Health Canada Santé Canada

Environmental Health and Environmental Research (EH-ER)

Cluster Evaluation

Final Report

October 2011

Canada

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Environmental Health-Environmental Research (EH-ER) – Cluster Evaluation
Management Action Plan

Recommendation	Management Response	Accountability	Completion Date
Recommendation # 1 Expand and enhance community-based service delivery model for environmental public health programming	**Increase Environmental Health Officer (EHO) presence, integration and proactive role in communities :** - Conduct Environmental Health Officer (EHO) workload analysis to better understand EHO shortages and workload demands.	Horizontal Manager, Environmental Public Health Division (EPHD), Primary Health Care and Public Health Directorate (PHCPHD), First Nations and Inuit Health Branch, (FNIHB), Health Canada With the support of Regional Environmental Health Managers (REHMs), Environmental Public Health Services (EPHS) First National and Inuit Health (FNIH), Regions and Programs Branch (RAPB), HC	March 2013
	- Support EHOs through continuation of the Community-Based Water Monitor (CBWM) program, and consider expansion of CBWM role and/or creation of other community-based support staff for EHOs.	Drinking Water Manager, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2014
	- Continue the EHO Recruitment and Retention Strategy.	Horizontal Manager, EPHD, PHCPHD, FNIHB with support of REHMs, EPHS, FNIH, RAPB	On-going
	Improve EPHP responsiveness to the specific needs and priorities of different communities: • Consider strategies for the generation of more regular community feedback on priorities, needs and satisfaction with EPH programming.	Horizontal Manager, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2012
	• Conduct analysis of the feasibility of shifting towards a risk-based approach to water sampling, thereby freeing resources for other community priorities or needs.	Drinking Water Manager, EPHD, PHCPHD, FNIHB, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2012
Recommendation # 2 Continue and enhance efforts to build community capacity in the area of environmental public health risk mitigation	• Continue to promote development of enforceable standards for mitigation of environmental public health risks at the national and regional levels (e.g., water legislation, participation in integration/tripartite discussions).	Strategic Initiatives Manager, EPHD, PHCPHD, FNIHB, HC EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2014
	• Develop a community enforcement/by-law best practices guide.	Horizontal Manager, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2013

Recommendation	Management Response	Accountability	Completion Date
Recommendation # 3 Assure evidence-based decision-making in environmental public health program and policy development and delivery.	• Develop environmental public health outcomes strategy (indicators and associated data collection and reporting plan).	Horizontal Manager, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	December 2012
	• Implement mandatory use of environmental health information systems in all Regions.	Horizontal Manager, EPHD, PHCPHD, FNIHB with support of REHMs , EPHS, FNIH, RAPB	March 2013
	• Improve timeliness of water quality data being tracked	Drinking Water Manager, EPHD, and Manager, Data Analysis and Program Support (DAPS), EHRD, PHCPHD, FNIHB, with support of REHMs , EPHS, FNIH, RAPB	Mar h 2013
Recommendation # 4 Explore options for ensuring long-term funding for Cluster programming	• Renew First Nations Water and Wastewater Action Plan (FNWWAP) funding in collaboration with INAC	Strategic Initiatives Manager, EPHD, PHCPHD, FNIHB	April 2012
	• Explore options for Environmental Public Health Program (EPHP) core program funding.	Horizontal Manager EPHD, PHCPHD, FNIHB	March 2014
	• Conduct meetings with Regions and Programs Branch staff to improve the EHRD Contribution Agreement process and (subject to funding) and include multi-year funding where appropriate.	Director , EHRD, EPHD, PHCPHD, FNIHB, with support of REHMs , EPHS, FNIH, RAPB	March 2012
	• Contribute to funding renewal / extension submissions for sunsetting programs (Climate Change, Indoor Air, Biomonitoring and Guides).	Director , EHRD, EPHD, PHCPHD, FNIHB, with support of REHMs , EPHS, FNIH, RAPB	June 2014
	• Initiate a working group with the Health Canada Research Ethics Board Secretariat to work on improvement of the process for First Nations and Inuit projects and to develop a guidance document on research ethics review of community-based projects.	Director , EHRD, EPHD, PHCPHD, FNIHB, with support of REHMs , EPHS, FNIH, RAPB	June 2014

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ENVIRONMENTAL HEALTH AND ENVIRONMENTAL RESEARCH (EH-ER)

CLUSTER EVALUATION

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List of Acronyms and Abbreviations

