	Can the authors state clearly that low rates of fatal disease during a mild winter leaves a higher proportion of the population vulnerable to fatal disease during the following summer? (Ole Faergeman, Aarhus University Hospital)	Revised
278	45010	11	9	10	9	11	Is there a reference for the influenza statement? In some parts of Germany affected by the 2003 heat wave there was an usual peak in mortality during the influenza season. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Ha et al. was added. 2003 heat wave is considered to be an exception.
279	37767	11	9	10	9	13	These sentences/statements are unsupported by cited references. The sentence starting in line 11 says "recent studies...". Which ones? The sentences should be deleted or supporting recent peer-reviewed literature provided. (Paul Beggs, Macquarie University)	Added Ha et al
280	42192	11	9	10	9	13	Citation or Quotation should be added to explain why previous year's winter lower mortality will increase the next year's summer heat effect. (Jianguo Tan, Shanghai Meteorological Institute)	Added Ha et al
281	43749	11	9	11	0	0	You may wish to cite the key studies that show this. (Peter Berry, Health Canada)	Added Ha et al
282	38038	11	9	11	9	11	Add "on death rates" after "summer heat". Reads better. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Added Ha et al
283	53346	11	9	12	9	12	References are needed. (Kristie L. Ebi, IPCC WGII TSU)	Added Ha et al
284	53347	11	9	15	9	18	Most studies also showed an increase in morbidity. (Kristie L. Ebi, IPCC WGII TSU)	noted - changes made

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
285	35121	11	9	18	0	0	The McMichael paper doesn't look at socio-economic factors. Also, I think the evidence of socio-economic factors in heightening heat risk is not as strong as currently conveyed. A few studies in Europe and elsewhere suggested little modification of a heat effect by SES. The evidence from US studies of a SES gradient is much stronger and may largely be reflecting access to air-conditioning at home. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	McMichael paper dealt with mid- to low-income countries and it allows us to compare by income level.. Reference to Bell 2008 was incorrect and we have replaced it with Int J Epi 2008.
286	37768	11	9	23	9	23	The research presented in Beggs and Vaneckova (2008) is relevant to this paragraph and should be briefly mentioned in a second sentence for this paragraph, such as: "Admission to hospital for effects of heat and light in New South Wales, Australia, over the period 1993–94 to 2003–04, showed consistently more males than females and a high proportion (39%) of people 65 years of age or older (Beggs and Vaneckova, 2008)." Reference: Beggs PJ, Vaneckova P. Admission to hospital for effects of heat and light: NSW, 1993-94 to 2003-04. NSW Public Health Bulletin 2008; 19(7–8):132-137. DOI 10.1071/NB07004 (Paul Beggs, Macquarie University)	FOD has similar description in p.9, l.43-50.
287	43753	11	9	29	0	0	An interesting potential indirect health impact of heat related to physical activity in Canada was reported in the National Drowning Report which found that the upswing in drowning deaths in 2005 (492 deaths), 2006 (508 deaths) and 2007 (480 deaths) from the long-term trend toward fewer fatalities is, at least in part, due to the warmer, drier than average weather in Canada during these years which was more conducive to participation in aquatic activities. Preliminary data from 2010, a record warm year for Canada, suggests a mortality increase of 10% (Drowning Prevention Research Centre Canada, 2011). Drowning Prevention Research Centre Canada. (2011). National Drowning Report – 2011 Edition. Prepared for the Lifesaving Society. Accessed July 10, 2012 from http://www.lifesaving.org/download/98NationalDrowningReport_2011Edition.pdf (Peter Berry, Health Canada)	similar description in p.8, l.45 and no more is needed.
288	37769	11	9	31	9	31	This sentence does not seem to make sense. Should the word "injury" or similar be inserted after "Cold weather"? (Paul Beggs, Macquarie University)	rephrased
289	37770	11	9	32	9	34	Why focus on indirect impacts for cold and not for heat in the paragraphs before this one? (Paul Beggs, Macquarie University)	Added a sentence.
290	35122	11	9	34	0	0	"It is still unclear precisely..." There is a nice figure in Paul Wilkinson's paper (BMJ 2004) which demonstrates the fraction of deaths attributable to low temperature and other seasonal factors. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	Wilkinson's paper is fine, but it is based on one model, and we are concerned that there can be many possible models. No action
291	45011	11	9	35	9	38	There is evidence that there is a relation between day-to-day temperature variations and cardio-vascular morbidity: e.g. (1) Morabito et al., 2008, A Synoptic approach to weather conditions discloses a relationship with ambulatory blood pressure in hypertensives. Amer. J. Hypertension 21, 748-752. (2) Koppe et al., 2011: The influence of meteorological parameters on the occurrence of hypertensive urgency and emergency. Meteorologische Zeitschrift, 20, 509-516. (3) Marchant et al., 1993: Circadian and seasonal factors in pathogenesis of acute myocardial infarction: the influence of the environmental temperature. Br. Heart J., 69, 385-387. (4) Barnett et al., 2007: The effect of temperature on systolic blood pressure. Blood Pressure Monitoring 12, 195-203. (5) Gyllerup, 2000: Cold climate and coronary mortality in Sweden. Int. J. Circ. Health 59, 161-175. etc. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	These references are not contradictory; even when daily data are used, the relation can be confounded by seasonal factor(s). No action
292	35123	11	9	39	0	0	Text currently suggests cold extremes are prevented by air-conditioning. (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	rephrased
293	38229	11	9	39	0	0	Load-shedding of electricity, i.e. planned power cuts, is a reality in several developing countries where electricity demand is becoming increasingly difficult to meet. It may be an issue worthy of mentioning, particularly in the context of air-conditioning and domestic solid fuel burning. (Caradee Wright, Council for Scientific and Industrial Research)	We added sentences about adaptation, with this comment and other possible problems in mind.
294	43750	11	9	39	0	0	This is unclear. How does one prevent cold extremes with air conditioning? Do you mean adequate heating? (Peter Berry, Health Canada)	rephrased
295	52313	11	9	39	0	0	and heating (Tanja Wolf, WHO Regional Office for Europe)	rephrased
296	37771	11	9	39	9	39	The statement that "Cold and heat extremes can be prevented by air-conditioning" is too general. Air-conditioning does not occur at the population level, it occurs at the individual or local level, and of course only occurs indoors, not outdoors. As far as heat extremes are concerned, air-conditioning actually makes conditions outdoors even hotter, both through release of heat from air-conditioning units, and the generation of climate warming greenhouse gases to produce the electricity they run on. Further, the paragraph as a whole seems out of place given it is about adaptation, which is covered in Section 11.6. (Paul Beggs, Macquarie University)	rephrased
297	38039	11	9	39	9	39	Add "and heating" after "air-conditioning". Air conditioning is usually used to refer to cooling the indoor air. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	rephrased
298	53348	11	9	39	9	39	Cold and hot extremes can not be prevented by air conditioning. Air conditioning can be protective during a heatwave. (Kristie L. Ebi, IPCC WGII TSU)	rephrased

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
299	40877	11	9	42	9	42	Additional paragraph on air conditioning and thermal adaptability: Furthermore, there is accumulating evidence that people who spent a lot of time in an air conditioned environment become increasingly more intolerant of hot summer temperatures. This is mainly caused by the stress on the body from moving from a cool environment to the sweltering outdoor air. Natural ventilation seems to offer advantages in comparison to air conditioning in respect to thermal adaptability (Yu J et al. A comparison of the thermal adaptability of people accustomed to air-conditioned environments and naturally ventilated environments. Indoor Air. 2012 Apr;22(2):110-8. doi: 10.1111/j.1600-0668.2011.00746.x. --- Yang W, Zhang G. Thermal comfort in naturally ventilated and air-conditioned buildings in humid subtropical climate zone in China. Int J Biometeorol. 2008 May;52(5):385-98) (Birgit Kuna-Dibbert, German Aerospace Center, Project Management Agency)	interesting but not relevant here. may be added in adaptation section No action
300	35124	11	9	47	0	0	"The comparability of studies is often limited..." I don't think this is true - most temperature-health studies are fairly comparable. Indeed many studies have been compared in review papers (see e.g. Hajat & Kosatsky, JECH 2010) Also, "...differences in measurement approaches..." This needs clarification - measurement of what? (Shakoor Hajat, London School of Hygiene & Tropical Medicine)	Tmax, Tave and Tmin have very high correlation, but studies using apparent mean temperature cannot be compared with those using Tave. Rephrased
301	43751	11	9	49	0	0	What is meant by community structure here? (Peter Berry, Health Canada)	rephrased
302	43752	11	9	50	0	0	Would be helpful, if possible, to cite literature that suggests how big of a problem extreme heat and cold are compared to other climate related natural hazards. Measurement is difficult but in developed countries it would seem that heat has a relatively high mortality rate. (Peter Berry, Health Canada)	Added description
303	37772	11	9	50	9	50	It is not "vulnerability to temperature exposure". Temperature, in itself, is not harmful. Insert the word "extreme" or the words "extreme high" before "temperature". (Paul Beggs, Macquarie University)	replaced temperature with heat
304	37779	11	10	1	0	0	Section 11.2.3. Much of this section seems quite Europe/UK focussed. Is this an internationally/globally objective and unbiased assessment of injury and disease resulting from storms and floods? (Paul Beggs, Macquarie University)	Added Taiwan PTSD paper
305	42576	11	10	1	0	0	5. A recent systematic review about the health consequences of flooding should be cited in the section 11.2.3 (p 10).21 (Shilu Tong, Queensland University of Technology)	Most of this material is already in the text. No action.
306	42193	11	10	1	10	1	This section "11.2.3 Injury and Disease Resulting from Storms and Floods" might be "11.2.3 Injury and Disease Resulting from Storms, Floods, Drought and Fires" and more cases and contents related to tropical cycle or hurrican, drought or fires could be added. (Jianguo Tan, Shanghai Meteorological Institute)	heading reflects the material that was available
307	37773	11	10	3	10	3	Change "the IPCC Fourth Assessment Report" to "AR4", to save space and to be consistent (see Page 4, lines 5-6). (Paul Beggs, Macquarie University)	done
308	37774	11	10	3	10	8	This introductory paragraph is a great start to this section. (Paul Beggs, Macquarie University)	thanks
309	42351	11	10	3	10	8	The opening para in this sub-section should note that data from the global disaster database (EM-DAT) maintained by CRED indicates that deaths and death rates from floods crested in the 1930s. By 2000–2008, they were down by 98.7% and 99.6%, respectively (Goklany 2009c). For storms, deaths and death rates peaked in the 1970s; by 2000-08, they had declined by 47.0% and 70.4%, respectively (Goklany 2009c). For all extreme weather events, global deaths and death rates has been declining continually since the 1920s. They have declined by 93%-98% since the 1920s (Goklany 2009a). (Indur Goklany, Independent)	Sentences and two papers were added.
310	41329	11	10	5	10	7	A reference is not clear for the list of countries with most losses by flooding. For example, Bangladesh is not listed here but, according to the EMDAT database, it is the country with third largest number of deaths by floods since 1900. Please check if the information is correct and add a reference. (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	Here the number of affected people, not number of deaths, was described. No action
311	39709	11	10	6	10	7	references required (Peter Burt, University of Greenwich)	Added Guha-Sapir D, Vos F, Below R, with Ponserre S. Annual Disaster Statistical Review 2010: Numbers and Trends. Brussels: CRED; 2011.
312	41920	11	10	10	10	14	Some mentioned references are not found on the listed ones under References: Dar et al 2011, WHO/HPA 2012, Jakubicka et al. 2010 (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	CHECK Found Dar et al. 2011 and Jakubicka et al 2010, but COULD NOT FIND WHO/HPA 2012. Pls ask the CA who wrote this.
313	41922	11	10	10	10	14	Losses and damages in an urban areas merits a metion and a cross reference with the Chapter 8 here may be releveant (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	will followup with chapter 8
314	37775	11	10	11	10	11	Displacement of what? Should it be "displacement of people"? Further, should the word "and" replace the comma between "infrastructure" and "water supplies", so that it reads, "...results from damage to infrastructure and water supplies..."? (Paul Beggs, Macquarie University)	rephrased
315	41330	11	10	16	10	25	A study in rural Bangladesh reported no evidence of increased risk of mortality or diarrhoea during 3 years after flooding after fully controlling for pre-flood rate differences between flooded and nonflooded areas and for seasonality (Milojevic A, Armstrong B, Hashizume M, McAllister K, Faruque ASG, Yunus M, Streatfield PK, Moji K, Wilkinson P. Health effects of flooding in rural Bangladesh. Epidemiology 2012;23:107–115.). The discrepancies between the results of this study and the apparent excess for mortality and diarrhoea reported in other situations, using less-controlled estimates, emphasized the importance of stringent confounder control. This study can be cited in this paragraph as another example investigating long-term effects of flooding. (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	A sentence and a paper was added.
316	37776	11	10	18	10	21	Delete the two sentences starting and ending in these lines. The reasons for this are that 1) the research being reported was published 42 years ago (1970), and 2) as the authors of the chapter themselves state, although others have sought similar results, none have found them. (Paul Beggs, Macquarie University)	done

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
317	45012	11	10	27	10	37	Flooding also has an impact on vector borne diseases (mosquitos) (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	revised and added a paper
318	39710	11	10	29	10	30	sense of sentence not clear. In what way will infectious diseases be affected? (Peter Burt, University of Greenwich)	rephrased
319	42633	11	10	31	10	31	It might also be worth mentioning cholera here as well. (Erin Coughlan, Red Cross / Red Crescent Climate Centre)	Added a sentence and a paper
320	41921	11	10	32	10	33	After the sentence "Drinking water can become contaminated ..." an emphasize may be usefull on the large amount of people in developing countries who are still drinking water from wells like in West Africa. (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	Using tube-wells is a risk factor for post-flood diarrhoea, but there are many other factors that cannot be put here. No action
321	43754	11	10	33	0	0	Some readers may not know what "reticulation" means (Peter Berry, Health Canada)	revised
322	52314	11	10	34	0	0	nice example; but at least here some kind of emergency provision of water was arranged; I guess this is often not the case in developing countries?! Delete the detail on number of distributed bottles. (Tanja Wolf, WHO Regional Office for Europe)	Done
323	38982	11	10	36	10	36	"resulted" should probably be replaced by "necessitated" (Ole Faergeman, Aarhus University Hospital)	Done
324	37777	11	10	36	10	37	Could the end of this sentence be reworded a little so that it is clear that the flooding resulted in provision of emergency water? The current wording makes it sound like the provision of safe drinking water to consumers was via the normal system, which of course does not make sense in this context. Further, the sentences in lines 33 to 37 are in some respects more about adaptation and could therefore be moved to that section of the chapter (11.6). These sentences certainly don't discuss health impacts (at least not explicitly). (Paul Beggs, Macquarie University)	Done
325	42593	11	10	39	10	51	perhaps a summary here to note the difference in flood risks in developing and developed countries. Developing risk death where as stress is biggest risk in developed countries. (MARGARET LOUGHNAN, MONASH UNIVERSITY)	somewhat addressed. Word limit prevents full treatment of this issue.
326	42592	11	10	44	0	0	a study of psychological impacts of flooding is mentioned but which country? (MARGARET LOUGHNAN, MONASH UNIVERSITY)	Original sentence deleted. Added Taiwan paper.
327	43755	11	10	50	0	0	I believe that some studies of psychosocial impacts of natural disasters show that the majority of people that display symptoms have a quick recovery without health interventions. However, those most seriously affected require help. (Peter Berry, Health Canada)	This pattern applies to any condition or disease, and we just describe those that are serious. While natural disasters have wide-ranging and often severe psychiatric and psychological impacts, the extent to which these have very long-term sequelae or resolve spontaneously is contested [ref Crabtree], including among children and adolescents Ref: McDermott BM, Cobham VE, Berry HL, Kim BN: Correlates of persisting posttraumatic symptoms in children who experienced a cyclone disaster. Australian and New Zealand Journal of Psychiatry. Forthcoming.
328	37778	11	10	50	10	51	Again, the sentence in these lines is adaptation. Move it to the Adaptation section (11.6). (Paul Beggs, Macquarie University)	Deleted this sentence.
329	42326	11	11	0	0	0	Dengue section: Is there not some evidence that the 'second' dengue vector Ae albopictus is gaining a foothold in southern and SE Europe? (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	New references about the relationship between Ae albopictus and climatic factors in Europe, as well as in China were added.
330	37555	11	11	1	14	13	Vector-borne diseases: It is clear that the incidence of major vector-borne diseases such as dengue and malaria is sensitive to climate via effects on vector abundance and pathogen transmission. It is also clear that there are multiple climate-independent determinants of the risk from these diseases, many of which are based on population vulnerability and the capacity to respond in terms of prevention and control (i.e. to adapt). So there are two problems associated with understanding the effects of climate change on these diseases which are poorly explored in the current text. First, only by searching in long, retrospective time series are we going to be able to see the fingerprint of climate change (versus other factors) on the incidence of these diseases. Some studies have been able to associate climate change and vector-borne diseases but these have been vector-borne zoonoses (see below). Also, some studies have identified associations between risk and climate, but in general it is too soon to reasonably expect to be able to show associations between climate change and increasing/changing incidence of these diseases. Second, identifying effects of climate rather than socio-economic factors (I include in this prevention and control efforts) is difficult so we would not expect to be able to identify effects of climate change on these diseases at present. What has been missing from many assessments in the past has been that while there may be direct effects of climate and climate change on the ecology of these diseases, there have been few efforts to assess the effects of climate change on those socioeconomic factors that constrain malaria and dengue (as much as the direct biological effects) as have been discussed by critics of previous assessments (Reiter 2001; 2008; Reiter et al., 2004). For example, most sub-saharan African economies are agriculture-based and are likely to be negatively affected by climate change (see Africa regional section). This will have knock-on effects: i) local incidence of vector-borne disease will likely rise (due to increased abundance of infected vectors and decreased capacity for control efforts); ii) people will migrate as economic migrants or disaster refugees and have the propensity to spread the diseases across the globalised world (as described in Reiter 2001 for malaria spread by migrants into northern Russia, and as happened recently with Chikungunya: Angelini et al., 2008); iii) climate change will increase the possibility for migrant-spread vector-borne diseases to be transmitted and maintained in parts of the world where they are currently considered exotic (Berrang-Ford et al., 2009). These latter effects can be very significant as the case-fatality rate can be very high for vector-borne disease in regions where they are currently exotic (Berrang-Ford et al., 2009). Zoonoses, vector-borne or otherwise transmitted. The effect of climate change on zoonoses is a paradigm for One Health, and these	see above

