

Climate Change in BC: Implications for Seniors

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Purpose

Take a social determinants approach to identify communities that will be highly vulnerable to the health impacts of climate change (rural communities) and using this same framework, explore the potential impacts of a major indirect pathway (food insecurity) between climate change and adverse health outcomes among seniors.

Outline

Introduction

A Social Determinants Approach to the Study of Climate Change and Health

Changes in Climate in British Columbia

Pathways by which the Health of British Columbian Seniors will be Impacted


The Vulnerability of Rural British Columbians to Climate Change

The Climate Change- Food Security Pathway

Conclusions

Introduction


- Much of the research on health in relation to climate change is based upon the impact of major weather driven disasters on health and on the exposure of human populations to extreme temperatures, mainly heat.
- Research frameworks describing the complex, linkage between climate change and the main diseases of concern for seniors in a place like BC (i.e., cardiovascular, cancer, diabetes, mental health etc.) have not been well articulated.

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- Given the complex way in which climate change will act in concert with other socio-economic and environmental factors it is best to approach the study of climate change and health using a social determinants of health framework.


A Social Determinants Approach


- Several conceptual models have been developed in order to frame research on the impacts of climate change on health (McMichael et al., 2003).
- Most of these focus on the health impacts of climate change in developing nations as they tend to have large populations already suffering from ill health, few resources to adapt to either the direct impacts of severe weather events or their indirect long term sequelae, and little institutional capacity to drive adaptation to climate change (Adger et al., 2003; Kristie et al., 2006; Lieshout et al., 2004).

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- Very simply, climate change is conceptualized, in most of these models, as impacting human health directly or indirectly (Haines et al., 2006a, 2006 b).
 - **Direct effects** might be death and illness due to thermal extremes arising from severe heat waves (Campbell-Lendrum and Corvalan, 2007) or from the direct effects of flooding (Ahern et al., 2005).

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- Most climate change research has been conducted on the direct effects of climate on health. Since 1970, the WHO conservatively estimates 150,000 deaths per annum from such effects (Adger et al., 2003; Campbell-Lendrum and Corvalan, 2007; Kristie et al., 2006; Lieshout et al., 2004). These events have significant immediate public health impacts (e.g., excess deaths from the European heat-wave in 2003) (Robine, 2007) and, from a research and policy standpoint, offer the potential to demonstrate a direct link with climate change.

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- **Indirect effects on health** arise from the sustained impact of altered climate which cause changes to ecosystems and which, in turn, impact human health through various pathways (Martens, 1998).
 - For example, rises in temperature may alter living conditions for animal and plant vectors of diseases with subsequent, very difficult to predict, impacts on human health (Patz et al., 1996).

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- Other models posit more complex pathways from climate and ecosystem transformation to adverse health outcomes including, for example, impacts of social dislocation and migration that might arise from these broad changes to ecosystems (Patz et al., 2000).
 - Still other models, focus on secondary health affects (such as malnutrition and vitamin deficiency) attendant to medium and long term adverse changes in the conditions governing agriculture and food production (Rosenzweig et al., 1993).

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- Finally, the magnitude of direct and indirect effects of climate change on health will be a function both of the nature and magnitude of climatic changes and the *vulnerability* of the affected populations (Woodward et al., 1998). *Thus, it is essential that research on human health effects of climate change must, not only grapple with the intensity and pace of climate change but also with the location and extent of vulnerability of human populations most likely exposed to climate change* (Haines et al., 2006a, 2006b).

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- What can a social determinants approach to research on climate change and health offer.
 1. To identify those communities which will likely bear the brunt of the coming direct and indirect impacts of changes in climate.
 2. Identify the most vulnerable groups in these vulnerable communities.
 3. Identify the pathways by which these vulnerable communities and groups within them will likely be impacted.
 4. Develop pro-active adaptation strategies .