AO	Aboriginal Organization
AFN	Assembly of First Nations
CA	Contribution Agreement
CBWM	Community-based Drinking Water Quality Monitor
CD	Communicable Disease
CDC	Communicable Disease Control
CFIA	Canadian Food Inspection Agency
CMHC	Canada Mortgage and Housing Corporation
EC	Environment Canada
EH-ER	Environmental Health – Environmental Research Cluster
EHIS	Environmental Health Information System
EHO	Environmental Health Officer
EHR	Environmental Health Research
EHRD	Environmental Health Research Division
EHRP	Environmental Health Research Program
EPH	Environmental Public Health
EPHD	Environmental Public Health Division
EPHP	Environmental Public Health Program
EPHS	Environmental Public Health Services
FNIH	First Nations Inuit Health
FNIHB	First Nations and Inuit Health Branch
FNUC	First Nations University of Canada
FNWWAP	First Nations Water and Wastewater Action Plan
INAC	Indian and Northern Affairs Canada
NAO	National Aboriginal Organization
PHAC	Public Health Agency of Canada
PHE	Public Health Engineer
PHI	Public Health Inspector
POR	Public Opinion Research
RAO	Regional Aboriginal Organization
RAPB	Regions and Programs Branch
REHM	Regional Environmental Health Manager
RFNECP	Regional First Nations Environmental Contaminants Program
RMAF	Results-based Management Accountability Framework
RMO	Regional Medical Officer
WNv	West Nile Virus

EXECUTIVE SUMMARY

This report presents the findings from the Relevance and Performance Evaluation of the Environmental Health and Environmental Research Cluster, 2005-2010 (First Nations and Inuit Health). The two main objectives of the evaluation are to assess the Environmental Health and Environmental Research (EH-ER) Cluster's relevance to First Nations and Inuit needs, federal priorities, and strategic outcomes; and to assess the Cluster's performance in terms of effectiveness (progress towards expected outcomes), efficiency and economy. In addition to assessing the relevance and performance of Cluster program activities in order to inform management action planning in coming years, the evaluation contributes to a broader evidence base to enable Branch reporting on higher-level results and fulfillment of accountability requirements.

Description of EH-ER Cluster

The objective of the EH-ER Cluster is to identify and promote the mitigation and/or prevention of human health risks associated with exposure to hazards within the natural and built environments. This is accomplished through the provision of environmental public health services; community capacity building activities; surveillance and research; and collaboration with partners to address the determinants of health. There are two main programming areas under the Cluster: 1) Environmental Public Health Program (EPHP); and 2) Environmental Health Research Program (EHRP). The objective of the EPHP is to identify environmental public health risks that could impact the health of community residents and to recommend corrective action that may be taken by community leaders and residents to reduce these risks. Although risk mitigation is an underlying objective of the program, EPHP's responsibility in this area is limited to the provision of advice, guidance and recommendations regarding potential mitigation strategies and actions to be taken by communities. The EHRP focuses on research of environmental hazards and risks (i.e., physical, chemical, biological, radiological) that affect the health of First Nations and Inuit. The program is designed to assist First Nations and Inuit communities in developing capacity to work with governments, agencies, academia and other organizations to incorporate both scientific and Traditional Knowledge in environmental health studies and outreach materials.

Evaluation methods

The evaluation drew on multiple lines of evidence, including interviews with 85 key informants, a web-based survey of 93 Environmental Health Officers (including 15 transferred EHOs), and a review of literature, documentation, and administrative data. Key informants included representatives from EPHD and EHRD from the National Office, Regional Environmental Health Managers, Regional Medical Officers of Health, Contribution Agreement Holders for Environmental Health Research Projects, First Nations communities including both communities with Contribution Agreements and those without Contribution Agreements to deliver environmental health programming, National Aboriginal Organizations, Regional Aboriginal Organizations, and other government stakeholders including INAC, Canadian Mortgage and Housing Corporation, and the Canadian Environmental Assessment Agency.

Evaluation findings and conclusions

The Cluster has been appropriately designed to contribute to addressing many of the environmental public health risks that are identified as issues and priorities in First Nations and Inuit communities. The evaluation found that the EHRP and EPHP Cluster components aligned with the key environmental public health risks, issues and priorities identified among First Nations and Inuit. The complexity of the environmental health risks requires approaches that take into account multiple determinants of health within an overall population health model. The evaluation concluded that the Cluster design successfully demonstrates the implementation of a population health approach given its heavy emphasis on community involvement and participation, collaboration and partnerships at multiple levels, capacity building, flexibility, prevention, and evidence. While the Cluster overall is well aligned with the priority risks identified, several gaps warranting further consideration include water sample testing that covers the diverse drinking water systems in First Nations communities such as cisterns and wells, occupational health and safety, and injury prevention. Another key gap was the lack of necessary resources or enforcement standards required to actually mitigate EPH risks that are identified (this is discussed in further depth below).

The Cluster design balances sufficient structure with flexibility to be responsive to most First Nations and Inuit and Regional needs, though challenges remain in terms of assuring regular community feedback is accounted for in program planning, and improving coherence of priorities between regions and HQ in order to facilitate regional flexibility to respond to community priorities. The EHRP demonstrated flexibility and responsiveness by supporting community-driven research projects in which communities identify the need, research questions, and implement the projects. This flexibility was balanced with the structure of various types of review processes to ensure the quality of research projects. The EPHP component demonstrated flexibility by having Regions and communities develop workplans based on their priorities in environmental health. Flexibility is also demonstrated in the funding models used for some First Nations communities who receive Contribution Agreements to implement their own environmental health programming. The overall flexibility is balanced by the structure provided by the *National Framework for the Environmental Public Health Program* that guides the implementation of the EPHP by outlining roles and responsibilities, activities, and common tools. However, there is still a need to generate more regular community feedback on priorities, needs and satisfaction to ensure EPH programming remains responsive and effective. Finally, work remains to be done to improve coherence and communication of priorities between Regions and HQ.

