PRESENTATIONS

Environmental variables and the risk of disease/symptoms

Torbjörn Messner

Main conclusion

- Be cautious when extrapolating results from another population

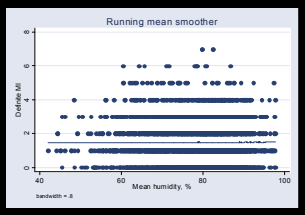
Reasons

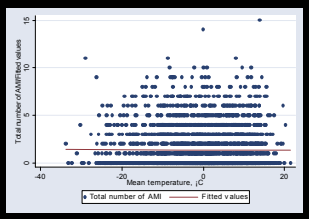
- Different genetic setup
- Different adaptation
- Population responses vary by
  - Latitude
  - Altitude

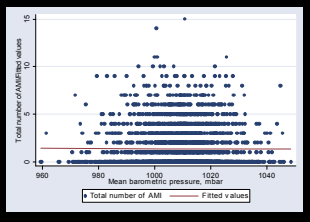
Other causes for caution

- Ecologic fallacy
- Negative publication bias

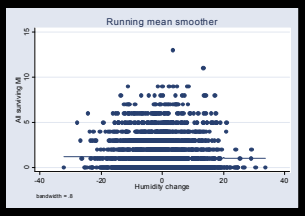
Static weather variables and AMI

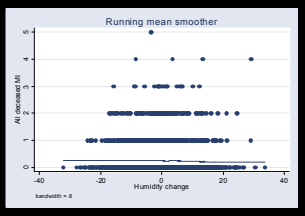


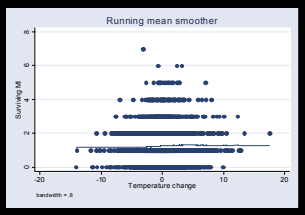




Dynamic weather variables and AMI



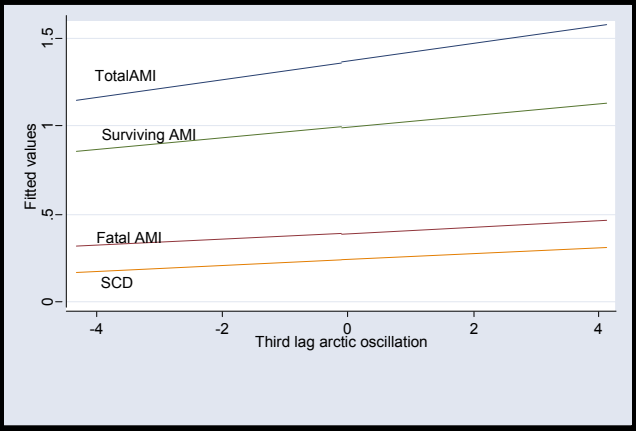




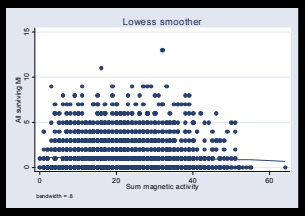
NAO and weather
Positive NAO

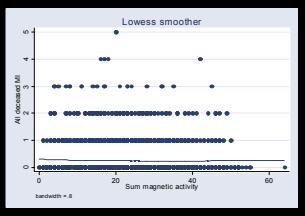
NAO and weather
Negative NAO

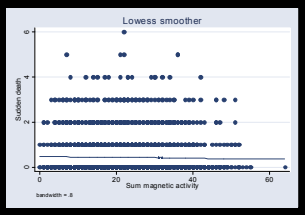
NAO variations and AMI



AMI and geomagnetic activity







Other diseases

- ”Weather sensitivity”
- Stroke
- Blood pressure
- Rheumatic diseases
- Migraine/headache
- Miscellaneous

Climate Change and Contaminants in the Arctic

Alaska Forum on the Environment
Symposium on Climate Change and Human Health in the Arctic

13-15 February 2008
Anchorage, Alaska

James E. Berner, MD
Alaska Native Tribal Health Consortium

Climate Change and Contaminants in the Arctic

- Atmospheric and Ocean Processes
- ACIA Climate Model Projections
- Impact of Climate on Contaminants
- Conclusions

Climate Change and Contaminants in the Arctic

Atmospheric Processes

Polar Vortex (PV)

A cyclonic wind pattern around the North Pole strongest in the troposphere above 15,000 ft., and strongest in winter. The PV profoundly influences temperature, barometric pressure, Arctic ice and surface water circulation as well as Arctic and Northern hemisphere weather.

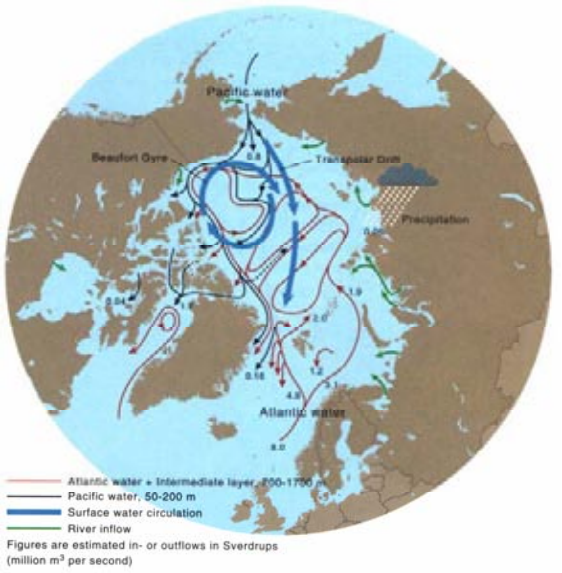
Climate Change and Contaminants in the Arctic

Atmospheric Processes

Semi permanent surface high and low pressure fields

- Icelandic low – strongest in winter.
- Aleutian low – strongest in winter.
- East Siberian high – strongest in winter.
- Chukchi-Beufort Sea high – strongest in winter.
- Arctic high (Baffin Island) – strongest in winter.

Circumpolar Ocean Currents



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Climate Change and Contaminants in the Arctic

Atmospheric Processes

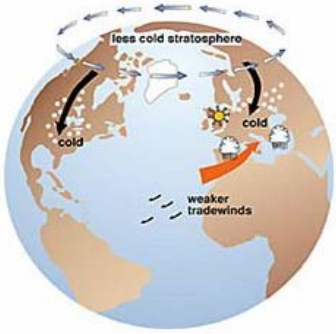
Arctic Oscillation (AO) Index

A measurement of difference in sea level pressure (SLP) between the Arctic high pressure field, and the northern hemisphere mid-latitude (37-45°N) low pressure field.

Climate Change and Contaminants in the Arctic

A positive AO increases wind currents into the Arctic, and raises the mean Arctic temperature, decreases sea ice, increases precipitation. A negative AO increases sea ice decreases mean temperature, increases cold air movement into northern latitudes.

Effects of the Positive Phase of the Arctic Oscillation



Effects of the Negative Phase of the Arctic Oscillation

(Figures courtesy of J. Wallace, University of Washington)

Website: http://nsidc.org/arcticmet/patterns/arctic_oscillation.html

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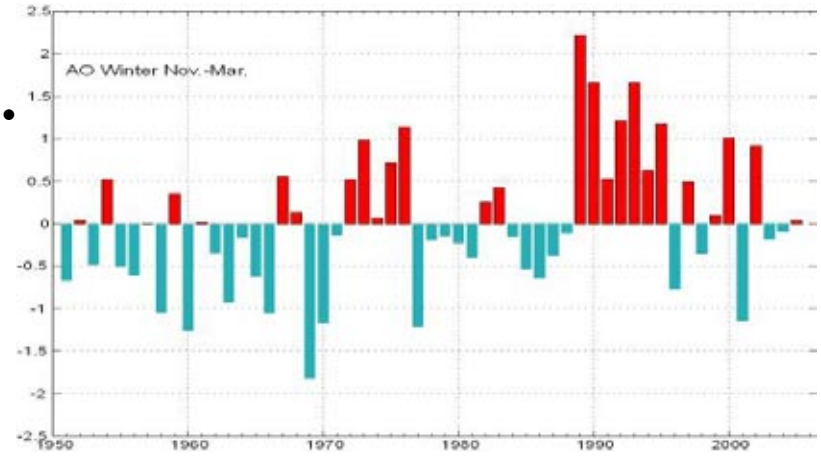

The Arctic Oscillation in Winter (November to March).
Data from NCEP.