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
330.2	37555	11	11	1	14	13	Zoonoses, vector-borne or otherwise transmitted. The effect of climate change on zoonoses is a paradigm for One Health, and these two words are not mentioned at all. Clearly climate change is an environmental change that is going to affect human health by direct and indirect effects on wild and domesticated animal health and diseases and this is completely lacking from the report. The section on vector-borne diseases focusses on human-to-human transmitted mosquito-borne diseases, with a small section on tick-borne diseases, but completely ignores the plethora of vector-borne zoonoses across multiple continents (ranging from west Nile virus, Eastern & Western & Venezuelan Equine Encephalitis viruses, LaCrosse virus, Powassan virus, Japanese Encephalitis, Rift Valley Fever, Chagas, Plague, Tularemia, Leishmaniasis to Crimean Congo Haemorrhagic Fever, Babesiosis, Anaplasmosis, Ehrlichiosis, Rickettsiosis, Ross River etc etc). Individually these diseases are not comparable to the big two/three but together they comprise a significant impact on human health and are likely going to be impacted by climate change in a very significant way, particularly as many are maintained in natural transmission cycles that are much less impacted or controlled by those socioeconomic (prevention and control) drivers that determine geographic and temporal occurrence of malaria and dengue risk. Thus the risk from these diseases is much more likely to change due to direct effects of climate change on the ecology of their transmission amongst their wild animal hosts and their vectors, than is the risk from human-to-vector-to-human transmitted diseases such as malaria. Individually the risk from these diseases will change with climate change in time and space in an idiosyncratic fashion that awaits further elucidation of their ecology and understanding of effects of climate and climate change. In general though climate change is a huge environmental change that will impact the emergence and re-emergence of zoonoses whether or not they are vector-borne, and some of these events may have effects on human populations that range from the banal to the profound. While variable climate and climate extremes may drive re-emergence epidemics of flood-borne zoonoses such as leptospirosis (Vijayachari et al., 2008) and vector-borne zoonoses such as WNV (Artsob et al., 2009), climate change is likely to drive the emergence of new pathogens or new variants of pathogens by altering the environmental landscape of transfer of genetic material and pathogen fitness. For example, at the 'profound' end of the scale, climate change may alter the opportunities for, and processes of, genetic reassortment of influenza viruses that may give rise to pandemic strains of influenza by changing bird migration patterns and the patterns of exchange of wild animal viruses with those maintained by humans and livestock (Shaman & Lipsitch 2012). Consequently, while it may in general be correct to say that "The most important effect of climate change is to multiply current risks to health" the AR4 assertion that "Climate change does not create new diseases.." is likely incorrect. Also lacking in the human health section is a crosswalk to animal diseases (vector-borne or otherwise) and their impact indirectly on human health via economic and food security effects (please see recent World Bank report on this). There are multiple typos that need addressing and I will do this if the section is not going to be dramatically changed from its current form. References Angelini P, Macini P, Finarelli AC, Pol C, Venturelli C, Bellini R, Dottori M. Chikungunya epidemic outbreak in Emilia-Romagna (Italy) during summer 2007. (2008) Parassitologia. 50, 97-98. Artsob H, Gubler DJ, Enria DA, Morales MA, Pupo M, Bunning ML, Dudley JP. (2009) West Nile Virus in the New World: trends in the spread and proliferation of West Nile Virus in the Western Hemisphere. Zoonoses Public Health. 56, 357-369. Berrang-Ford L, Maclean JD, Gyorkos TW, Ford JD, Ogden NH. (2009) Climate change and malaria in Canada: a systems approach. Interdiscip Perspect Infect Dis 385487. Epub 2009 Shaman J, Lipsitch M. (2012) The El Nino-Southern Oscillation (ENSO)-pandemic Influenza connection: Coincident or causal? Proc Natl Acad Sci U S A. Jan 17. Reiter P. (2008) Climate change and mosquito-borne disease: knowing the horse before hitching the cart. Rev Sci Tech. 27(2):383-98. Reiter P. (2001) Climate change and mosquito-borne disease. Environ Health Perspect. 109 Suppl 1, 141-161. Reiter P, Thomas CJ, Atkinson PM, Hay SI, Randolph SE, Rogers DJ, Shanks GD, Snow RW, Spielman A. (2004) Global warming and malaria: a call for accuracy. Lancet Infect Dis, 4, 323-324. Vijayachari P, Sugunan AP, Shriram AN. (2008) Leptospirosis: an emerging global public health problem. J Biosci. 33, 557-569. (Nicholas Ogden, Public Health Agency of Canada)	
330.3	37555	11	11	1	14	13		
331	37780	11	11	5	11	5	Is "bite" the correct word here? (Paul Beggs, Macquarie University)	yes
332	53349	11	11	5	11	16	No references newer than 2008? What about the Swedish studies by Lindgren and colleagues, and those in the Czech Republic? (Kristie L. Ebi, IPCC WGII TSU)	one Swedish study on Plasmodium knowlesi , and one in the Czech Republic were added.
333	37781	11	11	9	11	10	"altitudinal and latitudinal" in line 10 should be changed to "poleward (northward) and upward" to be consistent with the terminology used in line 9, and to make the directions of shift explicit. (Paul Beggs, Macquarie University)	"altitudinal and latitudinal" in line 10 has been changed to "poleward (northward) and upward".
334	50645	11	11	9	11	13	As possible, it would be helpful to specify the relevant time frames for these shifts. (Katharine Mach, IPCC WGII TSU)	We have specified the relevant time frame as " over the last few decades" .
335	37783	11	11	9	11	16	The text starting at the end of line 9 with the word "For" and ending at the end of the paragraph should be moved to Section 11.2.4.1.3, or better still, this is on climate change so move to Section 11.4. (Paul Beggs, Macquarie University)	These sentences were used to describe the effect of climate change on vector-borne diseases and their hosts and vectors in general, so we think they are appropriate in this position.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
336	42324	11	11	10	0	0	Ixodes ricinus = 2 words; and L 20: sparganosismansoni (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	We have corrected these errors in the text.
337	37782	11	11	10	11	10	The tick genus and species names in this and some other lines have been combined into the one word instead of two. (Paul Beggs, Macquarie University)	changes made
338	39711	11	11	15	11	15	please separate (and italicise) genus and species names (Peter Burt, University of Greenwich)	changes made
339	52315	11	11	19	0	0	"this is not true in every case" -weird statement, consider to skip. Balance between text for studies strengthening the evidence and the one weakening is interesting (Tanja Wolf, WHO Regional Office for Europe)	The statement was revised: "but not all of them found such a relationship"
340	39712	11	11	20	11	20	please separate (and italicise) genus and species names (Peter Burt, University of Greenwich)	for copy editing
341	40828	11	11	25	0	0	Malaria - This statement is very vague as to the question in which direction M might develop. A4 R was more outspoken – although balanced. World development report 2010 (by WB) clearly projects a large increase. (Winfried Zacher, Germanwatch)	We added more, updated references
342	42207	11	11	25	0	0	Section 11.2.4.1.1: It is mentioned that the incidence of malaria is declining in several countries (e.g. Figure 11.9), but it would seem appropriate to quote the much stronger WHO model predicting near-eradication of malaria by 2030 (WHO: The global burden of disease: Updated projections, Geneva 2008). Similar projections are made by the WHO for other tropical diseases. If correct, the impact of global warming on absolute mortality would dramatically decrease. (Bent Sorensen, Roskilde University)	Future risk of malaria transmission is described in 11.5.2. The section is mainly focused on current evidence of the impact of cc on VBD.
343	52585	11	11	25	11	39	With respect to human malaria parasites, it was accepted until recently, that human malarial diseases are caused by only four Plasmodium [P] species namely P falciparum, P ovale, P. vivax and P. malariae. However, results of more recent work suggest that Plasmodium knowlesi, a plasmodium parasite of animals caused human disease including deaths [(Daneshvar C, Davis TME, Cox Singh et al: Clinical and laboratory features of human Plasmodium knowlesi infection. Clinical Infectious Diseases, 49, 852-860, 2009). My strong recommendation is that we take this finding into consideration when planning CC issues. Will this (Etim Essien, University of Uyo)	We added information about Plasmodium knowlesi and the recommended references.
344	53350	11	11	27	11	29	Please provide updated statistics. (Kristie L. Ebi, IPCC WGII TSU)	World Malaria Report 2011 was used and statistics were updated.
345	41336	11	11	27	11	39	Epidemics of malaria in the East African highlands in the 1990s have often been associated with climate variability, particularly the El-Niño-Southern Oscillation (ENSO). However, there are other factors associated with malaria risk and there is increased interest in the influences of the Indian Ocean Dipole (IOD), a climate mode of coupled ocean-atmosphere variability, on East African rainfall. There are some studies reporting the association between malaria incidence and IOD there and suggesting that IOD should be considered as the more appropriate index to decipher the signature of climate changes in the resurgence of malaria in the African highlands in the 1990s. (Hashizume M, Terao T, Minakawa N. Indian Ocean Dipole and malaria risk in the highlands of western Kenya. Proc Natl Acad Sci U S A. 2009;106:1857–1862.; Chaves LF, Satake A, Hashizume M, Minakawa N. Indian Ocean Dipole and rainfall drive a Moran effect in East Africa malaria transmission. J Infect Dis. 2012;205:1885–1891.; Hashizume M, Chaves LF, Minakawa N. Indian Ocean Dipole drives malaria resurgence in East African highlands. Sci. Rep. 2012;2:269 doi:10.1038/srep00269.; Chaves LF, Hashizume M, Satake A, Minakawa N. Regime shifts and heterogeneous trends in malaria time series from Western Kenya Highlands. Parasitology 2012;139:14–25.) (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	The effects of IOD on malaria transmission in East Africa were stated in the text and the three recommended references were added.
346	42352	11	11	27	11	39	This section needs to be updated based on the World Malaria Report 2011 (WMR 2011) and various other sources. WMR (2011) indicates that (a) there were 655,000 deaths from malaria in 2010 from 216 million episodes, (b) 91% of deaths and 81% of the episodes were in the African Region, (c) malaria death rates declined by 26% from 2000 to 2010 while incidence declined by 17%, (d) total funding for malaria control is less than \$4 billion in 2011, and (e) an additional \$3 billion per year is needed for 2010-15 in order to meet international malaria targets and goals. These targets include reducing by 2015, malaria deaths to near zero, and incidence by 75% from the 2000 level. Finally, it should also be noted that the \$5 billion (total) needed annually is less than half of what the OECD provides developing countries to mitigate (OECD 2012). This section should also note that the annual death toll from malaria (655,000 according to WMR 2011) far exceeds the 141,000 attributed to climate change by WHO (2009), which updates McMichael et al. (2004) (see Goklany 2012a). (Indur Goklany, Independent)	World Malaria Report 2011 was used and statistics were updated.
347	53351	11	11	27	11	39	Only 5 references on malaria? (Kristie L. Ebi, IPCC WGII TSU)	13 updated references were added in this version
348	42325	11	11	35	0	0	explain 'highly non-linear' (could be downwards) (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	"Highly" seems to be inappropriate here and we deleted it
349	42194	11	11	35	11	37	The terms of "Daily temperature fluctuation around mean temperatures" and "daily fluctuation around high mean temperature" are not understandable. (Jianguo Tan, Shanghai Meteorological Institute)	"Daily temperature fluctuation around mean temperatures" should be "Minimum temperature fluctuation"; "daily fluctuation around high mean temperature" should be "maximum temperature fluctuation.
350	42353	11	11	37	11	39	Update this sentence based on Stern et al. (2011). Their analysis indicates that temperature has increased significantly in the region, but "malaria in Kericho and many other areas of East Africa has decreased during periods of unambiguous warming." (Indur Goklany, Independent)	The work of Stern et al. (2011) was added and the statement was updated.
351	40829	11	11	42	0	0	No clear statement is made in regard to the probability of an extension of Dengue whereas Dengue has already spread (to the US) due to climate and many studies lead to the conclusion that it will continue to do so due to climate change. (Winfried Zacher, Germanwatch)	This paragraph was revised in order to make the statements more clearly in regard to the impact of cc on dengue.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
352	41331	11	11	44	12	4	A study in Dhaka, urban Bangladesh reported an evidence of increased risk of dengue hospitalization with both high and low river levels, suggesting possibly important role of river levels on predicting dengue incidence in Dhaka. (Hashizume M, Dewan AM, Sunahara T, Rahman Z, Yamamoto T. Hydroclimatological variability and dengue transmission in Dhaka, Bangladesh: a time-series study. BMC Infect Dis. 2012;12:98 doi:10.1186/1471-2334-12-98). This study can be cited in this paragraph as another example of a hydroclimate-dengue study. (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	these study results were cited as an example in this section.
353	52316	11	11	44	12	4	I think it is difficult to compare evidence from so different places. When so many other than climate factors have a play, it is obvious that "findings are not entirely consistent" in different parts of the world. This needs to be looked at in a different way. Even a mention of the fact that review of literature (as compared to expert opinion) is not the ideal way to assess the risks of infectious diseases (see Suk and Semenza 2011) could fit here. (Tanja Wolf, WHO Regional Office for Europe)	Here we focus on current evidence on impacts of cc on diseases, but not comparative assessment. We consider a critical review is not necessary
354	40830	11	11	49	0	0	Why are all of a sudden "entirely consistent" findings between different studies required? Rarely you find that all studies are "entirely consistent". What is the majority fo studies saying should be stated. (Winfried Zacher, Germanwatch)	This sentence was deleted and the section has been revised totally.
355	37784	11	11	50	11	50	Insert the word "increased" before "dengue transmission". Otherwise delete the word "high" before "rainfall and humidity" in line 49. (Paul Beggs, Macquarie University)	This sentence was deleted.
356	42594	11	11	53	11	54	what you are saying here is that lack of plumbing/sanitation infrastructure increases the risks of dengue transmission during drought. (MARGARET LOUGHNAN, MONASH UNIVERSITY)	Because the drought is also a result of climate change. When the drought occurs, the residents have to use the buckets or other equipments to store water, and these provide a suitable habitat for the Aedes mosquito.
357	45014	11	12	1	0	0	Section 11.2.4.1.3: The climatological parameters that influence the distribution and activity of ticks should be mentioned explicitly (e.g. temperature, relative humidity ...) (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	We have included the effects of climate on the tick-borne diseases.
358	40831	11	12	8	12	14	tick born encephal. and Lyme: contradictory? again: no trend (Winfried Zacher, Germanwatch)	Trends for TBE and Lyme are not contradictory.
359	42595	11	12	10	12	20	Australia also has shown endemic dengue. http://www.health.qld.gov.au/dengue/ (MARGARET LOUGHNAN, MONASH UNIVERSITY)	Sentence deleted because it is redundant.
360	39713	11	12	11	12	11	delete 'latitude' (Peter Burt, University of Greenwich)	"latitude" was deleted.
361	39714	11	12	15	12	15	please separate genus and species names (Peter Burt, University of Greenwich)	"Aedesalbopictus" has been re-written as "Aedes albopictus".
362	37785	11	12	22	12	22	Figure 11-5 does not really show most DF cases were recorded during the wet season. The figure has just 3 years of data, and sustained rainfall in 2004 had no dengue peak! (Paul Beggs, Macquarie University)	changed to "Figure 11-5(Chadee, Shivnauth et al. 2007) shows most(>80%) of the DF cases recorded during 2002-2004 were reported during the rainy season (from May to November) when the BI for Ae. aegypti ranged between 20 and 46, that is, five to eleven times higher than BI of 4 through to represent the threshold for dengue transmission (Sanchez, Cortinas et al. 2010)."
363	53352	11	12	22	12	29	References are needed. (Kristie L. Ebi, IPCC WGII TSU)	From line 22 to line 25, the references has inserted (see above). From line 25 to line 29: Studies conducted in Trinidad(Chadee 2009) demonstrated proof of concept by the application of insecticides (temephos) into water drums, the primary breeding sites of Ae. aegypti in the Caribbean region, prior to the onset of the rainy season. This strategy effectively controlled the mosquito populations for almost 12 weeks (Figure 11-6) after which the mosquito populations reverted to levels observed in the untreated control areas.
364	37786	11	12	23	12	23	The Macdonald 1956 reference seems to be missing from the References lists and should be deleted anyway given it is over half a century old. (Paul Beggs, Macquarie University)	This reference has substituted with the work of Sanchez et al. 2010
365	37787	11	12	26	12	26	What are the human health impacts of the insecticide itself. It is applied to water drums which one assumes are used for drinking water and other human uses. (Paul Beggs, Macquarie University)	In the (Chadee 2009) original article, the author described the method to apply the insecticides not into water drums but all positive and potential Ae. aegypti breeding sites was evaluated at the study sites, although the water drums, buckets, tubs and basins accounted for about 50% of the Ae. aegypti breeding sites observed in Curepe and St. Joseph. The author suggested to remove them but not to apply temephos in the water store equipments. So this sentence would be adapted as: Studies conducted in Trinidad demonstrated proof of concept by the application of insecticides (temephos) in all positive and potential Ae. aegypti breeding sites was evaluated at the study sites, prior to the onset of the rainy season (Chadee 2009).
366	54877	11	12	32	0	0	Figure 11.5 It may be preferable if Breteau index is explained. (Monalisa Chatterjee, IPCC WGII TSU)	Breteau index (BI), is the number of positive containers per 100 houses.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
367	45013	11	12	32	12	32	What is the Breteau index? Please explain or delete figure 11-5 (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	Breteau index (BI), is the number of positive containers per 100 houses.
368	54878	11	12	36	0	0	Figure 11.6 The use of 'control' is confusing. (Monalisa Chatterjee, IPCC WGII TSU)	"Control" is the word relatively to compare with "treatment", here it means no application of insecticides (temephos) into water drums in St. Joseph.
369	37788	11	12	39	12	48	The two sentences in lines 39-41 and the remaining text in this paragraph seem to contradict each other. Also, this final paragraph seems to be mainly future climate change and adaptation, so could be moved to these sections. (Paul Beggs, Macquarie University)	The first two sentences mean the present findings of Caribbean region climate model consistent patterns with no marked changes. But from here till the end, it illustrates the scenarios in the future 2071-2100, the dynamic circulation patterns in both dry and wet will alter, so we should plan and manage astutely to systematically in vector control strategies to reduce vector populations.
370	43756	11	12	39	12	48	The point of this paragraph is a bit unclear. Is it that expected increased climate variability and rainfall patterns will mean that vector control programs will be more challenging to execute and may perhaps be less successful? (Peter Berry, Health Canada)	The first two sentences mean the present findings of Caribbean region climate model consistent patterns with no marked changes. But from here till the end, it illustrates the scenarios in the future 2071-2100, the dynamic circulation patterns in both dry and wet will alter, so we should plan and manage astutely to systematically in vector control strategies to reduce vector populations.
371	39715	11	12	40	12	40	reference incomplete (Peter Burt, University of Greenwich)	J and L,2010" replaced by Hansen, Hoffman et al. 2010
372	52318	11	12	53	0	0	Chikungunya?? (Tanja Wolf, WHO Regional Office for Europe)	We added one reference about the impact of the climate variables on Chikungunya
373	52317	11	13	3	0	0	substitute "underappreciated" with underestimated (Tanja Wolf, WHO Regional Office for Europe)	"Underappreciated" was substituted.
374	53353	11	13	3	13	15	Please explain the differences between TBE and Lyme. Also, please update with references from Sweden and the Czech Republic. (Kristie L. Ebi, IPCC WGII TSU)	TBE and Lyme were described respectively in detail and updated references were added.
375	39716	11	13	6	13	6	please separate (and italicise) genus and species names (Peter Burt, University of Greenwich)	Borrelia burgdorferi
376	39717	11	13	7	13	7	genus and species names should be in italics (Peter Burt, University of Greenwich)	Lyme borreliosis
377	43757	11	13	8	0	0	We also have Lyme Disease in Canada (Ogden, 2008) (Peter Berry, Health Canada)	We have revised the lyme disease distribution range.
378	39718	11	13	8	13	8	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	This sentence has been deleted.
379	39719	11	13	13	13	14	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	noted
380	39720	11	13	20	13	20	hantavirus should be Hanta virus, to match rest of text (Peter Burt, University of Greenwich)	Hanta virus was inserted.
381	42596	11	13	20	15	31	perhaps a mention of the likely impact will CC have on spread of infectious diseases and climate refugees? (MARGARET LOUGHNAN, MONASH UNIVERSITY)	Climate refugees are not a concern of this section
382	38230	11	13	23	0	0	'natural foci' meaning? (Caradee Wright, Council for Scientific and Industrial Research)	It's should be natural epidemic foci.
383	53354	11	13	28	0	0	This section is not well organized, in terms of what is covered and in the order of information in paragraphs. Why is rotavirus here and not in food- and waterborne diseases? (Kristie L. Ebi, IPCC WGII TSU)	changes madeto the organization of this section
384	43758	11	13	30	0	0	What is a gram negative infection? (Peter Berry, Health Canada)	it refers to the staining characteristics of the organism
385	39721	11	13	35	13	35	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	editing - will ensure these changes are made consistently
386	53355	11	13	37	13	37	Please differentiate between whether is is an environmental factor involved in initiating an outbreak and the role of person-to-person transmission once an outbreak starts. (Kristie L. Ebi, IPCC WGII TSU)	text altered
387	42909	11	13	37	13	48	Please consider including the results of the study on the seasonal variation of influenza activity in Hong Kong. The study showed that the activity of influenza A and B has significant seasonal variations subject to the temperature and humidity conditions. Expected warming in the 21st century may have significant impacts on the number of favourable days for influenza in different seasons. Reference : - Chan, Paul K.S., H.Y. Mok, T.C. Lee, Ida M.T. Chu, W.Y. Lam, Joseph J.Y. Sung, 2009 : Seasonal influenza activity in Hong Kong and its association with meteorological variations, Journal of Medical Virology, 81(10), 1797-1806. http://onlinelibrary.wiley.com/doi/10.1002/jmv.21551/abstract (Sai-ming Lee, Hong Kong Observatory)	Agreed
388	53356	11	13	40	13	41	There are studies on the importance of humidity in the spread of influenza. (Kristie L. Ebi, IPCC WGII TSU)	Agreed but the signal is uncertain- more evidence is required
389	39722	11	13	43	13	43	second 'n' of Nino should be an enye (Peter Burt, University of Greenwich)	editing
390	45230	11	13	44	0	0	Paper by Sagripanti and Lytle 2007 has a mistake and questionable results. See a note published by Weber Th. and Stilianakis NI, A note on the inactivation of influenza A viruses by solar radiation relative humidity and temperature, Photochemistry and Photobiology, 2008, 84: 1601-1602. For detailed information on mods of transmission and inactivation of influenza see also Weber Th. and Stilianakis N.I., ,Inactivation of influenza A viruses in teh environemt and modes of transmission: a critical review., Journal of Infection, 57, 361-373, 2008. (Nikolaos Stilianakis, European Commission)	Noted but not enough space to include all relevant citations
391	37789	11	13	50	13	50	Should the word "the" be deleted in this line, so that it reads "Illness caused by infection with rotavirus caused ..."? (Paul Beggs, Macquarie University)	Noted

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
392	41332	11	13	50	14	2	Variations in seasonal pattern of rotavirus infections are described here. Attempts to explain these findings have been made by relating disease incidence to climate factors such as temperature, humidity and rainfall, but no clear conclusions have been drawn. Most of the studies inferred this relation from the increased number of rotavirus infections in cold or dry months, but it may be a consequence of other environmental or behavioural factors that are more (or less) often observed in the cold or dry months. Thus seasonality and potential mutual confounding between weather factors (e.g. temperature and humidity) should be controlled in time-series studies to estimate direct association between rotavirus infections and each weather factor. There are a few such studies which are worth citing here (1. Atchison CJ, Tam CC, Hajat S, van Pelt W, Cowden JM, Lopman BA. Temperature-dependent transmission of rotavirus in Great Britain and The Netherlands. Proc Biol Sci. 2010;277(1683):933-42.; 2. Hashizume M, Armstrong B, Wagatsuma Y, Faruque ASG, Hayashi T, Sack DA. Rotavirus infections and climate variability in Dhaka, Bangladesh: a time-series analysis. Epidemiol. Infect. 2008;136:1281–1289.) (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	Noted. Good references but unable to include them all.
393	38231	11	14	5	0	0	first sentence requires a reference. (Caradee Wright, Council for Scientific and Industrial Research)	Thanks- change will be made
394	45223	11	14	16	0	0	Little critical review approach. Only description of findings. Please improve. (Nikolaos Stilianakis, European Commission)	Noted
395	50646	11	14	18	14	24	The author team may wish to provide some background citations for the reader in support of these statements. (Katharine Mach, IPCC WGII TSU)	Noted
396	37790	11	14	25	14	26	The text after the semicolon in line 25 is about climate change and should therefore be moved to Section 11.5. (Paul Beggs, Macquarie University)	Noted
397	39723	11	14	31	14	31	genus and species names should be in italics (Peter Burt, University of Greenwich)	dealt with
398	53357	11	14	31	14	40	You might differentiate the Bay of Bengal studies, which show SSTs are important, from studies in other areas that may not have such a clear signal. (Kristie L. Ebi, IPCC WGII TSU)	Noted, but not sufficient space
399	39724	11	14	33	14	33	genus name should be in italics (Peter Burt, University of Greenwich)	noted
400	39725	11	14	34	14	34	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
401	37791	11	14	36	14	36	Delete the mention of sea level rise. It is not appropriate in this section of the chapter (11.2). It could be moved to Section 11.5. (Paul Beggs, Macquarie University)	Noted. 11.5 deals with future risks (although some areas are currently dealing with sea level rise)
402	41333	11	14	38	14	40	Not only for temperature-based models but also a rainfall-based model for cholera has been developed (Hashizume M, Armstrong B, Hajat S, Wagatsuma Y, Faruque ASG, Hayashi T, Sack DA. The effect of rainfall on the incidence of cholera in Bangladesh. Epidemiology 2008;19:103–110.) (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	Rainfall studies have been added
403	37792	11	14	42	14	51	Are the "climate anomalies" mentioned in line 42 really climate change? If so, then put this paragraph in that section (11.4). (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
404	39726	11	14	43	14	43	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
405	39727	11	14	47	14	47	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
406	39728	11	14	49	14	50	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
407	42577	11	15	0	16	0	6. Different referencing styles were used (eg., pp15-16). It needs to be standardised. (Shilu Tong, Queensland University of Technology)	Noted
408	43759	11	15	3	0	0	"There is a general trend for rising...." This sentence is a bit unclear. Is this in a specific region or country that this trend is being observed or is this globally? (Peter Berry, Health Canada)	Sentence (and paragraph) was re-worded.
409	39729	11	15	5	15	5	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
410	53358	11	15	8	15	9	Most of these studies excluded outbreaks in their case definitions. (Kristie L. Ebi, IPCC WGII TSU)	agree this is important.
411	40331	11	15	11	15	25	Arctic – Climate change impacts on AGI Comment – Consider ref: Harper, S.L et al. Weather, water quality, and infectious gastrointestinal illness in two Inuit communities in Nunatsiavut, Canada: Potential implications for climate change. EcoHealth 2011, DOI: 10.1007/s10393-011-0690-1. Available at: http://www.springerlink.com/content/022335522588134u/ (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	Incorporated this additional reference into the discussion of both temperature and rainfall
412	41334	11	15	13	15	14	Hand, foot and mouth disease showed a positive linear relationship with temperature and humidity after controlling for seasonality and interannual variations (Onozuka D, Hashizume M. Weather and hand, foot and mouth disease incidence: a time series study. Sci Total Environ 2011;410–411:119–125.) (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	Qualifying factors were added to text
413	53359	11	15	19	15	23	Swimmers also at risk. (Kristie L. Ebi, IPCC WGII TSU)	Noted, but I do wonder how much swimming is done in these Arctic waters. Is this a significant risk factor for exposure? Additional text on contamination of surface waters was added
414	39730	11	15	25	15	25	taxonomic details need to be in italics (Peter Burt, University of Greenwich)	Noted
415	42597	11	15	31	0	0	A short mention of Schistosomiasis here would be beneficial as it is mentioned later. (MARGARET LOUGHNAN, MONASH UNIVERSITY)	restricted by space
416	45224	11	15	34	0	0	Too detailed for this rather secondary aspect. (Nikolaos Stilianakis, European Commission)	disagree - no changes made
417	53360	11	15	36	15	38	There also are issues about the distribution within a family and community. (Kristie L. Ebi, IPCC WGII TSU)	agree - and some changes made
418	54879	11	15	36	15	38	Figure 11.7 The author team may consider further explaining different aspects of the figure. (Monalisa Chatterjee, IPCC WGII TSU)	willing to try, though some aspects are mentioned in the text, eg "nutrient bypass"

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
419	42355	11	15	36	15	39	In order to provide context, it should be noted that global rates of malnutrition and hunger have declined substantially over the past few decades despite any warming (Goklany 2007b; World Bank 2011; FAO 2010, figure 2, page 9). (Indur Goklany, Independent)	this is true and is acknowledged in the food chapter
420	50647	11	15	47	15	47	The chapter being referred to here is chapter 7 presumably, and it would be preferable to refer more specifically to the relevant sections of this chapter. (Katharine Mach, IPCC WGII TSU)	Yes, chapter 7 .. Direct references made where possible
421	37794	11	15	47	15	48	The statement "The effects of higher temperatures and variations in rainfall patterns" and text in this paragraph that follows it (especially "due to increasing temperatures and changes in rainfall") suggest all but the first sentence of this paragraph is about climate change and it should therefore be moved to Section 11.4. (Paul Beggs, Macquarie University)	disagree - no change
422	53361	11	15	50	15	51	But these losses are still important for those on the margins. (Kristie L. Ebi, IPCC WGII TSU)	We acknowledge this point about vulnerable populations and have endeavoured to emphasise the importance of marginal groups (see reference to Ebi 2008)
423	53362	11	15	52	15	52	Food storage losses are important for smallholders. (Kristie L. Ebi, IPCC WGII TSU)	we have added more detail on nutrition and re-organised the chapter. Food storage is mentioned.
424	53363	11	16	3	16	4	The presence of diarrheal diseases are important. (Kristie L. Ebi, IPCC WGII TSU)	yes - diarrhea is mentioned in Fig 11-7
425	53364	11	16	14	16	14	Micronutrients are an important issue receiving more attention. David Lobell has a student who reviewed the issue. Other studies discuss the issue. (Kristie L. Ebi, IPCC WGII TSU)	noted
426	37795	11	16	16	0	0	Section 11.2.7. This section starts with the statement "Since the AR4 substantial new evidence...". However, many of the references cited in the section are not new, and some are far from it, including publications published in 2005, 2003, 2000, 1995, 1983, and 1969. Indeed, the second and third paragraphs of the section rely solely on just one such reference. Given this, and given the considerable overlap with the reasonably substantial Section 11.2.2, I suggest this Section (11.2.7) be significantly shortened or perhaps even combined with Section 11.2.2. (Paul Beggs, Macquarie University)	much of the new analysis is based on evidence that was previously overlooked". Where available, new references have been added
427	38984	11	16	16	0	0	Although Section 11.2.7 on occupational health begins with a statement about substantial new evidence for effects of heat on working people, most of the references are to older literature. The observation that very hot weather makes it harder to work is made at least three times in this section, which could be shortened. (Ole Faergeman, Aarhus University Hospital)	Have rewritten to make more concise and accurate, and less repetitive. Also to explain the older references
428	43760	11	16	16	16	44	It is not clear whether the discussion about occupational health is discussing primarily outdoor or indoor exposure situations or both. This is important because indoor occupational settings (e.g., bakeries, foundries, etc) can be quite hazardous during heat events. As well, the management systems to protect health are very different between outdoor and indoor settings. (Peter Berry, Health Canada)	have rewritten
429	53365	11	16	30	16	37	This does not seem to include outdoor workers such as farmers, who do not have standard shifts. (Kristie L. Ebi, IPCC WGII TSU)	noted
430	39731	11	16	32	16	32	delete , after second 'C' (Peter Burt, University of Greenwich)	typos fixed as much as possible
431	39732	11	16	41	16	41	change 'like' to 'such as' (to remove bad English) (Peter Burt, University of Greenwich)	copy editing will come later
432	53366	11	16	49	16	49	What is the evidence that acclimatization takes 1-2 weeks? This is inconsistent with the literature on heat-related mortality. (Kristie L. Ebi, IPCC WGII TSU)	text changed
433	43761	11	16	49	16	51	This sentence is very unclear. (Peter Berry, Health Canada)	this section has been re-written.
434	42327	11	17	0	0	0	Chronic Air Pollution: There is no explicit reference to any non-US studies or data (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	Have added a WHO review
435	43762	11	17	1	17	2	"while the number of mouths to feed remains the same". This seems to be a very specific (albeit important) impact or consideration to highlight in this context. Is this at the household, community or country level. Also, by using this example, the implication is that heat impacts on productivity are only an issue for developing countries. However, I don't believe this is the case. (Peter Berry, Health Canada)	noted
436	53367	11	17	1	17	2	This is repeated elsewhere. Further, a large number of assumptions underly these analyses; these should be discussed in the appropriate place in the chapter. (Kristie L. Ebi, IPCC WGII TSU)	noted
437	53368	11	17	8	17	10	The number of mosquitoes tends to be correlated with disease burdens, so this is not imparting new information. (Kristie L. Ebi, IPCC WGII TSU)	the point seems worth making in the occupational section, however
438	37796	11	17	24	0	0	Section 11.2.8. It is excellent to see this section on Air Quality, and it is of a high quality. The one structural modification I'd suggest is to delete the subheadings. "Chronic" in particular is misleading, because it implies such pollution is present all the time, which is not the case. (Paul Beggs, Macquarie University)	changed
439	52319	11	17	24	0	0	add some introduction? This section (11.2.8 to 11.2.9) is much weaker than the rest (Tanja Wolf, WHO Regional Office for Europe)	done