The Cluster objectives are aligned with Government of Canada priorities, roles and responsibilities in health programming for First Nations and Inuit communities, Health Canada's strategic outcomes, and FNIHB's mandate. Cluster activities and objectives were in alignment with priorities as identified in recent Budget Plans, and announcements in the area of health and the environment. Similarly, the Cluster was found to align with the Government of Canada's roles and responsibilities and policy decisions with respect to health programming in First Nations and Inuit communities. Finally, the evaluation concluded that the Cluster activities clearly aligned with Health Canada's strategic outcomes and FNIHB's mandate.

The Cluster contributes significantly to the short-term outcome of improved and identification and immediate mitigation of environmental public health risks. Critical to this outcome is the community-driven approach to research, EHOs' interactions and communication with communities, and the hiring and training of CBWMs. However, significant challenges remain in this area. The success in this area over the past five years was judged to be substantial and has likely contributed to both benefits and challenges for communities with respect to risk mitigation, particularly where identified risks require substantial investments in infrastructure, or a re-ordering of community priorities in order to be adequately addressed. One key critical success factor identified in this area with respect to the EHRP component has been the community-based, participatory nature of the research conducted. Other critical success factor identified by the evaluation was the presence of EHOs in First Nations communities and the introduction of Community-based Drinking Water Quality Monitors (CBWMs) to First Nations communities. The evaluation identified some barriers and challenges to achieving success with this outcome which should be considered for future improvements to the Cluster programming. These included: potential gaps in awareness among community members of some aspects of Cluster programming; timing, length and amount of funding associated with community-based participatory research projects; an insufficient number of EHOs given current demands and workloads; some challenges in integrating EHOs in First Nations communities; and challenges with ensuring communities under Health Funding Agreements implement the full scope of EPH programming required for EPH risk identification and immediate mitigation.

The Cluster contributes to First Nations communities' capacity to mitigate and address environmental health risks through the provision of assistance and support for immediate risk mitigation, community capacity building, and advocacy. The degree to which communities can leverage Cluster supports for actual risk mitigation is contingent on numerous factors external to the Cluster such as availability of resources for infrastructure improvements, and community priorities. The Cluster was relatively successful in contributing to immediate risk mitigation where the most appropriate interventions were education and awareness along with pragmatic, low-cost interventions. When risk mitigation required more resource intensive efforts, the Cluster contributed by assisting in developing community capacity in areas such as accessing external supports, developing networks to advocate for resources or changes in priorities to adequately mitigate these risks. Continued efforts are required by EPHP to enhance community capacity in the area of risk mitigation (e.g., through risk communication and engagement of community leaders; provision of resources / liaison activities to link communities with other supports). Additionally, the EPHP can continue its activities at the national, regional and community levels towards the development of enforceable standards to assure public health risks are mitigated as required.

The Cluster contributes to the longer term outcome of improved health and wellbeing of First Nations and Inuit individuals and communities through its contributions to known health determinants such as physical environments, personal health practices, health services and culture. Although the evaluation was not able to directly measure contributions to improved health and wellbeing, there was evidence of contributions made to known health determinants. By demonstrating the contributions in these areas, it is plausible that contributions are being made overall to improved health and wellbeing.

Although considerable progress has been made over the past five years, performance and financial data collection for the Cluster programming require improvements in order to facilitate monitoring, reporting and evaluation of the actual activities, outputs and outcomes being achieved. Additional efforts will be needed to ensure that the data collected are reflective of the Cluster's activities, outputs and outcomes. Performance monitoring should focus not only on activities and outputs, but also consider what immediate outcomes and environmental public health status indicators could be measured on an ongoing basis to enable evidence-based decision-making and monitoring of public health associated with EPH programming over time. This will require, among other strategies, improved completeness, timeliness and quality of program data reporting (into water databases, EHIS). Additionally, improved financial data (allocations and expenditures) tracking is required at the Cluster level to enable linkages to be made between program costs, outputs and activities at the national and regional levels, and to ensure future analyses of economy and efficiency can be undertaken.

Cluster programming demonstrates economy and efficiency with steps having been taken to minimize costs and duplication while attempting to maximize outputs produced and outcomes achieved. One main challenge identified as negatively impacting on outcomes was the heavy workload of EHOs which results in them working reactively rather than proactively in communities. Other challenges identified included insufficient resources available for research, and gaps in expertise and experience among EPHD staff. The evaluation found evidence of steps that had been taken to minimize costs such as sharing of equipment, hiring CBWMs to conduct bacteriological drinking water testing rather than EHOs, and delivering distance education which permits increased opportunities while minimizing the costs of delivery. One critical factor identified by the evaluation that contributes to the overall economy and efficiency of the Cluster is the amount of time spent in communities by EHOs. According to the findings, the outputs and outcomes achieved by the EPHP are proportional to the amount of time EHOs are able to spend in communities. Although the success of the EHRP was noted throughout the evaluation, the limited funding available for community-based participatory research appears to be detrimental to the actual outcomes that can potentially be achieved. The other main challenge was in the area of human resources at the EPHD. Regions noted that there are gaps among EPHD staff with respect to content expertise, public health experience, and experience with First Nations communities.