Website: http://www.arctic.noaa.gov/detect/climate-ao.shtml

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Climate Change and Contamints in the Arctic

Ocean Processes

Thermohaline Circulation

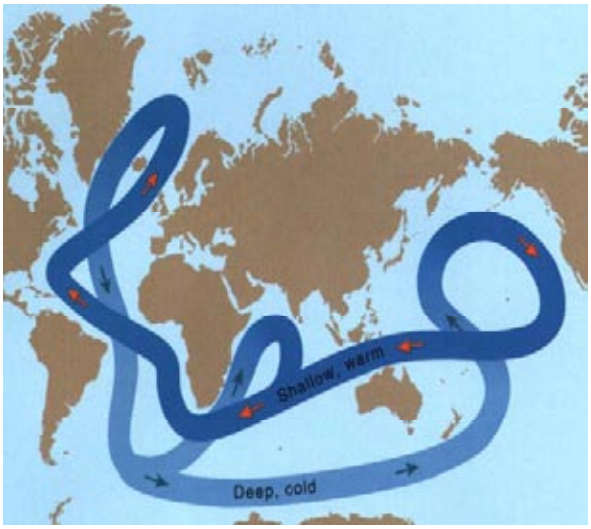
A global ocean current that delivers warm surface water from the tropics to the Arctic and Antarctic.

Climate Change and Contaminants in the Arctic

Bering Sea Inflow

Pacific and Bering Sea water passes through the Bering Strait at 800,000m^3/sec. The flow is forced by an 18 cm difference in sea level from the Atlantic, and flows east through the Canadian Archipelago to the Atlantic. It circulates at a few meters depth, and is the major heat delivery mechanism to the Beaufort Sea.

Arctic Influence on Ocean Circulation



The polar front influences global ocean currents

The Arctic plays a fundamental role in circulation of water in the oceans of the world. When warm, salty North Atlantic water reaches the cold Arctic around Greenland and Iceland and in the Labrador Sea, it becomes denser as it cools, and therefore sinks to deeper layers of the ocean. This process of forming deep water is slow, but takes place over a huge area. Every winter, several million cubic kilometers of water sink to deeper layers, which move water slowly south along the bottom of the Atlantic Ocean.

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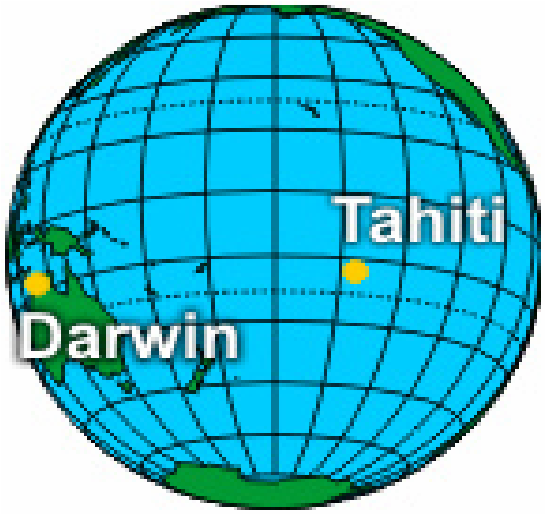
Climate Change and Contaminants in the Arctic

Ocean Processes

Southern Oscillation Index

Cyclic changes in equatorial Pacific Ocean surface temperatures, as expressed by the gradient between Darwin, Australia and Tahiti result in El Niño events. Warm surface water in the western Pacific, and cold surface water in the eastern Pacific, result in La Niña events.

El Niño Southern Oscillation (ENSO)



Website: http://www.srh.weather.gov/srh/jetstream/tropics/enso.htm

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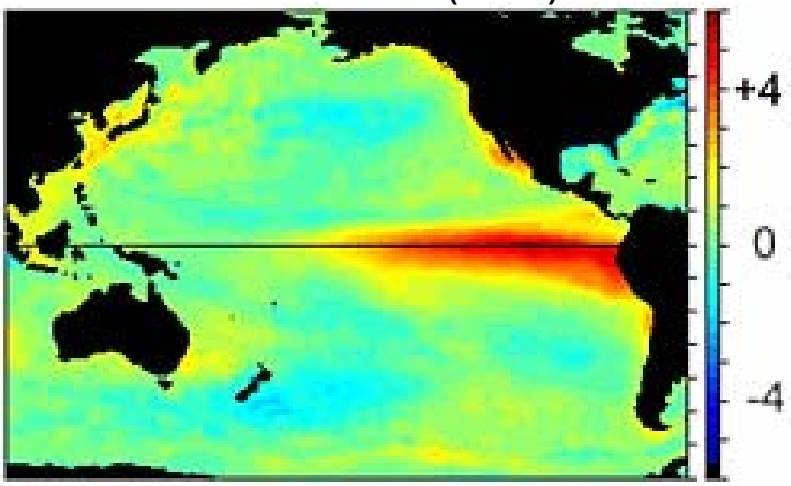
El Niño Southern Oscillation (ENSO)



From December 1997, this image shows the change of sea surface temperature from normal. The bright red colors (water temperatures warmer than normal) in the Eastern Pacific indicates the presence of El Niño

Website: http://www.srh.weather.gov/srh/jetstream/tropics/enso.htm

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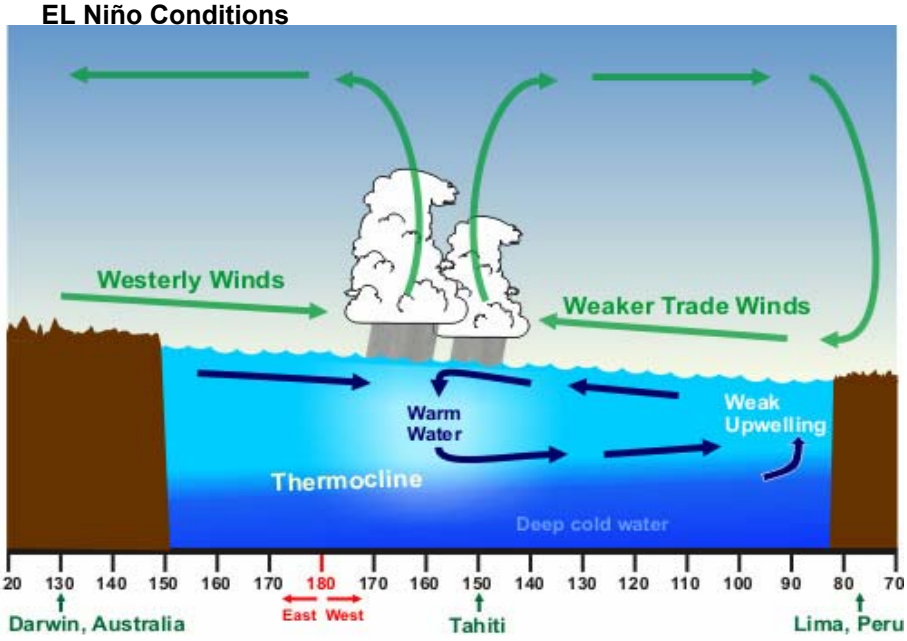
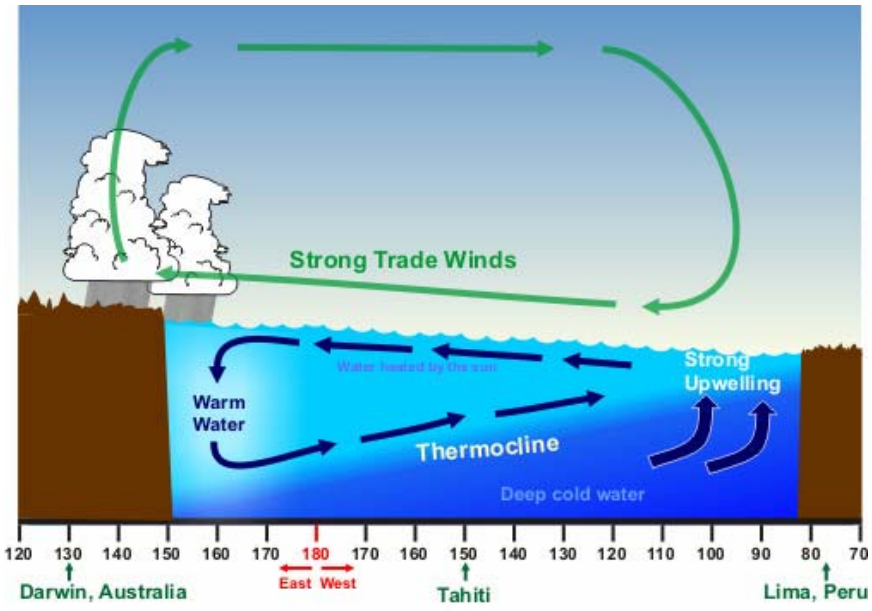
EL Niño Conditions



Website: http://www.srh.weather.gov/srh/jetstream/tropics/enso_patterns.htm

La Niña Conditions



Website: http://www.srh.weather.gov/srh/jetstream/tropics/enso_patterns.htm

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Climate Change and Contaminants in the Arctic

ACIA Climate Model Projections

- Increase mean temperature of 1.6–5.8C by 2100.
- Increase precipitation, mostly as rain.
- Decreased sea ice, decreased snow cover and albedo.
- Increase in sea level ≈ 20cm.
- Possible increase river output in some, not all, Arctic rivers.
- Decrease in permafrost in some regions.

Climate Change and Contaminants in the Arctic

ACIA Climate Model Limitations

- No ability to model ocean processes.
- No ability to model AO, SO, PV.
- No ability to model clouds.