Likely Climate Changes in BC

- BC's climate has warmed significantly in recent decades with changes in temperature and precipitation exceeding global averages in southern BC (BC Ministry of Environment, 2006; Whitfield et al., 2002a; Zhang et al., 2000). Conditions will likely become wetter in most regions of the province during the winter and spring and drier during summer, at least in the south and on the coast (Walker and Sydneysmith, 2007).

Impacts of changes in climate on ecosystems

- reduced snowpack (Stewart et al., 2004).
- rapid melting of alpine glaciers (Moore et al., 2007).
- changed streamflow volumes and timing, especially that spring snowmelt occurs much earlier in many BC rivers (Zhang et al., 2001)
- increasing winter runoff for most of BC (Mote and Hamlet, 2001).


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- -groundwater recharge rates are also sensitive to changing climate conditions (Rivera et al., 2004).
 - reduced summer-time flows in many BC rivers, a particular issue for the Okanagan
 - sea level rise will be a hazard for coastal communities in BC

What will be the impact of climate change on the health of British Columbians?

- While there is strong evidence for shifts in climate in BC, *there is virtually no direct evidence yet available on the impact of climate change on human health in BC*. However, it is possible to extrapolate (somewhat tentatively) from some of the evidence, mainly restricted to the direct impacts of climate change, to suggest ways in which climate change could impact human health in this province.
- Climate change will act on the health of British Columbians through physical, biological, and socio-economic pathways


Physical Pathways


- More exposure to fire
- increased exposure to heat and air pollution
- urban heat islands
- floods on the coast, and increased sediment load due to landslides or heavy runoff may affect drinking water quality and fish breeding habitat

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- floods and groundwater contamination
 - floods and contamination of agricultural land
 - drought in the Okanagan
 - mountain pine beetle (MPB) infestation and associated logging will exacerbate flood and fire risk in central part of BC
 - air pollution risks to health exacerbated by heat

Biological Pathways


- Water-borne diseases may increase as a result of increased precipitation and flooding (Mullens, 1996).
- Many respiratory pathogens such as influenza exhibit winter seasonality. Some data has shown increased influenza with arrival of El Nino patterns in the United States (Choi et al., 2006).


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- Food–borne gastroenteritis, particularly illnesses related to *Salmonella*, currently exhibit a summertime pattern of occurrence (Bowman et al., 2003). Rises in temperature will likely see growth in the prevalence of these types of illness in human populations in BC (Gubler et al., 2001)

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- Rise in temperature may alter living conditions for animal and plant vectors of diseases (Patz et al., 1996). (e.g., Hanta virus, West Nile Virus, *C. gatti*, Lymes disease)

Socio-economic Pathways

From social determinants models of health we know that difference in chronic physical and mental illness are driven by cultural, economic, and geographic factors much more than by genetic or other biological determinants of health (Paradis, 2008).

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- We also know that, in BC, the main diseases of interest for seniors are hypertension, coronary heart disease, cancer, and mental illness.
 - All of these illnesses (cancer less than the others) are diseases whose prevalence varies in sub-populations depending on the different socio-economic and cultural conditions to which they are exposed.

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- This means that the pathways that really matter for investigating the impacts of climate change on health are ones that research how climate change will change the socio-economic situation facing communities and individuals.
 - Further, it means looking at communities most exposed to climate change and those communities with the socio-economically most disadvantaged people.
 - Impoverished rural communities in BC and poor seniors living in these places are highly vulnerable to impacts of climate change.




Vulnerability of Rural People

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- Rural British Columbians are by and large much poorer and much less healthy than urbanites.
 - Not only are socio-economic conditions worse in rural places in BC but, unsurprisingly, the health status of rural residents is much worse than it is for urbanites.
 - Health status of Aboriginals living in rural BC worst in the province.



○ For example:

i) According to the 2005 Canadian Community Health Survey, approximately 20 percent of residents of northern regions were obese and approximately 25 percent smoked, compared to, respectively, 8 and 12 percent in Vancouver (Statistics Canada, Special Surveys Division, 2005).