One of the greatest risks faced by the Cluster design at this point is its heavy reliance on funding from First Nations Water and Wastewater Action Plan (FNWWAP) that is scheduled to finish in 2012. In the absence of renewal or alternate source of funding, the EPHP program would likely need to decrease to approximately one-half of its current size, or less. This would impact not only water and wastewater services and support, but also overall environmental health risk identification and mitigation given the integrated nature of these risks. While the FNWWAP funding was targeted at water and wastewater risks, within this focus, the EPHP has taken a comprehensive approach to environmental risk identification and mitigation given the integrated nature of risk. As a result, much of the FNWWAP funding has gone to hiring additional EHOs who provide training and support to CBWMs, as well as assist First Nations communities to identify and mitigate multiple areas of environmental health risks. Should this source of funding that is set to conclude in 2012 be no longer available for the EPHP, the impact would reach significantly beyond water and wastewater risks in First Nations communities.

One of the Cluster's main challenges is its dependence on external sources including other departments and authorities to achieve the anticipated outcomes of increased First Nations and Inuit capacity to mitigate and address environmental health risks. This challenge is magnified due to the lack of resources for risk mitigation, and the lack of enforceable standards or regulations in First Nations communities. The Cluster activities have been designed primarily to focus on the initial steps of risk awareness and identification resulting in advice and recommendations on how to reduce or mitigate identified risks. Ideally, once risk awareness and identification has occurred via Cluster activities, communities can work towards mitigation. The evaluation concluded that it is at this point where most challenges are encountered for two main reasons: 1) lack of resources for mitigation (primarily related to housing and infrastructure), and/or 2) lack of enforceable standards or regulations in First Nations communities. Both factors are outside the direct influence and control of the Cluster. In order to contribute to risk mitigation, the Cluster works on multiple levels with communities, First Nations and Inuit organizations, provinces/territories and various federal departments/agencies to advocate and to identify potential resources for risk mitigation, and to contribute to developing acceptable, relevant standards and/or regulatory frameworks for use by First Nations.

RECOMMENDATIONS

The following recommendations have been developed based on the findings and conclusions of the evaluation:

1. Expand and enhance community-based service delivery model for environmental public health programming.

2. Continue and enhance efforts to build community capacity in the area of environmental public health risk mitigation.

3. Assure evidence-based decision-making in environmental public health program and policy development and delivery.

4. Explore options for ensuring long-term funding for Cluster programming.

1.0 INTRODUCTION

This report presents the findings from the Relevance and Performance Evaluation of the Environmental Health and Environmental Research Cluster, 2005-2010 (First Nations and Inuit Health). The two main objectives of the evaluation are to assess the Environmental Health and Environmental Research (EH-ER) Cluster's relevance to First Nations and Inuit needs, federal priorities, and strategic outcomes; and to assess the Cluster's performance in terms of effectiveness (progress towards expected outcomes), efficiency and economy. In addition to assessing the relevance and performance of Cluster program activities in order to inform management action planning in coming years, the evaluation contributes to a broader evidence base to enable the First Nations and Inuit Health Branch (FNIHB) reporting on higher-level results and fulfillment of accountability requirements.

Relevance was assessed through analysis of the consistency of Cluster programming with broader government priorities, as well as the needs and priorities of First Nations communities. Performance was assessed through analysis of the effectiveness, efficiency and economy of the Cluster. This report is broadly structured by these lines of analysis, and is further broken down by a set of 14 specific research questions and their associated indicators. Overall conclusions and recommendations from the evaluation are presented in the final section.

1.1 EH-ER Cluster Description

1.1.1 Background and Context

Mandate and role of Government of Canada

The mandate and role of the Government of Canada to address First Nations health needs is captured in the Federal Indian Health Policy (1979). The goal of the Policy is to achieve an increasing level of health in First Nations communities. In this Policy, the Government of Canada recognizes its legal and traditional responsibilities for First Nations health, and seeks to promote the ability of communities to pursue their aspirations within the framework of Canadian institutions. In keeping with the Policy, there has been a long-term plan to transfer delivery and administration of health programming to First Nations control. Roles and responsibilities of the Government of Canada and First Nations are evolving as the transfer process continues.

Given that it is based on the 1979 Indian Health Policy, the *Department of Health Act* and the federal jurisdiction over "Indians, and Lands reserved for the Indians" under s. 91(24) of the *Constitution Act*, 1867, the Government of Canada does not have any statutory or legislative authority to enforce environmental public health standards or regulations (federal, provincial or otherwise) on-reserve. EH-ER programming is provided at the request and/or with the agreement of First Nations Authorities and in the area of environmental public health risk mitigation, it plays an advisory (rather than regulatory) role.