Climate Change and Contaminants in the Arctic

Climate and Contaminant Transport (Atmospheric)

- Siberian high is responsible for about 15%.
- Aleutian low contributes about 25%.
- Icelandic low contributes about 40%.

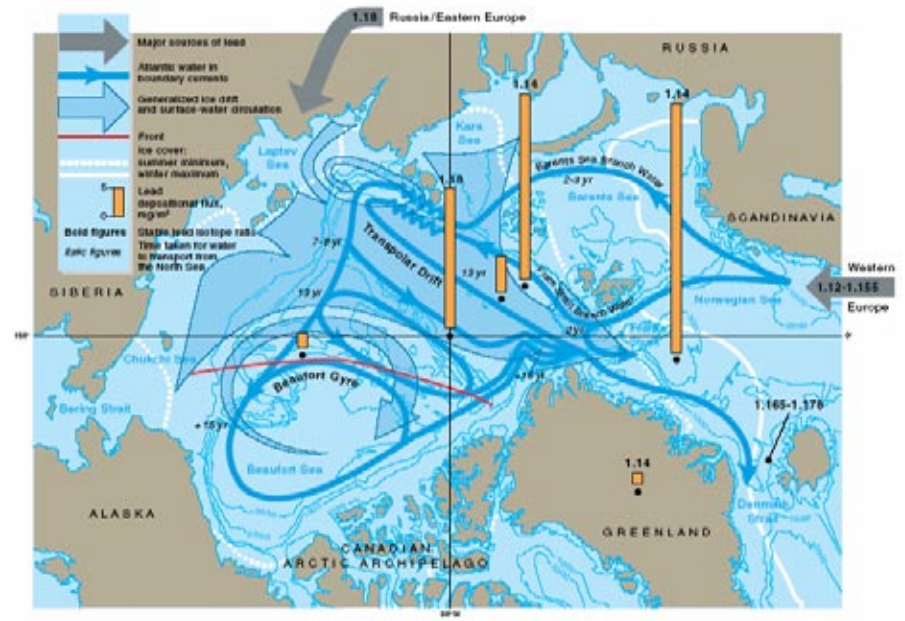

Fig. 6·1. The major sources of contaminant lead transported to the Arctic are indicated by the stable lead isotope composition of sediment cores as being either Western Europe (indicated by a ^{206}Pb:^{207}Pb ratio of 1.14) or Eurasia (indicated by a ^{206}Pb:^{207} Pb ratio of 1.18) adapted from Gobeil *et al.*, 2001a). AMAP Assessment 2002: The influence of Global Change on Contaminant Pathways. 21

Climate Change and Contaminants in the Arctic

Climate and Contaminant Transport (Oceanic)

- Strong positive AO causes increased cyclonic movement of surface water and ice in the Arctic Ocean.
- Strong positive AO diverts Russian Arctic river inflow (1000 Km^3/yr.) into the Canada Basin, and the Canadian Archipelago.
- Strong negative AO causes Russian River water to be diverted to eastern Greenland.

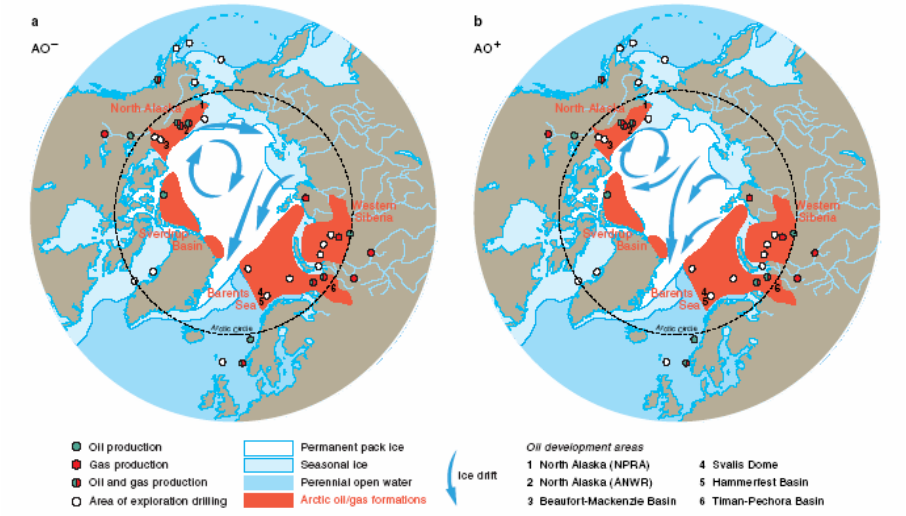

Fig. 6·10. Oil/gas-bearing regions and locations of oil/gas production together with the ice-drift field under a) AO-conditions and b) AO+conditions (ice motion based on Rigor *et al.* (2002) and oil data from Bakke *et al.* (1998)). AMAP Assessment 2002: The Influence of Global Change on Contaminant Pathways.

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Climate Change and Contaminants in the Arctic

Climate and Contaminant Transport (Atmospheric)

- Strong ENSO events increase atmospheric transport of lower latitudes contaminants to Eastern Arctic Canada.

Climate Change and Contaminants in the Arctic

Climate – Contaminant – Ecosystem Interaction

- Increased temperature increases volatilization.
- Increased temperature speeds bacterial uptake and chemical reaction with contaminants.
- Increased solar radiation on open Arctic Ocean water speeds gaseous evasion of volatile contaminants.
- Increased precipitation increases atmospheric scavenging of contaminants, and decreases rate of transport to the Arctic.

Climate Change and Contaminants in the Arctic

Conclusions

- Climate-contaminant interaction is complex, and poorly understood.
- Impact of climate is not uniform.
- Some contaminants (HCH) appear to be decreasing in Arctic environmental samples.
- Only serial measurements, over time, in the environment, biota, and human residents, will eventually allow understanding of mechanisms and impacts.

Agricultural Research Service

Climate & Pathogens:

Consequences for Human Health & Subsistence Food Chains Across High Latitudes of the North

Eric P. Hoberg, US National Parasite Collection, USDA
Lydden Polley, Veterinary Microbiology, Univ. Saskatchewan
Susan Kutz, Ecosystem and Public Health, Univ. Calgary
Emily Jenkins, Veterinary Microbiology, Univ. Saskatchewan
Brett Elkin, Government of Northwest Territories
Alasdair Veitch, Government of Northwest Territories

Climate Change in the North

Climate change will modify the interface for people & the environment.

Exposure to pathogens through water-borne & food-borne pathways will be altered.

Pathogens & diseases in key mammalian, avian & fish species can influence availability, sustainability & suitability of food resources.

Pathogens & emergence of diseases can disrupt structure for terrestrial, aquatic & marine ecosystems.

Climate Change Predictions

Climate change will eliminate ecological barriers & constraints on development & distribution for pathogen transmission;

creates new conditions.

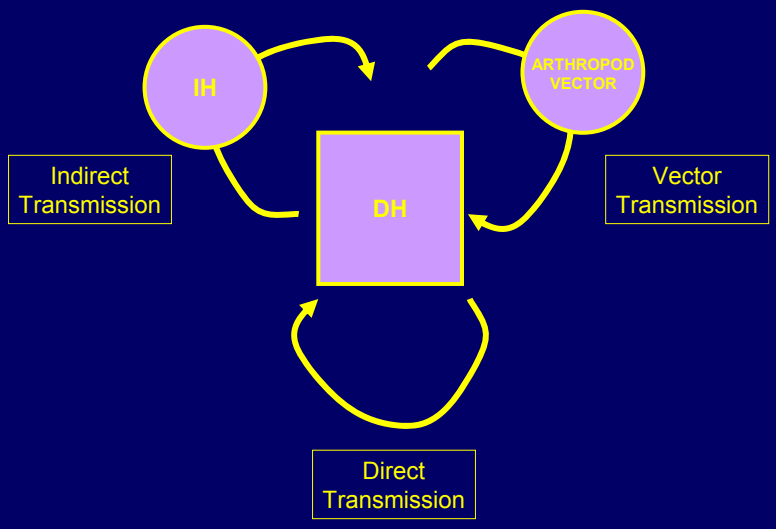
Maps for distributions of hosts, pathogens & diseases will be redrawn.

Emergence of diseases & unanticipated "cascades" can influence terrestrial, aquatic and marine ecosystems.

