

Water, hygiene and skin infections: Northern Saskatchewan Experience

Water and Sanitation Innovations for the Arctic
February 5, 2013

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NORTHERN MEDICAL SERVICES
University of Saskatchewan



Waterborne diseases:

where the pathogen is in the water and causes illness when ingested

Water-washed diseases:

where transmission of the pathogen is interrupted by washing with water

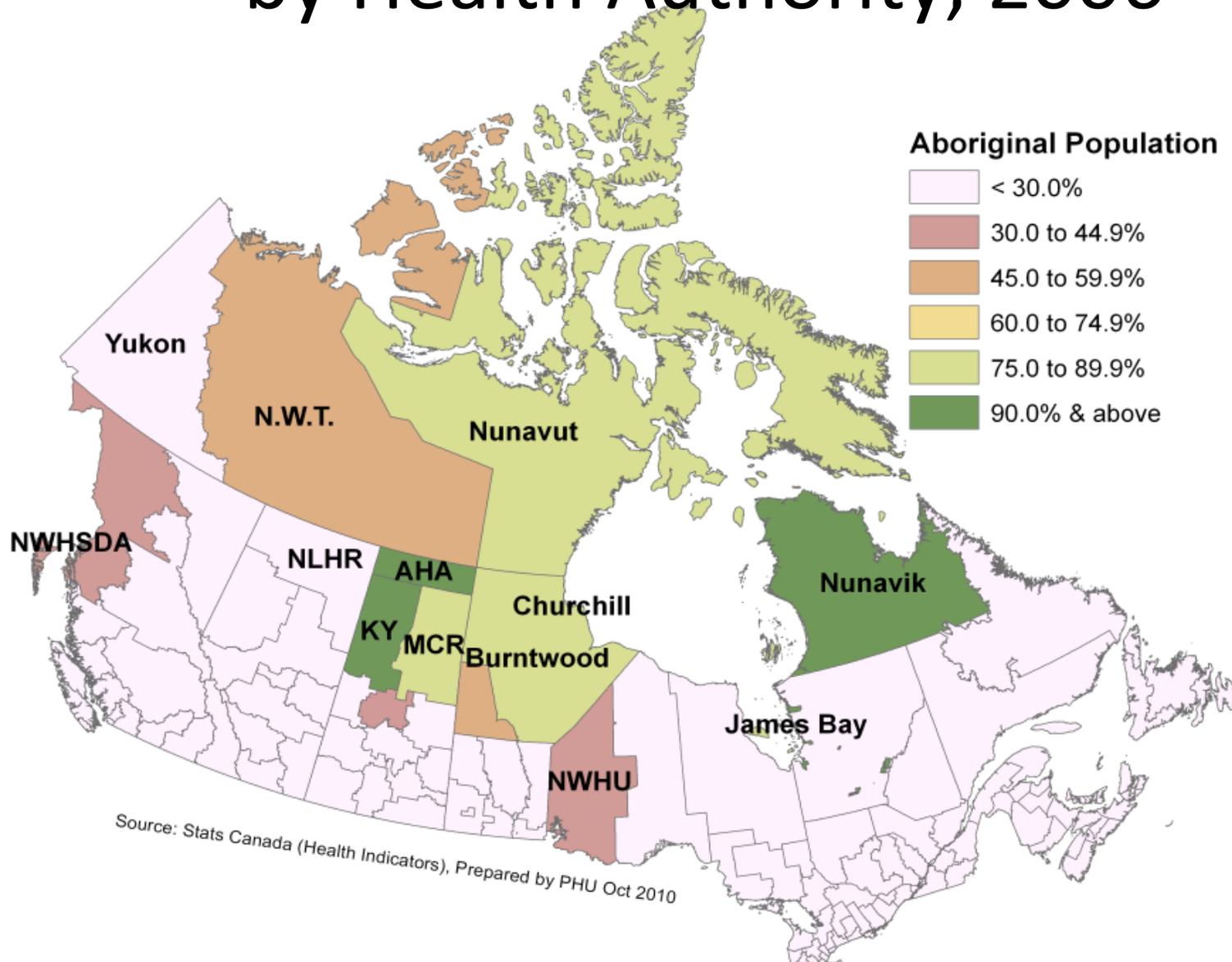




Northern Saskatchewan
2011 population = 39,000

0.3 people / sq mile
226,480 square miles

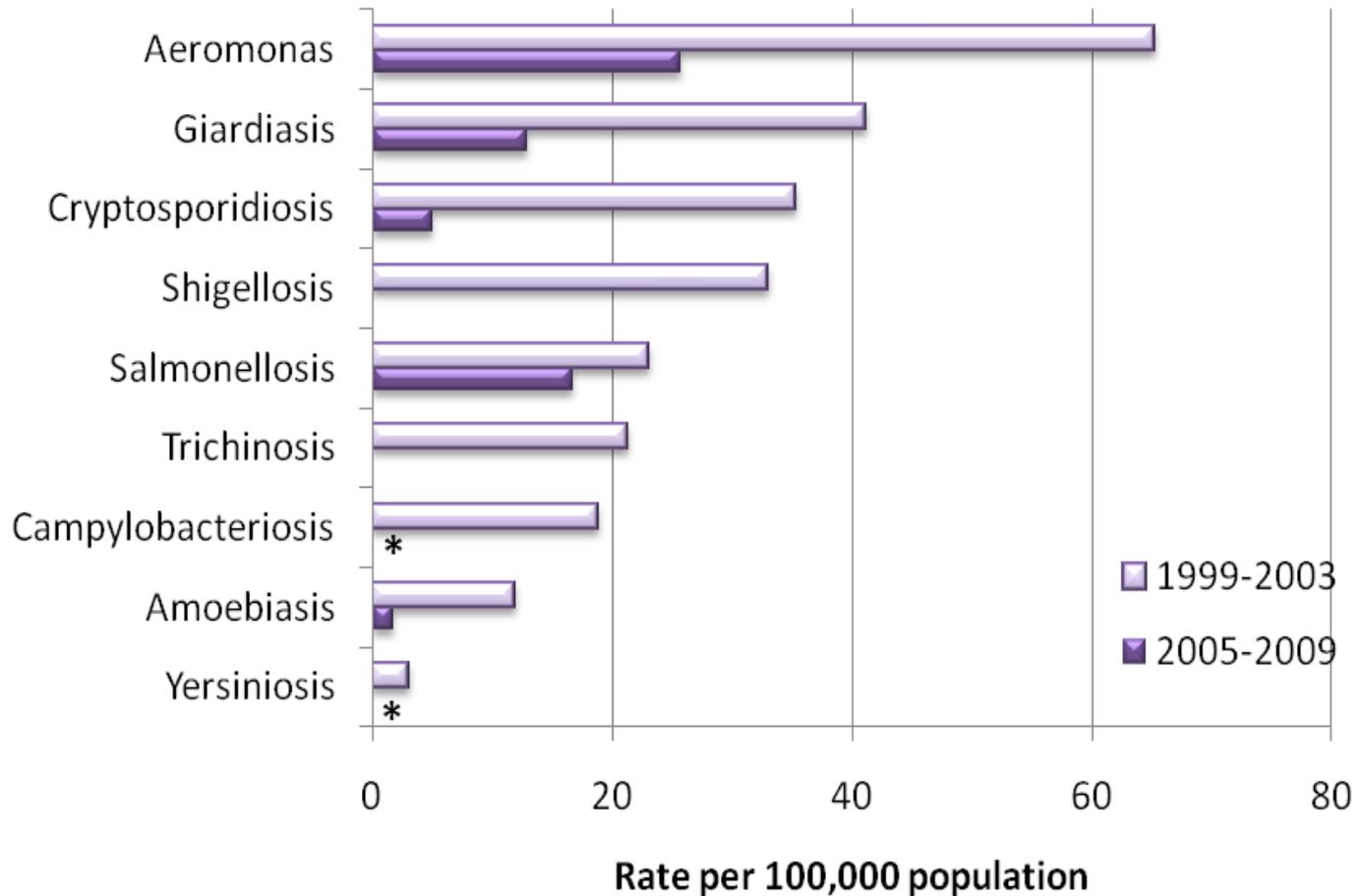
Population declaring Aboriginal identity, by Health Authority, 2006