First Nations and Inuit Health Branch

Working towards achieving the strategic outcome of "better outcomes and reduction of health inequalities between First Nations and Inuit and other Canadians", FNIHB has the overall mandate to:[1]

- Ensure the availability of, or access to, health services for First Nations and Inuit communities;
- Assist First Nations and Inuit communities to address health barriers, disease threats, and attain health levels comparable to other Canadians living in similar locations; and,
- Build strong partnerships with First Nations and Inuit to improve the health system.

Aligned with its mandate, FNIHB's three main goals are: 1) to reduce the gap in health outcomes between First Nations and Inuit with other Canadians; 2) to provide access to services comparable to other Canadians living in similar areas; and 3) to build strong partnerships with First Nations and Inuit communities to increase their participation, management and control of their health. These goals are accomplished by continuing to deliver or fund programs and services, and striving to meet standards while moving towards closer coordination and integration with the provincial system.[2]

EH-ER Cluster within the Health Protection Program Authority

FNIHB has grouped its programs and services into "clusters" based on their shared intended outcomes. The EH-ER Cluster was formed when FNIHB renewed its contribution authorities in March 2005. The EH-ER Cluster is one of two clusters of the Health Protection Program Authority. The Health Protection Program Authority is one of five main contribution authorities within FNHIB. Services and programs under this authority are managed by the Primary Health Care and Public Health Directorate of FNIHB and First Nations and Inuit Health (FNIH) Regional Offices of the Regions and Programs Branch (RAPB).

The EH-ER Cluster, in collaboration with eligible First Nations and Inuit recipients, delivers environmental public health and environmental health research programs through contribution funding as well as direct services administered by Health Canada. Programming is delivered at the national, regional and community levels, and is managed by FNIHB and FNIH Regional Offices in partnership with First Nations and Inuit communities and/or by First Nations and Inuit under Contribution Agreements (CAs).

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1 Mandate was obtained from the following Health Canada website: http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/fnihb-dgspni/mandat-eng.php

2 FNIHB. (2009a). Developing a Five-Year Strategic Framework for FNIHB's Public Health Role in First Nations Communities: a Discussion Document

1.1.2 Overview of Cluster Initiatives, Programs and Objectives

The objective of the EH-ER Cluster is to identify and promote the mitigation and/or prevention of human health risks associated with exposure to hazards within the natural and built environments. This is accomplished through the provision of environmental public health services; community capacity building activities; surveillance and research; and collaboration with partners to address the determinants of health. There are two main program areas under the Cluster: 1) the Environmental Public Health Program (EPHP); and 2) the Environmental Health and Environmental Research Program (EHRP).

Environmental Public Health Program

The objective of the Environmental Public Health Program (EPHP) is to identify environmental public health risks that could impact the health of community residents and to recommend corrective action that may be taken by community leaders and residents to reduce these risks. Although risk mitigation is an underlying objective of the program, EPHP's responsibility in this area is limited to the provision of advice, guidance and recommendations regarding potential mitigation strategies and actions to be taken by communities.

Environmental public health programming is directed to First Nations communities south of 60^0 and is delivered by Environmental Health Officers (EHOs) employed by Health Canada or by individual Bands and/or Tribal Councils through Contribution Agreements. Programming is provided in agreement with and/or at the request of First Nations Authorities. The EPHP is coordinated regionally by Environmental Public Health Services (EPHS) within the RAPB and supported nationally by the Environmental Public Health Division (EPHD) within FNIHB. Specific activities include public education, training, and environmental public health assessments (e.g., public health inspections; communicable disease investigations, monitoring and surveillance; infrastructure plan reviews; and the provision of advice and recommendations). Activities are delivered across eight core program areas (see Table 1).

Table 1: EPHP Core Program Areas

Core Program Area	Description
Drinking Water	The EPHP provides public education about safe drinking water and risk prevention; training and education material to Community-Based Drinking Water Quality Monitors (CBWMs); conducts monitoring and testing of drinking water supplies including interpretation of results, recommendations for corrective action and mitigation (including issuance and rescindence of drinking water advisories); and provides engineering reviews of water infrastructure project proposals from a public health perspective
Health and Housing	The EPHP works with First Nations communities and other partners to address public health issues at the various stages of housing: site and design, construction, occupancy and demolition. This is accomplished through on-request public health inspections of housing, public education and training sessions.
Food Safety	The EPHP works with First Nations communities to prevent foodborne illness and address public health issues related to both traditional and conventional foods. Activities include public education, food handler training and routine and on-request public health inspections of permanent, seasonal and special event food service facilities.