The average age standardized mortality rate between 1997 and 2000 was 6.4 deaths per 1,000 in the Fraser Health Authority (largely urban and located in the south west corner of the province) compared to 8.4 per 1,000 in the Northern Health Authority (largely rural and covering the northern half of the province).

Health status of rural Aboriginals much worse than for urban Aboriginals.


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- What happens when on top of these economic and health deficits we get a slow moving climate change-related disaster?
 - Mountain Pine Beetle infestation (itself a result of climate change) has increased the likelihood of fire and flood in many rural and remote communities.
 - Increased likelihood of increased direct effects (e.g., smoke inhalation, displacement due to flooding) on health in these communities among seniors already at a health disadvantage.

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- Increased likelihood of increased indirect effects (e.g., community economic destabilization) on health in these communities among seniors already at a health disadvantage.
 - These direct and indirect effects will be magnified in rural and remote communities as they are already buffeted by more adverse socio-economic winds than more diversified urban communities (Hayter, 2000; Hayter and Barnes, 1992) and because they have less robust health, welfare, and disaster response infrastructure.

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- Rural and remote communities will be at risk.
 - Poor rural remote Aboriginal communities will be at particular risk.
 - Those poor rural and remote communities surrounded by MPB killed timber are at heightened fire and flood risk.
 - Those poor rural and remote communities surrounded by MPB killed timber, with no policies in place for clearing this timber and who are dependent on forestry will be at risk.
 - The poor elderly in these communities at especially high risk




Climate Change Food Security and Seniors in BC



Poor seniors will, after housing, spend a major proportion of their disposable income on food
BC is about 50% self-sufficient in food.

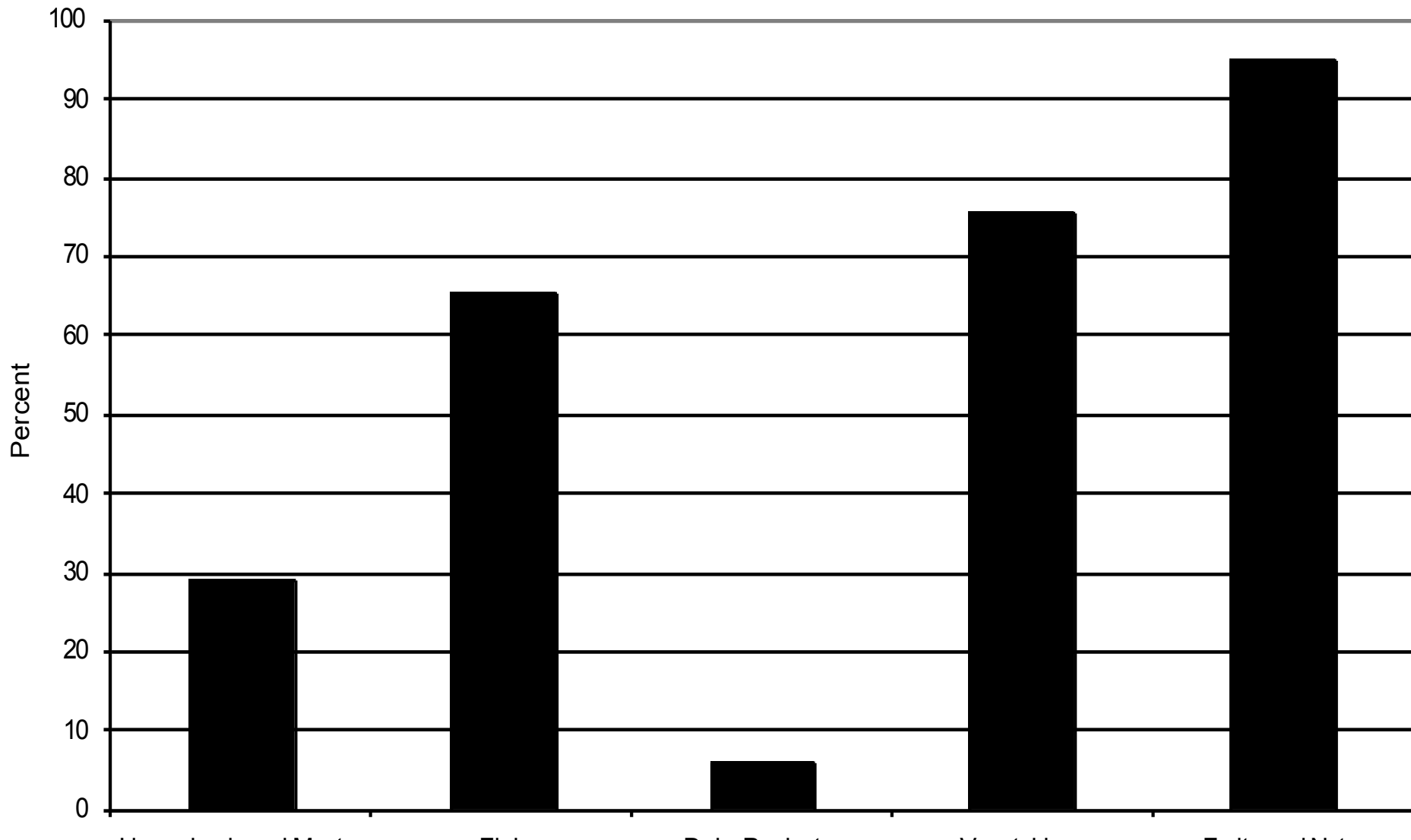
This varies across types of food with BC (See next slide)