Water Systems for First Nations homes on reserve in Saskatchewan

- 74% of the homes (10,523) are piped
- 21% of the homes (3,028) are on truck delivery
- 5% of the homes (652) are serviced by individual wells
- <1% of the homes (45) were reported to have no water service.

Selected infectious diseases reported, 5 year average estimated crude rates, Northern Saskatchewan 1999-2003 to 2005-2009

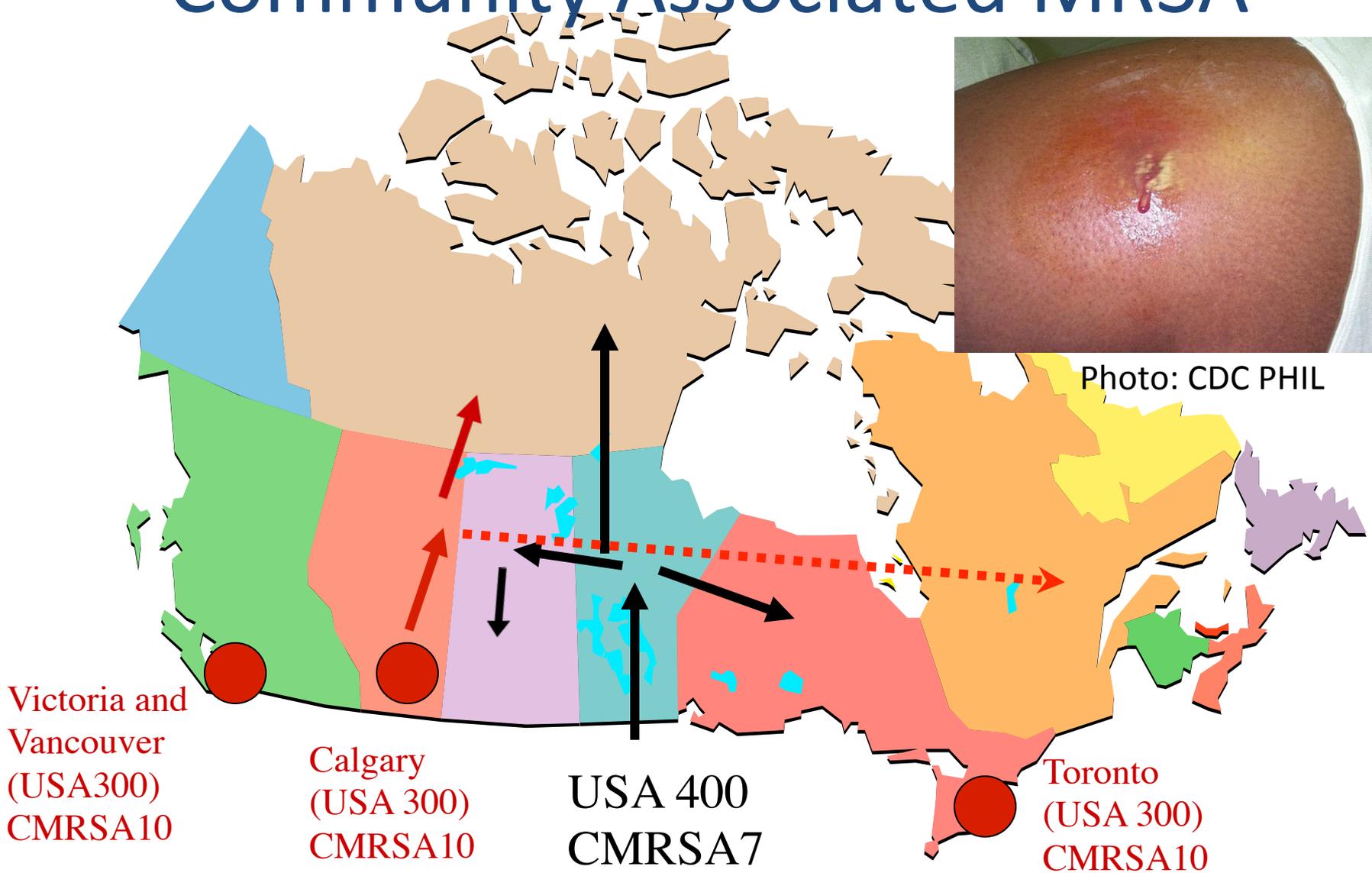


Source: PHU, Prepared by PHU Apr 2010, * data suppressed for 2005-9 as cell < 5

Community Associated MRSA



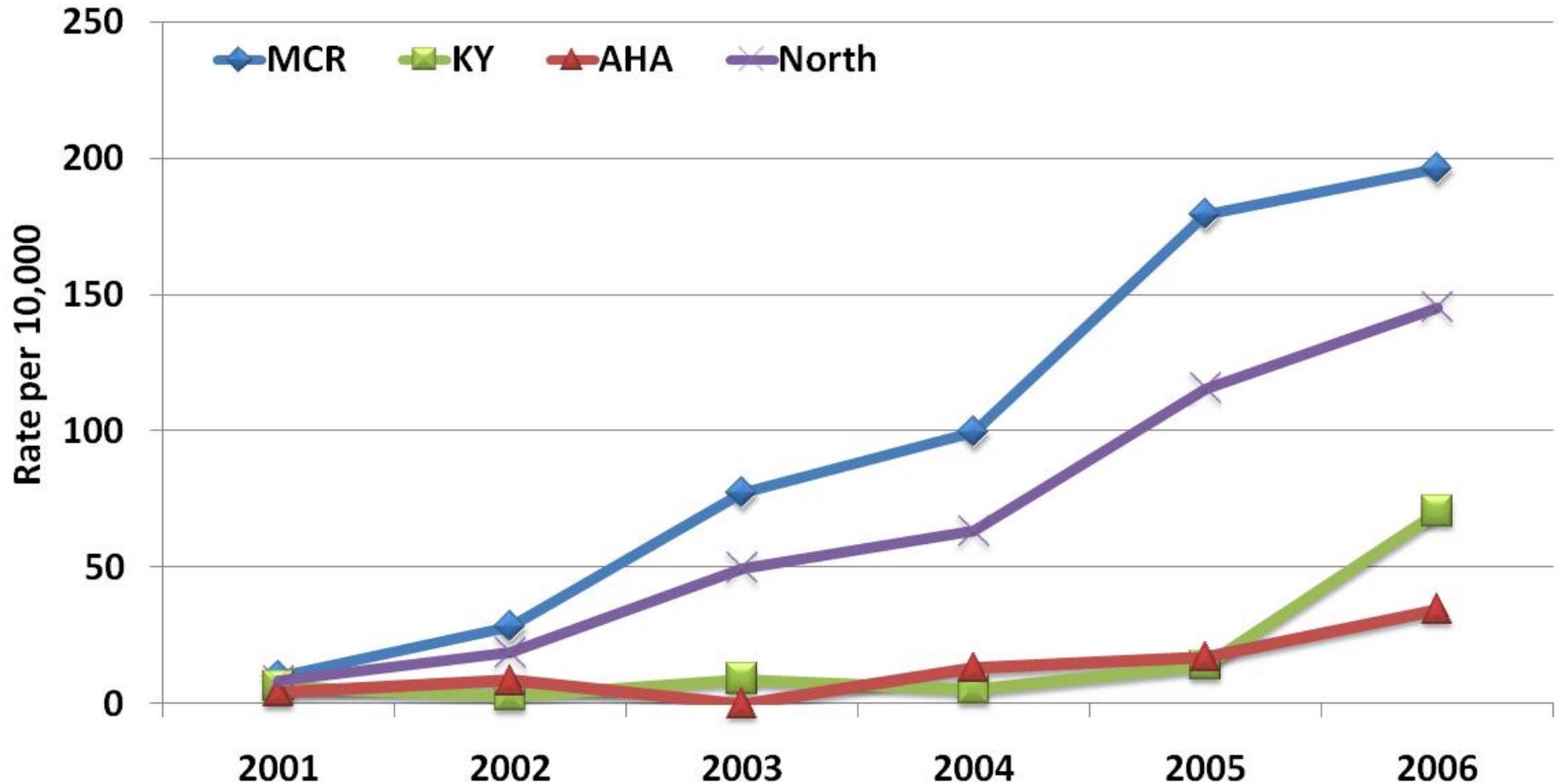
Photo: CDC PHIL



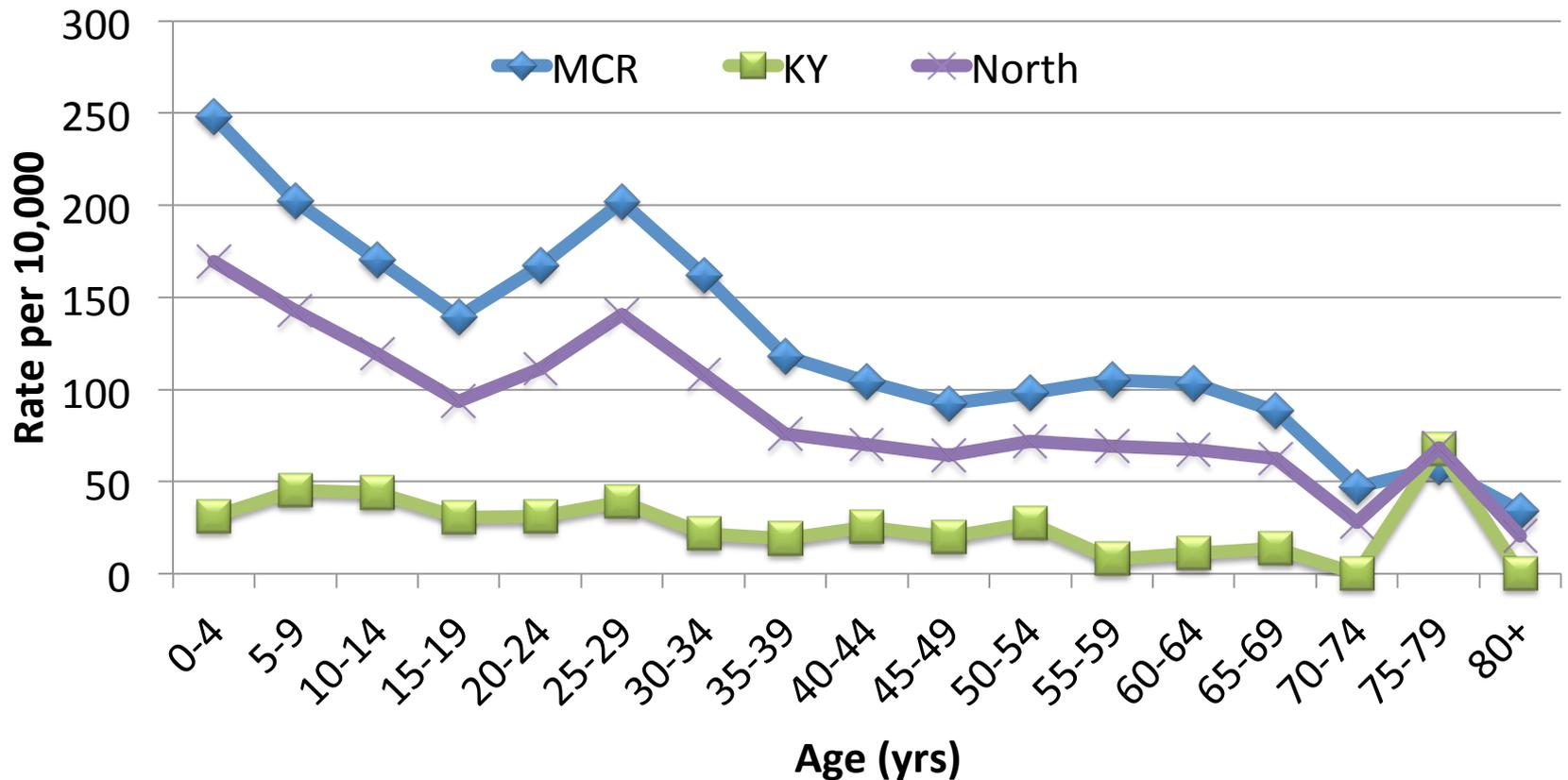
Wylie and Nowicki. JCM. 2005, 43:2830-6.; Mulvey *et al.* EID 2005, 11:844-850;
Gilbert *et al.* CMAJ. 2006, 175:149-154.