Core Program Area	Description
Facilities Inspections	The EPHP works with First Nations communities, owners, operators, employees and users of facilities (health, community care, recreational and general facilities) to help prevent the spread of communicable disease, minimize public health risks and reduce safety hazards. Activities include providing routine and on-request inspections, providing advice, guidance and recommendations and delivering public education and awareness sessions related to public health and safety within facilities.
Environmental Communicable Disease Control	All regular EPHP activities aim to prevent illness and the spread of communicable diseases. Specific activities, such as, inspections, outbreak investigations, surveillance and public education are also undertaken to prevent and control foodborne (e.g., salmonella), waterborne (e.g., E. coli), and vectorborne (e.g., West Nile Virus, rabies) environmental communicable diseases. All activities are carried out in collaboration with local, regional, provincial and/or national communicable disease staff (including but not limited to nurses, epidemiologists and Regional Medical Officers).
Emergency Preparedness and Response	The EPHP works with communities and other partners to ensure environmental public health considerations are included in emergency planning, response and recovery activities. Activities include assessment of environmental public health risks during emergency planning, response and recovery situations and providing advice, guidance, and recommendations on how to minimize these risks.
Solid Waste Disposal	EPHP works with communities and other agencies to help limit public health risks posed by solid waste disposal. Activities include conducting environmental public health assessments of disposal sites and transfer stations, and providing advice and public education about health waste disposal practices, and providing engineering reviews of solid waste site project proposals from a public health perspective.
Wastewater	EPHP identifies existing and potential hazards associated with wastewater disposal in order to reduce and prevent public health risks. Program activities focus on community wastewater treatment plants as well as on-site sewage disposal systems. Activities include conducting environmental public health assessments, providing public education, and providing engineering reviews of wastewater infrastructure project proposals from a public health perspective.

It is widely recognized in most public health models that the Public Health Inspector (PHI) or Environmental Health Officer (EHO) plays a vital role in the public health team and delivery system. All Canadian provinces and jurisdiction employ PHIs/EHOs to carry out various activities such as health inspections, delivery food handler training, investigate suspected and confirmed cases of foodborne, waterborne and vectorborne illness, ensure drinking water quality monitoring, investigate complaints of potential public health hazards, deliver awareness and public education, and ensure and enforce compliance with public health legislation and regulations. PHIs/EHOs must be entitled to practice in accordance with the professional governing body (Board of Certification of Public Health Inspectors of the Canadian Institute of Public Health Inspectors) and the laws of the province and/or territory where the services are to be provided[3].

To assure that First Nations communities have comparable services on-reserve as those available to the rest of the Canadian public, FNIHB delivers the EPHP using the public health models most commonly used in other jurisdictions in Canada. The EPHP is a required public health

[3] Notably, the Quebec provincial government and municipalities do not recognize CIPHI exclusively in the hiring and certification of EHOS.

program which means that Health Canada assures that every community receives the services of EHOs and communities receiving contributions must hire an EHO and assure the delivery of the range of EPHP programming.

Environmental Health Research Program

The Environmental Health Research Program (EHRP) focuses on research of environmental hazards and risks (i.e., physical, chemical, biological, radiological) that affect the health of First Nations and Inuit. The program is designed to assist First Nations and Inuit communities in developing capacity to work with governments, agencies, academia and other organizations to incorporate both scientific and Traditional Knowledge in environmental health studies and outreach materials. The program provides funding for community-based participatory research[4] programs and conducts research, monitoring, surveillance, laboratory and field studies related to environmental health. There are six main elements of the EHRP, as illustrated in Table 2.

Table 2: EHRP Elements

Elements	Description
Research and Monitoring (RM)	EHRP provides funding for community-based participatory research and risk assessment through the National and Regional First Nations Environmental Contaminants Programs and the Northern Contaminants Program. It funds First Nations and Inuit educational activities such as curriculum development for Health Impact Assessment, the development of the *Food Safety for Aboriginal people of Canada: A Manual for healthy eating Practices* (Food Safety Manual) and the ongoing conduct of Traditional Foods and Environmental Contaminants Workshops. EHRP also provides input and funding for targeted environmental monitoring and community exposure assessments, when necessary. Under the Chemical Safety of Traditional Foods Program, EHRP supports major research initiatives, such as the First Nations Food, Nutrition and Environmental Study, which aims to provide the first regionally representative portrait of First Nations diets and the estimate of potential health risks associated with consuming various country foods that could be affected by environmental contaminants, while promoting the importance of traditional diets. Research and Monitoring aims to: • scan, analyse, integrate and interpret scientific data to understand exposure levels and possible impacts of key persistent environmental contaminants on the health status of First Nations and Inuit; • contribute to the development of human exposure standards and guidelines; • research, monitor and report on the results of environmental contaminants programs and research initiatives in Canada and in the Arctic countries; • identify emerging research needs to target program development; and, • communicate risk-related issues based on environmental contaminants research and analysis to First Nations, Inuit and the general public.

[4] Community-based participatory research is an umbrella term and is defined as follows: " a research process that endeavours to balance interests, benefits and responsibilities between Indigenous peoples and the research institutions concerned, through a commitment to equitable research partnership". The term implies that "the entire process, from planning to reporting, will be transparent and accessible to all parties involved" (*Indigenous Peoples and Participatory Health Research: Planning and Management, preparing research Agreements*, World Health Organization, 2003, p. 2). In contrast, Community participatory research is when the principal investigator (PI) comes to the community and discusses the study and makes changes after the discussions. Community members are seen more as partners than as test subjects. Community-based research is when the PI is from the community or an FN/I national organization, and any non-Indigenous researchers are considered partners. EHRD supports both research approaches, and thus uses the umbrella term of “community-based participatory research”.