Defining Pathogens

- Microparasites (prions, viruses, bacteria, protozoans)
- Macroparasites (worms, arthropods- ticks, fleas)
- Widespread among all vertebrates & invertebrates
- Potential to cause disease- impaired function or responses; reproductive success; survival
- Interactive (multifactoral) processes for disease
  - Weather, habitat, long term climate change
  - Contaminants,
  - Other stressors on host individuals/ populations

Circulation of Pathogens



Pathogens & Environment

- Zoonoses (animals to humans)
  - Subsistence food chains & "country foods"
- Wildlife & Fish Pathogens
  - Circulate in natural populations
  - Ecological mechanisms/ characteristic ranges
  - Shape ecosystem structure & function
  - Food-web interactions & cascades
  - Influence on subsistence food chains, animal or resource distribution & availability

Pathogens & Climate Change

- Long term/ Cumulative "in situ" processes
  - Responses to trends in warming
  - Decadal and longer
  - Extension of growth season; tolerance, development & generation time; amplification; emerging disease
  - Tipping points for changing dynamics of transmission
  - Latitudinal & altitudinal range shifts
  - Host-switching? Sympatry, "Ecotone" or Border effects
- Short-term/ Ephemeral "external" processes
  - Responses to extreme weather events
  - Temperature anomalies/ humidity
  - Explosive emergence of disease

Climate & Pathogens

- Ecology of Parasitic Disease in Wildlife-
  - Prevalence, intensity, dynamics of transmission
  - Interactions among pathogens
  - New ecological associations (wild/domestic hosts)
  - Pathogen evolution (viruses) in new hosts
  - Altered vector ecology, distribution, abundance
  - Synergy w/ environmental stressors, habitat
  - Extreme weather, anthropogenic disturbance
- Ecology of Zoonoses (transmissible from animals to people)
  - Food chains in terrestrial, aquatic & marine environments
  - Water resources
  - Interface for people, wildlife & environment

Things We Know?

- Climate change is accelerating
- Increasing abundance of pathogens
- Climate has direct influence on distribution for pathogens/ diseases
- Host-Species distributions change
  - Change drives host-switching
- Switching to new hosts drives disease

Things We Need to Know?

- Pathogen diversity
- Distribution- hosts & geography
- Effects on hosts
- Potential for interaction with climate
  - development, thresholds, tipping points,
  - Resilience, tolerances

Things We Don't Know?

- Challenge to predict dynamic change
- Specific biological parameters
- Detailed data for pathogen distribution
- Unanticipated cascades
- Consequences for perturbation of key vertebrates/invertebrates

Process for Understanding

- Evidence based to demonstrate links
- Baselines for distribution, epidemiology
- Effects of temperature on transmission
- Regional evidence of climate change
- Forecast temporal & spatial effects
- Detect consequences of climate change

Collaboration is Critical

- Local knowledge- communication
- Integrated field sampling- hosts/pathogens
  - Opportunistic (hunting activities)
  - Targeted Survey and inventory (standards)
  - Monitoring (following specific systems)
- Development of baselines/ museum archives (tissues, specimens, informatics)
- Research networks/ training

Why We Need Archives?

- **"The Past is the Key to the Present"**
- **Environments in rapid transition**
  - **Permanent change & loss**
  - **New ecological associations**
- **Permanent record of faunal structure**
- **Documenting Stability & Change**

Influence of Climate

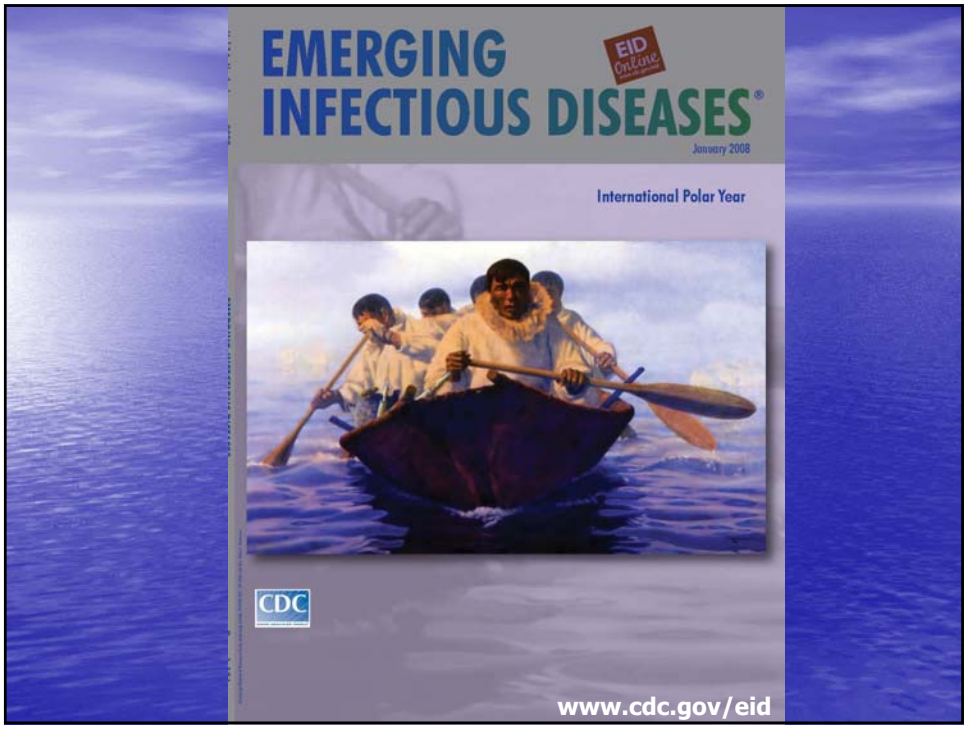
- Spatial/ Temporal distributions of wildlife/ migration, habitat use
- Wildlife numbers, population structure
- Access to wildlife resources
- Pathogens are part of equation
- Reduced reliance on wildlife resources?
- Cascading effects on a subsistence culture in northern communities?

Climate change in the Arctic:
Potential emergence or re-emergence of infectious diseases

Alan J. Parkinson Ph.D.
Arctic Investigations Program
Centers for Disease Control & Prevention
Anchorage, Alaska.

Where are we going?

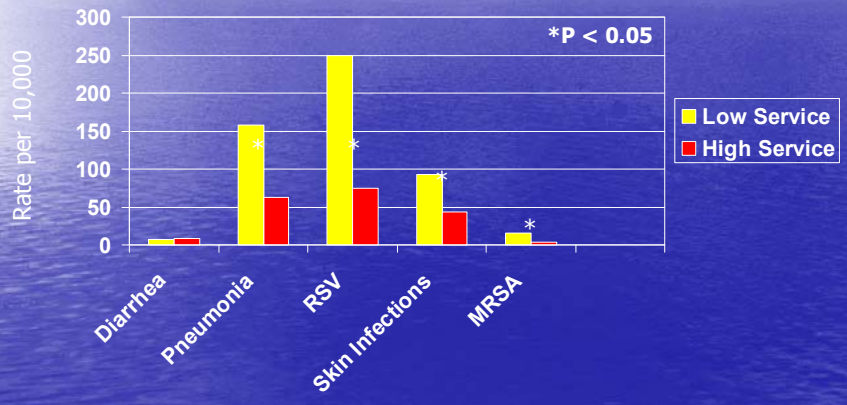
- Climate Change and infectious Diseases Diseases
  - Increase in existing diseases?
  - New diseases?
- Planning Ahead-Public Health Actions
  - Tracking
  - Outbreak investigation
  - Partnerships
  - Education
  - Research
- Conclusions



Existing Infectious Diseases of Concern In Arctic Regions

- Invasive bacterial diseases (pneumonia; meningitis)
  - *Streptococcus pneumoniae*
  - *Haemophilus influenzae*
- Tuberculosis
- Influenza and other respiratory viruses
  - RSV
- Methicillin resistant staph aureus (MRSA)
  - Antimicrobial resistance
- Sexually transmitted infections
  - Chlamydia, gonorrhea, HIV
- Botulism
- Parasitic diseases
  - *Echinococcus multilocularis*; *Echinococcus granulosis*

Hospitalization Rates for "High" and "Low" Water Service Regions, Alaska, 2000-2004



Hennessy etal AJPH 2008 in press

Infectious diseases may increase due to damage to the sanitation infrastructure

- "Water-washed" diseases
  - Bacterial Skin infections
    - Methicillin Resistant *Staphylococcus aureus*
  - Respiratory diseases
    - RSV
    - Pneumonia, influenza
- "Waterborne" diseases
  - *Giardia sp*
  - *Cryptosporidium*
  - Hepatitis A

Existing infectious diseases that may increase in prevalence

- *Clostridium botulinum*
  - Caused by eating food contaminated with botulinium neurotoxin
  - Common in US, Canadian Arctic and Greenland
  - Associated with fermented foods made in sealed (anaerobic) containers at temperatures above 4C (41F)
  - Incidence may increase as ambient temperatures increase

Existing infectious diseases that may increase in prevalence

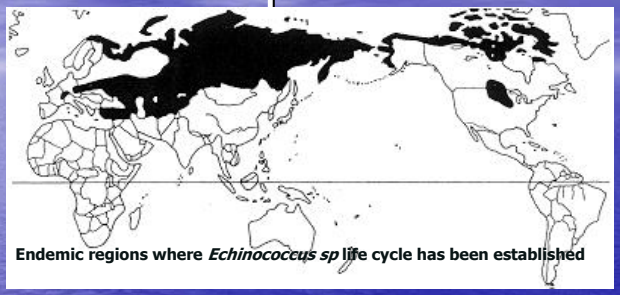
- Paralytic Shellfish poisoning (PSP)
  - Shellfish concentrate neurotoxin from algal blooms (red-tides)
  - Follows eating raw shellfish
    - gastroenteritis, paralysis
  - Alaska has one of the highest rates in US
  - Potentially increase by climate-related sea water warming, precipitation, nutrient-laden run-off

Existing infectious diseases that may increase in prevalence

- *Giardia lamblia*
  - Protozoan infection of the GI tract
  - Diarrhea following consumption of contaminated untreated water
  - Beaver common host
    - Range expanding northward in Alaska and Canada
  - Expansion of habitat may result in appearance of disease in new regions.