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
440	37321	11	17	24	18	3	There is a large literature in atmospheric science on the effects of climate change on air pollutants. This is reviewed by WGI in Chapter 11, and so it would be appropriate to reference that discussion and to give a more robust summary of the science that is in line with WGI's review. This section has a few of the good articles on this topic are referenced, but it would be worthwhile to give a more complete state-of-the-science as to what is known about the effects of climate change on ozone and PM, in different regions of the world. The best review papers that I am aware of are: Weaver, C. P. et al. (2009) Bulletin of the American Meteorological Society, 1843-1863. Jacob, D. and D. Winner, 2009: Effect of climate change on air quality. Atmospheric Environment, 43(1), 51-63. This literature shows that it is more than just temperature affecting reaction rates, but many other influences are important also: frequency of cyclones (removing pollutants), vertical air movements affecting dispersion, influences on biogenic emissions and fires, etc. A more complete discussion of the atmospheric science here will help set up the discussion that follows in Secs. 11.5.5 and 11.7.1. I suggest covering this atmospheric science first before then addressing the health impacts, so that rather than organizing this section as "chronic" and "acute," it could instead be "climate effects on air quality" and "air quality influences on health". In addition, I'll mention that since many of the available studies focused on the US, Chapter 26 gives a good treatment of many of the relevant studies (Sec. 26.8.3). (J. Jason West, University of North Carolina)	Good points, but it is a matter of balance. Ozone effects in addition to being less than certain as true effects of human induced climate change according to WGI are not yet determined as a major global health risk by the major reviews. Very tight word limits force us to make trade-offs. PM is not found by WGI to be associated consistently in studies with CC
441	42195	11	17	24	18	3	The Terms of "Chronic Air Pollution" and "Acute Air Pollution Episodes" are not familiar to the publics. It is not suitable to divide the air pollution into chronic air pollution and acute air pollution, although there are short term and long term health effect of air pollution. (Jianguo Tan, Shanghai Meteorological Institute)	Have rewritten
442	43810	11	17	24	18	3	In June 2012 the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), classified diesel engine exhaust as carcinogenic to humans, based on sufficient evidence that exposure is associated with an increased risk for lung cancer. In that way IARC changed its finding from 1988 when it classified diesel exhaust as probably carcinogenic to humans. The finding from a previous evaluation of 1989 that gasoline exhaust is possibly carcinogenic to humans remained unchanged. Large populations are exposed to diesel exhaust in everyday life, whether through their occupation or through the ambient air. People are exposed not only to motor vehicle exhausts but also to exhausts from other diesel engines, including from other modes of transport (e.g. diesel trains and ships) and from power generators. The WHO announcement is expected to have far reaching consequences and is an important signal requiring a policy response to reduce human exposure to diesel exhaust. A gradual ban of diesel fuelled vehicles from cities and urban areas may be required. Alternative transport modes and transport strategies will need to be developed and implemented. Road transport will have to undergo a major shift in medium and long-term timescales. The shift should lead to considerable emission reductions of both greenhouse gases and air pollutants. (Krzysztof Olenarczyk, United Nations Economic Commission for Europe)	may have impact of policy and public perceptions, as noted. However, this revelation does not change the burden of disease calculations substantially as cancer is already included and is not the major health impact of air pollution. We need to cite the new IARC report, however. not here, however, but in the co-benefits section, as diesel exhaust is not caused by climate change
443	44887	11	17	24	18	3	There are further reports on acute air pollution levels, not only forest fire related ones: search for smog episodes. E.g., Brockhaus 1966 smog episodes in the Ruhr Area and increase in premature deaths. In addition, please check what is written in chapter 8 p. 17-18 of this IPCC WG2 report. (Sabine Wurzler, LANUV NRW)	we will aim to be consistent with WG1
444	45015	11	17	26	0	0	Sections 11.2.8.1 and 11.2.8.2: Relative strong emphasis on premature mortality. A more balanced description of possible health impacts would be desirable (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	agreed, but space is limited, and both BD and cost impacts are driven by premature mortality
445	45016	11	17	26	0	0	Section 11.2.8.1: Also other important air pollutants (like PM) should be included. For example there is a study from China about dust storms and human health: Pan, Xiao-chuan; Liu, Junhan (2011), Study on Health Effects of Dust Storms (Asian Dusts) in China. Epidemiology: January 2011 - Volume 22 - Issue 1 - pp S26-S27 doi: 10.1097/01.ede.0000391739.70312.ad (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	we will aim to be consistent with WG1, when this report available
446	40832	11	17	28	17	30	The important role of Methane for the forming of ozone is not mentioned. Yet: "Methane contributes around 50 per cent of the increases in background ozone, with smaller contributions from non-methane volatile organic compounds and carbon monoxide." (Royal Society (2008). Ground-level Ozone in the 21st Century: Future Trends, Impacts and Policy Implications. Science Policy Report 15/08; <royalsociety.org/WorkArea/DownloadAsset.aspx?id=5484>). (Winfried Zacher, Germanwatch)	yes, have fixed
447	42196	11	17	28	17	39	Issues of Air pollution and human health could be added instead of limited to the developed countries and O3. (Jianguo Tan, Shanghai Meteorological Institute)	Not sure the meaning here
448	53369	11	17	28	17	39	There are a few studies on PM. (Kristie L. Ebi, IPCC WGII TSU)	will wait for WG1 report, and make sure the health chapter is consistent
449	37797	11	17	39	17	39	Delete "See also section 11.5.5.". Such cross-referencing to the Future Risks section is not done elsewhere in the chapter. (Paul Beggs, Macquarie University)	to be dealt with in copy editing
450	43763	11	17	44	17	45	"Among all air pollutants, literature sources provided most detailed accounts on the relationship between forest fires and PM10 levels." What other relationships were examined? This is a bit unclear. (Peter Berry, Health Canada)	yes, a bit of an overstatement -- have modified
451	38985	11	17	45	17	45	Spell out PM: "particulate matter" and explain the subscript number, particle diameter in micrometers (Ole Faergeman, Aarhus University Hospital)	to be fixed in copy editing
452	37798	11	17	45	17	46	The text "1-hour concentrations of PM10 and PM2.5 reached 370 ug/m3 and 200 ug/m3" is of little value without comparison with a guideline, as is done for the 24-hour concentrations that follow this text. (Paul Beggs, Macquarie University)	do not understand as there is a comparison to the WHO AGQs

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453	43764	11	17	51	18	3	Approximately 56,000 people died in Russia during this period of high heat and air pollution. Does the literature allow you to attribute a specific number of deaths in Moscow from the heat and/or air pollution? If so, I would include this. (Peter Berry, Health Canada)	More exact estimate is 54,000, including 34,500 cardiovascular diseases and 1 300 respiratory diseases. Unfortunately, paper has been published only in Russian journal. English-language paper has been submitted. Mortality in July and August of 2010 increased by 11,000 deaths (60% higher than 2009) including an additional 5,951 deaths from cardiovascular diseases, 339 deaths from respiratory diseases and 101 deaths from suicide. Revich B. Heat-wave, air quality and mortality in the Russian Federation's Europe, 2010: Preliminary assessment. Human Ecology, 2011, № 7, C. 3-9
454	45017	11	17	51	18	3	Please do not only describe the meteorological situations but also what kind of health impacts have been observed during this period. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	See answer 453
455	39733	11	18	2	18	2	10 of PM10 should be a subscript (Peter Burt, University of Greenwich)	copy editing will come later
456	37799	11	18	6	0	0	Section 11.2.9. This is an excellent section on Mental Health. (Paul Beggs, Macquarie University)	No comment
457	38213	11	18	6	18	27	Surprising that the mental health section only has references from public health and no references from psychology or psychiatry. See Doherty & Clayton (2011) American Psychologist. Coping is in the figure referenced. Coping can more completel described if some of its complities could be addressed (e.g., see Reser & Swim, 2011, American psychologists. (Janet Swim, The Pennsylvania State Universi)	The new version of the chapter has revised the section on mental health, with these comments in mind.
458	47984	11	18	6	18	27	I am very pleased to see a section on Mental Health in this report, as since the last AR report, there has been an increasing body of work emerging from Australia and Canada, as well as clinical projections from the American Psychological Association. This is an important area of climate change and health that is often forgotten about or ignored, and it is great to see this recognition in AR5. I would suggest, however, that this section be expand with a few more details and references to reflect the geographic diversity of this work (see below). (Ashlee Cunsolo Willox, McGill University)	no more space available, given the word limits
459	47987	11	18	6	18	27	Finally, a discussion around who may be more susceptible to the impacts of climate change on mental health: resource-dependent populations, rural and remote areas, those living in environmentally-sensitive areas such as the Arctic, small island states, and areas prone to drought and flood, Indigenous populations, and potentially children and the elderly. (Ashlee Cunsolo Willox, McGill University)	section re-written, but limits on space
460	53941	11	18	6	18	27	Section 11.2.9: Figure 11-8 helps to visualize some details of the concepts described here, but it could be useful to develop an additional figure that clearly illustrates "three main pathways which climate may affect mental health." Or, if you identify and highlight three pathways in Figure 11-8, that may work as well. (Yuka Estrada, IPCC WGII TSU)	section re-written, but limits on space
461	43766	11	18	8	18	19	I don't understand the difference between the first and second pathways that mental health can be impacted. What is the substantive difference between mental health being impacted by a traumatic experience with an extreme weather and mental health suffering as a consequence of physical impacts - presumeably associated with an extreme weather event? Perhaps this can be explained more clearly. (Peter Berry, Health Canada)	section re-written, but limits on space
462	40332	11	18	13	18	14	Consider ref on solastalgia in Arctic – CunsoloWillox et al. 2012. 'The Land Enriches the Soul:'On Climatic and Environmental Change, Affect, and Emotional Health and Well-Being in Rigolet, Nunatsiavut, Canada. Emotion, Space, and Society, Special Issue on Ecology and Emotion. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	section re-written, but limits on space
463	47985	11	18	13	18	14	A study conducted in Northern Canada also indicates solastalgia, and expands this work to provide an in-depth look at the emotional spectrum of climate change impacts and the related health effects: Cunsolo Willox, A., Harper, S., Edge, V., Landman, K., Houle, K., Ford, J., & the Rigolet Inuit Community Government. (2011). 'The land enriches the soul:' On environmental change, affect, and emotional health and well-being in Nunatsiavut, Canada. Emotion, Space, and Society. Doi: 10.1016/j.emospa.2011.08.005. Another study by the same group also looks at the sense of place and health, and how place-based identities and place-based health indicators are negatively impacted by climate change in the Canadian North: Cunsolo Willox A, Harper SL, Ford JD, Landman K, Houle K, Edge VL, Rigolet Inuit Community Government: 'From this place and of this place': Climate change, sense of place, and health in Nunatsiavut, Canada. Social Science and Medicine Doi: 10.1016/j.socscimed.201.03.043. (Ashlee Cunsolo Willox, McGill University)	section re-written, but limits on space
464	43765	11	18	14	0	0	"...and they also lose amenity and opportunity". I don't know what this means. (Peter Berry, Health Canada)	section re-written, but limits on space
465	40333	11	18	16	18	16	Arctic – consider mental health issues /stress / depression - due to isolation when snow/ice conditions 'strand' communities in their own homes- unable to leave community when too little snow/ice to travel on and water still not open enough. Also impacts food security. issues. Consider ref: CunsoloWillox et al. 2012. 'The Land Enriches the Soul:'On Climatic and Environmental Change, Affect, and Emotional Health and Well-Being in Rigolet, Nunatsiavut, Canada. Emotion, Space, and Society, Special Issue on Ecology and Emotion. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	section re-written, but limits on space

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466	47986	11	18	24	18	24	It seems to be that a discussion on climate change and mental health would be remiss to not include the work done by the American Psychological Association in their report: Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., Stern, P., & Weber, E. (2010). Psychology and global climate change: addressing a multifaceted phenomenon and set of challenges. A Report of the American Psychological Association Task Force on the Interface between Psychology and Global Climate Change. And in the special issue of American Psychologist: Doherty, T., & Clayton, S. (2011). The psychological impacts of global climate change. American Psychologist, 66(40), 265-276; Reser JP, Swim J (2011) Adapting to and coping with the threat and impacts of climate change. American Psychologist 66 (4): 277-289; Swim, J., Stern, P.C., Doherty, T., Clayton, S., Reser, J., Weber, E., Gifford, R., & Howard, G. (2011). Psychology's contributions to understanding and addressing global climate change. American Psychologist, 66(4), 241-250). These are key references in a small, but growing area, that should be cited to inform the future of this field and provide a foundation upon which to continue this very important work. (Ashlee Cunsolo Willox, McGill University)	section re-written, but limits on space
467	54880	11	18	26	0	0	Figure 11.8 The author team may consider further explaining different aspects of the figure, perhaps with examples. (Monalisa Chatterjee, IPCC WGII TSU)	section re-written, but limits on space
468	50648	11	18	30	0	0	Section 11.2.10. In this section, the author team should also consider the assessment of chapter 12, ensuring appropriate consistency and cross-referencing. (Katharine Mach, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
469	38214	11	18	32	18	38	Anderson has a thorough review of the relation between heat and aggression. (Janet Swim, The Pennsylvania State University)	We took this under consideration in the rewriting of the section
470	52320	11	18	32	18	38	move to heat section? (Tanja Wolf, WHO Regional Office for Europe)	We took this under consideration in the rewriting of the section
471	37800	11	18	36	18	38	The sentence starting towards the end of line 36 and the sentence that follows it are not "violence". Move them to 11.2.2 (paragraph 6 perhaps). (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
472	39734	11	18	38	18	38	not really clear why the decrease in accidents, in this age group especially, should be weather related (Peter Burt, University of Greenwich)	We took this under consideration in the rewriting of the section
473	37802	11	18	40	18	44	Do these sentences describe a current impact of climate change? If so, move to that section (11.4). (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
474	53370	11	18	40	18	53	Please check against chapter 12. (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
475	48245	11	18	40	19	13	A supporting argument is, according to Raleigh & Kniveton (2012), that recent research has speculated that future climate-related shocks might spark violent conflict in a number of regions of the world (Swart 1996, Sachs 2005, Stern 2007, cited in Raleigh & Kniveton 2012). The scientific uncertainty associated to the predictions is most pronounced for the rainfall, rather than temperature (Meehl et al, 2007, cited in Raleigh & Kniveton 2012). (Jason Garcia-Portilla, University of Sussex)	We took this under consideration in the rewriting of the section
476	37801	11	18	44	18	46	The relevance of the sentence contained within these lines is not clear. It is also from a study published in 2004. I suggest the sentence be deleted. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
477	37803	11	18	48	18	51	The statement "has recently led to more highly specified models" seems incorrect given the dates of the citations that follow (2001 and 2004). Further, the sentence that precedes this describes a study published in 1998. Could these three sentences be deleted? (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
478	53371	11	19	1	19	2	Please see the Foresight report on migration. (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
479	37302	11	19	4	19	13	While I welcome this discussion on climate change and conflict, some of the qualifiers and citations should be reconsidered. Rather than a blanket qualifier ("in view of other social, cultural, political, and economic factors") the authors might specify that - historically - severe climate events during broader climatic fluctuations (such as the early modern Little Ice Age) have often triggered civil and international conflict, particularly under conditions of rural population pressure and state fiscal stress. More detailed case studies may be found in the following highly respectable peer-reviewed history publications: Parker, Geoffrey. "Crisis and Catastrophe: The Global Crisis of the Seventeenth Century Reconsidered." American Historical Review 113 (2008): 1053-79; Brook, Timothy. The Troubled Empire: China in the Yuan and Ming Dynasties. Cambridge: Harvard Belknap, 2010; White, Sam. The Climate of Rebellion in the Early Modern Ottoman Empire. New York: Cambridge University Press, 2011. The last of these also contains a more detailed review of literature on historical climate change and conflict and their demographic impacts. The citation to Tol and Wagner may be inappropriate here, since the authors state clearly in the abstract that "This relationship weakens in the industrialized era, and is not robust to the details of the climate reconstruction or to the sample period. As the correlation is negative and weakening, it appears that global warming would not lead to an increase in violent conflict in temperature climates." This is likely because industrial Europe has rarely met the preconditions of rural population pressure and fiscal stress described above. (Samuel White, Oberlin College)	We took this under consideration in the rewriting of the section
480	53372	11	19	9	19	9	This conflicts with an earlier statement. (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
481	53373	11	19	11	19	11	Rapid climate change was not discussed earlier. (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
482	37804	11	19	16	0	0	Section 11.2.11. It is excellent to see a substantial section on Aeroallergens. (Paul Beggs, Macquarie University)	Thank you.
483	37812	11	19	16	0	0	Section 11.2.11. The following sentence could be inserted after the first sentence of this section: "It is important to note that aeroallergens such as pollen are now being associated with other important diseases such as stroke (Low et al. 2006)." Low RB, Bielory L, Qureshi AI, Dunn V, Stuhlmiller DFE, Dickey DA. The relation of stroke admissions to recent weather, airborne allergens, air pollution, seasons, upper respiratory infections, and asthma incidence, September 11, 2001, and day of the week. Stroke 2006;37(4):951-7. (Paul Beggs, Macquarie University)	unable to include this due to space restraints

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
484	37819	11	19	16	0	0	Section 11.2.11. This section on the climate-sensitivity of aeroallergens and allergic diseases could include more of the recent research on this topic. The following sentence, for example, could be added in the first paragraph: "Research on the seasonal distribution of pollen in the atmosphere of Darwin, tropical Australia, shows the peak pollen period occurring at the onset of the dry season (April–May)." Stevenson J, Haberer SG, Johnston FH, Bowman DMJS. Seasonal distribution of pollen in the atmosphere of Darwin, tropical Australia: Preliminary results. <i>Grana</i> . 2007;46:34-42. (Paul Beggs, Macquarie University)	unable to include due to space restraints
485	38232	11	19	16	0	0	should this section on aeroallergens not be included in the air quality section, 11.2.8 it seems to follow on better in that section than its present location. (Caradee Wright, Council for Scientific and Industrial Research)	do not agree
486	40876	11	19	16	0	0	Section 11.2.11. and 11.2.12 Comment: rename the chapters into 11.2.9. "Aeroallergens and diseases" and 11.2.10. "Ozone, UV and Skin Cancer" respectively, then continue with 11.2.11. "Mental Health" and 11.2.12 "Violence". Reasoning: keep specific health outcomes together (Birgit Kuna-Dibbert, German Aerospace Center, Project Management Agency)	I do not agree because this partition is fully justified from pathogenetic standpoint.
487	43767	11	19	16	0	0	11.2.11. Aeroallergens and Diseases - I suggest having this section follow section 11.2.8.2. Acute Air Pollution Episodes (Peter Berry, Health Canada)	I do not agree. Maybe it is sufficient to write "prolonged exposure to allergens, acute exposure to high levels of air pollutants which last usually for several days."
488	37805	11	19	16	19	16	Could the title of this section be modified to "Aeroallergens and Related Diseases" or "Aeroallergens and Allergic Diseases"? (Paul Beggs, Macquarie University)	do not agree.
489	39735	11	19	16	19	48	this section is rather weak. Having read Section 11.4.2 I think there is much more that could be emphasised by at least cross-referencing that later section here, so readers know further information is provided. (Peter Burt, University of Greenwich)	cross-reference added and new text.
490	52321	11	19	16	19	48	could this be moved to air quality (Tanja Wolf, WHO Regional Office for Europe)	don't agree
491	53374	11	19	16	19	48	What about work by Paul Beggs and Lew Ziska? Why no references post 2008? (Kristie L. Ebi, IPCC WGII TSU)	recent references are included
492	37806	11	19	19	19	19	Change "mushroom" to "fungal". (Paul Beggs, Macquarie University)	Agree, changed
493	39736	11	19	19	19	19	the term mushroom spores is meaningless. Spores can come from fungi and also lower plants, 'mushroom' is a colloquial name for one sub-set of the fungi. I suggest replacing 'mushroom' with 'fungal', at least, or, ideally, 'spores of fungi and lower plants' for accuracy (Peter Burt, University of Greenwich)	Agree, changed
494	37808	11	19	19	19	20	"allergic rhinitis" is an allergic respiratory disease, so replace the comma after "allergic respiratory diseases" with "such as". (Paul Beggs, Macquarie University)	Changed
495	37807	11	19	20	19	21	Add "Beggs, 2011" as a second citation with "Schmier and Ebi, 2009". The full reference is: Beggs PJ. Impacts of climate change on aeroallergens and allergic respiratory diseases in children in rural areas. <i>International Public Health Journal</i> 2011;2(4):377-383. Open Access at: https://www.novapublishers.com/catalog/product_info.php?products_id=22886&osCsid=46679f8f73b54db47805ec3eacbc171d (Paul Beggs, Macquarie University)	Added
496	39737	11	19	21	19	21	the implication here is that fungi are plants, which they are not. Has increased CO2 been shown to stimulate fungal growth (I know of no studies of this)? (Peter Burt, University of Greenwich)	The text does not claim that CO2 stimulates fungal growth
497	37809	11	19	21	19	23	The sentence about earlier flowering in these lines could be deleted. It is more important to discuss the studies that have examined atmospheric pollen seasonality itself. (Paul Beggs, Macquarie University)	I do not agree. Several publications have confirmed this phenomenon in different countries
498	39738	11	19	22	19	22	please give taxonomic details (Peter Burt, University of Greenwich)	no change
499	37810	11	19	23	19	23	The phrase "not only by plants but also by trees" is concerning because trees are plants and the author of this section should know that. (Paul Beggs, Macquarie University)	changes made
500	39739	11	19	23	19	24	please give taxonomic details (Peter Burt, University of Greenwich)	this detail is not warranted, in our view
501	43768	11	19	23	19	24	I believe some studies have suggested that efforts to reduce the urban heat island effect need to give consideration to the potential risks from efforts to green urban areas that may actually increase aeroallergens as the climate warms. See Carinanos P, Casares-Porcel M (2011) Urban green zones and related pollen allergy: A review. Some guidelines for designing spaces with low allergy impact. <i>Landscape and Urban Planning</i> 101:205-214. This is an important consideration for adaptation / maladaptation that you may wish to highlight. (Peter Berry, Health Canada)	point noted and changes made CHECK
502	46452	11	19	23	19	24	Please, give a reference to this sentence: "Temperature increases stimulate production of allergens not only by plants but also by trees, e.g., birch and sycamore". (Rubén Piacentini, Institute of Physics Rosario (CONICET - National University of Rosario))	see Sherry et al., 2007
503	37811	11	19	24	19	26	The article by de Weger and Hiemstra is in Dutch, with only the Abstract available in English, according to the PubMed entry: http://www.ncbi.nlm.nih.gov/pubmed/20025786 It is therefore difficult to determine the accuracy of the associated sentence. However, it seems likely the study does not provide an example of the impact of climate change described in the previous sentence. I suggest the last sentence of this paragraph (the one describing the de Weger and Hiemstra study), be deleted. Further, the second last sentence of the paragraph will then need an alternate study to provide an example, and may need revision if such an article cannot be found. (Paul Beggs, Macquarie University)	deleted
504	39740	11	19	25	19	25	the implication here is that pollen is only transported with dust. This is not the case. Pollen (and spores) may be windborne independently of dust or other atmospheric materials. Also, changing wind patterns are likely to change the distributions of many aeroallergens and pathogens. This will be global, not just in Holland! (Peter Burt, University of Greenwich)	corrected