MRSA

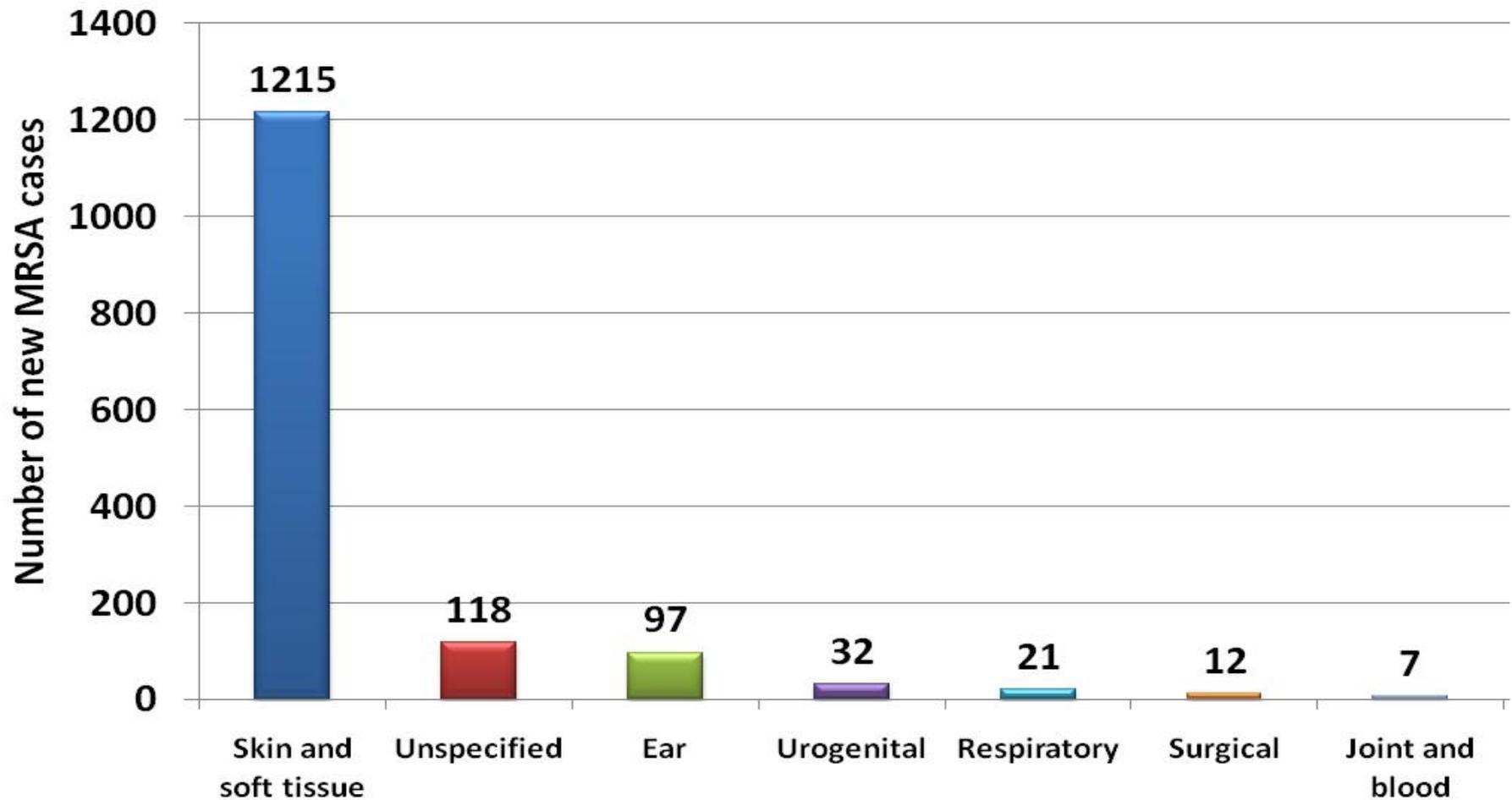
crude rate per 10,000 population in Northern Saskatchewan
by Health Authority 2000-2006.



Annual age-specific rate of individuals with new CA-MRSA by health region (three – year average 2004-2006)