CDC

Existing infectious diseases that may increase in prevalence



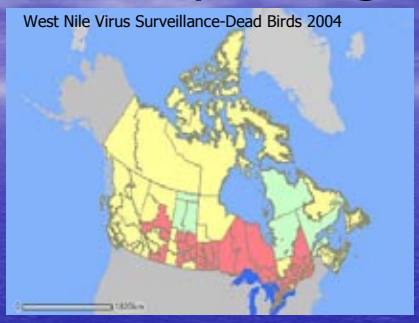
Endemic regions where *Echinococcus sp* life cycle has been established

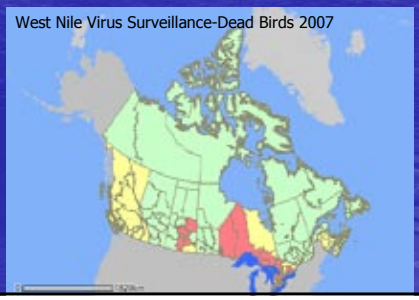
- *Echinococcus multilocularis*
  - Northern Hemisphere only
  - Parasitic tape worm disease
  - Human accidental host
  - Cyst-like lesions in liver
  - Vectors are foxes, rodents (voles)
  - Dogs and man accidental hosts
  - Climate-favoring expansion of habitat may result in appearance of disease in new regions.

CDC

Infectious diseases that may emerge

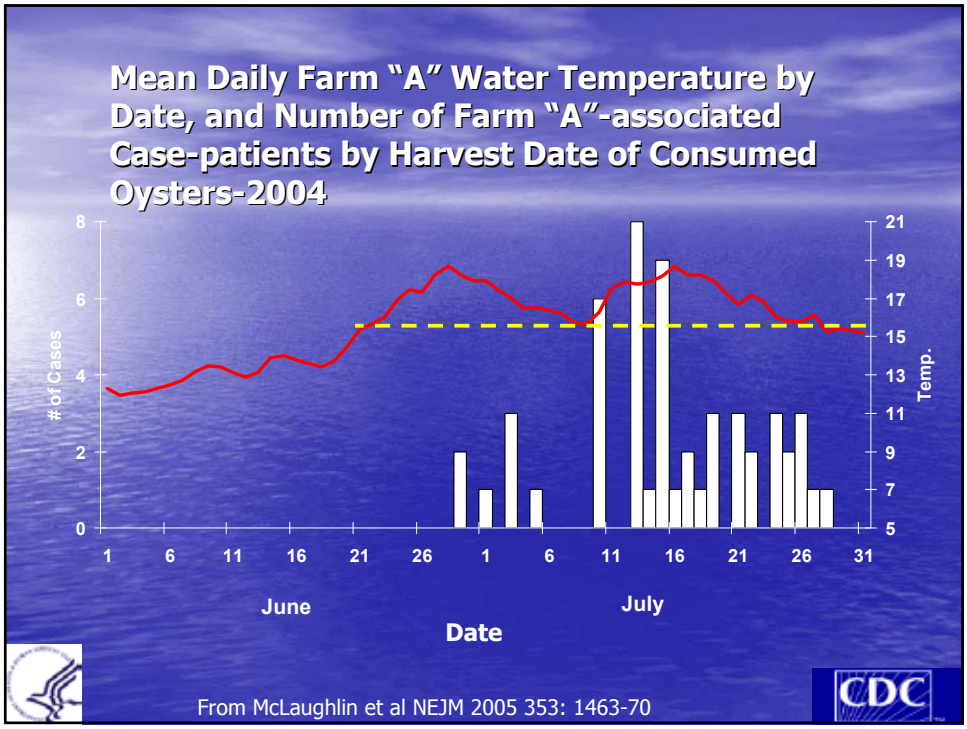
- West Nile virus
  - Emerged in US 1999-outbreak of encephalitis
  - Infects mosquitoes, birds,
  - Humans, horses dead-end hosts
  - Mosquito vectors in Alaska and Canada
    - A. vexans
    - C.pipiens
    - C.resuans
  - Dead bird surveillance conducted 2000-2006
  - Furthest north 57° L North 2004

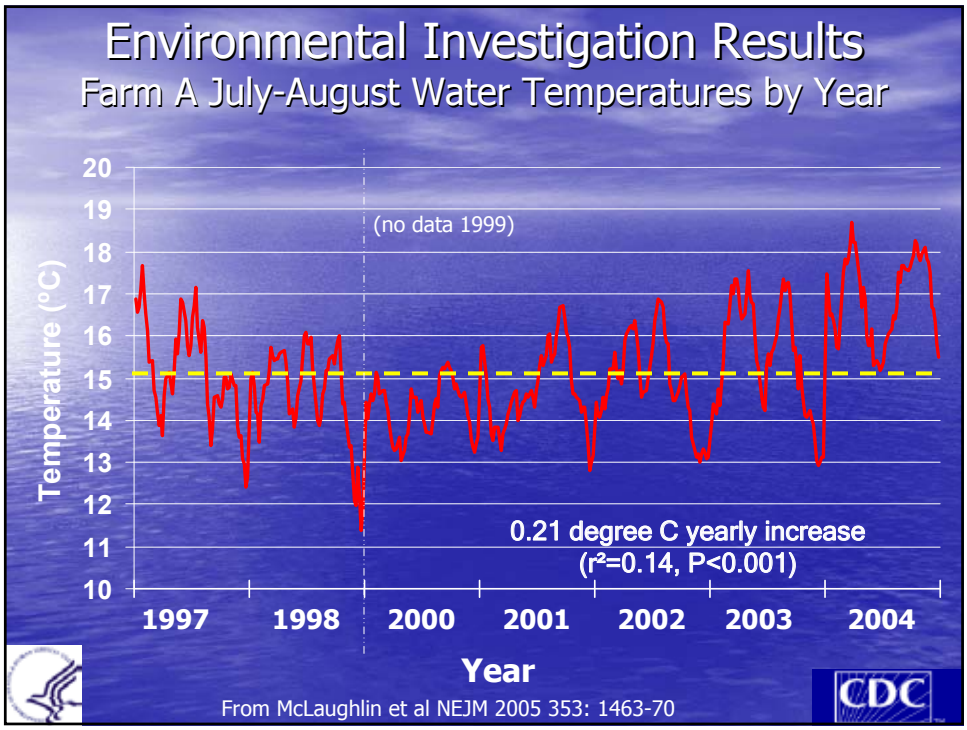




Infectious diseases that may emerge

- *Vibro parahemolyticus*
  - Ubiquitous in marine environments
  - Associated with fish/shellfish
  - Causes gastroenteritis
  - Outbreaks associated with farm seawater mean temperatures of >15C
  - Outbreaks increasing since 1997
    - California
    - Washington
    - British Columbia

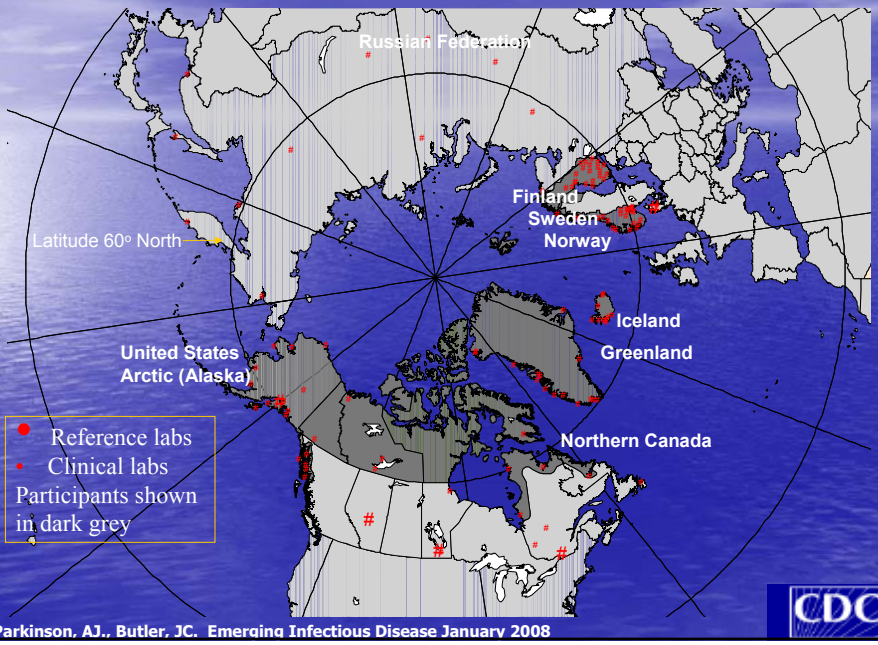

Mean Daily Farm "A" Water Temperature by Date, and Number of Farm "A"-associated Case-patients by Harvest Date of Consumed Oysters-2004
# of Cases
Temp.
0
2
4
6
8
5
7
9
11
13
15
17
19
21
1
6
11
16
21
26
1
6
11
16
21
26
31
June
July
Date
From McLaughlin et al NEJM 2005 353: 1463-70
CDC