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
505	37813	11	19	31	19	33	The sentence in these lines discusses only climate and allergic diseases, not aeroallergens. Direct impacts of climate (temperature, humidity, etc.) on diseases like asthma have been documented. If such direct impacts (i.e., not via the impacts of climate on aeroallergens) is the focus of this sentence, then it would be best moved to a separate paragraph on such direct impacts of climate/weather on allergic diseases. (Paul Beggs, Macquarie University)	do not agree
506	37814	11	19	36	19	36	Add "Beggs, 2011" as a second citation with "D'Amato et al., 2007". The full reference is provided in an earlier comment by this Reviewer. (Paul Beggs, Macquarie University)	added
507	39741	11	19	36	19	36	yes and no. The main mechanism is thought to be due to rupture of pollen grains releasing starch particles, which are severe respiratory irritants. See, for example, Suphioglu C. 1998. Thunderstorm asthma due to grass pollen. Int Arch Allergy Immunol, 116(4): 253-60. (Peter Burt, University of Greenwich)	changed
508	39742	11	19	37	19	39	the text here is wrong! The study by Grundstein et al. reports pollen rupture in association with thunderstorms. There is no mention of fungal spores. Also, there is a mix up of two processes: the New Orleans spores were released from mould growing in damp buildings and flooded areas, the Atlanta study was thunderstorm-induced rupture of pollen (which may or may not have been concentrated in thunderstorm outflows). Further, the climate change context of these observation is not drawn out. (Peter Burt, University of Greenwich)	deleted
509	53375	11	19	39	19	39	I presume you mean Katrina? (Kristie L. Ebi, IPCC WGII TSU)	deleted
510	37815	11	19	43	19	44	The word "inter-dependencies" should be changed to "interactions" to be consistent with the start of the sentence. (Paul Beggs, Macquarie University)	changed
511	37816	11	19	43	19	44	This section (11.2.11) is not on future projected impacts of climate change on aeroallergens and allergic diseases, so the last part of this sentence ("and these inter-dependencies make it difficult to project...") should be deleted or moved to an Aeroallergens section in 11.5 (as discussed in an earlier comment). (Paul Beggs, Macquarie University)	The risks described here have already occurred. They are not just future risks.
512	37817	11	19	47	19	47	Delete the Galan et al. (2003) reference. There is plenty of recent (post-AR4) climate change, allergens and allergic diseases research, so there is no need to refer to any research prior to the AR4. (Paul Beggs, Macquarie University)	deleted
513	37818	11	19	47	19	48	The meaning of the final sentence of this paragraph is not clear. "may also play a role" in what? (Paul Beggs, Macquarie University)	have chosen to keep this phrase.
514	39743	11	19	47	19	48	very vague hand waving, what changes will there be and what is the role of local climate? (Peter Burt, University of Greenwich)	have chosen to keep this phrase.
515	37820	11	19	51	0	0	Section 11.2.12. Does temperature actually play a direct role in the prevalence of skin cancers, or is it simply that locations with higher UV levels also tend to have higher temperatures? If temperature is not directly related to UV or skin cancer levels, then mention of it here should be deleted. However, the sentence contained within lines 3 to 5 of this page is interesting and valid, although, again, the supporting reference at the end of the paragraph is now quite dated (2004). Overall, this section (11.2.12) seems weak and could be deleted. (Paul Beggs, Macquarie University)	It is true that researchers are only beginning to tackle this problem.
516	42197	11	19	51	19	51	The title of section 11.2.12 "Ozone, UV, and Skin Cancer" should be "Ozone depletion, UV, and Skin". UV-induced-adverse health effects are more than skin cancers. (Jianguo Tan, Shanghai Meteorological Institute)	There is no direct evidence which can prove the relationship between climate change and other skin diseases.
517	46453	11	19	54	20	3	About these sentences: "In one study in the United States, the number of cases of squamous cell carcinoma was 5.5% higher for every 1°C increment in average temperatures, and basal cell carcinoma was 2.9% more common with every 1° C increase. These values correspond to an increase in the effective UV dose by 2% for each 1°C (van der Leun et al., 2008)", I was one of the authors of this research work and I think that there is an incorrect introduction of the words: "more common", which are included after "2.9%". I reproduce part of the Abstract of the work of van der Leun J C, Piacentini R D and de Gruijl F R. Climate change and human skin cancer. Photochem. Photobiol. Sciences, 7, 730-733, 2008: "The incidence of non-melanoma skin cancer in the ten regions surveyed not only correlated significantly with the ambient UV dose but also with the average daily maximum temperature in summer. For squamous cell carcinoma the incidence was higher by 5.5% (SE 1.6%) per degrees C and for basal cell carcinoma by 2.9% (SE 1.4%) per degrees C. These values correspond to an increase of the effective UV dose by about 2% per degrees C". Probably, "more common" corresponds to the type of skin cancer: basal cell carcinoma. If this is the case, a possible expression would be: "... and basal cell carcinoma (the most common skin cancer) was 2.9% with every 1° C increase." Also, verify the letter for Celsius (C), that it is not well reproduced in the first two descriptions of "1°C". (Rubén Piacentini, Institute of Physics Rosario (CONICET - National University of Rosario))	new sentence added.
518	45019	11	20	0	0	0	Section 11.3.1: Each sub-section should address vulnerability due to socio-economic factors AND vulnerability due to physiological factors. It should be also stated if there are NO physiological reasons for differences in vulnerability. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	disagree - no changes made
519	52322	11	20	6	0	0	could changes in travel and recreation be consequences of changes in climate?? (Tanja Wolf, WHO Regional Office for Europe)	agree - changes made in text
520	40894	11	20	9	0	0	Section 11.3. - in section introduction, link vulnerability specifically to thresholds after which climate change stress severely magnifies health related problems. This is addressed in the explanation in most sections and needs an introduction. (Adger, N., I. Lorenzoni and K. O'Brien (eds). 2009. Adapting to Climate Change: Thresholds, Values, Governance. Cambridge, Cambridge University Press) (Lynn Wilson, SeaTrust Institute)	this point is covered in the discussion (within this section)
521	50649	11	20	9	0	0	Section 11.3. Throughout this section, the author team should consider distinguishing between exposure and vulnerability. Please see the discussion of vulnerability as defined in the context of IPCC assessments in chapter 19, in SREX chapter 1, and also in the glossary for this report. (Katharine Mach, IPCC WGII TSU)	accepted - the AR5 definition has been added in place of that used previously
522	54873	11	20	9	0	0	To avoid overlaps, the author team may wish to add a table here and provide key findings relevant to health issues here. (Monalisa Chatterjee, IPCC WGII TSU)	noted, but not sufficient space

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
523	44280	11	20	11	0	0	Please ensure consistency of vulnerability definition with other chapters and the glossary. It seems the definition has been changed there compared to previous IPCC assessments. (Dominik Reusser, Potsdam Institute for Climate Impact Research)	as above - new definition inserted
524	37821	11	20	11	20	14	Ensure the definition of vulnerability in these lines is replaced by the AR5 definition, which may or may not be the same as the definition in these lines. For such an important term, it is essential that this and other WGII chapters use the current (AR5) IPCC definition as provided in the AR5 Glossary. (Paul Beggs, Macquarie University)	as above - new definition inserted
525	50650	11	20	11	20	14	For this presentation of the definition of vulnerability, the author team should consider and cross-reference the glossary for the report and also discussion in chapter 19. In particular, the author team may want to refine the inclusion of exposure in vulnerability, as described on line 14. Additionally, on line 14, is it more nearly the potential for response or the capacity to respond, rather than simply "the response"? (Katharine Mach, IPCC WGII TSU)	as above - new definition inserted
526	53376	11	20	11	20	14	Please ensure consistency of definition of climatic events with the AR5 glossary. This is not the definition of vulnerability used in the other chapters. (Kristie L. Ebi, IPCC WGII TSU)	as above - new definition inserted
527	43769	11	20	14	0	0	"This means vulnerability encompasses both exposure to a hazard, and the response to this exposure". A more complete definition of vulnerability explicitly incorporates considerations of sensitivity, exposure and adaptive capacity. Response to exposure may be too limiting as it does not include the breadth of actions that are covered under adaptive capacity. For analysis that highlight the complexity of vulnerability analysis and incorporate more explicitly these components see Ebi, K.L., Berry, P., Campbell-Lendrum, D., et al., (2012). Protecting Health from Climate Change: Vulnerability and Adaptation Assessment. World Health Organization and Pan American Health Organization, Geneva and Berry, P. (2008). Vulnerabilities, Adaptation and Adaptive Capacity in Human Health and a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity, edited by J. Seguin; Health Canada, Ottawa. (Peter Berry, Health Canada)	as above - new definition inserted
528	43772	11	20	17	0	0	"Current sources of vulnerability". Some interesting sources of vulnerability related to sensitivity (age), exposure (geography) and adaptive capacity (socio-economic status) are presented in this section. However, some important factors that are very important are not included such as strength of the health care system, health status, perception of risks and knowledge of adaptations etc. Some of these other key vulnerability factors that have been highlighted in the literature should be acknowledged. (Peter Berry, Health Canada)	not possible to list all causes of vulnerability, but those mentioned here are all referred to in subsequent sections
529	50651	11	20	19	0	0	Section 11.3.1.1. For this section as well, the author team may wish to more clearly separate exposure and vulnerability. (Katharine Mach, IPCC WGII TSU)	propensity to harm refers to environmental factors as well as internal variables
530	52324	11	20	19	20	34	this section is weird. "place" could be a "source of vulnerability". However, the examples seem a bit random. (Tanja Wolf, WHO Regional Office for Europe)	examples are illustrative
531	41923	11	20	21	20	34	This paragraph can also mention the differential of vulnerabilities in urban contexts due to the heterogeneity of the city; mapping of vulnerabilities is of high interest including at the city level; one may also emphasize the case of cities growing near rivers with a higher risk of flooding events for underprivileged areas; and the case of medium or small sized cities (called also secondary cities) can be added. There is a particular gap of information on cities of that size. For references on secondary cities may be of interest to mention Cissé et al 2010: <Cissé Guéladio, Brama Koné, Hampaté Bâ, Ibrahima Mbaye, Koffi Koba, Jürg Utzinger, and Marcel Tanner (2010). Ecohealth and Climate Change: Adaptation to Flooding Events in Riverside Secondary Cities, West Africa. K. Otto-Zimmermann (ed.), Resilient Cities: Cities and Adaptation to Climate Change - Proceedings of the Global Forum 2010, Local Sustainability 1, DOI 10.1007/978-94-007-0785-6_6, Springer Science+Business Media B.V. 2011 > (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	noted, but not able to include all references due to space limitations
532	53377	11	20	23	20	25	There also are studies showing no difference in vulnerability. Please provide a comprehensive assessment. (Kristie L. Ebi, IPCC WGII TSU)	changed to "may be"
533	52323	11	20	30	0	0vulnerability to FLOODING. (Tanja Wolf, WHO Regional Office for Europe)	accepted
534	37822	11	20	32	20	34	The sentence in these lines regarding the Arctic, rapid temperature rise, food, and drowning, seems a little too repetitive with other similar sentences in the chapter (Page 17, lines 19-21; Page 21, lines 52-54). Perhaps the research by Ford et al. being assessed in these three locations could be combined into a single comprehensive assessment perhaps in Section 11.3.1.4. Race and Ethnicity. (Paul Beggs, Macquarie University)	accepted - sentence deleted
535	37826	11	20	37	0	0	Section 11.3.1.2. A sentence about the higher prevalence of asthma in children should be added in this section. The following sentence or similar could be used to convey the actual magnitude of the disease: "The global average prevalence of current asthma symptoms in 13- to 14-year olds is 14.1%, and in some countries the prevalence is as high as 32.6% (Lai et al., 2009)." Lai, C.K.W., Beasley, R., Crane, J., Foliaki, S., Shah, J., Weiland, S., the ISAAC Phase Three Study Group. (2009) Global variation in the prevalence and severity of asthma symptoms: Phase Three of the International Study of Asthma and Allergies in Childhood (ISAAC). Thorax 64(6), 476-483. (Paul Beggs, Macquarie University)	no change made: asthma is not strongly climate sensitive
536	50652	11	20	39	20	39	It would be preferable to indicate more specifically what is meant by "risk" here. Risk of what? (Katharine Mach, IPCC WGII TSU)	accepted
537	52325	11	20	39	21	13	this section mixes up concepts of vulnerability and risk (Tanja Wolf, WHO Regional Office for Europe)	modified
538	39744	11	20	42	20	42	what is CRA? (Peter Burt, University of Greenwich)	changed
539	50653	11	20	42	20	42	It would be helpful to specify what the acronym CRA stands for. (Katharine Mach, IPCC WGII TSU)	changed
540	53378	11	20	42	20	42	Please define CRA. (Kristie L. Ebi, IPCC WGII TSU)	changed
541	37823	11	20	43	20	47	Delete the sentences fully contained within these lines. They are not needed to make the point about child vulnerability generally. (Paul Beggs, Macquarie University)	don't agree - prefer to retain text

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
542	43770	11	20	48	0	0	"...may be encouraged under climate change..." I suggest rephrasing this. (Peter Berry, Health Canada)	accepted - change made
543	37824	11	20	48	20	48	Is "encouraged" the best word here? (Paul Beggs, Macquarie University)	agree - word has been changed
544	37825	11	20	54	21	2	Delete the sentence in these lines. The last part of the sentence "although it is not clear whether these effects are more severe than in other age groups" makes the sentence irrelevant in this section on age as a source of vulnerability. All three of the references for the sentence are also too old (2005, 1993, and 1978). (Paul Beggs, Macquarie University)	the sentence has been deleted
545	52326	11	21	4	0	0	households with children tend to have lower than average incomes- per capita?? (Tanja Wolf, WHO Regional Office for Europe)	per household
546	53379	11	21	5	21	5	Air pollution could be mentioned. (Kristie L. Ebi, IPCC WGII TSU)	reference to air pollution has been included
547	53380	11	21	7	21	13	Heat should be mentioned. (Kristie L. Ebi, IPCC WGII TSU)	yes, heat is added now
548	38712	11	21	11	14	0	A key finding of the (Medina-Ramon and Schwartz, 2008) , paper is also that diabetics are a more susceptible sub group of the population to heat related mortality. With diabetes rising in the developed world this is an added risk of increased temperatures, and hot days. (Patrick Goodman, Dublin Institute of Technology)	change made
549	50654	11	21	16	21	21	It is not clear why the citation is provided as a footnote, in addition to a more usual citation as provided in the text. (Katharine Mach, IPCC WGII TSU)	footnote deleted
550	37827	11	21	28	21	28	Given this sentence refers to "in every age group", should the word "women" at the start of the line be changed to "females" and also the word "men" be changed to "males"? (Paul Beggs, Macquarie University)	accepted - male and female used in place of men and women
551	39745	11	21	35	21	35	Insert 'for' after 'than' (Peter Burt, University of Greenwich)	accepted
552	37828	11	21	38	21	41	The two references used in this paragraph are pre AR4, especially the second one (1981). While the point being made in this paragraph is important, it should be supported by post AR4 references only. (Paul Beggs, Macquarie University)	accepted - new references are being sought
553	47942	11	21	44	0	0	There is a growing and important body of literature highlighting the impact of climate change on mental health - especially among indigenous and marginalized communities. See for instance Berry, H., Bowen, K., and Kjellstrom, T., (2010) Climate Change and mental health: a casual pathways framework. In International Journal of Public Health 55(2): 123-132. Referencing this body of literature in this section would be appropriate especially as it has been linked/documentated in relation to particular ethnicities. (Amejali Ramos Castillo, United Nations University - Institute of Advanced Studies)	referred to elsewhere in the chapter
554	47943	11	21	44	0	0	Also important to cite more recent publications including Ford, J. (2012) Indigenous Health and Climate Change. In American Journal of Public Health. 102 (7): 1260-1266 (Amejali Ramos Castillo, United Nations University - Institute of Advanced Studies)	not possible to cite all relevant references; we have chosen those we think best fit the assessment
555	37829	11	21	49	21	50	The term "health-protecting air conditioning" is possibly misleading. Is there research to show that globally the population is healthier if air conditioned than if not air conditioned, and that this is a result of the air conditioning? Given this statement is made with respect to vulnerability to heat-related deaths only, it could be changed to "lower incomes may restrict access to extreme heat protecting air conditioning". (Paul Beggs, Macquarie University)	wording altered
556	45018	11	21	49	21	50	it's not only air conditioning. Often these people live in buildings with poor insulation (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	"for instance" inserted
557	37830	11	21	50	21	50	Insert the word "higher" before "local crime rates". (Paul Beggs, Macquarie University)	changed
558	47988	11	21	52	21	54	I am happy to see examples of populations who are currently experiencing rapid changes in their local environments, such as the Canadian Arctic. I would suggest, however, that for the Canadian Arctic, it is far more than hunting that is causing sources of vulnerability; rather, it is an entire culture, way of life, and livelihoods that are being impacted. The Ford 2009 reference is good here, but adding a clarification that it is not just hunting, but trapping, harvesting, travelling, fishing, foraging, and cultural activities and livelihoods, and providing another reference, would help to clarify this without simplifying down to hunting. I would suggest using: Ford, J, Berrang-Ford, L, King, M. & Furgal, C. (2010a). Vulnerability of Aboriginal health systems in Canada to climate change. Global Environmental Change, 20, 668-680. (Ashlee Cunsolo Willox, McGill University)	change made
559	42328	11	21	54	0	0	Why not cite Ford et al (2008) as well? (It's in the references) (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	reference list edited
560	37831	11	22	2	22	2	The reference at the end of the sentence (Green et al., 2010) is a study on California counties, and therefore does not seem to match the sentence ending in this line which is about Australia. (Paul Beggs, Macquarie University)	new reference added in place of Green et al
561	40895	11	22	6	0	0	Section 11.3.1.5 Link to MDGs and Hyogo Framework for Action (Lynn Wilson, SeaTrust Institute)	no change
562	53381	11	22	8	22	26	The problems with controlling dengue in Singapore could be an example. (Kristie L. Ebi, IPCC WGII TSU)	multiple
563	45020	11	22	18	22	18	outdoor occupation does not necessarily reflect the socio-economic status (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	inserted "which tend to have low SES"
564	37832	11	22	18	22	21	This discussion of outdoor occupations and disease in the socioeconomic status (as a source of vulnerability) section, implies that such occupations are lower paid, lower skilled and/or lower prestige than other occupations. While this might often be the case, it is not necessarily so. A professional golfer could be said to have an outdoor occupation but at least some in this occupation have very high socioeconomic status. Discussion of outdoor occupations as a source of vulnerability is fine, but perhaps it would be best placed in a separate section on "Occupation". (Paul Beggs, Macquarie University)	text altered
565	50655	11	22	21	22	21	It would be preferable to provide specific reference to the chapter sections intended with this parenthetical mention. (Katharine Mach, IPCC WGII TSU)	reference to 11.2.7 included

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
566	37833	11	22	22	22	22	Delete the text "related to age and gender, but", and insert the word "related" after "not". Age and gender are covered in earlier sections, and mention of them in this section on socioeconomic status simply confuses the picture. (Paul Beggs, Macquarie University)	disagree - no change made
567	43771	11	22	39	22	49	I am not quite sure how this discussion specifically relates to neighborhood as a key vulnerability factor apart from the fact that all of these areas discussed (e.g., Portugal, Africa) have people living in neighborhoods. (Peter Berry, Health Canada)	discussion refers to local (neighbourhood) environments
568	37834	11	23	1	0	0	Section 11.3.1.7. Change the title of this section to "Synopsis", or similar. The content of this section (11.3.1.7) is not a summary. (Paul Beggs, Macquarie University)	disagree - leave as is
569	50656	11	23	1	0	0	Section 11.3.1.7. For conclusions provided in this section, the author team should consider using calibrated uncertainty language to indicate its degree of certainty in the findings. (Katharine Mach, IPCC WGII TSU)	changes made
570	52327	11	23	1	23	25	to have parts of the summary as an intro would help the reader (Tanja Wolf, WHO Regional Office for Europe)	no change made
571	37835	11	23	5	23	5	Insert the words "the levels of" before "neighbourhood green space". (Paul Beggs, Macquarie University)	changed
572	53382	11	23	25	23	25	And nearly all of Bangladesh. (Kristie L. Ebi, IPCC WGII TSU)	added
573	37838	11	23	28	0	0	Section 11.3.2. Should obesity be mentioned in this section on projections for vulnerability? (Paul Beggs, Macquarie University)	yes, agree - reference to obesity has been added
574	50657	11	23	30	23	30	"likely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	change to "may"
575	43773	11	23	31	23	32	"Increasing numbers of people, particularly in environments that are already resource-stretched, will magnify harmful impacts" More people means greater exposure of populations which may certainly increase harmful impacts from climate change. However, populations have been growing rapidly while the climate has been changing and yet, as the beginning of this chapter highlighted, the last few decades have generally seen a marked improvement in global health outcomes. How is this explained? In fact, the end of this paragraph reiterates that mortality rates will continue to fall with increased populations and age related disability rates may continue to fall as well. Better explanation of why increased population may ultimately turn into an important vulnerability factor would be helpful. (Peter Berry, Health Canada)	extra text added
576	37836	11	23	38	23	38	While the aging population has enormous implications for vulnerability, by definition it is accompanied by a decrease in the proportion of the population aged under 60, including the proportion of the population who are children. Will the climate change and human health implications of more older people be countered, at least in part, by a decrease in the burden of disease in children via a decrease in the proportion of children into the future (see Section 11.3.1.2)? This is analogous to the question of the balance between reduced cold-related disease and increased heat-related disease. (Paul Beggs, Macquarie University)	noted - but no change to text
577	43774	11	23	48	23	50	What is the trend regarding Human Development Indices? This seems to be a very important indicator of whether countries, according to this measure, are getting better able to cope with climate change. (Peter Berry, Health Canada)	HDI measures have been improving in most countries, extra text added
578	45021	11	23	48	23	51	I'm not sure if it isn't the other way around; namely that countries that are less affected by extreme events can reach higher socio-economic status and as a consequence of this can cope better with an extreme event if it occurs. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	disagree - no change
579	37837	11	23	50	23	50	Change the end of this sentence to "are less affected by the floods, droughts and cyclones they experience.". It is important to distinguish between differences in exposure and differences in response to exposure. (Paul Beggs, Macquarie University)	agree - change made
580	50658	11	23	51	23	51	"likely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. If there is not a probabilistic basis, a level of confidence may be appropriate. The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	changed
581	42329	11	24	5	0	0	"it is not clear that" is rather meaningless. (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	changed
582	43775	11	24	9	24	10	"Other global trends that may impact on future vulnerability include the distribution of wealth and resources..." This was discussed to some degree in lines 1-3 on this page. Suggest merging. (Peter Berry, Health Canada)	changed
583	42330	11	24	11	0	12	sentences needs brief explanation – extended/expanded opportunities for pathogen, vector, vector eggs, or intermediate host (e.g. rats) (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	text added
584	43778	11	24	22	0	0	You might consider integrating sections in 11.4 with respective sections in 11.2 to improve logical flow for the reader and to reduce overlap. The material feels repetative as presented in this regard. (Peter Berry, Health Canada)	Disagree- but changes made to improve clarity.
585	45225	11	24	22	0	0	some kind of repetition of the previous individual descriptions. Could be incorporated in previous subchapter through a different structure (Nikolaos Stilianakis, European Commission)	chapter has been reorganised
586	52392	11	24	36	24	52	This section makes no quantitative attribution of flooding events or deaths to climate change. There are now a number of studies reviewed by WGI (Chapters 2, 7.6, 10, and 14) quantifying the increases in extreme rainfall (or in the probability of specific events) attributable to human-caused warming. Overall one can say that something on the order of 5% of the rain in extreme events, and 10-20% of the floodwater when flooding occurs, is typically, statistically attributable to anthropogenic warming so far. Of course this will increase severalfold in the future under pessimistic scenarios. (Steven Sherwood, UNSW)	Will include the references that quantify trends in flood outcomes only [rainfall per se is not relevant here]- which clearly show increase in flood outcomes