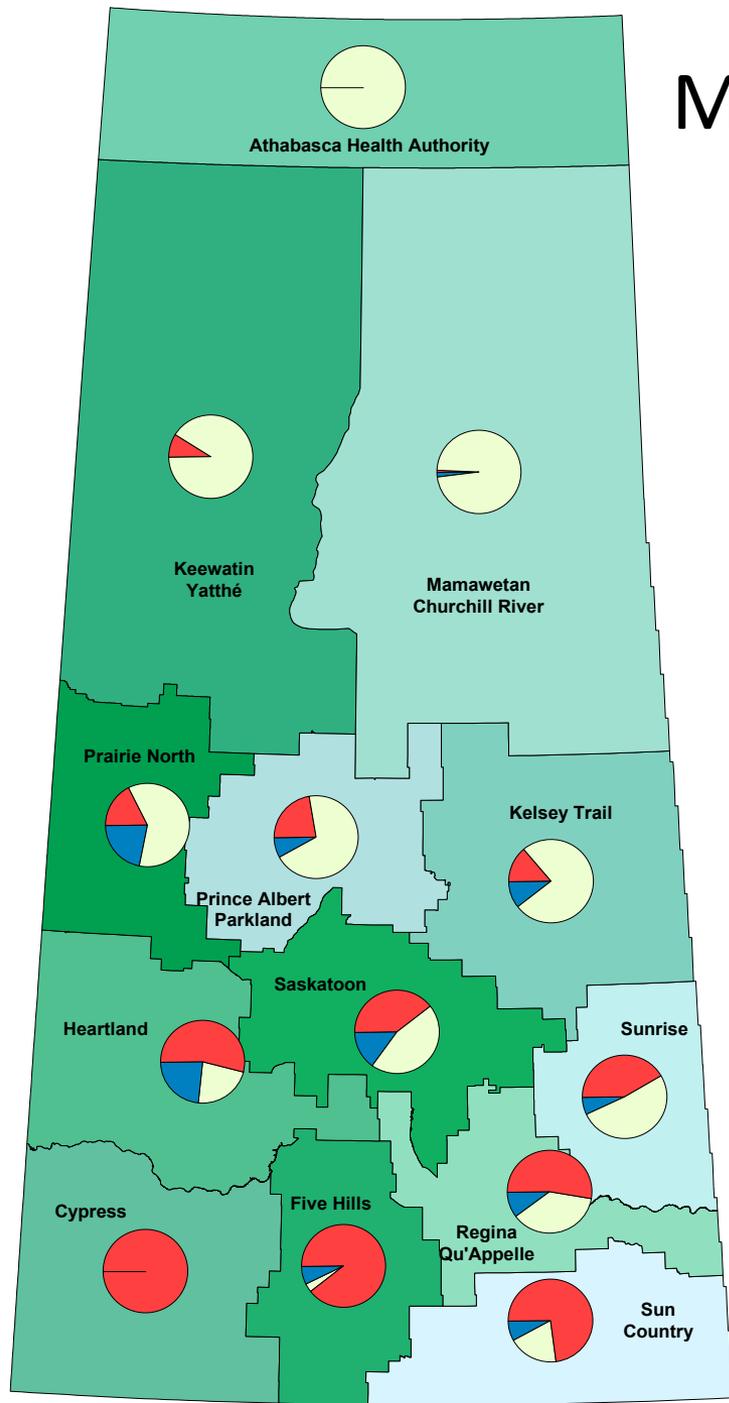


Number of New MRSA cases in Northern Saskatchewan by Clinical Picture



MRSA types by Health Region

(July 2006 – June 2007)



Community Associated types

CMRSA 7 (USA 400)



CMRSA 10 (USA 300)



Health-care Associated types

CMRSA 2, 4, 6, & 8



Reported reduction in diarrheal disease morbidity from various mitigations

Reference and intervention	All studies	
	% reduction in diarrhoeal disease	Relative risk (95% CI)
Esrey et al⁵		
Hygiene	33	0.67
Sanitation	22	0.78
Water supply†	22	0.78
Water quality	17	0.83
Multiple‡	20	0.80
Curtis and Cairncross⁶¹		
Handwashing§	43	0.57 (0.46–0.72)

RCT in Karachi, Pakistan

- Home delivery of plain soap and education:
 - 50% reduction in pneumonia
 - 53% reduction in diarrhea
 - 34% reduction in impetigo

Home water services and hospitalizations - Alaska

- Hennessy, AJPH, 2008
 - Hospitalizations for lower respiratory tract infections, pneumonia, RSV, Staphylococcus infections and MRSA associated with percentage of homes with water service

Water Outages and Health

- Water outages (average length of 15.7 hours) led to higher rates of outpatients visits during and 10 days following for:
 - Gastroenteritis RR - 1.31 (1.26-1.37)
 - Skin diseases RR - 1.36 (1.30-1.42)
 - Eye diseases RR - 1.34 (1.26-1.44)

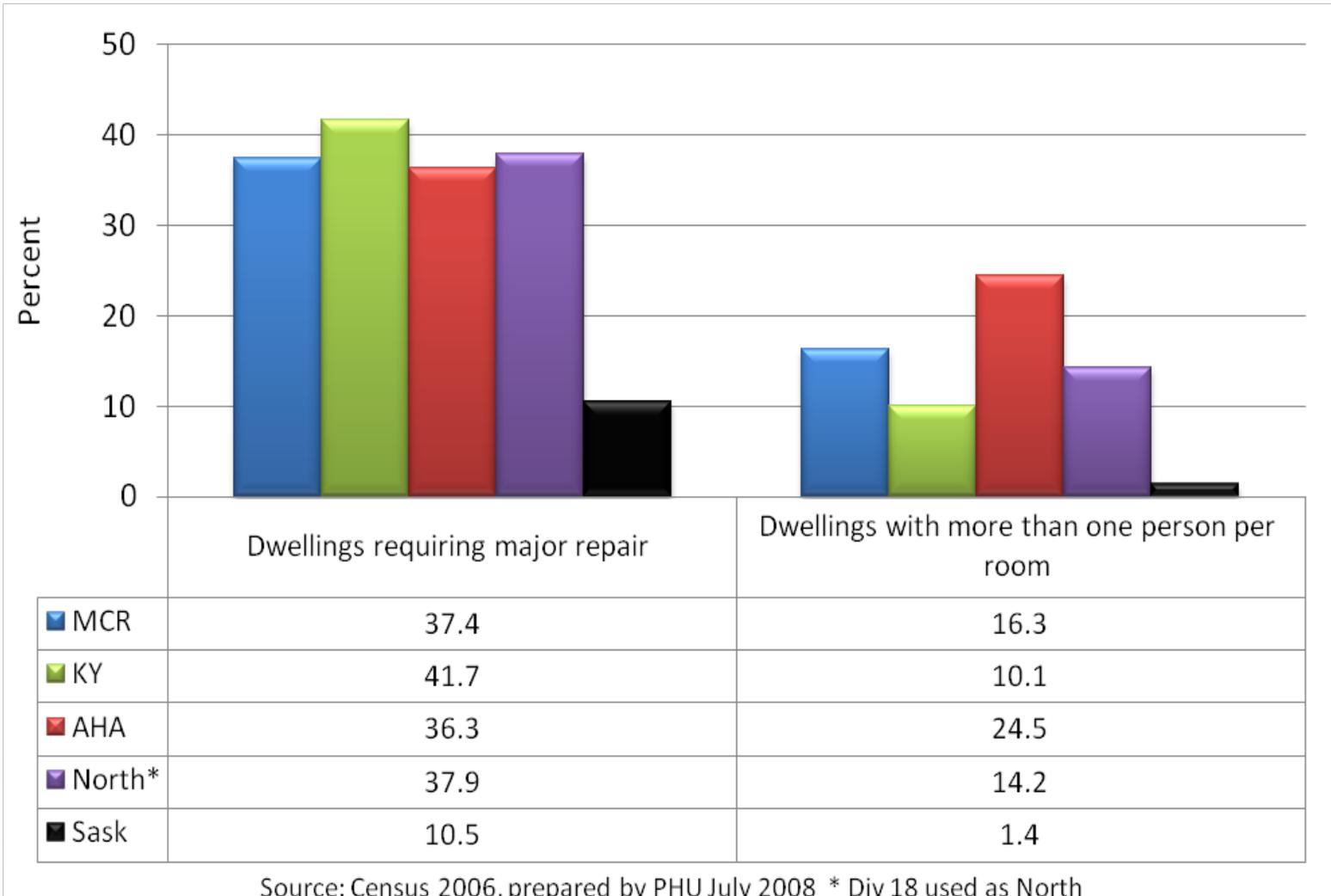
Source: Huang L-Y et al. BMC Public Health 2011

Promotion of handwashing:

- associated with a 12-34% reduction in respiratory-tract infections and colds in child-care centres in the USA [Masters 1997], Canada [Carabin 1999], and Australia [Roberts 2000]; and
- a 21% decrease in absences due to respiratory illness in the school setting [Masters 1997].