Environmental Investigation Results
Farm A July-August Water Temperatures by Year
Temperature (°C)
20
19
18
17
16
15
14
13
12
11
10
(no data 1999)
0.21 degree C yearly increase
(r²=0.14, P<0.001)
1997
1998
2000
2001
2002
2003
2004
Year
From McLaughlin et al NEJM 2005 353: 1463-70
CDC

Planning Ahead-Public Health Actions

- Track infectious diseases & trends
  - Surveillance
    - Climate sensitive diseases
      - Respiratory infections
      - Aseptic meningitis (WNV)
    - Circumpolar
      - International Circumpolar Surveillance (ICS)

International Circumpolar Surveillance Network



Parkinson, AJ., Butler, JC. Emerging Infectious Disease January 2008

Planning Ahead-Public Health Actions

- Investigate outbreaks
  - Gastroenteritis, aseptic meningitis, botulism
  - Related to climate?
- Develop partnerships
  - Local, state, federal govts, universities, NGO's, industry
  - Community based networks
- Develop policies and plans
  - Early warning systems
  - Public health advisories

CDC

Planning Ahead-Public Health Actions

- Ensure continuity of health care
  - Extreme events- village evacuation
- Inform and educate
  - Specific groups at risk
  - General public
  - Health care providers
    - Public health workforce
  - Policy makers

CDC

Planning Ahead- Public Health Actions

- Conduct research
  - Understand the associations between weather, weather extremes, climate and infectious disease emergence
    - Investigate outbreaks-role of climate
    - Need for baseline data on climate sensitive infectious disease prevalence
    - Role of temperature and food and water borne diseases
  - Community Based Research
  - Circumpolar Health Research Networks

Conclusions (1)

- Arctic communities uniquely vulnerable to climate change
  - Small isolated communities
  - Existing health disparities
  - Traditional lifestyle and culture important to health and wellbeing
  - Fragile economic support, dependence on subsistence hunting and fishing
  - Public health response and acute care may be marginal, or non-existent in some regions

Conclusions (2)

- Infectious diseases may emerge or reemerge, there may be:
  - Increase in infectious diseases already present
  - Emergence of new infectious diseases

Conclusions (3)

- Planning Head-Public Health Actions
  - Track infectious diseases & trends
  - Investigate outbreaks
  - Develop partnerships
  - Develop policies and plans
  - Ensure continuity of health care
  - Inform and educate
  - Conduct research

Community Relocation and Health
- Case Greenland

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Roskilde University, Denmark

Senior Research Fellow
Nordregio, Nordic Council of Ministers, Sweden

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Conclusions

- **Four elements are presently decisive in structuring the settlements and the relocation processes**
  - **Politics**
  - **Food access / the formal and the informal economy**
  - **Gender differences in aspirations and mobility**
  - **Generation differences in aspirations and mobility**
- **The relocation processes have marked influence on lifestyles and physical and social healt**
- **Perception of lifestyles and physical and social health have marked influence on the relocation processes**
- **The ongoing climate changes are generally enhancing these processes**

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The presentation

- **Introduce to changes in the settlement structure**
- **Focus on contemporary location/relocation mechanisms**
- **Look into consequences on both physical and social health**
- **Conclude on the most important challenges**

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1. Changes in the settlement structure

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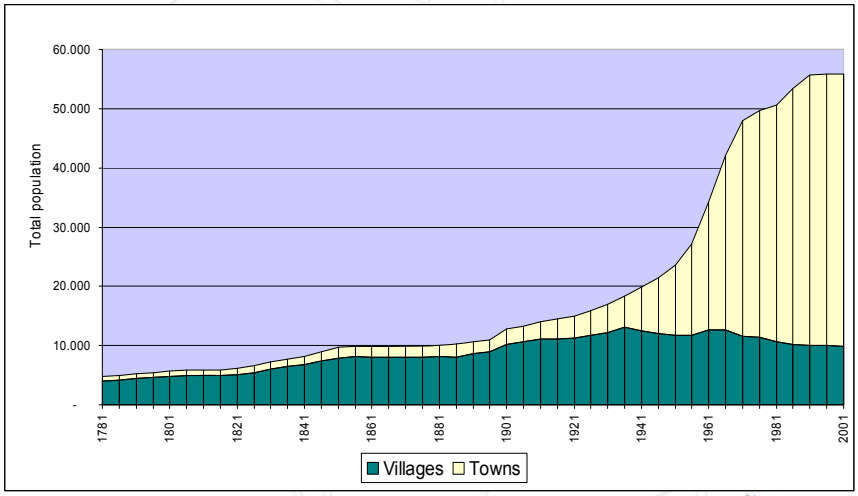
Settlement Structure



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Political processes of change

- **Sedentarization**
- **Intentional dispersion**
- **Modernization phase 1 – privatization, concentration**
- **Modernization phase 2 – state intervention, concentration**
- **Preparation for Home Rule – centralization**
- **Home Rule – intentional dispersion**
- **Home Rule – unintentional concentration**

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Settlement structure
– the village of Alluitsup Paa

- Picture from Alluitsup Paa

Settlement structure
- the village of Alluitsup Paa

- Picture from Alluitsup Paa

Characteristics of village life

- **Size: from few to 500 inhabitants**
- **Services available**
  - **A single shop**
  - **School, 1st to 6th or 8th grade**
  - **Service houses**
- **Economic background**
  - **Hunting and fishing**
  - **Simple processing facilities**
  - **Limited 3rd sector jobs**
  - **Informal economic activities**

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Settlement structure
- the town of Nanortalik

- Picture from Nanortalik

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Settlement structure
- the town of Ilulissat

- Picture from Ilulissat

Settlement structure
- the capital of Nuuk

- Picture from Nuuk

Characteristics of town life

- **Municipal centres**
- **Size: 500 – 14.000 inhabitants**
- **Full services available**
  - **Several shops**
  - **School 1-10th grade**
  - **Services available at individual level**
- **Economic background**
  - **Hunting and fishing**
  - **Processing facilities**
  - **3rd sector jobs**
  - **Informal economic activities**

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Gendered migration patterns

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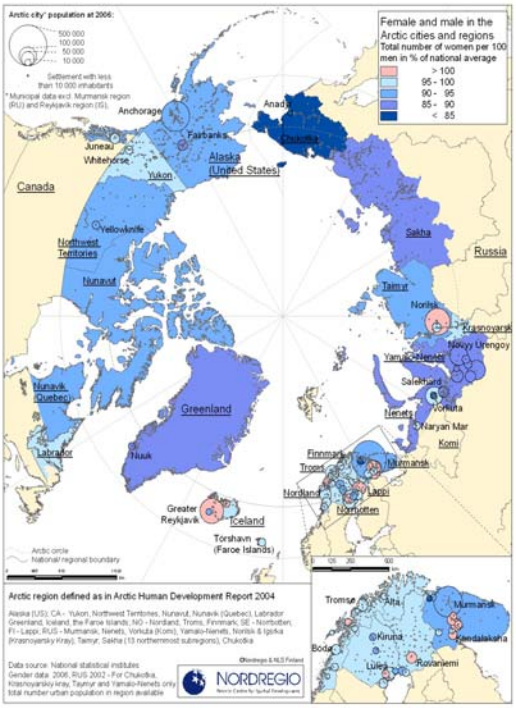

Circumpolar gender imbalance

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Nordic countries gender imbalance

- Map of gendered differences in the Nordic Countries

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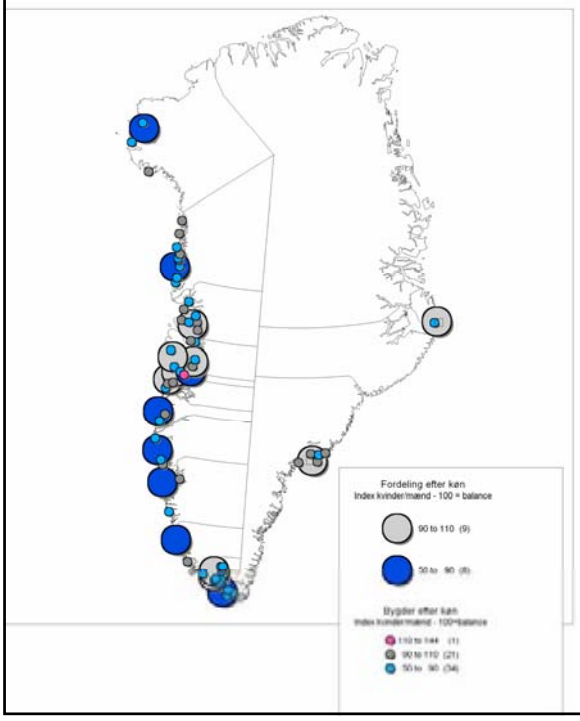