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
587	48663	11	24	39	0	0	This statement re attribution stands out, because one thing that has struck me about this chapter is the way you have avoided talking about attribution directly as a result. Instead you have focused firmly on the future, with attribution, when it appears, as one of many lines of evidence being synthesised toward an understanding of what possible pathways the future holds. As for this subsection, it notes how certain extremes have become more/less frequent and the evidence that this is driven by anthropogenic emissions, and it notes how mortality and these extremes are linked. But to me it doesn't address the missing link, whether trends in mortality are related to the trends in weather/climate extremes. Do the patterns match in some way? The evidence as presented does not convince me of that collective statement that the evidence is stronger now than it was then. (Dáithí Stone, University of Cape Town)	Wording will be reviewed to ensure that the presentation fairly reflects the health and climate literature (broadly good evidence for trends in exposure, and exposure-health links, methodological difficulties in interpreting long term trends due to confounding)
588	38711	11	24	39	24	52	This is an important concept, but be aware of cold weather extremes. In some countries there is significantly higher winter mortality compared to summer, its unlikely that increased heat related deaths will out weigh the current winter mortality peaks. (Patrick Goodman, Dublin Institute of Technology)	Will be reviewed to ensure fair assessment of different patterns across the globe (cold outweigh heat deaths in some regions, but not all).
589	50659	11	24	40	24	51	The calibrated uncertainty language used on these lines should be italicized--"very likely" on line 40, "likely" on line 43, "likely" on line 44, "very likely" on line 49, and "low confidence" on line 51. (Katharine Mach, IPCC WGII TSU)	OK.
590	48661	11	24	42	0	0	"statistically significant" can mean different things when it comes to climate change. It could mean that the observed trends are inconsistent with zero trend when uncertainties in the monitoring apparatus are taken into account; this is how the observational chapters of WGI interpret it, for instance. Or it could mean that the observed trends are inconsistent with the range of trends one might expect in a stable climate system in the absence of changing drivers, i.e. detection; this is how the detection and attribution chapter of WGI interpret it. (Dáithí Stone, University of Cape Town)	Agreed. Will clarify with specific references.
591	43776	11	24	48	0	0	The section 11.2.2. Disease and Injury due to Heat and Cold Extremes discusses "heat waves" and "extreme heat waves" and the relationship to health. Is this the same as "very hot days"? (Peter Berry, Health Canada)	not the same - will clarify
592	42198	11	24	48	24	48	The term of "Very hot days" should be defined. (Jianguo Tan, Shanghai Meteorological Institute)	Will be reviewed to make clear that this is usually defined relative to historical record for that location.
593	37839	11	24	48	24	51	The two sentences in these lines could be moved to Section 11.4.3, given they focus more on impacts on human health than impacts on meteorological hazards. (Paul Beggs, Macquarie University)	disagree
594	43777	11	24	49	0	0	"It is therefore very likely that the observed increase in very hot days..." But the text above refers to "warm days" Is this the same thing? (Peter Berry, Health Canada)	changed to achieve greater consistency
595	50660	11	24	49	24	49	The author team should carefully consider how the assignment of "very likely" here was made. It would seem perhaps preferable to use a conditional framing reflecting the likelihood assignment for the physical change and a separate assignment of calibrated uncertainty language for the corresponding conditional impact. (Katharine Mach, IPCC WGII TSU)	accepted - change
596	48662	11	24	49	24	50	This is a prediction of the past without observational evaluation, right? (Dáithí Stone, University of Cape Town)	this section is being re-written
597	53383	11	24	51	24	51	This is confusing winter mortality with mortality during cold spells. (Kristie L. Ebi, IPCC WGII TSU)	edit to make distinction clearer
598	37840	11	24	51	24	52	This sentence could be moved to form the final sentence of the first paragraph of this section (11.4.1). (Paul Beggs, Macquarie University)	this section is being re-written
599	50661	11	24	52	24	52	The author team should revisit the presentation of the finding on this line. It seems a more accurate presentation would indicate the confidence assignment for flood occurrence—ensuring that exposure to floods is not equated to flood occurrence. (Katharine Mach, IPCC WGII TSU)	Sentence on heavy rainfall will be replaced by paragraph on flood outcomes with references. Confidence statement will be re-assessed
600	52328	11	25	1	0	0	title is misleading, section is only about pollen and ticks?? (Tanja Wolf, WHO Regional Office for Europe)	title changed, text added
601	37842	11	25	3	25	3	Change "tree and plant" to just "plant". (Paul Beggs, Macquarie University)	ok
602	37841	11	25	3	25	8	It is outstanding that this section has started with a strong statement on the current impacts of climate change on exposure to aeroallergens. This is refreshing. (Paul Beggs, Macquarie University)	noted
603	45022	11	25	3	25	10	A study about trends in the start and the length of the pollen season in Germany was published in 2011 by Kaminski and Glod. They analysed Mugwort, grass, birch, alder and hazel pollen and were able to show significant trends in the start of the pollen season, the pollen amount, the season length and the peak concentration, depending on the kind of pollen and the region in Germany. Kaminski U, Glod T, 2011: Are there changes in Germany regarding the start of the pollen seasons, the season length and the pollen concentration of the most important allergenic pollen? Meteorologische Zeitschrift 20, 497-507. (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	We took this under consideration in the rewriting of the section
604	50662	11	25	4	25	8	As appropriate, it would be preferable to provide greater indication of the relevant time frames for these observations, as well as their approximate magnitudes in terms of number of days. (Katharine Mach, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
605	42199	11	25	7	25	8	"The length of the season" haven't exact mean. May it be "the length of flowering season" or "the length of growing season"? (Jianguo Tan, Shanghai Meteorological Institute)	We took this under consideration in the rewriting of the section
606	40833	11	25	8	0	0	Again the wording is misleading! You state that "...study reported changes in allergic sensitisation" A "change" might refer to an increase or a decrease. The quoted source however clearly states: "...Percentages of patients sensitized to the pollens increased..." (Winfried Zacher, Germanwatch)	We took this under consideration in the rewriting of the section
607	37843	11	25	8	25	8	Insert degree symbol between "44" and "N". (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
608	37844	11	25	8	25	10	The two last sentences of this paragraph should be moved to the following section (11.4.3) given they discuss current impacts of climate change on human disease. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
609	53384	11	25	12	25	17	The goal of the chapter is to provide a comprehensive assessment post-AR4. What about studies from Sweden and the Czech Republic? (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
610	37845	11	25	13	25	14	Delete the reference "Confalonieri ... Woodward, 2007". This Fifth Assessment of the research should not be relying on a previous assessment to support a statement. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
611	37846	11	25	14	25	15	The second half of the first sentence of this paragraph in these two lines should be moved to Section 11.4.3 because it discusses a current impact (or lack of one to be precise) of climate change on human health. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
612	37848	11	25	20	0	0	Section 11.4.3. The study by Demain et al. (2009) should be included in this section because it describes a current impact of climate change on human disease. A sentence such as the following could be used "Demain et al. (2009) examined documented insect reactions in Alaska over the period 1992 to 2007 and found up to a fourfold increase in patients during this period that had occurred after increases in annual and winter regional temperatures.". Demain, J.G., Gessner, B.D., McLaughlin, J.B., Sikes, D.S. and Foote, J.T. (2009) Increasing insect reactions in Alaska: Is this related to changing climate? Allergy and Asthma Proceedings 30, 238-243. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
613	42331	11	25	20	0	0	Human Infectious Disease (Tony McMichael, National Centre for Epidemiology and Population Health, Australian National University)	We took this under consideration in the rewriting of the section
614	53385	11	25	20	0	0	This section needs an updated literature review and a more balanced assessment, particularly on TBE and malaria. (Kristie L. Ebi, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
615	43779	11	25	23	0	0	What is a "disease system"? (Peter Berry, Health Canada)	We took this under consideration in the rewriting of the section
616	50663	11	25	24	25	27	For this statement, would it be more accurate to say "climate variability or climate change" instead of just "climate change"? (Katharine Mach, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
617	39746	11	25	27	25	29	bad English and text missing (Peter Burt, University of Greenwich)	We took this under consideration in the rewriting of the section
618	52329	11	25	31	25	31	not sure why this is separate from 11.2.4 (Tanja Wolf, WHO Regional Office for Europe)	We took this under consideration in the rewriting of the section
619	39747	11	25	32	25	32	what is TBE? (Peter Burt, University of Greenwich)	Will add in full. And to glossary.
620	45023	11	25	32	25	32	Explain abbreviation: TBE (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	We took this under consideration in the rewriting of the section
621	42200	11	25	32	25	33	"Spring-time maximum daily temperatures " is also not easy to understand. Perhaps it should be Spring-time average daily maximum temperature (Jianguo Tan, Shanghai Meteorological Institute)	We took this under consideration in the rewriting of the section
622	42356	11	25	38	25	45	Update this para based on Stern et al (2011). (Indur Goklany, Independent)	Agreed. Will include new study of temperature trends in Kericho region (PLOS ONE)
623	37847	11	25	40	25	42	Move the sentence contained in these lines to Section 11.4.4 because it discussed a modelling study. However, if Section 11.4.4 is estimation of TOTAL current impacts based on modelling, rather than estimation of current impacts based on modelling as opposed to other methodological approaches, then leave this sentence where it is. (Paul Beggs, Macquarie University)	multiple
624	50664	11	25	40	25	42	As possible for this statement, the author team might consider specifying the relevant time frame. (Katharine Mach, IPCC WGII TSU)	multiple
625	50665	11	25	43	25	43	"robust evidence" -- If this phrase is being used per the uncertainties guidance for authors, it should be italicized. (Katharine Mach, IPCC WGII TSU)	Reference will be included.
626	42358	11	25	48	25	0	I recommend reproducing the figures from Gething et al (2010). They are of greater import than most of the "anecdotal" figures currently included. (Indur Goklany, Independent)	Agreed. Details will be added.
627	42357	11	25	50	0	0	Substitute "lower now than in the past" for "restricted" (Indur Goklany, Independent)	Length of the pollen season [which has a formal definition according to the presence of pollen]
628	40334	11	26	0	27	0	Malnutrition section – is it possible to allow for a bit more detail on the reason for food scarcity in the various scenario models? Compared to other sections- this one leaves me looking for more of a basis for statements. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	Agreed. Will clarify
629	37849	11	26	1	0	0	Section 11.4.4. Should the title of this section be changed to "Estimation of Total Current Impacts based on Modelling". Further, much of the first paragraph of this section seems to rely on a 2004 study, while the third/final paragraph of the section is not supported by any references. As such, is there really enough new information on this topic to justify its own section? Could the truly new information (i.e., that since the AR4) be combined with Section 11.4.3? (Paul Beggs, Macquarie University)	OK
630	43780	11	26	4	0	0	The acronym CRA is used earlier and therefore should be defined earlier (Peter Berry, Health Canada)	See above. May need separate section on vectors or vector-borne disease.
631	50666	11	26	7	26	7	"likely" -- If this term is being used per the uncertainties guidance for authors, it should be italicized. The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	Agreed. Will look for references from other countries.
632	42359	11	26	13	26	16	I would eliminate reference to the GHF (2009) study. It lacks credibility; see Pielke, Jr. (2009, 2009b). I would instead refer to WHO (2009), which updated McMichael (2004). This report indicates that there were 140,000 deaths attributable to climate change in 2004. The implications of both McMichael et al. (2004) and WHO (2009) are laid out in Goklany (2009a, 2011, 2012a). WHO (2002, 2009) both indicate that, based on its contribution to the global burden of death and disease, current climate change health impacts do not even rank in the top 20 public health risks, and that poverty is a far greater health risk. (Indur Goklany, Independent)	There are a very large number of pollen studies pre-2007 and there is not the space to include them all here. If a systematic review is available, it will be included.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
633	52393	11	26	13	26	16	This is obviously an extremely important number, but is buried in the text and not noted in the executive summary. It is sufficiently important that it deserves either a more explicit assessment by the IPCC, or an explicit statement that for some reason it cannot or will not be assessed here. For example, how important are the "empiric evidence and methods for quantifying more complex...relationships" that are claimed to be lacking? Should we believe this 300,000 figure or not? How far off is it likely to be? (Steven Sherwood, UNSW)	OK
634	37850	11	26	14	26	14	While the 300,000 figure is impressive in its own right, and because it represents a doubling from the year 2000, for those wishing to place climate change against other causes of premature mortality, the figure should also be reported as a crude rate (# per 100,000 global population) and the total number of premature deaths per year from all causes should be reported. (Paul Beggs, Macquarie University)	Reference will be included.
635	38215	11	26	27	0	0	Perhaps a stretch, but discussion about the long term effects of stress within baby's and, e.g., the ability to regulate emotions, might be worth considering. (Janet Swim, The Pennsylvania State University)	OK
636	45226	11	26	27	0	0	Please group and justify selection of the specific risks presented here. (Nikolaos Stilianakis, European Commission)	OK.
637	40822	11	26	27	32	19	The paragraph on "Future risks" hardly mentions health risks resulting from the climate related reduction in the access to (safe) water for many people in many parts of the world. As this will constitute a major issue it merits a separate and extensive discussion. (cp. the discussion on "Climate change is (not) the biggest health threat" by Costello and Goklany in www.thelancet.com Vol 374 September 19, 2009 (Winfried Zacher, Germanwatch)	Disease system includes vector and host ecology [perhaps include in glossary?]
638	39748	11	26	36	26	38	supporting references required (Peter Burt, University of Greenwich)	No. This specifically refers to observed climate change.
639	35748	11	26	41	0	0	Section 11.5.5 air pollution. High temperature will increase the concentration of volatile organic compounds (VOCs) in the ambient air due to their increase in fugitive emission. Some species of VOCs are also classified as volatile hazardous air pollutants (VHAPs). Some known or suspected effects of exposure to VHAPs include cancer, reproductive effects, and birth defects. VOCs contribute to the formation of ground-level ozone. Ozone is a major component of smog, and causes or aggravates respiratory disease, particularly in children, asthmatics, and healthy adults who participate in moderate exercise. The above health impact is not covered in this section. May be considered here or at an appropriate section in the chapter. (Jitendra Desai, Reliance Industries Limited)	Agreed. Will edit.
640	42360	11	26	41	0	0	The sub-section should be retitled, "Hunger and Malnutrition", and should include results from Goklany (2009a, 2012a). Based on Parry et al.'s (2004) estimates for the global population at risk of hunger for 2085 under the A1FI, A2, B1 and B2 scenarios, Goklany (2009a, Table 2) provides estimates of the contribution of climate change to deaths from hunger. These indicate that, at most, climate change would contribute 21% of total deaths due to hunger in 2085 (under the A1FI scenario). Under the A2 scenario, climate change might marginally reduce hunger and, therefore, deaths due to hunger. Note that these estimates do not fully consider increases in future adaptive capacity due to future economic development and secular technological change hence that inflate the net negative impact of climate change (Goklany 2012a). (Indur Goklany, Independent)	Because this section is specifically on attributing health effects to observed climate change.
641	44983	11	26	43	0	49	In this section, poverty and socio-economic inequalities are more important that cause undernutrition and malnutrition. This section is better titled Hunger and Malnutrition. (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	Will add in full. And to glossary.
642	50667	11	26	47	26	48	For the statement, it would be helpful to indicate the relevant scenario of climate change that was used. (Katharine Mach, IPCC WGII TSU)	Will add in full. And to glossary.
643	50668	11	26	52	26	53	For assumptions 2 and 3, is it possible to indicate the magnitude of climate change considered? (Katharine Mach, IPCC WGII TSU)	Will clarify from original paper.
644	37851	11	27	1	27	1	Should this Lloyd et al. 2011 reference be Nelson et al. 2009 (i.e., the study the paragraph starts out talking about)? The actual results of the Nelson study are not summarised in the text in this paragraph. The confusion with the Lloyd study partly comes about because the paragraph starts and ends with the Nelson study and its associated table (11-1). On re-reading I can see where the Lloyd study fits in (talking about severity, not prevalence), but this was not clear to me upon first reading. (Paul Beggs, Macquarie University)	Agreed. Will include new study of temperature trends in Kericho region (PLOS ONE)
645	37852	11	27	3	27	3	Change "predicted" to "projected". (Paul Beggs, Macquarie University)	No. Because the study is about present not future.
646	38041	11	27	6	27	6	"under the NCAR climate model" - Change to - "using the NCAR climate model results". Also what forcing scenario is used? A2? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Agreed. Will add details.
647	50669	11	27	13	27	15	For this projection, as possible the author team should specify the relevant scenario of climate change. (Katharine Mach, IPCC WGII TSU)	It is not. Will edit.
648	37853	11	27	14	27	14	Change "predicted" to "projected". (Paul Beggs, Macquarie University)	Gethig paper does not address the recent warming that is of relevance. Not sure which figures the reviewer is referring to as anecdotal.
649	50670	11	27	21	27	24	For these conclusions, the author team should consider using calibrated uncertainty language to indicate its degree of certainty in assessment findings. Additionally, if "likely" is being used on line 23 per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized; the author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	Unnecessary - as meanings are the same.
650	52395	11	27	21	27	24	"negative impact on malnutrition" ambiguous language. Also, "assumptions" cannot counteract actual impacts on malnutrition. (Steven Sherwood, UNSW)	take into account, new para replacing the contentious one.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
651	42361	11	27	22	0	0	Delete "optimistic." Virtually all projections of future impacts tend to systematically overestimate negative impacts and underestimate positive impacts of climate change. Hence the implication that such studies are optimistic is unfounded. See Goklany (2007b, 2009d, 2012a). (Indur Goklany, Independent)	thanks, we deleted "optimistic" and re-wrote the final para of 11.5.2.
652	38986	11	27	27	0	0	The discussion in Section 11.5.2 of projections for the distribution areas of malaria is based on the A1B scenario. This is logical, given the available literature, but the final version of the section should relate also to whatever the AR5 ultimately says about the most likely course of global warming (A1F1?). This consideration applies to other parts of Chapter 11 as well. (Ole Faergeman, Aarhus University Hospital)	Point well taken, I referred this to my colleagues as the issue should not be dealt with in the "future risks" section.
653	44985	11	27	29	0	49	This section needs to be expanded with more regional case studies. (Malaria in South Asia, Rais Akhtar, A.K. Dutt and V. Wadhwa (eds.) Springer, 2010) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	we looked up the reference that you point out to us, but did not find any assessment of future malaria risks, which is the focus of this section.
654	39749	11	27	31	27	31	incorrect genus abbreviation for Plasmodium (Peter Burt, University of Greenwich)	thanks, corrected.
655	42362	11	27	45	0	0	Insert a new sentence on this line that reads as follows: "Moreover, death rates for malaria have declined over 90% since 1900 (WHO 1999, page 50; World Malaria Program 2011)." (Indur Goklany, Independent)	this is a valid and correct point, but does not belong in the section on future risks. I suggested to the coordinating lead author to place your comment upstream in the text.
656	50671	11	27	45	27	49	The author team should provide citations for these statements. (Katharine Mach, IPCC WGII TSU)	This sentence has been deleted for other reasons, so there is no need for a quote any more.
657	42363	11	27	46	27	47	The notion that "climate change does not play a role in malaria" is a strawman. It misses the real issue, namely, how important a driver is climate change with respect to malaria? The answer, based on empirical data, seems to be that it is substantially less important than economic development, technological change and public health measures (Gething et al. 2010; Beguin et al. 2011; WHO 1999, page 50; World Malaria Program 2011; van Vuuren et al. 2011; Bosello et al. 2006). So please delete the sentence on these lines. (Indur Goklany, Independent)	You rightly point out the importance of economic development for the evolution of malara (as are drug resistance development, maintainance of integrated malaria control etc.). However different causal contributions require different policy responses. The aim of the IPCC report, WGII is to soberly assess the evidencefor climate attributable impacts and option for adaptation. This is in no way to minimize or deny the contribution of non-climatic factors, such as poverty, inequity and so on. Same argument as with malnutrition and indeed any climate-sensitive health problem.
658	42364	11	27	47	0	0	Either delete the piece of the sentence stating, "and it should not be assumed (some say) that these favourable conditions will continue in the future" or provide references for "some say" and be more precise about what exactly is meant by "these favorable conditions." Is the sentence questioning the notion that economic development will continue or that public health measures will be abandoned, or both? What is the basis for this statement? I should note that scenario analysis assumes, like it or not, a certain level of economic development, so one is stuck with that even if one doesn't believe it's plausible (for whatever reason). (Indur Goklany, Independent)	We eliminated this para entirely, as it has no place in an assessment of the evidence of future risks.
659	54881	11	27	51	28	12	Figure 11.9 The author team may wish to increase the font to make it more legible. (Monalisa Chatterjee, IPCC WGII TSU)	will be done, thanks for pointing it out.
660	37854	11	27	52	27	52	Delete "using the A1B scenario". This is already stated earlier in the sentence in the line above (51). (Paul Beggs, Macquarie University)	Your suggestion has been incorporated.
661	50672	11	28	2	28	2	What is meant by "left panel" should be clarified given the layout of the figure. (Katharine Mach, IPCC WGII TSU)	thanks, we changed it to "upper panel".
662	43781	11	28	5	28	6	"As we will see in the projections of many health impacts, the potential impact of climate change can be reduced or even reversed by many health systems, biological and social factors, the most prominent being sustained, equitable economic and social development" - as per the comment above (page 20 line 17) there are other sources of vulnerability (e.g., health systems, social systems) that might be highlighted in any discussion about sources or causes of vulnerability (Peter Berry, Health Canada)	Is this a misunderstanding? We explicitly mention health systems and social factors in the sentence you quote. Please help us understand.
663	42365	11	28	6	0	0	To the list of most prominent factors on this line, please add "technological change" (see Goklany 2007b, 2009d). (Indur Goklany, Independent)	good point, we added this.
664	42366	11	28	8	0	0	Add at the end of this paragraph the following passage, "Mitigation may reduce economic development and/or add to poverty which may compromise adaptive capacity. This could outweigh the public health benefits from the associated greenhouse gas reductions (Tol and Dowlatabadi 2001; Tol and Yohe 2006; Goklany 2011)." (Indur Goklany, Independent)	This idea should be discussed, but I doubt that the 5 pages on "future risks" are the right place. I will take this up with my colleagues and get back. N.B. the cut-off for inclusion of papers is 2006. So the excellent paper of Tol and Dowlatabadi 2001, cannot be included in this report.
665	40834	11	28	11	0	0	The text of the figure 11-9 is seriously misleading as it makes its statement in the affirmative : "Contraction ... offsets expansion ..." The assumption from line 52/53 on p 27 is however much more likely to become reality than the assumption in line 54 p 27 and line 1 p 28 where the scenario is "...keeping climate constant and assuming ... equitable economic growth .." – which is extremely unlikely. (Winfried Zacher, Germanwatch)	This point re the term "offsetting" is valid. We replaced it by "compared to".. The terms keeping climate (or economic growth) constant refer to modeling approaches and were not intende to imply that these are realistic developments (as with all counterfactuals, they are not factual).
666	48114	11	28	11	28	12	Caption of figure 11-9: According to the text, it seems that the caption should be clarified, using text such as "economic development MAY offset expansion (...) given strong and equitable economic growth" -- because these are the specific hypotheses from the publication, which does not provide general statements (as it may appear from the current caption). (Philippe Marbaix, Université catholique de Louvain)	a valid point, we have replaced the term "offset" by "compared to"

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
667	42354	11	28	15	28	16	This sentence deserves to be revisited in light of the Stern et al. (2011) paper. (Indur Goklany, Independent)	This is correct, Stern reports an initial surge in highland malaria till 2002 which has returned to lower level since. We added the sentence: Stern et al., 2011 reported that the number of malaria cases in the highlands of East Africa increased until 2002, but have returned since to a low level again.
668	50673	11	28	24	28	26	Is it possible to provide any specific insights from these 2 unique papers? (Katharine Mach, IPCC WGII TSU)	We will consider in rewrite of section
669	37855	11	28	35	28	37	This first sentence of the section does not discuss future impacts of climate change on human health. It should be moved to Section 11.2.4.1.2. The sentence is also a little vague regarding exactly what the time lags are between (one assumes particular climate variables and particular measures of Dengue). (Paul Beggs, Macquarie University)	I agree, this sentence should be moved from the chapter.
670	39751	11	28	35	28	51	Dengue is capitalised in this paragraph, but lower case elsewhere. Consistency! (Peter Burt, University of Greenwich)	Your suggestion has been incorporated.
671	39750	11	28	36	28	36	second 'n' of Nino/Nina should be an enye. Capital 'L' for La (Peter Burt, University of Greenwich)	Your suggestion has been incorporated.
672	40896	11	28	37	0	0	Additional Studies on the future risk of dengue under climate change: Colón-González FJ, Lake IR, and Bentham G; 2011. Climate Variability and Dengue Fever in Warm and Humid Mexico; Am J Trop Med Hyg; 84(5): 757-763; Colón-González FJ, Lake IR, Hunter PR, and Bentham G. Marked Heterogeneity in the Associations Between Dengue Fever and Climate Variability Across Mexico; PLoS Neg Trop Dis. [Submitted]; Colón-González FJ, Fezzi C, Lake IR, and Hunter PR. Disentangling Climatic and Socioeconomic Effects on Dengue Fever Incidence Across Mexico. [In preparation] (Lynn Wilson, SeaTrust Institute)	Thanks for the literature references which I looked up, but could not find any modeling work of future effects of Dengue on climate In Colón -Gonzalez et al 2011. I would very much appreciate, if the reviewer could share the submitted papers with the IPCC writing team, if they deal with future impacts. Of particular interest is, of course the topic "Disentangling Climatic and Socioeconomic Effects on Dengue Fever Incidence Across Mexico".
673	41335	11	28	38	28	38	A reference of Astrom et al. (2012) cannot be found in the references at the end of the chapter. (Masahiro Hashizume, Institute of Tropical Medicine, Nagasaki University)	just been published last month, the reference list was modified accordingly.
674	50674	11	28	45	28	45	The author team should consider using summary terms for evidence and agreement per the uncertainties guidance for authors, given the characterization of agreement here. (Katharine Mach, IPCC WGII TSU)	will be done consistently, thanks for pointing it out.
675	50675	11	28	54	28	54	It would be preferable to paraphrase and evaluate this prediction, instead of just quoting it direct. (Katharine Mach, IPCC WGII TSU)	done
676	37856	11	29	7	29	8	Move this first sentence to Section 11.2.4 because it is about the climate-sensitivity of the causes of this disease. (Paul Beggs, Macquarie University)	You are right, some story as for dengue. Sentence removed here. I proposed to move it upstream in the text as you suggest
677	42367	11	29	7	29	23	Pl. include results from Bosello et al. (2006). (Indur Goklany, Independent)	We will consider
678	42598	11	29	8	29	9	another Schistosomiasis and CC study WJM Martensa, TH Jettenc, J Rotmans, Niessena L. Climate change and vector-borne diseases: A global modelling perspective. Global Environmental Change 1995;5(3):195-209. (MARGARET LOUGHNAN, MONASH UNIVERSITY)	Do you refer the paper Climate change and vector-borne diseases: A global modelling perspective by WJM Martens, b, TH Jetten, J Rotmans, b, LW Niessen? This is an interesting paper indeed, but published well before our cutoff for inclusion of papers (2006) for the IPCC 5AR.
679	50676	11	29	9	29	12	As possible, the author team should indicate more specifically the climate/socio-economic scenarios that were used in the described analysis. (Katharine Mach, IPCC WGII TSU)	Unfortunately, Zhou et al. (2008) do not provide any information regarding the climate model they used, nor the SRES scenario chosen.
680	54882	11	29	11	29	12	The author team may wish to reconsider the use of 'suitable' in this sentence. (Monalisa Chatterjee, IPCC WGII TSU)	We edited the previous sentence accordingly (adding the suitability term)
681	45024	11	29	26	0	0	Section 11.5.5: I wonder if there are no studies about the impact on biogene air "pollutants" like dust or pollen on health ... (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	There is the seminal paper by van Vliet, Int. J Climatol 22:1757-1767, 2002. It relates pollen production amount and timing to climate change, but does not estimate health effects. In addition it was published before the cutoff for this 5AR (2006).The same holds for the paper by Teranhishi from Japan (2000). It stops at pollen production as outcome and does not get into health effects. Amato (2007) does not measure or model health effects. We could not locate a single study projecting effects of climate change on allergies using climate models. Good review articles from Beggs et al. (2004, 2008). We added a note for research needs.
682	44420	11	29	28	29	36	Biomass burnings and wildfires also play an important role in ozone pollution events (Jaffe (2011)), and its role could either be cited or mentioned here. (William Landuyt, ExxonMobil Research and Engineering)	The reviewer is right regarding the important role of biomass burning and wildfires in generating ozon pollution (and black carbon, for that matter). However, in this sections we review evidence on quantifiable future impacts, based on linking diseases models/variables to climate models. The paper by Jaffee (2012) does not attempt this. However I discuss within the chapter authro team to address this potential association elsewhere in the health chapter.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
683	44419	11	29	35	29	36	Similar to ozone, PM2.5 will see changes that vary by region. I recommend highlighting here that current research suggests that PM2.5 as a whole will actually decrease with climate change (Jacob and Winner (2009)), but these results also vary not only geographically but also by particulate type (e.g. Nitrate, Elemental Carbon, Organic Carbon, etc...) (Racherla and Adams (2006)). (William Landuyt, ExxonMobil Research and Engineering)	We need to rely on WGI for this
684	53386	11	29	36	29	36	There are a number of studies from the USEPA on PM concentrations that should be cited. (Kristie L. Ebi, IPCC WGII TSU)	We need to rely on WGI for this
685	39752	11	29	43	29	44	This contradicts what is said at the start of the following page (page 30, lines 1-4) (Peter Burt, University of Greenwich)	correct, thanks. I substituted "are lacking" with "are rare".
686	44417	11	29	49	29	54	I think an interesting point to differentiate between when talking about ozone-related mortality projections for the future are the differences between climate impacts and emissions impacts. The paper commonly cited in this subsection by Selin et al (2009) gives some perspective on the difference. They find that globally in 2050, climate change alone will cause a net decrease in ozone-related mortalities. On the contrary they find that changes in emissions in 2050 (and globally as well) will lead to a net increase in ozone-related mortalities. And while their results show that local variations can have a different sign to the global one, projections of ozone in the future show a significant amount of intermodel spread locally while being more consistent on a global average. Therefore I suggest highlighting the difference between climate and emissions impacts and which one is the primary driver highlighted in current research for ozone-related mortality. (William Landuyt, ExxonMobil Research and Engineering)	We will rely more heavily on WGI results for this
687	39753	11	30	1	30	4	this could be true for ozone, but what about PM-related mortality due to poor/non-applied vehicle emissions legislation in developing countries? (Peter Burt, University of Greenwich)	Certainly a valid point. But we need to focus here on (i) evidence and on (ii) future health risks. I think your comment is for our colleagues in WGIII Mitigation, to whom I referred your question.
688	37322	11	30	2	30	2	Should read "under a maximum feasible reduction scenario relative to A2". A2 is not a reduction scenario. (J. Jason West, University of North Carolina)	thanks, we changed the wording as suggested.
689	37857	11	30	2	30	2	"maximum feasible reduction" of what? (Paul Beggs, Macquarie University)	CO2 was added
690	50677	11	30	2	30	2	It would be helpful to clarify what is meant here by "maximum feasible reduction." (Katharine Mach, IPCC WGII TSU)	CO2 was added
691	50678	11	30	6	30	7	As possible, the author team should consider indicating the relevant climate/socio-economic scenario for the statement. (Katharine Mach, IPCC WGII TSU)	in the editing of the chapter we will wherever possible link statements about future outcomes to specific scenarios
692	37323	11	30	6	30	8	For the Tagaris reference, I assume that this is due to climate change (future climate minus present climate), but for what scenario? (J. Jason West, University of North Carolina)	The Tagaris paper uses the a downscaled Goddard Institute for Space Studies, Global Climate Model and the A1B SRES scenario.
693	44418	11	30	6	30	10	I agree that health impacts vary greatly from one location to another, within any country. But a point that I think could be added to this discussion is the range in model projections of ozone and PM concentrations in the future, owing to the science underlying the atmospheric chemistry not being fully understood. An appropriate citation would be the U.S. EPA, Assessment of the impacts of global change on regional U.S. air quality (2009). This study highlighted the challenges facing the scientific modeling community and gave a sense of the significant intermodel regional variations of ozone (and some PM) projections in the future. The geographic variations in ozone and PM are important contributors to their overall health impacts. (William Landuyt, ExxonMobil Research and Engineering)	We need to rely on WGI for this
694	37858	11	30	12	30	18	This paragraph is not about the future. Move it to Section 11.4.3. (Paul Beggs, Macquarie University)	you are right, we dropped the para here.
695	37859	11	30	19	30	19	The Aeroallergens section to be added here should include the study by Wolf et al. (2010). Wolf, J., O'Neill, N.R., Rogers, C.A., Muilenberg, M.L. and Ziska, L.H. (2010) Elevated atmospheric carbon dioxide concentrations amplify Alternaria alternata sporulation and total antigen production. Environmental Health Perspectives 118(9), 1223–1228. (Paul Beggs, Macquarie University)	This is an important paper, which would be better placed under section 11.2. as it does not provide an assessment or even a quantification of future health risks, which is the focus of section 11.5.
696	37903	11	30	19	30	19	The article by Beggs and Walczyk (2008) should be referred to in the new section on Aeroallergens in Section 11.5. Something like the following would be appropriate: Beggs and Walczyk (2008) have suggested, for the first time, the potential for climate change, and, in particular, increased atmospheric CO2 concentration and temperature, to have an impact on the allergenicity of plant food allergens such as peanut. Beggs, P.J. and Walczyk, N.E. (2008) Impacts of climate change on plant food allergens: a previously unrecognized threat to human health. Air Quality, Atmosphere and Health 1, 119-123. (Paul Beggs, Macquarie University)	This is an important paper which I recommended to take up in section 11.2.11 which is focussing on aeroallergens. To my knowledge there is no study projecting any aeroallergen health effects to the future by using climate models. But I am happy to be corrected.
697	40835	11	30	21	0	0	The Paragraph 11.5.6. on the future risks of "Diarrhoeal diseases" is too short to draw adequate attention to this topic. Even if not many new studies have been published on this issue since AR4 the climate change together with population increase in many developing countries will lead to a high burden of disease due to diarrhoea. (The study you quote in Table 11.3 obviously does not have figures for South Asia. As it is so important a region in regard to diarrhoeal disease it needs to be mentioned.) (Winfried Zacher, Germanwatch)	The length of a section or any parts in it are determined only by the amount and quality of the evidence available. As stated in the introduction of this section, there is quite a patchy literature on future risks. This comes to no surprise at this would imply to use climate models and coupling exposure and health data in a meaningful way to them, or to specific outputs for specific time and space horizons. I agree that South Asia is a key area particularly for diarrheal disease burden. It would be incorrect to imply from the length and depth of treatment of an issue any weighting on its importance. This said, as an author team we will spell out research gaps at the end of the chapter and we will include the issue the reviewer is referring to.