Housing

2006



Crowding in the north is 10 times that of the south



Challenges

- Infectious diseases common
- MRSA common
- High antibiotic useage
- Issues of household crowding
- Challenges of handwashing, sharing of clothes, bedding, towels

The Partnership



POPULATION HEALTH UNIT

Northern Saskatchewan



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Public Health
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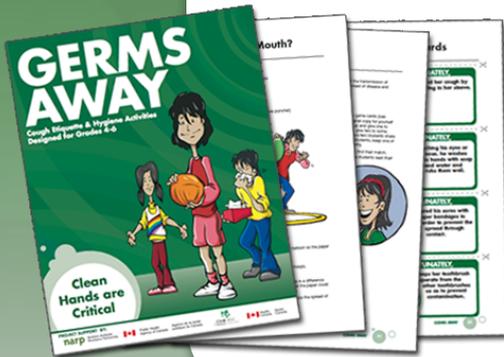


- Public Health Agency of Canada
- National Laboratory of Microbiology
- Saskatchewan Disease Control Laboratory
- University of Manitoba
- University of Saskatchewan
- Population Health Unit, Northern Health Authorities
- Kelsey Trail Health Region
- Mamawetan Churchill River Health Region
- Keewatin Yatthe Health Region
- Northern Intertribal Health Authority
- Prince Albert Grand Council
- Red Earth First Nation
- Shoal Lake First Nation
- Cumberland House First Nation



NARP Education Approaches

Educational Tools to Reduce the Spread of Communicable Disease



NARP Team
(Northern Antibiotic
Resistance Partnership)



Michael Mulvey, George Golding, James Irvine, Greg Horsman, Paul Levett, Brian Szklarzuk, Steve Silcox, Mandiangu Nsungu, Shirley Woods, Mohammed Khan, Kirsten Bergstrom, Barb Brooke, Shirley Paton, Donna Stockdale, and the Northern Antibiotic Resistance Partnership



Welcome to the Northern Antibiotic Resistance Partnership (NARP) web site.

The emergence of antimicrobial resistant organisms in our hospitals and communities is of major concern since they limit treatment options for infections involving common bacterial pathogens. Very little attention has been directed at this problem in northern communities as compared to hospital-acquired or common community-acquired pathogens in large urban communities in southern Canada. The factors influencing the emergence and spread of antibiotic resistance may be different in the north as compared to factors identified in studies involving large urban centers where cultural, medical, and educational systems are completely different.

NARP is comprised of a team of community members, healthcare professionals, educators and research scientists working in partnership to study antimicrobial resistant bacteria causing infections in northern communities.

We have developed a three-pronged approach to understand and combat this issue:



Establishment of sentinel surveillance sites to monitor bacterial infections and antibiotic use.



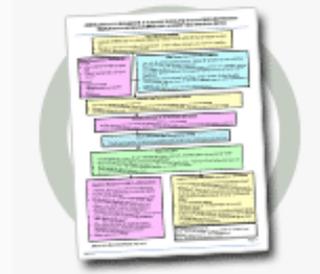
Development of a case control study to identify risk factors for acquisition of community-associated methicillin-resistant Staphylococcus aureus.



Address the emerging antimicrobial resistance issues through educational activities aimed at both health care providers and the general community.

Education for Patient and Healthcare Providers

- Prevalence and local antimicrobial susceptibilities provided through surveillance.



- Guidelines for Management of Suspected Community-Acquired Methicillin-Resistant Staphylococcus aureus (CA-MRSA) Skin and Soft Tissue Infections (SSTIs).



- A pamphlet describing MRSA has been developed and circulated in physicians offices and community health centres in the regions under study.

Community-Based Education



- Radio broadcasts have been developed in English, Cree, and Dene aimed at educating the general public on:
 1. Skin and soft tissue infections.
 2. Hand Washing.
 3. Completing the entire course of antibiotics.
- Community presentation slide decks and podcasts describing the educational goals, antibiotic resistance, and community-associated MRSA.