Cost of food in remote/rural communities (especially fruit and vegetables) is much higher than in urban places.



The next slide shows the proportion of foods we import (at least from other nations- because we have limited data on inter-provincial trade in food) into BC.

Proportion of Foods Imported into BC, 2007





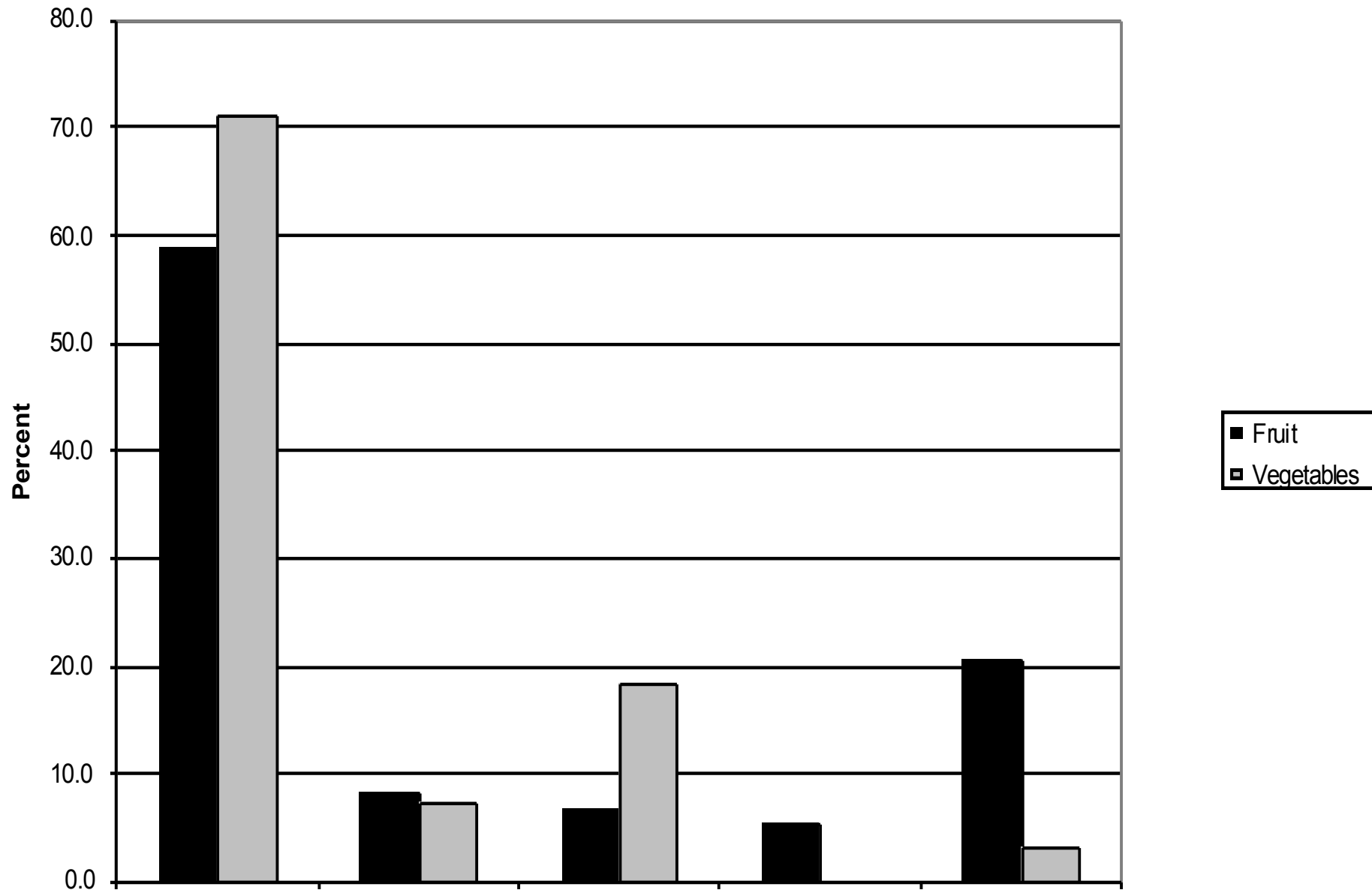
We are heavily reliant on other agriculture regions for our fruit and vegetables.