Elements	Description
Data Analysis and Program Support	EHRP funds and conducts research and gathers and analyses data to support the drinking water component of the Environmental Public Health Program. It publishes an annual Drinking Water Performance Indicator Report, which tracks progress towards achieving drinking water program goals and objectives. Activities include: • research and statistical analysis support and advice to other environmental public health programs within FNIHB; and, • funding of community-based research projects on drinking water quality and monitoring to support an evidence base for public health programs and policies regarding First Nations drinking water.
FNIHB Laboratory	EHRP provides human tissue analysis of persistent organic pollutants, including several organochlorines for initiatives such as the First Nations Food, Nutrition and Environmental Study. The laboratory specializes in international and national quality assurance studies and is a proficiency testing provider for international programs such as the Mercury in Hair Interlaboratory Comparison Program.
Climate Change and Health Adaptation	This funding program is directed to northern First Nation and Inuit communities. The program assists these communities to develop successful funding research proposals that identify and respond to the health impacts associated with climate change. The results of the research are used to: • develop human health risk management plans and tools, including culturally-sensitive educational and awareness materials; and, • enhance decision-making at the community, regional, and national levels regarding health adaptation in the North.
First Nations Biomonitoring	EHRP, in partnership with First Nations research and statistical organizations, implements a First Nations Biomonitoring Initiative to collect baseline information on human exposure to environmental chemicals. The initiative is for First Nations living on-reserve and is similar in approach to the Canadian Health Measures Survey conducted by Statistics Canada and Health Canada. Activities include consultations with national and regional First Nations organizations to: • determine their priorities; • determine suitable biomonitoring parameters; and, • collect, analyze and disseminate data.
Environmental Health Guides	In partnership with First Nations and Inuit organizations, EHRP is developing a series of environmental health guides for First Nations and Inuit to increase their awareness of environmental contaminants that could affect their health and to identify measures to reduce harmful exposure.

Cluster Reach

The overall reach of the cluster includes:

- First Nations communities on-reserve south of 60^0 (EPHP and EHRP); and,
- Inuit and First Nations north of 60^0 (EHRP)

The EPHP is delivered in all First Nations communities on-reserve south of 60^0, while responsibility for environmental public health programming north 60^0 has been devolved to Territorial governments, or First Nations and Inuit control as part of land-claims settlements. The EHRP works with First Nations on-reserve south of 60^0, and Inuit and First Nations north of 60^0.

Cluster Collaboration

The Cluster works in partnership and collaboration with First Nations and Inuit communities and organizations, other areas of FNIHB and Health Canada, and other federal, provincial, territorial and community agencies and organizations to help assure effective environmental public health and research programming is implemented. Collaboration, coordination and information sharing with partners such as Indian and Northern Affairs Canada (INAC), Environment Canada (EC), Public Health Agency of Canada (PHAC), Canadian Food Inspection Agency (CFIA), Canada Mortgage and Housing Corporation (CMHC), provincial and territorial governments, community organizations and academia is crucial to the development and delivery of effective and efficient

environmental health programming in First Nations and Inuit communities. Table 3 provides a few examples of stakeholders according to programming area, and a sample of role/responsibility[5].

Table 3: Examples of Other Stakeholders Involved with Cluster

Area	Examples of other Stakeholders Involved and Sample Role/Responsibility
Drinking Water	*First Nations communities* – Plan, design, construct, operate and maintain community infrastructure, facilities and services, such as those for the treatment and distribution of water; identify and hire Community-Based Water Monitors. *Community Health Nurses* – Treat and report on waterborne disease cases or outbreaks, in liaison with other public health professionals *INAC* - Provides funding and advice to help First Nations communities supply water services (systems with 5 or more connections) on-reserve; coordinates the integrated review process between HC, EC and INAC for project proposals for community water systems. *EC* - Assists First Nations to take action on source water protection and sustainable water use; participates in the integrated review process for community water systems.
Wastewater	*First Nations communities* – Plan, design, construct, operate and maintain and decommission community wastewater systems and onsite sewage disposal systems. *INAC* – Provides funding, advice and guidance for First Nations community wastewater systems and coordinates (through INAC regional offices) the integrated review process for community wastewater systems *EC* - May review wastewater project plans to ensure that projects contain appropriate measures to prevent or mitigate any factor that could threaten and/or decrease the quality of the environment
Food Safety	*First Nations communities* – Manage food service operations and development. *Community Health Nurses* – Treat and report on foodborne disease cases and outbreaks, in liaison with other public health professionals *Regional Medical Officers of Health (RMOs)* - work proactively with Chiefs and Councils, Community Health Representatives, Health Directors, Environmental Health Officers and provincial Medical Officers of Health, to assess all aspects of public health related to food safety *PHAC* - National laboratory-based surveillance and may provide assistance in investigations of foodborne disease outbreaks. *CFIA* – Issues food recalls and alerts which EHOs distribute as appropriate.
Solid Waste Disposal	*First Nations communities* – Carry out the day-to-day planning and management of solid waste activities in communities. *INAC* – Provides funding and advice to First Nations to assist them in the planning, design, construction, operation and decommissioning of solid waste disposal sites *Environment Canada* – May provide technical support / guidance to Health Canada and INAC on solid waste disposal issues. *Provincial Governments, Regional and Local Authorities* - Consider the impacts that provincial or municipal waste disposal sites may have on neighboring First Nations communities and address issues related to First Nations solid waste disposal on neighboring jurisdictions.
Housing	*First Nations communities* – Plan, develop and manage the communities' housing portfolio. *CMHC* – Provide financial assistance technical expertise in relation to housing supply and renovations on-reserve. *INAC* - May allocate additional resources to First Nations in support of corrective action to mitigate or reduce public health risks identified by EHOs during inspections *First Nations Organizations* – Organizations such as the AFN, First Nations National Housing Managers Association, Chiefs Committee on Housing and Infrastructure and First Nations Building Officers Association work to improve standards of housing on-reserve through a variety of activities.