Posters

- 3 different posters to raise awareness and keep interest

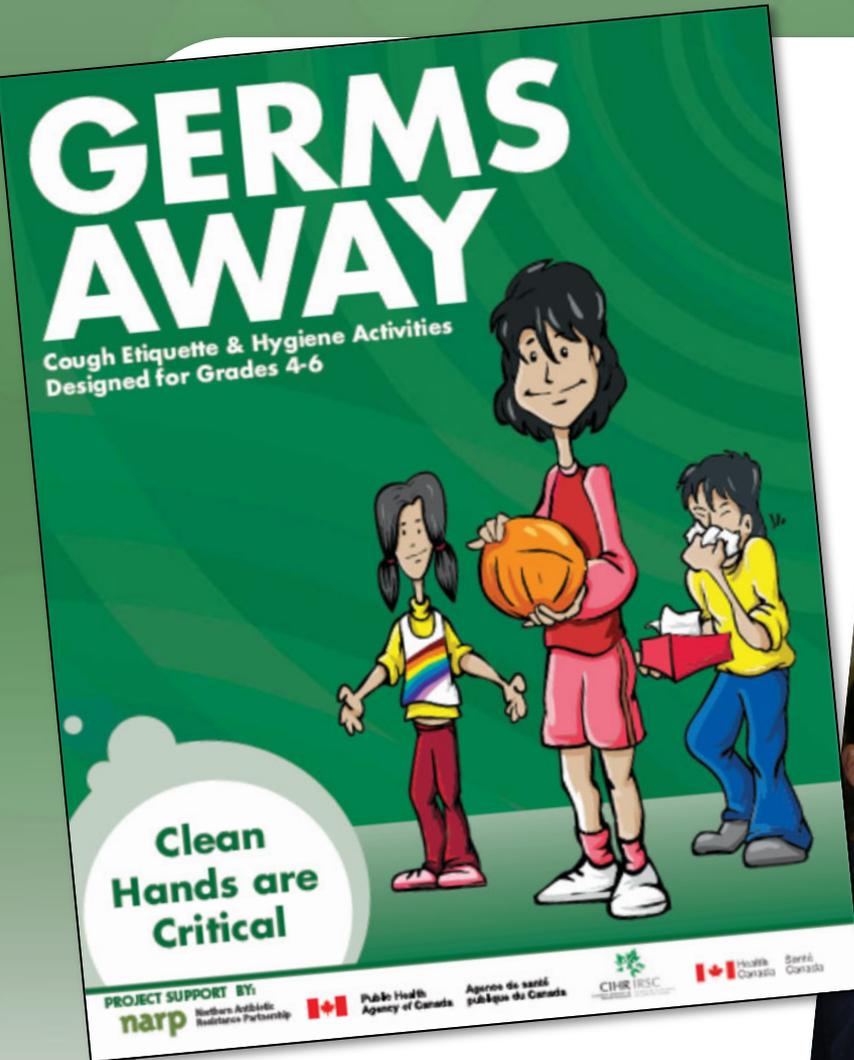




- <http://www.dobugsneeddrugs.org>
- Train the trainer for schools, daycares, Kids First / Head Start for “Do Bugs Need Drugs”®

School Aged Education

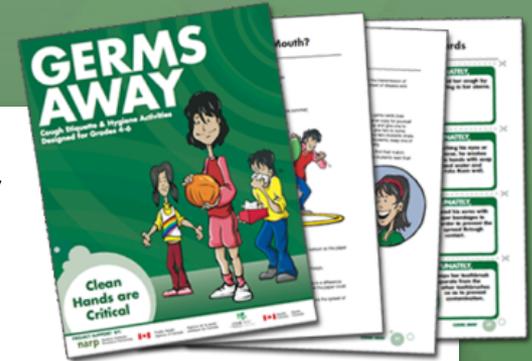
- Germs Away was designed for Grade 4- 6 educators and students.
- Introduces basic concepts related to the spread of infectious diseases through contact.



Germ Away Objectives



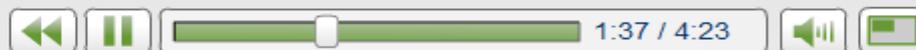
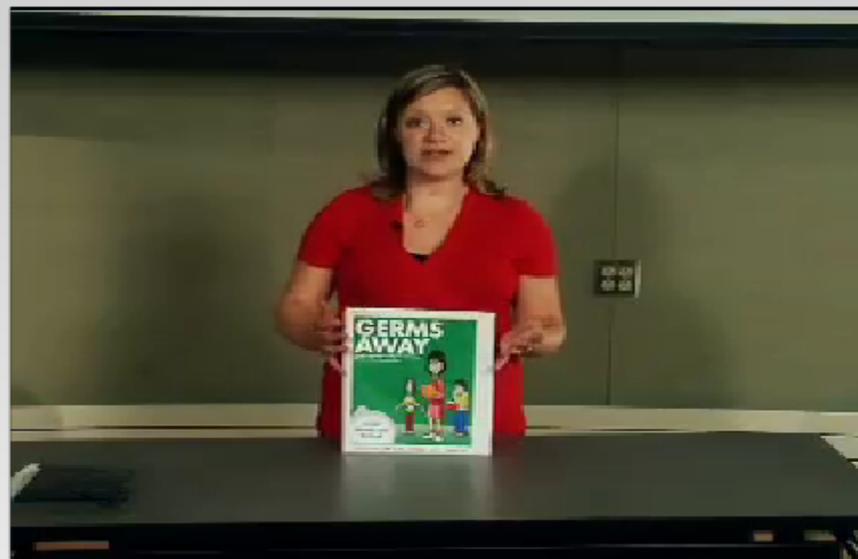
1. Students will be able to identify specific daily activities that spread germs;
2. Students will know that epidemics occur by the spreading of germs from person to person;
3. Students will be aware of the importance of proper hand washing for the prevention and spread of disease;
4. Students will be aware of specific disease prevention techniques; and
5. Students will know possible transmission routes for germs.





Education - Podcasts

Introduction



An introduction to the Germs Away curriculum

Download Podcasts

How to teach the Germs Away curriculum

- [Germ's Away - Introduction](#)
- [Activity #1 – Glowing Results](#)
- [Activity #2 – The Web of Infection](#)
- [Activity #3 – Germs Away](#)
- [Activity #4 – Battle of the Germs](#)
- [Activity #5 – Kayla's Day](#)
- [Activity #6 – Cover your Mouth?](#)
- [Activity #7 – House of Germs](#)
- [Germs Away - Conclusion](#)

Antibiotic Resistance

- [Antibiotic Resistance - Part 1](#)
- [Antibiotic Resistance - Part 2](#)
- [Antibiotic Resistance - Part 3](#)
- [Antibiotic Resistance - Part 4](#)

Note: To download the videos, right-click and select save target as. The Quicktime video player

GERMS AWAY

Play the Game!

Fun Stuff

Teacher's Section!

Français

BE A GERM FIGHTER! **PLAY**
GERMS AWAY



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Northern Antibiotic
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GERMS AWAY