Greenland gender imbalance

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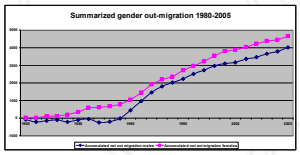
Gender characteristics of out-migration



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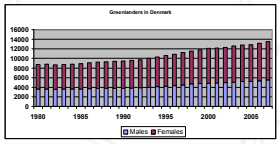
Gender characteristics of out-migration



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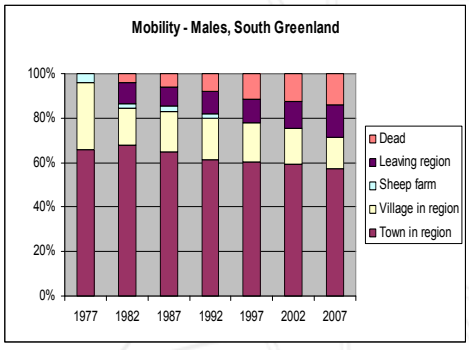
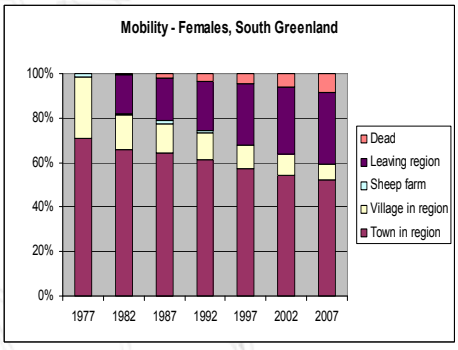
Gender characteristics of inter-settlement migration





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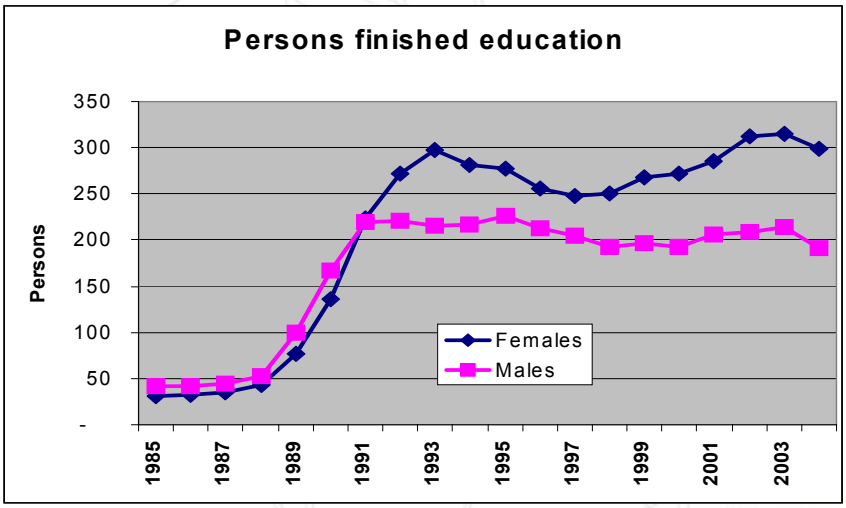
Gender structure of education



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Household incomes

- 24% of hunters with full time license had incomes from other activities
- In more than 70% of the households the wives contributed to the income
  - Typically incomes from the service sector, i.e. Schools, Kindergartens, Offices, Cleaning etc.
  - Very seldom in connection with processing of hunting and fishing products
- In more than 50% the major income source is generated by the wife
- In many villages the informal economy provides more than 30% of all incomes

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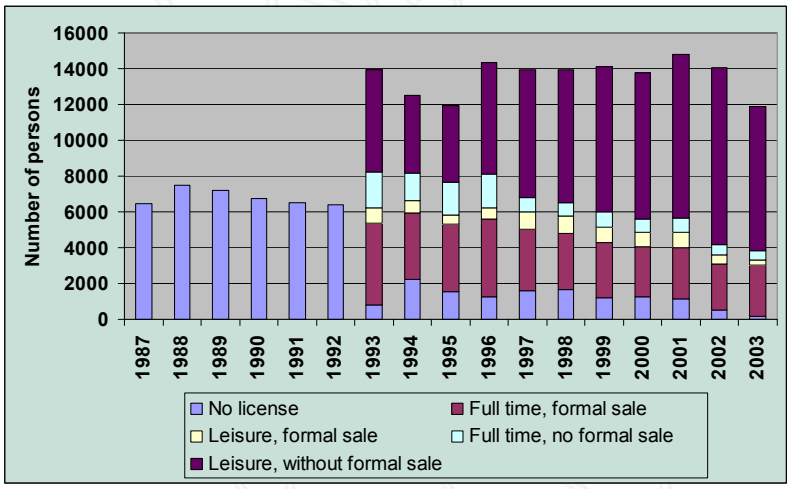
Renewable Resources



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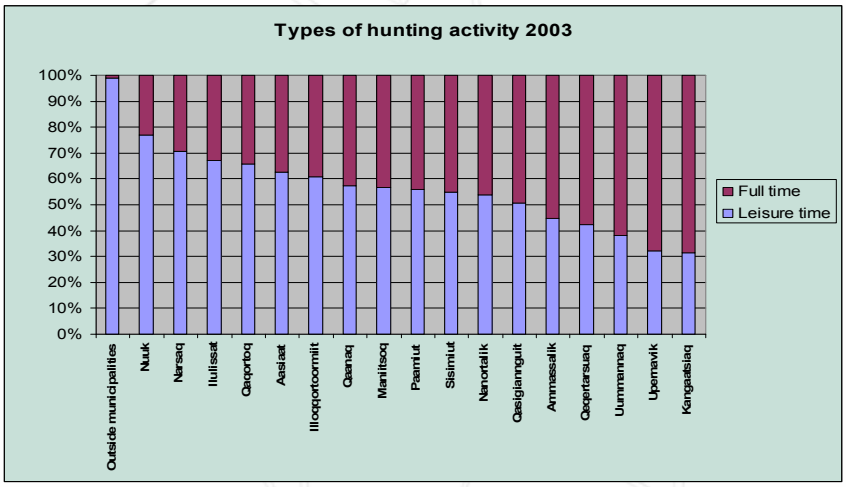
Renewable Resources



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Gender structure of education

- Picture from Alluitsup Paa

Gender structure of education

- Picture from Nanortalik

The demographic challenge

- Picture from South Greenland

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The demographic challenge

- Picture from South Greenland

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The demographic challenge

- Picture from South Greenland

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The demographic challenge

- Picture from South Greenland

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Food supply and food security

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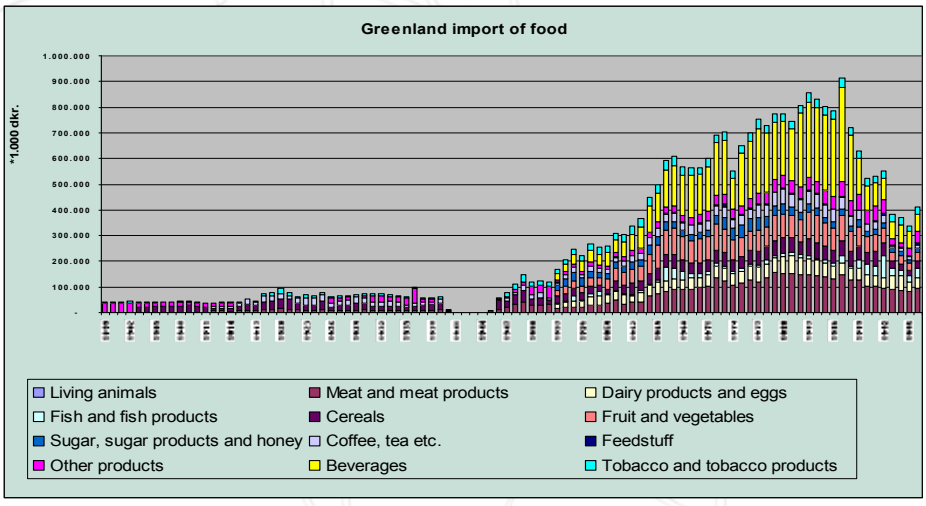
Food-security



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Informal economy
- case Nanortalik

- Picture from Nanortalik

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Informal economy – case Alluitsup Paa

- Picture from Alluitsup Paa

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Informal economy
- case Nanortalik

- Picture from Nanortalik

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Informal economy
– case Ilulissat

- Picture from Ilulissat

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Informal economy – case Ilulissat

- Picture from Ilulissat

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Informal economy – case Ilulissat

- Picture from Ilulissat

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Rationales

- **Maintaining a link to the formal economy**
- **(Re)distribution of formal economies**
- **Indirect and direct social support**
- **Maintaining local production**
- **Provides local products available for a larger audience**
- **Providing basic existence of otherwise condemned settlements**