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698	42368	11	30	23	30	30	Pl. include results from Bosello et al. (2006). Kolstad and Johansson's paper is merely a sensitivity analysis with respect to GCM models. It totally ignores adaptation. Therefore, it does not shed much light on future estimates of the public health effects of diarrhea, which should be much more sensitive to economic and technological development, and public health measures. In fact, they report that vaccinations could decrease rotavirus mortality by 40%, which exceeds the 22-29% increases projected for 2070-99. Moreover, this seems to ignore secular technological change which could lead to more effective vaccines/public health measures (see Goklany 2007b, 2009d). (Indur Goklany, Independent)	I agree that it is highly desirable to include various adaptation scenarios in the modeling of a particular "residual" health impact. However, few papers in any particular health effect of climate change do this. We will mention this important point in a joint section on research gaps and research agenda to be tackled, which we will place at the end of the chapter. The Bosello 2006 paper does not tackle adaptation, as I read it, but rather estimates the economic costs of climate change impact on health, direct and indirect costs. It does project those to 2050. The paper deserves to be discussed in the 5AR at a chapter where the costs of mitigation and the costs of non-action are compared. I will make sure this is done.
699	37860	11	30	24	30	24	Should "2030" be "2039"? I think so. (Paul Beggs, Macquarie University)	Your suggestion has been incorporated. The modification has been done according to the information cited.
700	50679	11	30	24	30	26	It would be preferable to indicate the relevant climate/socio-economic scenario (A1B). (Katharine Mach, IPCC WGII TSU)	Correct, I added the specifics in the section text.
701	41948	11	30	27	0	0	Missing is this peer-reviewed study by Patz et al. 2008 (Patz, JA, Vavrus S, Uejio C, McClellan S. Climate Change and Waterborne Disease Risk in the Great Lakes Region of the US. Am J Preventive Medicine 2008;35(5):451–458.) Includes threshold values for rainfall and "combined sewage overflow events", as well as downscaled climate model projection of CSO risks in the future. ABSTRACT: " Extremes of the hydrologic cycle will accompany global warming, causing precipitation intensity to increase, particularly in middle and high latitudes. During the twentieth century, the frequency of major storms has already increased, and the total precipitation increase over this time period has primarily come from the greater number of heavy events. The Great Lakes region is projected to experience a rise these extreme precipitation events. For southern Wisconsin, we simulated the precipitation rate of the 10 wettest days using a suite of seven global climate models from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. For each ranking, the precipitation rate of these very heavy events increases in the future. Overall, the models project that extreme precipitation events will become 10% to 40% stronger in southern Wisconsin, resulting in greater potential for flooding, and for the waterborne diseases that often accompany high discharge into Lake Michigan. Using 6.4 cm (2.5 in) of daily precipitation as the threshold for initiating combined sewer overflow into Lake Michigan, the frequency of these events is expected to rise by 50% to 120% by the end of this century. The combination of future thermal and hydrologic changes may affect the usability of recreational beaches. Chicago beach closures are dependent on the magnitude of recent precipitation (within the past 24 hours), lake temperature, and lake stage. Projected increases in heavy rainfall, warmer lake waters, and lowered lake levels would all be expected to contribute to beach contamination in the future. The Great Lakes serve as a drinking water source for more than 40 million people. Ongoing studies and past events illustrate a strong connection between rain events and the amount of pollutants entering the Great Lakes. Extreme precipitation under global warming projections may overwhelm the combined sewer systems and lead to overflow events that can threaten both human health and recreation in the region. (Jonathan Patz, University of Wisconsin)	We are aware of this important study and I agree it should be quoted in the health chapter. But is "Future risks" really the right place. If I read the paper correctly it is not linking diarrheal diseases directly to projected climate change (downscaled from IPCC 2007), but makes a strong point of plausible effects based on historical data (e.g. the increase in the frequency of extreme rainfall events and the Milwaukee 1993 Cryptosporidium outbreak. I suggest to review this paper under 11.2.
702	35836	11	30	31	0	0	Section 11.5.7 contains a good summary of the current knowledge concerning the health effects of high temperatures. However, the important topic of birth outcomes is not mentioned. A recent review (Strand et al, 2011) identified 20 studies examining the association between season and birth outcomes, and 13 studies examining temperature and birth outcomes. There were associations between high temperatures and both birth weight and preterm birth. In addition, our recent research in Australia found an association between high temperatures and both stillbirth and shorter gestation time (Strand et al, 2012) . The association between high temperatures and negative birth outcomes needs more study before conclusive evidence of cause-and-effect can be affirmed. However, the results so far are concerning, particularly considering the large costs to individuals and society of negative birth outcomes. Children born prematurely can struggle in childhood and adulthood, and are greater users of health services than children who have a healthy start to life. A warmer world could mean more negative birth outcomes, with consequences for developed and developing world countries. References: Strand, Barnett and Tong. The influence of season and ambient temperature on birth outcomes: A review of the epidemiological literature, Environmental Research, Volume 111, Issue 3, April 2011, Pages 451-462. Strand, Barnett and Tong. Maternal Exposure to Ambient Temperature and the Risks of Preterm Birth and Stillbirth in Brisbane, Australia. American Journal of Epidemiology, Vol 175, 2012, Pages 99-107. (Adrian Barnett, Queensland University of Technology)	we took this under consideration in the rewriting of the section
703	37861	11	30	33	0	0	Section 11.5.7. This section has multiple uses of the terms "predicted", "predict", "predictions", "expected". In the context of future impacts of climate change on human health, this is poor writing. (Paul Beggs, Macquarie University)	fixed
704	53387	11	30	33	31	26	This section needs to differentiate between seasonal temperatures and cold spells / heatwaves. The section assumes that winter mortality is temperature related, although there is good evidence it is not. Also, see new paper from Joacim Rocklöv about how assumptions about the shape of the tails affect mortality projections. (Kristie L. Ebi, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
705	40878	11	30	35	31	8	critical discussion to long-term exposure to air conditioning/ thermal adaptability is needed here - see comment in line above ... (NOTE: see Ch11, Page 9, Line 42) (Birgit Kuna-Dibbert, German Aerospace Center, Project Management Agency)	we took this under consideration in the rewriting of the section
706	42369	11	30	35	31	26	Pl. include results from Bosello et al. (2006). (Indur Goklany, Independent)	we took this under consideration in the rewriting of the section

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707	50680	11	30	36	30	36	For this description of changes in heat waves, the author team should consider and cross-reference the findings of the working group 1 contribution (and potentially also SREX). If "likely" is being used per the uncertainties guidance, it should be italicized; otherwise, casual usage should be avoided. (Katharine Mach, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
708	42201	11	30	38	30	41	The term of "dangerously days" should also be defined. It may not define as "when core body temperatures may increase by >=2 C and outdoor activity is hazardous." (Jianguo Tan, Shanghai Meteorological Institute)	we took this under consideration in the rewriting of the section
709	50681	11	30	38	30	54	For these statements as appropriate, the author team should indicate the relevant climate/socio-economic scenarios. (Katharine Mach, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
710	52396	11	30	49	30	49	does this mean the increase above current levels is likely to reach 10%? Currently not clear. In any case it would be worthwhile here to indicate how these percentages translate into average lifespan; does an increase in mortality of 2% mean a decrease in lifespan of 2%, which would be >1 year? Or is this a percentage of *heat-related mortality* only, in which case the lifespan loss is far less. (Steven Sherwood, UNSW)	we took this under consideration in the rewriting of the section
711	39754	11	30	52	30	52	units of temperature? (Peter Burt, University of Greenwich)	You suggestion has been incorporated. According to Huang (2012), the temperature-related life losses will increase if the climate goes beyond 2 °C, without proper adaptation for mitigation.
712	39755	11	30	53	30	54	change 2050's to 2050s and 1990's to 1990s (Peter Burt, University of Greenwich)	Your suggestion has been incorporated.
713	37862	11	31	2	31	3	This is a poor sentence which should be clarified or deleted. The spatial unit should be consistent (it compares "urban areas" with "less-urbanized counties"). Should it compare "urban counties" with "less-urban counties"? Also, reference to "greater numbers of deaths due to population density" should be deleted because it goes without saying that generally speaking there will be more people dying in larger populations. (Paul Beggs, Macquarie University)	we took this under consideration in the rewriting of the section
714	41949	11	31	9	0	0	For heat-mortality, missing is peer-reviewed paper by Peng et al. 2011 (Peng, R.D., et al., Toward a Quantitative Estimate of Future Heat Wave Mortality under Global Climate Change. Environmental Health Perspectives, 2011. 119(5): p. 701-706. Study showed a projected increase between 166 and 2,217 excess deaths per year from heat wave-related mortality in Chicago by 2081–2100 (Jonathan Patz, University of Wisconsin)	we took this under consideration in the rewriting of the section
715	41950	11	31	10	0	0	For heat-MORBIDITY, missing is Li, Sain, Mearns et al, 2011 ((Li B, Sain S, Mearns LO, Anderson HA, Kovats RS, Ebi KL, Patz JA, The impact of heat waves on morbidity in Milwaukee, Wisconsin. Climatic Change, 2011; DOI 10.1007/s10584-011-0120-y). Please see abstract in my 2nd comment. This study might go in both places since documents both historical dose-response and threshold temperature over an extended historic record, plus 2nd component of health risks from downscaled future climate scenario. (Jonathan Patz, University of Wisconsin)	we took this under consideration in the rewriting of the section
716	50682	11	31	10	31	20	For these tables, it would be much preferable to also provide indication of the study results in tabular form. (Katharine Mach, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
717	37863	11	31	15	31	17	Move this small paragraph, which is currently wedged between Table 11-4 and Table 11-5, to join the paragraph after Table 11-5. (Paul Beggs, Macquarie University)	we took this under consideration in the rewriting of the section
718	37864	11	31	22	31	22	Correct the spelling of "Sidney" to "Sydney"! (Paul Beggs, Macquarie University)	Your suggestion has been incorporated.
719	50683	11	31	22	31	26	It would be helpful to clarify unambiguously the citation relevant to these statements. (Katharine Mach, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
720	52397	11	31	29	31	54	This section, or perhaps 11.4.1 could cite Willett and Sherwood (2011) which gives trends of heat-stress threshold exceedence frequencies in a number of regions. (Steven Sherwood, UNSW)	we took this under consideration in the rewriting of the section
721	38987	11	31	31	31	31	"disease burden," not "health burden" (Ole Faergeman, Aarhus University Hospital)	write "ill health burden" instead of "health burden". Disease burden takes the focus on to "diseases" and many health concerns with climate change are not "diseases", but "injuries" or "human performance losses".
722	38988	11	31	34	31	34	explain WBGT (Ole Faergeman, Aarhus University Hospital)	after WBGT include: "(Wet Bulb Globe Temperature; Parsons, 2003)"
723	50684	11	31	39	31	50	For the projections characterized on these lines, it would be preferable to specify the relevant climate/socio-economic scenarios used in the analyses. (Katharine Mach, IPCC WGII TSU)	The Kjellstrom et al, 2009, paper used scenario A2. The new calculations (Kjellstrom et al, 2913, to be published) uses A1B
724	50685	11	31	46	31	46	"likely" – If this term is being used per the uncertainties guidance for authors, it should be italicized. The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	as above, check on proper and consistent use of IPCC uncertainty terminology
725	50686	11	31	52	31	54	For the summary statements, the author team should consider using calibrated uncertainty language to characterize its degree of certainty in the assessment findings. (Katharine Mach, IPCC WGII TSU)	we took this under consideration in the rewriting of the section
726	45025	11	32	3	0	0	Section 11.5.9: Please include results of the following study: UV Dosage Levels in Summer: Increased Risk of Ozone Loss from Convectively Injected Water Vapor; Anderson, et al.; Science 1222978; DOI:10.1126/science.1222978 (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	I read the paper, it describes important pathways of atmospheric chemistry related to ozone loss in the stratosphere. The related health effect would obviously be skin malignancies. Strictly, we only include studies that model simultaneously a health risk and a climate projection. I will take up the discussion with my colleagues where best to place the treatment of this paper.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
727	44984	11	32	3	0	9	More case studies to be included pertaining to human skin cancer from Scandanavian countries, Western Australia, and California in order to enrich this section. (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	I am not aware of a study projecting climate change and linking relevant variables to UV-induced skin cancers from the countries you mention. Would be grateful for literature suggestions. Remember, this section is about quantified future health risks which can be attributed to future climates.
728	37865	11	32	5	32	5	Delete this first sentence. It is too general a sentence to put here in the UV-Induced Skin Cancers section. Asthma, for example, is a chronic disease that is impacted by climate change. (Paul Beggs, Macquarie University)	Agree. I eliminated the sentence.
729	46454	11	32	6	32	7	About the sentence: " Sun-induced skin cancers have been predicted to rise from mice experiments when the combined effects of ozone depletion, climate change and a rise in ambient temperature are taken into account (van der Leun et al., 2008)", in the Abstract of the work of van der Leun et al (see reference above), we described the mice experiment as a previous one to our study, based on human skin cancer (as it is informed in the title of the article: Climate change and human skin cancer). So I propose to modify the sentence in the following way (also incorporating the relation between ozone depletion and solar UV radiation increase): "Sun-induced skin cancers have been predicted to rise from human epidemiological studies when the combined effects of ozone depletion (related to solar UV radiation increase), climate change and a rise in ambient temperature are taken into account (van der Leun et al., 2008)". (Rubén Piacentini, Institute of Physics Rosario (CONICET - National University of Rosario))	We replaced our sentence with your suggested one, thanks for the clarification.
730	37866	11	32	6	32	9	Would the authors of the chapter please check the statements in these sentences carefully. The causal pathways between "climate change and a rise in ambient temperature" and skin cancer should be made clear so that the reader does not assume an incorrect causal pathway. (Paul Beggs, Macquarie University)	We changed the section and hope it addresses your concern now.
731	38233	11	32	8	0	0	insert 'solar' before UV-B radiation. (Caradee Wright, Council for Scientific and Industrial Research)	Your suggestion has been incorporated.
732	41951	11	32	10	0	0	Add new study by Anderson et al. published in the journal Science, July 26, 2012 issue. Documents effects of intensified storms pushing water vapor into the stratosphere, with expected increase of destruction of the stratospheric ozone layer. This is a new and potentially important discovery pertinent to future health risks of UV exposures. (Jonathan Patz, University of Wisconsin)	Done, thanks for the suggestion.
733	37867	11	32	12	0	0	Section 11.5.10. Either delete this last section or replace it with what we DO know about. The current content of this section should be moved to Section 11.9 Key Uncertainties and Research Recommendations. (Paul Beggs, Macquarie University)	I agree.
734	50687	11	32	12	0	0	For the summary statements presented in this section, the author team should consider using calibrated uncertainty language to characterize its degree of certainty in the assessment findings. If "likely" is being used on line 17 per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized; the author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	Thanks for the comment, we will move the conclusions to section 11.9. Key uncertainties and research recommendations.
735	52330	11	32	16	0	0	consider to refer to other sources when suggesting future work foci for example http://whqlibdoc.who.int/publications/2009/9789241598187_eng.pdf , there are many more (Tanja Wolf, WHO Regional Office for Europe)	Thanks for the comment, we will move the conclusions to section 11.9. Key uncertainties and research recommendations.
736	38989	11	32	22	0	0	The authors of Section 11.6 on adaptation to protect health should consider emphasizing that the potential for adaptation of health care systems to new patterns of disease will depend on how warm the world will get. For example, what is the potential for adaptation in a B1 or an A1F1 scenario, and which scenario will the AR5 say now seems to be the most likely? (Ole Faergeman, Aarhus University Hospital)	Thank you for this helpful point. However, it is more appropriate to include in section 11.5.
737	53388	11	32	22	32	45	It would be useful to differentiate between incremental, transitional, and transformational adaptation. (Kristie L. Ebi, IPCC WGII TSU)	Added
738	38216	11	32	24	32	26	Adaptation mentioned here does not cover psychological adaptation see Reser & Swim, 2011, American Psychologists. (Janet Swim, The Pennsylvania State Universi)	We took this under consideration in the rewriting of the section
739	50688	11	32	24	32	26	The author team should consider and cross-reference the glossary entry for "adaptation." Please note that the glossary entries for "adaptation" have been slightly revised in the SREX and draft AR5 glossaries as compared to the WG2 glossary for the 4th assessment report. (Katharine Mach, IPCC WGII TSU)	Definitions of adaptation were deleted.
740	42370	11	32	26	0	0	Add a sentence that reads as follows: "autonomous adaptations should be included in the analysis of the impacts of unmitigated climate change, and they should fully consider changes in adaptive capacity, including chnges resulting from economic development, secular technological change and human capital." (Indur Goklany, Independent)	Thank you for this helpful point. However, it is more appropriate to include in section 11.5.
741	42371	11	32	39	0	0	Add the following passage: "The importance of adaptation is most evident in the long term declines in death rates for various climate-sensitive health outcomes despite any warming. Global death rates have declined 98% since the 1920s for all extreme weather events (Goklany 2009c); over 90% for malaria since 1900 (WHO 1999, page 50; World Malaria Program 2011); and at least 50% for diarrheal diseases since 1980 (Keusch et al. 2006, figure 19.2). In addition, hunger and malnutrition rates have declined (Goklany 2007b; World Bank 2011; FAO 2010, figure 2, page 9)." (Indur Goklany, Independent)	The section was modified to start with a sentence pointing out recent increases in life expectancy, referencing the just published Global Burden of Disease Study 2010.
742	38990	11	32	44	32	44	The authors use the term, "generic" (in quotation marks) here and later, but they do not define it or indicate how it differs from "general." I suspect there is no difference, and I suggest that they use "general" throughout. (Ole Faergeman, Aarhus University Hospital)	Generic has been deleted from the section.
743	40898	11	32	48	0	0	Section 11.6.1 Add creating and implementing health plans as part of climate adaptation plans as a governance strategy at local to national levels. (Lynn Wilson, SeaTrust Institute)	This helpful suggestion is included in new table 11.6.
744	52331	11	32	48	0	0	not well structured section (Tanja Wolf, WHO Regional Office for Europe)	The section was restructured.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
745	42372	11	32	50	32	51	Replace the first sentence with the following: "Climate change can fractionally increase many existing weather- and climate-sensitive health risks." For rationale see comment on page 3, line 33. I would do a global search for "multipl*" within the document and replace all instances where "multiple" or "multiplies" is used in this context. (Indur Goklany, Independent)	Reference to the increased risks of climate change was added to the new first paragraph.
746	50689	11	32	50	32	51	On line 50, it would be preferable to indicate more specifically what is meant here by "risk"--risk in what context, due to what factors, etc. Also, it would be beneficial to clarify the intended time for the statement--is it forward-looking, or does it also reflect observed trends to date? (Katharine Mach, IPCC WGII TSU)	This paragraph was rewritten.
747	42373	11	32	50	33	52	Add "economic development" and "technological change" to the list of general adaptations. See, e.g., Goklany (2007b, 2009a, 2012a); IPCC AR5 (Section 11.5, page 27, lines 13-15 and page 28, lines 1-7); van Vuuren et al. (2011); Beguin et al. (2011); Bosello et al. (2006); Tol and Dowlatabadi (2001); Tol and Yohe (2006). The text should also note that policies or intuitions that would advertently or inadvertently restrain either economic development or technological change could reduce or slow the increase in adaptive capacity and, thereby, increase the net negative impacts of climate change. (Indur Goklany, Independent)	The list of general adaptations was deleted.
748	40897	11	32	51	0	0	[Add after "...already present"] "or trigger health problems in vulnerable groups not demonstrating active health issues." (Lynn Wilson, SeaTrust Institute)	This sentence was deleted.
749	43782	11	33	4	33	5	"Improvements in basic public health functions such as disease surveillance, monitoring of risky exposures, and coordination between health and other sectors also constitute adaptation" With this definition of adaptation, does the WHO finding of very little public health adaptation taking place still hold? I expect that a more generous definition of climate and climate change health adaptation would mean that we would find rather larger efforts being undertaken to "adapt" to climate change impacts. (Peter Berry, Health Canada)	The adaptaiton section was restructured to clarify this issue.
750	41924	11	33	19	33	32	Regarding other sectors, a mention of urban planning is needed here. Particularly again for the growing number of secondary cities (possible same reference as above: Cissé et al. 2010) (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	Urban planning was added as an example.
751	43783	11	33	26	0	0	The reader may not know what "built forma" is. (Peter Berry, Health Canada)	Deleted
752	38991	11	33	26	33	26	what does "built forma" mean? (Ole Faergeman, Aarhus University Hospital)	Deleted
753	39756	11	33	26	33	26	the term 'built forma' is odd. Do you eman 'form'? Perhaps clarify or use another description. (Peter Burt, University of Greenwich)	Deleted
754	48242	11	33	35	33	44	This is a misleading example. Any example of the Small Island States – SIS should be referred as SIS only, since they have very specific conditions. Tuvalu and Kiribati for instance, show insignificant migration processes due to several barriers. In other cases, people have specific reasons, such as labour or economic reasons that pull them to migrate. When specific processes such as that just an American Company is generating government jobs and 1/3 of the GDP of a tiny country, people move for this. (Jason Garcia-Portilla, University of Sussex)	This example was deleted.
755	44281	11	34	0	0	0	Section 11.6.2.2: Further spatially explicit vulnerability assessments analyzing the effects of extreme heat on human health have been conducted for southern Quebec (Canada) (Vescovi et al. 2005) and for western Germany (Lissner et al. 2012). VescoviL,Rebetez M, Rong F (2005) Assessing public health risk due to extremely high temperature events: climate and social parameters. Clim Res 30(1):71–78; **Lissner T, Holsten A, Walther C, Kropp JP** (2012): Towards sectoral and standardised vulnerability assessments: the example of heatwave impacts on human health. /Climatic Change/ 112: 687-708 (Dominik Reusser, Potsdam Institute for Climate Impact Research)	Thank you, the references were added.
756	43784	11	34	3	0	0	11.6.2.1. Early Warning Systems - this section does not capture the breadth of warning systems or other types of advisories that exist in some countries such as Canada to help protect people from a range of climate-related natural hazards. These include systems for air pollution (Air Quality Health Index), pollen forecast, UV forecast, early warning systems for extreme weather other than heat (severe thunderstorm), special weather bulletins etc. By leaving such examples out, the text leaves the impression that warning systems to reduce health impacts from climate variability and change are relatively new, which is not the case. (Peter Berry, Health Canada)	Thank you. Text was added on the wide range of possible early warning systems.
757	42202	11	34	5	34	5	the expression of "altering public health authorities" could be changed to "altering health authorities and the general publics". (Jianguo Tan, Shanghai Meteorological Institute)	The change was made.
758	49089	11	34	11	34	12	The reference to Ebi et al. Looks awkward, replace "(Ebi et al., 2004)" with "(2004)" (Oyvind Christophersen, Climate and Pollution Agency)	Deleted
759	53389	11	34	14	34	14	What were the criteria for deciding which are most informative? (Kristie L. Ebi, IPCC WGII TSU)	This sentence was deleted.
760	37868	11	34	23	34	23	The article by Beggs (2010) should be added to Section 11.6 generally and 11.6.2.1 specifically. As one of nine adaptations to impacts of climate change on aeroallergens and allergic respiratory diseases he states that "aeroallergen forecasting currently occurs in some locations, but is limited or absent in many other locations around the world. Enhancement of such forecasting will enable both individuals with allergic respiratory diseases and their carers (parents, teachers, and health professionals) in more locations to better manage within-season variability of aeroallergen levels." Beggs PJ. Adaptation to impacts of climate change on aeroallergens and allergic respiratory diseases. Int. J. Environ. Res. Public Health 2010, 7, 3006-3021; doi:10.3390/ijerph7083006 (Paul Beggs, Macquarie University)	Thank you. This point was added.
761	53390	11	34	23	34	31	It was not possible to develop a malaria early warning system for Eritrea. Another example is meningitis. (Kristie L. Ebi, IPCC WGII TSU)	These points were added.
762	37869	11	34	29	34	31	This final sentence of the paragraph is not a warning system. It should be moved to Section 11.2.5. (Paul Beggs, Macquarie University)	The sentence was moved.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
763	37871	11	34	34	0	0	Section 11.6.2.2. This section should refer to Beggs (2010), which states that with respect to aeroallergen observation, remote sensing such as the use of satellite imagery is very much an emerging technology. Integration and coordination of ground and space based (and possibly other) observation instruments, systems and networks will become increasingly important, with assessments such as the recent Group on Earth Observations (GEO) Task US-09-01a to identify critical earth observation priorities for Societal Benefit Areas (one of which is Human Health through Aeroallergens) a vital step towards this. Full reference for Beggs (2010) is in a comment for previous section. The GEO report should also be cited: National Aeronautics and Space Administration (NASA), Group on Earth Observations (GEO). GEO Task US-09-01a: Health Societal Benefit Area: Aeroallergens; 2010. Available online: http://sbageotask.larc.nasa.gov/Aeroallergens_US0901a-FINAL.pdf (Paul Beggs, Macquarie University)	Thank you. This point was added.
764	43785	11	34	34	0	0	11.6.2.2. Vulnerability Mapping - vulnerability mapping can be a useful tool for targeting health adaptations. However, the complexity of climate change and health pathways and inherent limitations of mapping as a tool for conveying complex information means that there is always the danger that such maps may misrepresent actual levels of vulnerability and lead to mal-adaptation. This is particularly the case if there is not yet general agreement on indicators of vulnerability for a health issues or they vary significantly from community to community (e.g., heat). You may wish to suggest that the results from vulnerability maps should be tested against actual morbidity and mortality data to validate them. (Peter Berry, Health Canada)	Thank you for these helpful points; they were added.
765	41925	11	34	36	34	47	Here a mention of urban areas and their heterogeneity may be again of relevance for vulnerability mapping (Guéladio Cissé, Swiss Tropical and Public Health Institute (Swiss TPH))	The issue of spatial variability was added to the section.
766	37870	11	34	41	34	44	The sentence in these lines is not adaptation as such and should therefore be moved to Section 11.5. (Paul Beggs, Macquarie University)	The sentence was moved.
767	53391	11	34	46	34	47	This was discussed earlier. (Kristie L. Ebi, IPCC WGII TSU)	Redundancies were removed.
768	43786	11	34	50	0	0	11.6.2.3. Public Education - it is appropriate, as the text in this section does to point out that public education is needed for adaptation and that there are examples of success in this regard. However, it should also be pointed out that there is evidence that some public education campaigns on issues related to climate change health concerns are not fully effective. This is a significant challenge to health adaptation and is a starting point for improving adaptation efforts in countries. See Peter Berry, Kaila-Lea Clarke, Mark Pajot, and David Hutton (2011). Chapter 14 Risk Perception, Health Communication, and Adaptation to the Health Impacts of Climate Change in Canada. In J.D. Ford and L. Berrang-Ford (eds.), Climate Change Adaptation in Developed Nations: From Theory to Practice, Advances in Global Change Research 42, DOI 10.1007/978-94-007-0567-8 14. (Peter Berry, Health Canada)	The section on public education was removed.
769	37872	11	35	1	35	4	Should the following text be added to the end of the sentence ending in line 4 "in Pohnpei but not the affected islands"? (Paul Beggs, Macquarie University)	The example was deleted.
770	43787	11	35	12	0	0	11.6.2.4. Health Care - Health care is an important adaptation to climate change impacts. However, there is some confusion created by the fact that it is included in both the generic adaptation section and specific adaption section. You may wish to discuss why this is the case - it is not clear from the existing text. Also in the text in this section some specific, largely natural disaster related examples are used to discuss health care as an adaptation. This leaves the impression that it is for only these types of issues that decision makers need to utilize health care as an adaptation. What about the range of other issues - air pollution, UV, food contamination etc? (Peter Berry, Health Canada)	The adaptation section was restructured to clarify these issues.
771	47989	11	35	12	35	30	These are good examples of the importance of looking at health care and health care interventions from the point of climate change, and of doing strategic planning and scenario analysis around these issues. However, this is very clinical in its examples, and is neglecting the diversity of health practitioners and programmers and policy makers that will be involved in dealing with the health effects of climate change, and will be looking for suggestions for health systems and health programming adaptation. I would suggest expanding this section to be more inclusive to those who are not solely clinicians, nurses, doctors, or epidemiologists. (Ashlee Cunsolo Willox, McGill University)	Additional examples were added.
772	53392	11	35	19	35	22	You also could look at the UK program. (Kristie L. Ebi, IPCC WGII TSU)	Different examples were added.
773	40823	11	35	33	0	0	The logic in this paragraph is confused: the health co-benefits of mitigation is one thing. It refers to the reduction of all "future risks" as elaborated in paragraph 11.5. In addition it means health effects of specific mitigation measures as e.g. the reduction of meat production - which will result in less meat consumption. What is missing in this paragraph - and merits elaboration - are the mitigation effects of some health measures. E.g. the increase in "active transport" for health reasons will reduce emissions as will the reduction of the consumption of meat - which in turn will negatively influence meat production and associated emissions. Co-benefits of mitigation for health and co-benefits of health interventions for the climate (via mitigation effects) should be clearly differentiated. (Winfried Zacher, Germanwatch)	this is what is intended -- will revise to make more clear, but most of the explanation requested is found in the text below
774	48117	11	35	33	0	0	Section 11-7 : This section is mostly about mitigation; it contains some useful content that should remain somewhere, but I would suggest to discuss with WGIII whether it would be appropriate to move part of this section to the WGIII volume (e.g. in an expanded section 5.10.1 ?). In addition, could you check that potential co-benefits of adaptation are sufficiently discussed ? (e.g. plans to reduce the risks from heat waves may have health benefits even in the absence of climate change, and improved health systems may help reducing risks - possibly linking with chapter 20) (Philippe Marbaix, Université catholique de Louvain)	benefits of adaption are elsewhere