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Français



GERMS AWAY



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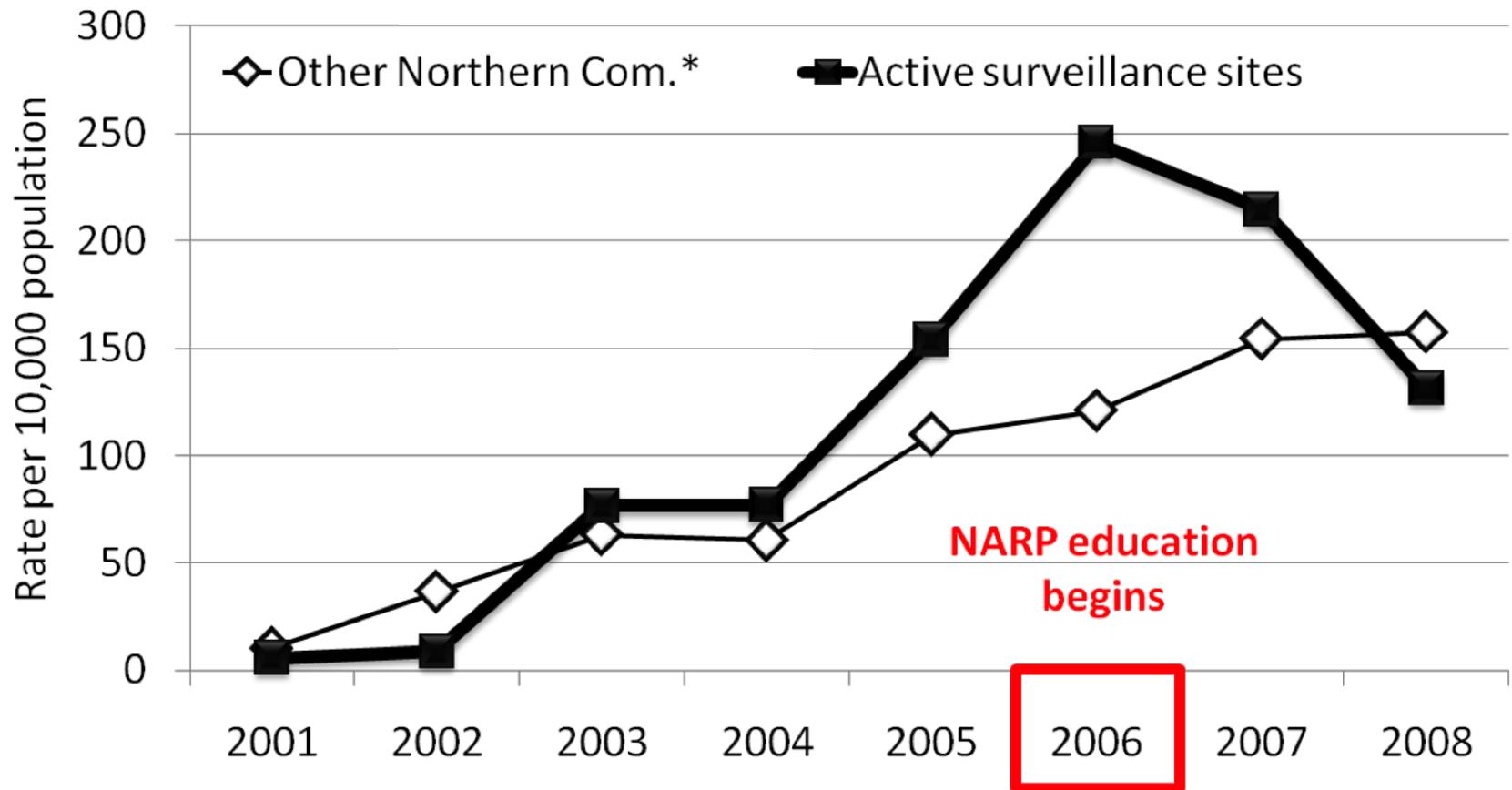
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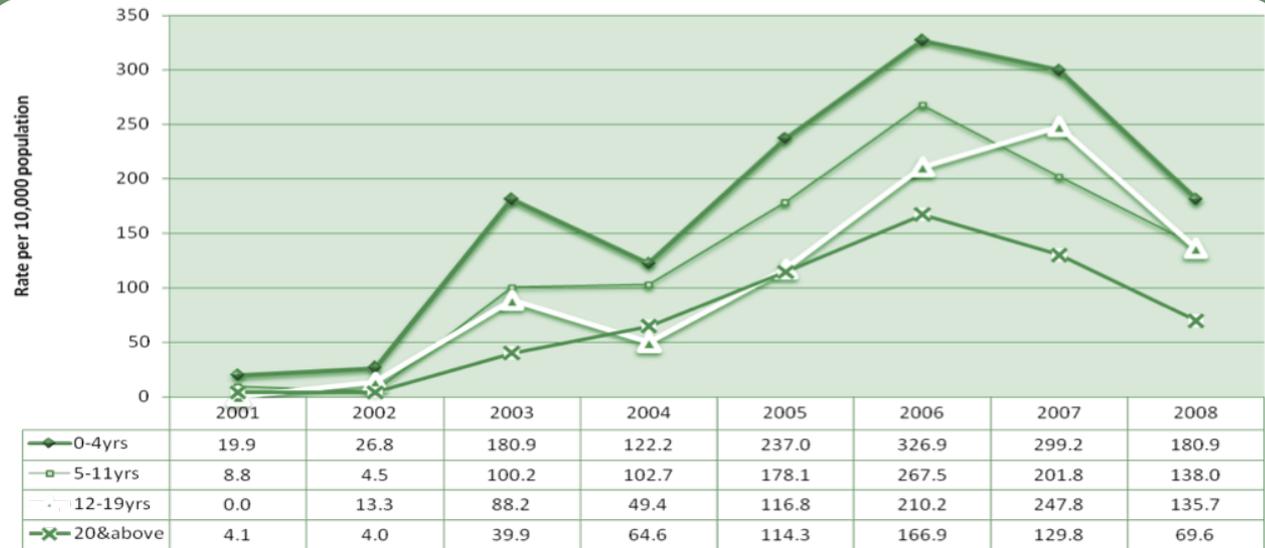
Using Surveillance to Monitor Possible Effectiveness: Rates of MRSA Infections



Source: PHU & NITHA 2001-8 , Prepared by PHU Aug 2009

Age Distribution of MRSA Infections

Intervention communities



Source: PHU & NITHA 2001-8 , Prepared by PHU Dec 2010

Other* northern communities

*Had some spill over intervention including Germs Away in 2008



Source: PHU & NITHA 2001-8 , Prepared by PHU Dec 2010

Team

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And many more...



References

- *BMC Public Health* 2012, **12**:15

Research article

Open Access

Community-based educational intervention to limit the dissemination of community-associated methicillin-resistant *Staphylococcus aureus* in Northern Saskatchewan, Canada

George R Golding¹, Brian Quinn², Kirsten Bergstrom³, Donna Stockdale^{2,4}, Shirley Woods⁴, Mandiangu Nsungu⁴, Barb Brooke⁵, Paul N Levett⁶, Greg Horsman⁶, Ryan McDonald⁶, Brian Szklarczuk¹, Steve Silcox¹, Shirley Paton⁷, Mary Carson⁸, Michael R Mulvey¹, James Irvine^{2,9*} and the Northern Antibiotic Resistance Partnership

* Corresponding author: James Irvine James.Irvine@mcrha.sk.ca

- <http://www.cps.ca/en/documents/position/community-associated-MRSA-in-Indigenous-communities>

POSITION STATEMENT

Community-associated methicillin-resistant *Staphylococcus aureus* in Indigenous communities in Canada



Canadian
Paediatric
Society

James Irvine; Canadian Paediatric Society
First Nations, Inuit and Métis Health Committee
Abridged version: *Paediatr Child Health* 2012;17(7):385-6