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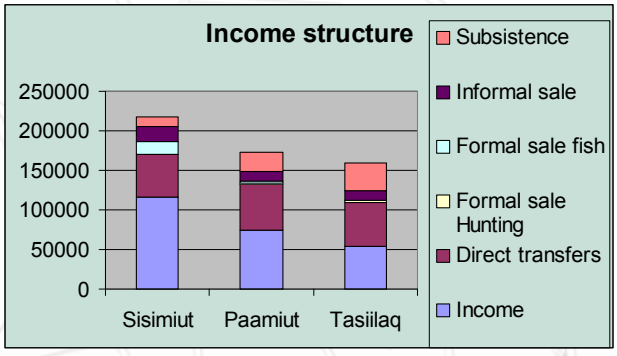
Economic base



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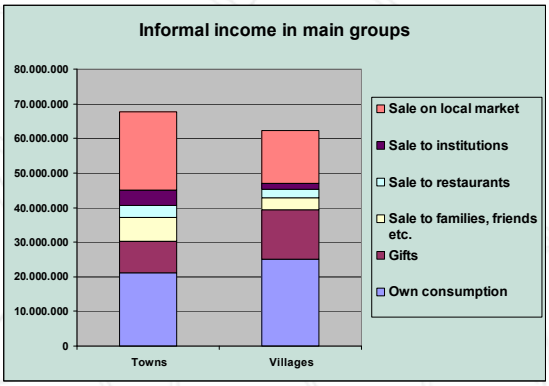
Informal economy in towns and villages



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From informal to formal economy

- Picture from supermarket

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From informal to formal economy

- Picture from supermarket

Health characteristics

Town/village smoking characteristics

- **Graph to be included showing:**
  - **Level of smoking high**
  - **Differences in the type of smoking between towns and villages**
  - **Faster reaction to rejection of smoking habits in the towns**
  - **Report of diseases directly caused by smoking between towns and villages not significant**
  - **Respiratory diseases, however, reported higher in villages compared to towns**

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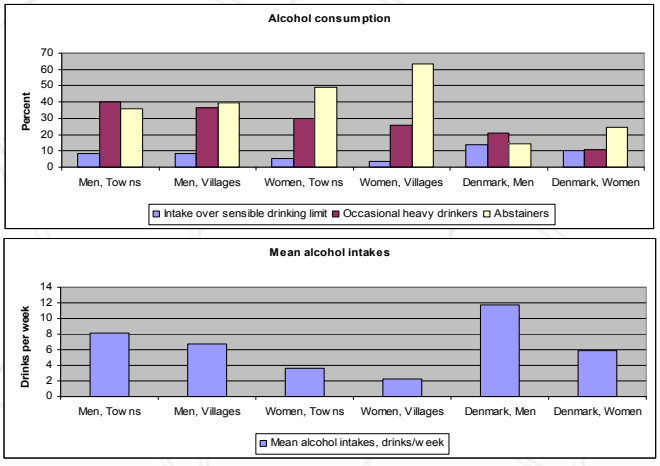
Town/village drinking characteristics



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Town/village obesity characteristics

- **Graphic to be included showing**
  - **Reported obesity and obesity related health problems higher in villages compared to towns**
  - **Higher consumption of local food, but also higher consumption of low quality food in villages**

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Town/village health differences

- **Graphic to be included showing:**
  - **The general pattern of health related problems in towns and villages show a marked over-representation of most health problems in the villages**

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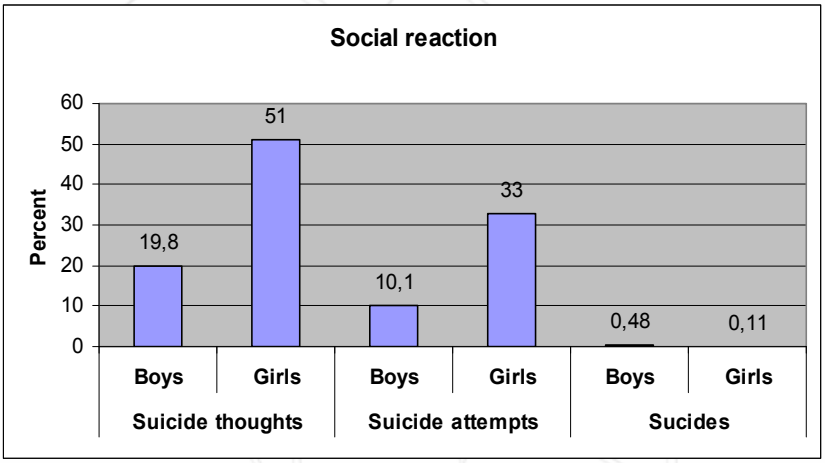
Social health

Town/village violence and abuse characteristics

- **Graphic to be included showing**
  - **Violence is a crucial factor in both towns and villages. The level of unreported violence is substantial higher in villages, and the level of violence has huge impact on the gendered migration pattern.**

Youth risk perception



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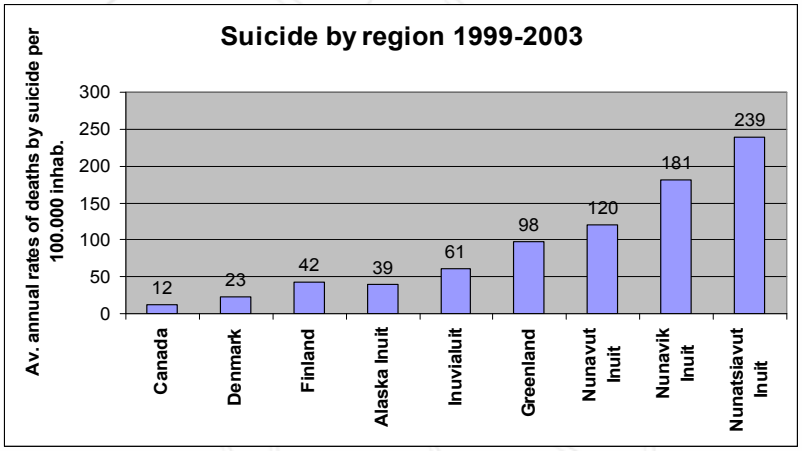
Suicide



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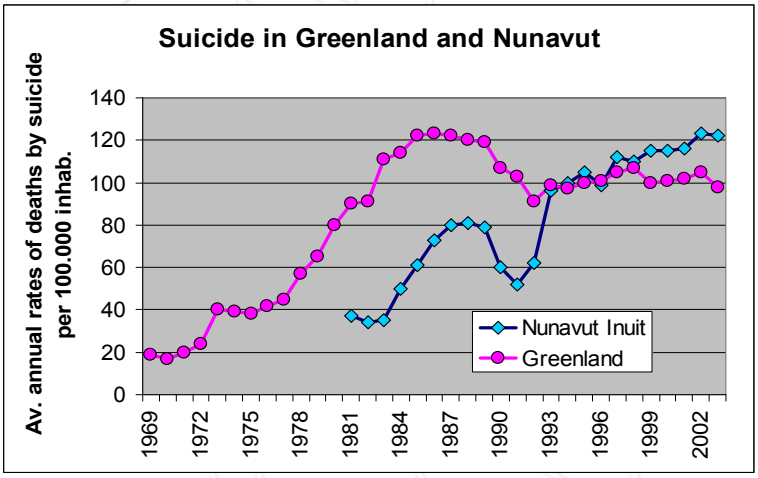

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Perspectives

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Gendered perspectives

- **Perceptions of changes**
- **The role of relations to community**
- **The role of relations to the world outside the community**
- **The role of qualification to the world outside the community**
- **Gender based differences in discourses and actions**

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Youth perspective

- **Perceptions of their future**
  - **Possibilities / options**
  - **Local and global constraints**
- **The relations to community**
- **The relations to the world outside the community**
- **Youth gender based differences**

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Generation reflections

- **Parents: Would like to see their children follow them in the activity**
- **BUT**
- **They would not like to recomment it due to**
  - **It is VERY hard**
  - **It pays VERY little**
  - **It is too risky**

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Generation reflections

- **Many sees their future in other settings**
- **Many, however, would like to pursue a future in hunting and fishing,**
- **BUT would require**
  - **Professionalization**
  - **Better equipment**
  - **Better working environment**
  - **Better economy**
- **A prerequisite, therefore, is a more modern, advanced, skilled AND RESPECTED trade**

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Generation reflections

- **THEY HAVE A CULTURAL IDENTITY**
- **But it differs from their parents..**
- **And it differs from what outsiders would like it to be..**
- **And it worries them that THEIR culture is not accepted by the ones who are supposed to represent them in international settings!**

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Conclusions

- **Four elements are presently decisive in structuring the settlements and the relocation processes**
  - **Politics**
  - **Food access / the formal and the informal economy**
  - **Gender differences in aspirations and mobility**
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Thank you for your attention

- Picture from Nanortalik

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