

Community dermatology

# Global climate change and its dermatological diseases

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**Introduction**

Global climate appears to be changing at an unprecedented rate. It is one of the greatest threats to our capacity to benefit in the context of “Skin Care for All”. In 2010 the horrors of flooding in Pakistan and the heat in Russia are but two examples. The *BMJ* in November 2010<sup>1</sup> states “Health professionals everywhere have a responsibility to put health at the heart of climate change”. No health care profession is doing more in this respect than those concerned with skin care. The International Society of Dermatology has made “Climate Change” one of its lead topics, hoping to educate its members to be proactive in support of interventions to slow down the change, protect populations and teach them to reduce the effects of climate change on their skin.

**What is climate change?**

A review of the literature for dermatologists confirms that climate change has been attributed by some to an accumulation of greenhouse gases (carbon dioxide, methane, chlorofluorocarbons and nitrous oxide) in the atmosphere, mainly due to more human activities, such as use of fossil fuel, land use and agriculture, of which deforestation and irrigation are much discussed examples.<sup>2</sup>

Change in climate is associated with a rising surface temperature. It has been claimed that the global surface temperature will increase by 2 °C by the end of 2100.<sup>3</sup> Such global warming increases the frequency and severity

of extreme weather events. Hurricanes and tropical storms will become more frequent and intense. Sea levels will rise and lead to more flooding.<sup>4</sup> Changing climate also explains shifts in the distribution and behavior of insect and bird species.<sup>5</sup>

The worldwide changes in climate are anticipated to change the burden and pattern of disease. It is known that many skin diseases have a high sensitivity to climate. Only a few of the many publications describing health impacts of climate change have focused on skin disease. On the other hand, extensive research has been done on increased UV radiation and the development of skin carcinoma.

**Skin carcinoma**

Ozone depletion increases UV radiation at the Earth's surface. During the last decades, an increased incidence of skin carcinoma has been reported. There is little doubt but that increased human UV exposure is playing an important role. Add to that the fashion for getting tanned and sitting in the sun.

Published literature has also suggested that higher temperature associated with climate change could contribute to the development of skin carcinoma. Animal studies have illustrated that an elevation in room temperature increases UV radiation-induced carcinogenesis. In humans, it has been speculated that a long-term rise of temperature by 2 °C, could increase the carcinogenic effectiveness of solar UV by 10%.<sup>6</sup>

### Extreme weather events

Documented effects of climate change include how extreme weather events such as hurricanes, tropical storms and massive flooding can affect humans and cause skin disease. Published literature indicates that the commonest skin diseases after flood-related disaster are skin infections – infestations,<sup>7</sup> caused by various organisms from common bacteria, and fungal,<sup>8</sup> to more uncommon, such as *Burkholderia pseudomallei*<sup>9</sup> and *mycobacterium abscessus*.<sup>10</sup> Other common skin implications associated with flood-related disaster are scabies,<sup>11</sup> papular urticaria<sup>12</sup> and eczema.<sup>13</sup>

### Vector-borne infectious diseases

The incidence of vector-borne infectious diseases is rising worldwide. It is argued that we can blame changes in climatic factors as one of the reasons for this increase in incidence – but factors such as globalization, population growth, migration, international trade and urbanization among others also may play a role.

Changes in temperature, humidity and precipitation that are anticipated to occur under various climate change scenarios are affecting the biology and ecology of hosts and vectors.<sup>14</sup> Additionally, as climate warms, certain vectors are likely to expand their geographical ranges into more northern latitudes.<sup>15</sup>

Published literature indicates that short-term climate variability like El Niño–Southern Oscillation, are linked to outbreaks of certain infectious vector-borne illness like Leishmaniasis in Colombia,<sup>16</sup> Malaria in Venezuela<sup>17</sup> and Dengue in Thailand.<sup>18</sup> Further, the effect of inter-annual climate variability on Lyme disease transmission in USA,<sup>19</sup> and West Nile virus transmission in southern Florida, USA<sup>20</sup> has been examined.

### Skin cares capacity to benefit

Interventions to reduce climate change include reducing access to care that uses fossil fuel. In this respect the use of Telemedicine and the mobile phone may well have the greatest impact, as discussed by other articles in this series entitled “Community Dermatology”. Disorders of the skin are ideal subject matter, and there are many examples of how they can be examined at a distance rather than using fuel to travel by road or air.

Any review of the use of fossil fuel will draw attention to the use of wood fires to boil water, resulting in deforestation, inordinate uptake of time to fetch wood, and burns in children from fires, which are recorded consequences. Procter and Gamble’s humanitarian gift of a water purifier in sachets, which purifies water in

10 min and makes boiling unnecessary, is an example of a new initiative making a difference.<sup>21,22</sup>

There are few social marketing projects more successful than that of the Australian public health campaigns in collaboration with dermatologists to reduce tanning and to protect the skin from sun burn.<sup>23</sup> But continuing input from those who care for the skin is necessary.<sup>24</sup> Dermatology has identified and helped to assuage the disabling problem of polymorphic light eruption in ethnic groups of the west of the Americas. The Albinism project carried out by the Regional Dermatology Training Centre in Tanzania has reduced the severity of skin cancers in this population.

The effect of overheating due to climate requires attention to overheated homes, clothing and bedding that have also resulted in advice from dermatology.<sup>25,26</sup> But it is not just protection from too much sun that must be focused upon. There is protection of the armed forces from not only heat but from trench foot and from exposure to cold.<sup>27</sup> The first significant treatise on cold was as early as that in 1930 by Haxthausen.<sup>28</sup> Cold exposure of the extremities may lead to amputation<sup>29</sup> and affect not just those in the coldest climates but also persons with neuropathy and hence diabetics that contribute to one of today’s most serious epidemics. Continuing concern about protection of the skin concerns also the homeless, who are derived from more than 100 million mobile populations.

Finally there is the largest epidemic of all. Obesity and consequent diabetes have the same causes as global warming,<sup>30</sup> and as a supportive partner Community Dermatology can contribute to remedy both by supporting the many Public Health initiatives to intervene in early stages by education of those affected.

### Conclusion

The effects of climate on skin health and disease are an important topic for our specialty. Counteracting the effects of change is something all who care for the skin are able to do.

Awareness about the potential impacts of climate change on human health seems to be growing. Currently, there is some literature describing how certain skin diseases may be affected by climatic change, but for the future more research and data collection are needed.

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