Fruits and vegetables are important because these are under-consumed in the population especially among the elderly and they are necessary for a healthy diet.

Two inter-related policy issues that arise are:

- i) Where do we import these from
- ii) What is likely impact of climate change in these regions

Source of Fruit and Vegetable Imports






From where in the USA do we import our fruits and vegetables?


Bulk of these are from California which produces half of all vegetables and fruit in USA.

At this point California is suffering from its worse drought in decades with predictions of more years of drought to come. At present the state is under water rationing restrictions and agricultural production and employment is declining.



Extent to which California can continue to be a reliable supplier of *cheap* fruits and vegetables to BC is uncertain and will become more uncertain as climate change unfolds.

What can nutritional policy makers do in order to ensure that British Columbia's seniors increase their intake of fruit and vegetables in the future as the climate changes?
Will poor British Columbian seniors be able to afford these foods?



Same drought conditions that affect Californian fruit production likely to affect domestic fruit production in Okanagan valley.

Impact of climate change, especially in rural/remote communities and especially for those on fixed incomes (like seniors) will be to increase price of foods most important in keeping seniors healthy.

Social policy adaptations will be needed to support seniors, in the face of high food prices caused by climate change.

Conclusions

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References

- **Ostry A**, Ogborn M, Basil K, Takaro T, Allen D. Climate Change and Health: A Research and Policy Agenda for British Columbia , International Journal of Environmental Research and Public Health (Special Issue on Climate Change and Health), 7(3), 1018-1035, 2010.
<http://www.mdpi.com/1660-4601/7/3/1018/pdf>
- **Ostry A**, Ogborn M, Takaro T, Allen D, Bassil K. Climate Change and Health in British Columbia. (White paper). BC Climate Action Secretariat, November 17th, 2008.
<http://www.pics.uvic.ca/research.php>

References

- **Ostry A.** Climate Change and Food Security in British Columbia: Provincial Health Services Authority of British Columbia, May, 2009.
- **Ostry A.**, Miewald C, Beveridge R. Climate Change and Food Security in British Columbia. White Paper Commissioned by the Pacific Institute for Climate Change Solutions, in press.