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
775	42374	11	35	33	40	10	The section on "Health Co-Benefits" (Section 11.7) has a major omission. This section should note that because climate change is expected to exacerbate existing health risks (rather than create new risks), reducing existing climate-sensitive risks will provide major health co-benefits (in theory far in excess of what mitigation would provide and at much lower cost). This approach, known as "focused adaptation," has been outlined in some detail in Goklany (2005, Section 4, Table 4; 2009b, Section 4.1; 2009a, page 73). (Indur Goklany, Independent)	benefits of adaptation are elsewhere
776	47990	11	35	33	40	10	Very nice to have this section on health co-benefits, and to provide concrete examples and ideas of possible mitigation strategies that individuals, communities, and countries can take that will increase health or support the determinants of health. (Ashlee Cunsolo Willox, McGill University)	noted
777	40797	11	35	35	35	35	It is not true obviously that "Essentially every human activity affects (and is affected by) climate". This sentence should be rephrased. (Michel Petit, CGIET rue de Bercy)	think it is true -- but to very different degrees -- have revised
778	53393	11	35	36	35	36	Please define and list climate active pollutants. (Kristie L. Ebi, IPCC WGII TSU)	will be in glossary
779	41952	11	35	40	0	42	Five categories are listed, yet in text that follows, sub-sections for categories 2 and 3 are missing (Jonathan Patz, University of Wisconsin)	yes, sorry, to save space two were limited to the table -- is rewritten to be more clear
780	53394	11	35	40	35	40	Please define and list co-pollutants. (Kristie L. Ebi, IPCC WGII TSU)	will do
781	44785	11	35	42	0	0	Add "health" to (5) Increased access to reproductive health services. (Karen Hardee, Futures Group)	yes
782	40335	11	36	0	36	0	Consider moving this section up to precede 11.7.1.1 Outdoor? (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	do not understand as it precedes it now
783	48465	11	36	1	36	16	It might be good to note that not all climate measures will necessarily reduce co-pollutants, and not all measures to reduce pollution will reduce climate change. Eg, switching from a renewable but dirty harvested-biomass stove to a clean but fossil based gas stove increases GHG emissions (depending on assumptions about just how carbon-neutral the biomass really is), similarly end-of-pipe control measures often reduce efficiency, leading to more fuel combustion. Switching from gas to diesel can reduce CO2 emissions but increase particulates (though there are additional climate effects of BC). etc. Some citations: West et al. 2004 (Co-control of urban air pollutants and greenhouse gases in Mexico City) showed that in this case study, co-benefit potential was small. See also Wang and Smith, 1999, Secondary Benefits of Greenhouse Gas Control which looked at different options for replacing coal stoves, and also the issue that PM10 emissions tend to be highest from small sources, because the big power plants are usually cleaner than home stoves. Finally, Hourcade et al. (Third Assessment Report, WGIII, 2001) note that some CO2 measures will have little air pollution effect until after a threshold is passed, in cases where they are implemented in countries with, for example, an SO2 cap-and-trade market. (apologies for the age of the references. I haven't kept up with this literature in this area since finishing my thesis 5 years ago, but the main issues should still be relevant) (Marcus Sarofim, US EPA)	noted
784	42203	11	36	12	36	16	The viewpoint of "household fuel is responsible for a substantial percent of primary outdoor fine particle pollution" can still not be accepted. Please give the citation and quotation of estimation of indoor air pollution's contribution to the outdoor air pollution. (Jianguo Tan, Shanghai Meteorological Institute)	have revised provided citation
785	42204	11	36	15	36	11	a third to a half of what in China and India? Areas Or puputation? (Jianguo Tan, Shanghai Meteorological Institute)	see above
786	53395	11	36	25	36	25	Ozone production is exacerbated by temperature? (Kristie L. Ebi, IPCC WGII TSU)	yes, but not directly relevant here
787	37873	11	36	38	36	38	The end of the sentence ending in this line could be rewritten. One option is "...for cooking, and very few families who can afford it go without.". (Paul Beggs, Macquarie University)	noted
788	44421	11	36	45	36	49	I suggest discussing the need to expand health exposure functions to take into account the likelihood that health impacts to PM depends on the particulate type, and how this will affect PM exposures worldwide given that the make up of PM varies substantially across the globe. (William Landuyt, ExxonMobil Research and Engineering)	noted, but word limits prevent us from elaborating on every aspect
789	53396	11	36	45	36	49	This could be moved to the background on PM. (Kristie L. Ebi, IPCC WGII TSU)	as PM looks to be attributable to CC itself, it seems best to leave here in the co-benefits section
790	42205	11	37	8	37	8	"CAP and health-damaging" should be "CAP and health-damaging co-pollutants" (Jianguo Tan, Shanghai Meteorological Institute)	edited
791	43809	11	37	8	37	13	The following comment could be inserted here: Health effects of black carbon were investigated in a recent report by Regional Office for Europe of the World Health Organization (Jansen et al., 2012; http://www.unece.org/env/irtap/welcome.html and http://www.euro.who.int/en/what-we-publish/abstracts/health-effects-of-black-carbon). The report was prepared by the Joint WHO/UN Economic Commission for Europe's Convention on Long-range Transboundary Air Pollution Task Force on Health Aspects of Air Pollution. The Task Force recommends that PM2.5 should continue to be used as the primary metric in quantifying human exposure to PM and the health effects of such exposure and for predicting the benefits of exposure reduction measures. The use of black carbon as an additional indicator may be useful in evaluating local action aimed at reducing the population's exposure to combustion PM e.g. from motorized traffic. (Krzysztof Olendrzynski, United Nations Economic Commission for Europe)	good quote and will consider, but word limits are forcing us to reduce not expand
792	50690	11	37	10	37	10	It would be helpful to specify what the acronym EC stands for. (Katharine Mach, IPCC WGII TSU)	glossary
793	53397	11	37	10	37	10	Please define EC. (Kristie L. Ebi, IPCC WGII TSU)	glossary
794	52332	11	37	13	0	0	consider to cite also http://www.euro.who.int/en/what-we-publish/abstracts/health-effects-of-black-carbon (Tanja Wolf, WHO Regional Office for Europe)	yes, thanks
795	39757	11	37	18	37	18	non-seq between first and second sentences (Peter Burt, University of Greenwich)	removed first sentence
796	54883	11	37	24	0	0	Figure 11.11 It will be preferable if the figure is further explained. (Monalisa Chatterjee, IPCC WGII TSU)	noted

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
797	37325	11	37	24	37	34	We have a new paper that addresses the health benefits of reducing methane: http://www.springerlink.com/content/3102n71v233p74w6/ West, J. J., A. M. Fiore, and L. W. Horowitz (in press) Managing ozone air quality by reducing methane emissions: abatement costs and mortality benefits in scenarios to 2030, Climatic Change. This paper analyzes realistic scenarios through time and does a more complete economic analysis than the West et al. (2006) paper – the new results support the 2006 results. (J. Jason West, University of North Carolina)	noted
798	37324	11	37	32	37	34	Anthropogenic methane is about as important for ozone air quality on a global scale as anthropogenic NOx. But total methane emissions are less important than total VOCs (as most VOCs are biogenic). In addition to this point, or instead of, one could say that anthropogenic methane has a large influence on the global background of ozone, and reducing CH4 would improve ozone air quality everywhere. (J. Jason West, University of North Carolina)	fixed
799	53398	11	37	36	37	42	This could be moved to the background on PM. (Kristie L. Ebi, IPCC WGII TSU)	noted
800	37874	11	37	37	37	37	Change "failed to increase" to "remained constant". (Paul Beggs, Macquarie University)	ok
801	39758	11	37	42	37	42	replace 'like' with 'such as' (Peter Burt, University of Greenwich)	editing
802	41953	11	37	46	38	20	A directly relevant new N. American case study should be added (and is currently not cited in this FOD). The peer-reviewed quantitative study is by Grabow et al. 2012 (Grabow ML, Spak SN, Holloway TA, Stone B, Mednick AC, Patz JA. Air quality and exercise-related health benefits from reduced car travel in the Midwestern United States. Environmental Health Perspectives 2012; 120:68-76. Suggested text is as follows: The transportation sector produces one-third of U.S. greenhouse gas emissions. Automobile exhaust contributes not only to GHGs but also contains precursors to fine particulate matter (PM2.5) and ozone (O3), posing public health risks. Adopting a low carbon transportation system with fewer automobiles, therefore, could have immediate health "co-benefits" via improved air quality. Grabow et al. (2012) modeled census tract-level mobile emissions for two comparative scenarios: current baseline versus a low carbon scenario where automobile trips shorter than five miles round-trip would be removed for the 11 largest metropolitan areas in the Midwestern U.S. These relatively short car trips comprised approximately 20% of vehicle miles traveled for the region Across the upper Midwest study region of approximately 31.3 million people and 37,000 total square miles, mortality would decline by nearly 575 deaths per year from the benefit of improved air quality. Health benefits would also accrue in rural settings as well, with 25% air quality-related health benefits to populations outside metropolitan areas. An active transport scenario was then added, with the assumption that 50% of the short trips (<5 miles) could be achieved by bicycle during the four months of most favorable weather conditions in the region. This theoretical maximum level of biking was selected because some locations in Europe have achieved this amount of bicycle commuting, and there already exists an observed trend of increasing bicycle share across all of the 11 midwestern metropolitan areas (US Census 2008). This active transport scenario alone yielded savings of another 700 lives/year. In summary, the estimated benefits of improved air quality and physical fitness from a green transportation scenario would be 1,295 (95% CI: 912, 1,636) lives saved per year for the upper Midwest region alone. Nationally, there is already evidence that U.S. cities with enhanced levels of active transport experience large health benefits; one study found that cities with the highest rates of commuting by bike or on foot have obesity and diabetes rates 20 and 23% lower, respectively, than cities with the lowest rates of active commuting (Pucher et al 2010). Pucher J, Buehler R, Bassett DR, Dannenberg AL. 2010. Walking and cycling to health: A comparative analysis of city, state, and international data. Am J Public Health 100(10):1986-1992, doi:10.2105/AJPH.2009.189324. (Jonathan Patz, University of Wisconsin)	Adopting a low carbon transportation system with fewer automobiles, therefore, could have immediate health "co-benefits" via improved air quality. Replace with 'via multiple pathways, many of which have a series of linked benefits' (ref: Capon AG, Rissel CE: Chronic disease and climate change: understanding co-benefits and their policy implications. New South Wales Public Health Bulletin. 2010, 21:109-113), including for mental health (Berry HL: Pearl in the oyster: Climate change as a mental health opportunity. Australasian Psychiatry. 2009, 17:453 - 456)
803	53399	11	37	47	37	47	Who proposed the measures? What are some categories of examples? (Kristie L. Ebi, IPCC WGII TSU)	will consider details, but need to shorten not lengthen
804	53400	11	38	5	38	19	Why are these studies described and not others? (Kristie L. Ebi, IPCC WGII TSU)	others?
805	38992	11	38	24	38	24	write "greenhouse gases" instead of "CAP" (climate active pollutants) (Ole Faergeman, Aarhus University Hospital)	CAPs is the preferred term for gases plus aerosols
806	48466	11	38	26	38	26	Please define "agriculture sector" as separate from "livestock production systems". (Marcus Sarofim, US EPA)	seems fairly intuitive and is not critical
807	38993	11	38	27	38	28	I believe the authors use the term, "red meat," incorrectly. In the epidemiological literature, such as Sinha et al. 2009, the term comprises meat from cows, pigs, sheep and goats, i.e. also meat from pigs. Conversely "white meat" denotes meat from poultry and fish. So meat from pigs is "red," and meat from salmon is "white" by these conventions, which are important, given the size of the global production of pigs. Monogastric animals like pigs do not produce methane, but they account for greenhouse gas emissions from manure and from the production of feed. Industrial production of pigs requires substantial production of feed that results in substantial emissions of CO2 (e.g. South American soy for European production of pigs) . (Ole Faergeman, Aarhus University Hospital)	yes, rewoded to be more specific to ruminants. Would note, however, that is used in the health risk literature
808	53401	11	38	29	38	30	Obesity is not a cancer. (Kristie L. Ebi, IPCC WGII TSU)	fixed
809	48116	11	38	33	38	42	The consistency of the details in this paragraph with the reference paper needs to be checked (also with other data): - it does not seem that the hypothesis from that paper would result in halving the global red meat consumption (the proposed target is 50g/day.person world average; from FAO data about production, it seems that the 2007 value for red meat including pork is about 72g, and much less if only ruminants are included - as in the paper) - the inclusion of "stroke" in the sentence about reduction of risk in developing countries is most likely wrong - the paper suggest that it is an exception (reduction in high income countries would not have substantial effects (table 3), it is increase in low income countries that could possibly have benefits). (Philippe Marbaix, Université catholique de Louvain)	checked

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
810	53402	11	38	33	38	42	The paragraph talks about reductions to 50 g/day and to 90 g/day. Please clarify. Note that increasing the amount of animal protein in g/day in developing countries would mean a significant increase in consumption. (Kristie L. Ebi, IPCC WGII TSU)	yes, noted
811	37875	11	38	36	38	36	Should the word "red" be inserted before "meat"? (Paul Beggs, Macquarie University)	yes
812	40836	11	39	1	0	0	The whole chapter 11.7.3 does not differentiate between industrialized countries and developing countries. However of the 280 Mio. women worldwide with unmet need for family planning, some 65 Mio. are living in the US. Their lack of access is the one which has probably a bigger (negative) effect on CC than all the other 215 mio. from developing countries! (http://www.un.org/esa/population/publications/wcu2010/WCP_2010/Data.html) (Winfried Zacher, Germanwatch)	good point - added
813	44786	11	39	1	40	10	The title of this section should read "Access to Reproductive Health Services." It is not clear why the only evidence presented in this section is so narrowly about birth intervals and maternal age. Suggest broadening this section to include more about what addressing reproductive health can contribute to climate change adaptation in addition to mitigation. Here is some possible language and citations to consider. For the chapter. There is an emerging literature on the links among population, fertility and reproductive health and adaptation to climate change (UNFPA 2009; Stephenson, Newman and Mayhew 2010; Hardee, forthcoming). Poor reproductive health contributes to one-third of the burden of disease among women (WHO, 2005) and can be exacerbated by climate change. Providing women and couples with the ability to have their desired number and spacing of children can contribute to promoting adaptive capacity within families and communities. Analysis of National Adaptation Programmes of Action (NAPAs) by 49 LDCs and small island states, found that among 41 NAPAs completed by May 2009, fully 37 mentioned rapid population growth as a factor exacerbating the effects of climate change, yet none included reproductive health or family planning among their projects (Bryant et al. 2009). A study from several areas of Ethiopia of people living under changing climate conditions explored the potential roles of family planning and reproductive health in increasing resilience to climate change impacts. Women and men recounted how rising temperatures, more frequent draughts, increased flooding, receding agricultural grazing land and diminishing forests, were making it more difficult for their families and communities to cope. They particularly noted the effects of climate change on children and said that families should consider having fewer children to avoid so much hardship in making a living and in utilizing natural resources for survival (Kidanu, et al., 2009). An assessment of vulnerability to glacier ice melts in Asia also noted that "existing vulnerabilities in human health status, population pressure, degraded ecosystems and – especially – water stress make societies and ecosystems vulnerable to any changes in water availability as glacier melt accelerates in the coming decades" (Malone et al., 2010: 5). The need to address population pressure, including through meeting family planning needs, was one of nine cross-sectoral approaches recommended to addressing glacier melt. Bryant, L, Carver, L., Butler, C.D. & Anage, A. 2009. Climate change and family planning: least developed countries define the agenda. Bulletin of the World Health Organization, 87, 852-857. Hardee, K. forthcoming. "Climate Change Science, Policy and Programming: Where are Population and Reproductive Health?" Kulczycki, A. Ed. Critical Issues in Reproductive Health. Springer. Kidanu, A, Rovin, K., & Hardee K. 2009. Linking population, fertility and family planning with adaptation to climate change: views from Ethiopia. Washington, DC: Population Action International. Submitted for publication. Malone, E, M Melnyk, K Yarrow, R Armstrong, L D'Agnes, J Ayres, J Gavin, S Harding, K McNamara, B Melchior, F Rosenweig, G Taylor, H D'Agnes and R Rainey. 2010. Changing glaciers and hydrology in Asia. Addressing vulnerability to glacier ice melt impacts. Washington, DC: USAID. Stephenson, J., K. Newman, K., & Mayhew, S. (2010). Population dynamics and climate change: what are the links? Journal of Public Health, 32(2), 150-156. UNFPA. 2009. Facing a changing world: women, population and climate. State of the world population report 2009. UNFPA, New York. World Health Organization. 2005. The world health report 2005: Make every mother and child count. Geneva: WHO. (Karen Hardee, Futures Group)	all good points, but this is not the cobenefits of adaptation
814	53403	11	39	4	39	4	You mean WGIII. (Kristie L. Ebi, IPCC WGII TSU)	no
815	53404	11	39	5	39	9	What assumptions underly these results? (Kristie L. Ebi, IPCC WGII TSU)	Cannot go through every paper cited to check their assumptions, but will check to see if any major unexpected assumptions were used here
816	40837	11	39	6	0	0	The study quoted (O'Neill) has nothing to do with contraception and its CO2 effects. (Nor has Prata, N., the only other quoted reference for family planning) (Winfried Zacher, Germanwatch)	yes
817	40838	11	39	6	0	0	Should read: However health reasons are providing the main line of reasoning for increasing access to family planning: ... (Winfried Zacher, Germanwatch)	not sure this is the case
818	44787	11	39	6	0	0	O'Neill et al. 2012 could be added. The citation is: O'Neill, BC, B Liddle, L Jiang, KR Smith, S Pachauri, M Dalton and Regina Fuchs. 2012. "Demographic change and carbon dioxide emissions." www.thelancet.com Published online July 10, 2012 http://dx.doi.org/10.1016/S0140-6736(12)60958-1 . (Karen Hardee, Futures Group)	fixed
819	37876	11	39	12	0	0	Section 11.7.3.1. This section is particularly reliant on pre AR4 publications, several going back to the 1990s. Section 11.7.3 as a whole covers 1.25 pages of the 39 or so pages of text in this chapter. Given the apparent lack of current research on this topic, could the length of the section be perhaps halved? (Paul Beggs, Macquarie University)	good point, but as this subject was not covered by AR4, AR5 needs to bring it up to date
820	52333	11	39	12	0	0	to me, section 11.7.3.1 and 11.7.3.2 are obsolete and not really applicable to developed countries. The sentence "if access to contraception were provided to those women expressing a need for it" says it all!!!!? (Tanja Wolf, WHO Regional Office for Europe)	not sure the point here - developed countries are not the entire world
821	50691	11	39	14	39	14	If "moderate confidence" represents an assigned level of confidence for the uncertainties guidance for authors, it should be "medium confidence" and presented in italics. (Katharine Mach, IPCC WGII TSU)	ok -
822	54884	11	39	38	0	0	Figure 11.12 The author team may wish to revise the description provided in the two axis (Monalisa Chatterjee, IPCC WGII TSU)	We took this under consideration in the rewriting of the section

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
823	44788	11	39	43	0	0	Suggest using a later citation for Conde-Agudelo's work on birth spacing and maternal morbidity and mortality. The new citation in the Lancet is: Cleland, J., A Conde-Agudelo, H Peterson, J Ross and A Tsui. 2012. "Contraception and health." www.thelancet.com. Published online July 10, 2012 http://dx.doi.org/10.1016/S0140-6736(12)60609-6. The analysis in this article is more recent than in Conde-Agudelo et al. 2007. (Karen Hardee, Futures Group)	thanks, done
824	50692	11	39	43	39	43	"likely" -- The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	removed
825	38234	11	39	53	0	0	insert 'maternal' before death. (Caradee Wright, Council for Scientific and Industrial Research)	done
826	37877	11	39	54	39	54	I think "with" should be "risk". (Paul Beggs, Macquarie University)	yes, thanks
827	40793	11	40	13	0	0	Secion 11,8 Repeating the executive summary is meaningless at any stage, including the FOD (Michel Petit, CGIET rue de Bercy)	yes, will be changed in SOD
828	50693	11	40	13	0	0	Section 11.8. For the 2nd order draft, the author team should further develop this section in a format and style differing from the executive summary. (Katharine Mach, IPCC WGII TSU)	yes, will be changed in SOD
829	42376	11	40	16	40	54	This has the same deficiencies as the Executive Summary. Pl. see comments on that section. (Indur Goklany, Independent)	ok
830	45026	11	40	18	40	18	see comment 1 (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	ok
831	47991	11	40	30	40	37	Again, nice list to summarize the chapter. However, mental health is missing as a major effect on health, and should be included. (Ashlee Cunsolo Willox, McGill University)	Agree. Include: 'pressure on individuals and communities, with negative consequences for psychological functioning and mental health.'
832	42375	11	40	39	0	0	Replace "multiply" with "fractionally increase". See previous comments, e.g., on page 3, line 33, and page 32, lines 50-51. (Indur Goklany, Independent)	ok
833	40336	11	40	39	40	39	Is this multiply or magnify? (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	magnify might be better
834	40337	11	40	39	40	40	(And also in the Ruminant section 11.7.2) Interesting concept/approach and a bit troubling in some of its implications and perhaps (affluent) vantage point-- would expect that it is not that realistic and a hard sell in this type of document-- unless some indication of 'how' one would shift the diets -- unlikely that this would happen voluntarily, but perhaps simply through, for example, increased prices? This is where the troubling aspect comes in -- it would seem that any 'shift' would in some way be strongly linked to income and increases the discrepancies we are already seeing between poor and wealthy and developing world and developed. (VICTORIA EDGE, PUBLIC HEALTH AGENCY OF CANADA)	seems to be mislocated
835	47992	11	40	39	40	43	The multiplier effect of climate change will not just impact the burden of disease, but also health in general -- i.e. health that is not connected to disease (however that may be construed). (Ashlee Cunsolo Willox, McGill University)	noted
836	41954	11	40	48	0	0	Add, "urban planning" (Jonathan Patz, University of Wisconsin)	changed to land-use planning
837	47993	11	41	10	41	15	This section should also include mental health and well-being. (Ashlee Cunsolo Willox, McGill University)	Line 11. There is a fourth and very important route, which is 'impacts via damage to built infrastructure, such as dwellings, roads and public buildings, a particularly significant concern now that more than one-half of the world's population lives in cities'. boht can actually subsumed under the third category. Have done so.
838	42377	11	41	10	41	40	Several more important FAQs should be included. These FAQs are: (a) How important a health risk is climate change relative to other factors? ANS: To date and through at least 2085, the contributions of climate change to the global burden of disease are likely to be relatively small compared with other stressors (Goklany 2009a, 2011, 2012a; IPCC AR5 section 11.5.1, page 27, lines 13-15; page 28, lines 1-7, van Vuuren et al. 2011; Beguin et al. 2011; Bosello et al. 2006)." (b) Are the global health impacts of climate change increasing? ANS: Over the long term, global deaths and death rates from weather- and climate-sensitive health conditions have declined regardless of any climate change. Specifically, deaths and death rates have declined 93%-98% globally for all extreme weather events since the 1920s (Goklany 2009c). Similarly, death rates for malaria -- which accounted for the bulk of deaths (83%) attributed in 2004 collectively to malaria, tropical diseases, dengue, Japanese encephalitis, trachoma, and intestinal nematode infections (WHO 2011) -- have declined over 90% since 1900 (WHO 1999, page 50; World Malaria Program 2011); and at least 50% for diarrheal diseases since 1980 (Keusch et al. 2006, figure 19.2). In addition, hunger and malnutrition rates have declined (Goklany 2007b; World Bank 2011; FAO 2010, figure 2, page 9), which indicates that death rates from these causes should also have declined. Third, (i) comparing (the declines in mortality from climate-sensitive causes with the increases in mortality from all causes, and (ii) contribution of climate change to the global burden of death now and through at least 2085, indicates that humanity is coping better with the former than it is with far more important health and safety problems (Goklany 2012b; see comment on page 3, line 24). It should be further noted that this suggests that public health would be far better served and it would be more cost-effective from the perspective of human health if these other higher consequence health problems were given higher priority than climate change. (Indur Goklany, Independent)	Agree with this. Mental health should be mentioned here.
839	37878	11	41	11	41	11	Delete the second "change". (Paul Beggs, Macquarie University)	done
840	37879	11	41	13	41	13	Insert "by indirect" after "3)". (Paul Beggs, Macquarie University)	done

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
841	42378	11	41	18	41	20	Modify the response to FAQ 11.2 to note that deaths may also decline from excess winter mortality, which is a chronic problem and should not be confused with deaths from extreme cold. Notably, the mortality from EWM exceeds the current mortality attributed to climate change by WHO (2009) and McMichael et al. (2004). For additional details, see Goklany (2009a, 2012a, 20012b), and references therein. (Indur Goklany, Independent)	Section beginning line 17: Agree. Section should also note that substantial co-benefits to health may accrue from mitigation activities (and refer to FAQ 11.5). For example, reducing car use by using more active forms of transport can increase physical activity with well-documented benefits for physical and mental health. (I can provide refs if needed)
842	39296	11	41	23	0	0	Here you write: "...and does not create significant new ones..." when in the Executive Summary you write: "...new infections may emerge...". (PAUL REITER, INSTITUT PASTEUR)	do not think it is inconsistent -- key is the word "significant"
843	50694	11	41	24	0	0	"likely" -- The author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	ok
844	42379	11	41	29	41	32	Modify FAQ 11.4 as follows: "FAQ 11.4: What ARE the most important STRATEGIES to reduce the health impacts? THE MOST EFFECTIVE METHODS OF IMPROVING RESILIENCE AND ADVANCING ADAPTIVE CAPACITY TO REDUCE HEALTH IMPACTS FROM CLIMATE CHANGE ARE TO CONTINUE TO ENCOURAGE ECONOMIC AND TECHNOLOGICAL DEVELOPMENT. THESE ENABLE WIDER ADOPTION OF EXISTING--AS WELL AS IMPROVEMENTS IN--PUBLIC HEALTH MEASURES. EQUALLY IMPORTANTLY, THEY WOULD HELP REDUCE PUBLIC HEALTH IMPACTS FROM ALL CAUSES, WHICH ARE POROJECTED TO OUTWEIGH THOSE FROM CLIMATE CHANGE (SEE GOKLANY 2007B, 2009A, 2009B, 2009D, 2012A)." (Indur Goklany, Independent)	wil include this point
845	47994	11	41	29	41	32	Adaptations do not just need to occur at the public health and medical interventions levels. This is forgetting the importance of many other health practitioners, community programming, and individual and societal wellness. The language throughout this chapter is often reading as very clinical-oriented, and not as inclusive as it could be to recognize the numerous individuals that work in health, the numerous determinants of health, and the many ways in which we can support the health and well-being of individuals and communities at the local, national, and international levels through diverse and holistic programming. (Ashlee Cunsolo Willox, McGill University)	this is the health chapter -- other chapters are dealing with these. We will mention importance, but cannot dwell given the space allocated
846	41955	11	41	37	0	0	Add, "multi-model transportation that promotes physical activity." (Jonathan Patz, University of Wisconsin)	as not in text, only in summary table, do not think we can put here
847	38994	11	41	38	41	38	write "greenhouse gases" instead of "CAP" (climate active pollutants) (Ole Faergeman, Aarhus University Hospital)	not correct - CAPs is correct
848	42380	11	41	41	0	0	Add a new FAQ to parallel the current FAQ 11.4 as follows: FAQ 11.5: What are the health co-benefits of "focused adaptation"--an approach which requires focusing on reducing vulnerability to today's climate-sensitive global health problems that might be exacerbated by global warming as a means of reducing the total health burden from such health problems--and how do they compare with the health benefits from mitigation? ANS: Because climate change is expected to exacerbate existing health risks (rather than create new risks), reducing existing climate-sensitive risks will provide major health co-benefits (in theory far in excess of what mitigation would provide and at much lower cost). This approach has been outlined in some detail in Goklany (2005, Section 4, Table 4; 2009b, Section 4.1; 2009a, page 73). As noted in the references furnished, "focused adaptation" would reduce the total health burden from climate-sensitive problems regardless of the fraction that may be attributable to climate change. (Indur Goklany, Independent)	[we do not include co-benefits of adaptation -- arguably an important issue, but we are already so short of space I am not sure what we can Any other chapter doing something? WGIII]
849	37880	11	41	43	41	43	There is a multitude of errors and inconsistencies in style in the References section(s). This section will have to be very carefully checked against original PDFs or prints of the articles a number of times by a number of people to ensure the accuracy and formatting is of the expected high standard. (Paul Beggs, Macquarie University)	noted
850	44987	11	45	51	0	52	Ebi, K.L. and G. McGregor, 2008: Climate change, tropospheric ozone and particulate matter, and health impacts. 52 Environ Health Perspect, 116(11). (Page numbers) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
851	44986	11	48	49	0	50	Islam, M.S., 2009: Effects of local climate variability on transmission dynamics of cholera in matlab, bangladesh. 50 Transactions of the Royal Society of Tropical Medicine and Hygiene, 103(11), 1165 (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
852	37881	11	49	47	49	48	This reference is a newsletter and is unlikely to be peer-reviewed. It should probably be deleted. (Paul Beggs, Macquarie University)	OK, Paul Beggs does not like this, even though it is peer reviewed and produced by a very scientifically based institution, FIOH. The reference can in the text be replaced by Kjellstrom et al., 2013 (in press, Industrial Health, etc).
853	44988	11	50	36	0	37	Lloyd, S.J., Kovats, R.S., Chalabi,Z., 2011: Undernutrition. unpublished report for the comparative risk assesment 37 of global burden of disease from climate change in 2050 pp. 25. (25pp.) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
854	44989	11	52	42	0	43	Oikonomou, E. and P. Wilkinson, 2012: Modelling the relative importance of the urban heat island and the thermal 43 quality of dwellings for overheating in london. Building and Environment (Incomplete reference) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
855	44990	11	55	50	0	51	Solomon, G.M., M. Hjelmroos-Koski, M. Rotkin-Ellman, and S.K. Hammond, 2006: Airborne mold and endotoxin 51 concentrations in new orleans, louisiana, after flooding, october through november 2005. Environ Health 52 Perspect, 114(9) (Page numbers) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
856	44991	11	56	29	0	0	Tanzler, D., Carius, A., 2002: Climate change and conflict prevention (incomplete reference) (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted
857	44992	11	56	50	0	51	Tol, R. and S. Wagner, 2010: Climate change and violent conflict in europe over the last millennium Springer 51 Netherlands, pp. 65-79 (Please check the reference).The correct reference is: (R. Tol, S. Wagner,2010 Climate change and violent conflict in Europe over the last millennium. Clim. Change 99, 65 (RAIS AKHTAR, ALIGARH MUSLIM UNIVERSITY)	noted

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
858	37882	11	58	51	0	0	References for Figures/Tables should be integrated with all the other References, not separate. (Paul Beggs, Macquarie University)	noted
859	37883	11	62	0	0	0	Table 11-1. What are the numbers in this table (i.e., is there a multiplier)? Are they millions? (Paul Beggs, Macquarie University)	millions (extra detail added)
860	38217	11	62	0	0	0	It is not clear why the number of malnourshed children changes within a country based upon the + and ++ models. Seems like within the developing countries the number should not change. Also, I assume the last column is the sum of the previous columns but this is not obvious. If the heading was changed it would make more sense. (Janet Swim, The Pennsylvania State Universi)	Heading on the last column has been changed
861	40794	11	62	0	0	0	Table 11,1 Explicit the unit used (millions of children ?) (Michel Petit, CGIET rue de Bercy)	yes, millions
862	45227	11	62	0	0	0	Table 11-1. units are missing (probably Mio). Are children under 5 as table 6 in the original reference or children in general? (Nikolaos Stilianakis, European Commission)	yes, millions and mortality is under 5 years (detail added)
863	53405	11	62	0	0	0	What assumptions underly these results? What scenarios were used, which of the NCAR models, etc. (Kristie L. Ebi, IPCC WGII TSU)	detail added in the heading
864	37884	11	63	0	0	0	Table 11-2. This table has no column headings. This makes understanding and therefore commenting on the table a little difficult. However, the two entries in the 6th column "Mortality rates held constant at 2000 levels" and "Disease incidence rates held constant at 2000 levels" seem unexpected when the table is projecting future health impacts of climate change. (Paul Beggs, Macquarie University)	column headings now included
865	50695	11	63	0	0	0	Table 11-2. This table would benefit from substantial clarification. Column headings are needed, and citations should be provided for all information presented. (Katharine Mach, IPCC WGII TSU)	changes have been made
866	37326	11	63	0	11	63	Table 11-2 reports good information but is confusing in its organization and is huge. I suggest reducing the number of columns and streamlining to more punchy messages. This Table might include the Selin 2009 reference. (J. Jason West, University of North Carolina)	changes have been made - not persuaded that the Selin reference should be added
867	37885	11	64	0	0	0	Table 11-3. What are the numbers in parentheses? Are they +/- confidence interval? (Paul Beggs, Macquarie University)	Standard error (detail added)
868	37886	11	64	0	0	0	Table 11-4 is not referred to in the text of the chapter. (Paul Beggs, Macquarie University)	Table 4 has been deleted
869	37887	11	64	0	0	0	Table 11-4 has no results, just methods, and is therefore of limited value. (Paul Beggs, Macquarie University)	Table 4 has been deleted
870	41956	11	64	0	0	0	Table 11-4 - Add Peng et al. (Peng, R.D., et al., Toward a Quantitative Estimate of Future Heat Wave Mortality under Global Climate Change. Environmental Health Perspectives, 2011. 119(5): p. 701-706. Study showed a projected increase between 166 and 2,217 excess deaths per year from heat wave-related mortality in Chicago by 2081–2100 (Jonathan Patz, University of Wisconsin)	Table 4 has been deleted
871	50696	11	64	0	0	0	Table 11-4. This table would be substantially more useful with a final column indicating the results obtained in each study. (Katharine Mach, IPCC WGII TSU)	Table 4 has been deleted
872	37888	11	65	0	0	0	Table 11-5. The last word of the table title should be "heat" not "health". (Paul Beggs, Macquarie University)	changed
873	37889	11	65	0	0	0	Table 11-5. Column two of this table should briefly summarise the actual projected health impact, not just say what health measure (mortality) is used. The Reference column should only include the author(s) and date, not the article title. (Paul Beggs, Macquarie University)	agree - change made
874	37890	11	65	0	0	0	Table 11-5. Cheng et al. 2008 is not in the References section. (Paul Beggs, Macquarie University)	added
875	50697	11	65	0	0	0	Table 11-5. This table would be substantially more useful with a final column indicating the results obtained in each study. (Katharine Mach, IPCC WGII TSU)	agree - to be done
876	37891	11	67	0	0	0	Table 11-6. In column 4, row 2, paragraph 2, I think "2004" should be "2003". (Paul Beggs, Macquarie University)	changed
877	37892	11	67	0	0	0	Table 11-6. The "Commentary" column should be deleted from this table and its content moved to Section 11.6.2.1 paragraph 2 text. (Paul Beggs, Macquarie University)	commentary retained
878	50698	11	67	0	0	0	Table 11-6. As a relatively minor comments for the table overall, there are 2 instances of the word "likely"--if being used per the uncertainties guidance for authors, they should be italicized. Otherwise, casual usage of the term should be avoided. (Katharine Mach, IPCC WGII TSU)	"likely" changed
879	37893	11	69	0	0	0	Table 11-7. Ensure the Co-benefit categories in column 1 of this table are worded exactly as in the text. (Paul Beggs, Macquarie University)	yes, have tried to ensure this
880	53406	11	69	0	0	0	Access to reproductive services is a benefit of mitigation? (Kristie L. Ebi, IPCC WGII TSU)	no, this refers to a category of co-benefits
881	37894	11	70	0	0	0	Figure 11-1. Define "ALRI". Could the disease category labels in the figure be moved to a legend to unclutter the figure? (Paul Beggs, Macquarie University)	defined
882	37895	11	70	0	0	0	Figure 11-1. Is there a particular logical order to the positioning of the disease categories? If not, then re-order, e.g., biggest killer to smallest killer (or vice versa); or greatest decline to smallest decline (or vice versa). (Paul Beggs, Macquarie University)	noted, but decided to leave as is
883	38995	11	70	0	0	0	Spell out ALRI: "acute lower respiratory infection" in third wedge from top (Ole Faergeman, Aarhus University Hospital)	done
884	53407	11	70	0	0	0	I really tried but could not understand this figure. (Kristie L. Ebi, IPCC WGII TSU)	see new text in the heading
885	53936	11	70	0	0	0	Figure 11-1: MDG should be spelled out. It would be useful for readers to have further clarification on what the lines (labeled Business as usual, MDG Target) are illustrating exactly in the caption. (Yuka Estrada, IPCC WGII TSU)	done
886	44999	11	70	0	70	0	Figure 11-1: I would suggest to display death rates. This would be more meaningful than absolute values (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	disagree - left as numbers
887	37896	11	71	0	0	0	Figure 11-2. This Figure is poorly labelled. What is the circling indicating? What are the dashed lines? (Paul Beggs, Macquarie University)	new labels provided

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
888	37897	11	71	0	0	0	Figure 11-3. This Figure is poorly labelled. What are the dashed lines? What are the rainfall units? (Paul Beggs, Macquarie University)	detail added in the heading
889	38996	11	71	0	0	0	Broken lines in both Figs. 11-2 and 11-3 must be explained (standard deviations, standard errors of the mean?) (Ole Faergeman, Aarhus University Hospital)	detail added in the heading
890	42211	11	71	0	0	0	Figure 11.2. Treats only effect of hot preceding day. Knowledge exists both for the effect of cold and hot days, and up to a month prior to registered death, cf. B. Sørensen (2011) quoted above, with further references. (Bent Sorensen, Roskilde University)	We took this under consideration in the rewriting of the section
891	45228	11	71	0	0	0	Figure 11-3 should be better explained. (Nikolaos Stilianakis, European Commission)	detail added
892	46965	11	71	0	0	0	Figure 11-3. This data are plotted for a location mentioned at "AMK HDSS, Bangladesh" which is not clear. Moreover, the graphs is not very clear and it will not be very wise to draw conclusions based on this findings. (A K M Saiful Islam, Bangladesh University of Engineering and Technology)	detail to be added (or graph deleted)
893	50699	11	71	0	0	0	Figure 11-2. The variable plotted on the y-axis should be introduced and briefly explained in the figure caption to orient the reader. Additionally, the source of the figure should be provided in the figure caption. (Katharine Mach, IPCC WGII TSU)	detail added
894	50700	11	71	0	0	0	Figure 11-3. The variables plotted on both axes should be introduced and explained in the figure caption. Additionally, the acronym used in the caption should be explained further, and the source of the figure should be provided. (Katharine Mach, IPCC WGII TSU)	detail added
895	53408	11	71	0	0	0	More details are needed -- where, when, etc. (Kristie L. Ebi, IPCC WGII TSU)	detail added
896	53937	11	71	0	0	0	Figure 11-2, and 11-3: These are not very intuitive figures for readers who are not familiar with the field. It would be a great help for those readers to provide a brief description on what exactly these figures are showing and how to interpret them. For Figure 11-2, it is not clear what the red circle is illustrating. Axis titles should be labeled more explicitly instead of simply using variable names. (Yuka Estrada, IPCC WGII TSU)	detail added in the heading
897	45000	11	71	0	71	0	Figure 11-3: What is AMK HDSS? Please explain axis (Christina Koppe, Deutscher Wetterdienst (German Meteorological Service))	detail added in the heading
898	37898	11	72	0	0	0	Figure 11-4. I don't particularly like this diagram because it could lead to misinterpretation. (Paul Beggs, Macquarie University)	We took this under consideration in the rewriting of the section
899	38218	11	72	0	0	0	I don't get the point of Figure 11-4. I assume environment is physical environment rather than social environment. The model does not provide any particular insight. It seems like the point could be made in one or two sentences and a figure should illustrate some particular organization or process and I don't get that from the model. Perhaps it could combine with figure 11-7, which has the same basic elements. (Janet Swim, The Pennsylvania State University)	We took this under consideration in the rewriting of the section
900	41957	11	72	0	0	0	Figure 11-4: Contributes little information. Recommend deleting. (Jonathan Patz, University of Wisconsin)	We took this under consideration in the rewriting of the section
901	44663	11	72	0	0	0	Figure 11-4: Ways in which climate, climate variability and climate change may influence human health, Source: E. Garcia (2011). Why one way array between climate change and Social and economic disruption?. Social and economic disruption can also influence climate change intensity. (by increasing or decreasing impacts from climate change following consideration and strategies giving to attenuation of greenhouse effects) . (Dieudonné Pascal YAKA, Burkina Meteorological Authority (B.M.A.) ; University of Ouagadougou (U.O.))	We took this under consideration in the rewriting of the section
902	50701	11	72	0	0	0	Figure 11-4. It would be helpful to clarify if climate and climate variability, as introduced in the figure caption, are represented in the figure through "environmental conditions," which presumably also includes other non-climate-related environmental factors. (Katharine Mach, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
903	53938	11	72	0	0	0	Figure 11-4: It would be more useful to readers if this figure was reproduced to communicate the key concept discussed in this chapter/section. To my eyes, this figure did not illustrate that "human health can be affected by variability in the climate" (p 8 line 22-23) since climate or climate variability are not (clearly) depicted in this figure. (Yuka Estrada, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
904	38997	11	73	0	0	0	In text to Fig. 11-5 explain "Breteau index." (Ole Faergeman, Aarhus University Hospital)	Breteau Index defined
905	50702	11	73	0	0	0	Figure 11-5. It would be helpful for an unfamiliar reader to specify and clarify what the Breteau index is. (Katharine Mach, IPCC WGII TSU)	as above
906	53409	11	73	0	0	0	Please define the Breteau index. (Kristie L. Ebi, IPCC WGII TSU)	as above
907	53939	11	73	0	0	0	Figure 11-5: Since the Breteau index or temperature is not discussed in the text, I would remove those two lines to focus on only Rainfall and Dengue cases. Having four lines (with two axes showing two different variables each) makes this figure unnecessarily complicated. (Yuka Estrada, IPCC WGII TSU)	as above
908	37899	11	74	0	0	0	Figure 11-8. This figure seems inconsistent with the text of Section 11.2.9. Berry et al. (2010) Figure 2 would be better. (Paul Beggs, Macquarie University)	text has been changed
909	53940	11	74	0	0	0	Figure 11-7: I think it would be most useful if the chapter could include a figure that can capture the concepts described in Figure 11-4 and 11-7 Specific cases shown in Figure 11-7 ("nutrient consumers ...etc) can be described in the caption or the main text. (Yuka Estrada, IPCC WGII TSU)	not persuaded to prepare a new figure
910	37900	11	75	0	0	0	Figure 11-9. What are a) and d)? (Paul Beggs, Macquarie University)	detail added
911	37901	11	75	0	0	0	Figure 11-10. The map on the left should be deleted. It is not needed because it is included in the map on the right. (Paul Beggs, Macquarie University)	we believe this helps with comparison - leave as is
912	37902	11	75	0	0	0	Figure 11-10. Change "predicted" to "projected" in the first line of the figure legend. (Paul Beggs, Macquarie University)	done

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
913	50703	11	75	0	0	0	Figure 11-9. It would be beneficial to further introduce the 2 panels of this figure in the figure legend. Panel D presumably illustrates contraction through economic development, while panel A illustrates expansion through higher temperatures? (Katharine Mach, IPCC WGII TSU)	clarifications given
914	53942	11	75	0	0	0	Figure 11-8: CC needs to be spelled out. It would be interesting to explore some ways to illustrate and emphasize the concept of "CC as a multiplier" in this figure. Currently, CC is more or less depicted as a part of a risk cycle. Would it be helpful if it were compared with risk cycles without CC impacts? Also see comments for section 11.2.9. (Yuka Estrada, IPCC WGII TSU)	detail added
915	50704	11	76	0	0	0	Figure 11-2. The author team should clarify in the figure legend the variables being plotted on the X and Y axes. (Katharine Mach, IPCC WGII TSU)	extra text in the heading to explain
916	53943	11	76	0	0	0	Figure 11-9: It is not clear what the a) and b) are illustrating. Would it be possible to combine them since there seems to be very little overlap of the colored areas? Are the data used in this figure available from certain countries (due to visible political boundaries in the maps)? If that is the case, it should be noted. (Yuka Estrada, IPCC WGII TSU)	changes made to explain the two panels
917	53944	11	77	0	0	0	Figure 11-11: As it is presented, this figure could be interpreted as an illustration of the direct linear relationship between avoided global premature death with a CH4 emission reduction, although p 37 line 32-34 states "the indirect health co-benefits of CH4 reductions are epidemiologically significant." It should be noted accordingly. (Yuka Estrada, IPCC WGII TSU)	We took this under consideration in the rewriting of the section
918	53945	11	77	0	0	0	Figure 11-12: It would be helpful for readers to have a clarification on axis titles (Abbreviations (CI, PBI) should be spelled out). (Yuka Estrada, IPCC WGII TSU)	done