[5] The contents of this table is not designed to be exhaustive in listing all stakeholders and all roles and responsibilities. Rather, it is designed to illustrate a few examples of stakeholders and related sample role/responsibility.

Area	Examples of other Stakeholders Involved and Sample Role/Responsibility
Facilities Inspections	*First Nations communities* – Responsible for the management, administration, maintenance, and operations of facilities on-reserve. *INAC* - Provides funding to First Nations to assist them in the planning, operation and maintenance and decommissioning of community-owned facilities on-reserve, generally limited to educational facilities, diesel electricity generation facilities, and water and wastewater treatment plants *Provincial Governments* – Responsible for occupational health and safety in provincially-regulated enterprises on-reserve *Human Resources and Social Development Canada* – Responsible for occupational health and safety in federally-regulated workplaces on-reserve.
Environmental Communicable Disease Control	*First Nations communities* – Work in partnership with EHOs, other healthcare workers (including provincial authorities) to develop and implement recommendations pertaining to CDC. *Communicable Disease Control Nurse Coordinators* - Build partnerships and contribute to coordination of CDC activities between partners including: First Nations, provinces and other federal departments (INAC, PHAC). *Community Health Nurses* – Identify, monitor and report on communicable disease cases and outbreaks on-reserve. *Regional Medical Officers (RMOs):* Oversee health surveillance, communicable disease prevention and control activities on-reserve, working closely with provincial Medical Officers of Health to reduce CDC risks. In some Regions, RMOs have delegated authority through provincial public health legislation to address CD cases and outbreaks as per provincial outbreak protocols *Provincial governments* – In some Regions, Provinces have the legislative authority, mandate and resources to address communicable disease issues on-reserve including diagnosis, investigation, and response. *Communicable Disease Control (FNIHB)* - Provides technical and financial support for the development and ongoing testing of community, regional and national pandemic influenza plans in First Nations and Inuit communities outside the Territories. CFIA – Assists with rabies sampling protocols on-reserve.
Emergency Preparedness and Response	*First Nations communities* – Develop, approve and implement community EPR / pandemic plans *Communicable Disease Emergencies Nurse* Coordinators – Assist communities in the development, testing and implementation of pandemic influenza plans and liaise with Regional FNIH staff, provincial authorities, First Nations and other stakeholders on pandemic preparedness in First Nations communities. *Regional Medical Officers* – Provide leadership and/or support in emergency situations; in some regions, have delegated authority through provincial public health legislation to address health emergencies as per the provincial emergency/outbreak response protocols. Office *of Emergency Preparedness* - Regions and Programs Branch (HC) Provides a single window to Health Canada emergency management issues for internal and external partners *INAC* - Develops agreements with provincial and territorial governments that ensure emergency services (e.g., evacuations etc.) are in place in First Nations communities, and communicates the terms of agreements with Health Canada; supports First Nations to develop Emergency Preparedness Plans.
Environmental Health and Environmental Research Program	*First Nations University of Canada (FNUC) – Administers the national program component of the community-based environmental contaminants program*

Cluster Governance

The design, implementation, management, monitoring and reporting of programs is a shared responsibility between FNIHB, FNIH Regional Offices (part of RAPB), and First Nations and Inuit communities receiving either direct services from Health Canada or administering their own EPH programming or EHR research projects through Contribution Agreements. Specific roles and responsibilities are described in the following sections.

Role and Responsibilities of FNIHB

In the context of the administration of the cluster, FNIHB serves as the national office/headquarters, and works in collaboration with First Nations partners and regions to lead strategic policy development and program planning activities. More specifically, FNIHB:

- Supports Regional Environmental Public Health Program activities at the national level[6;]
- Develops national program objectives, guidance materials, program policies and frameworks;
- Updates senior management and central agencies about program activities through Departmental Planning Reports, Report on Plans and Priorities, Results-based Management and Accountability Framework (RMAF) reporting and evaluation, and other formal and informal reporting;
- Provides input to Treasury Board submissions and memoranda to Cabinet;
- Develops performance indicators and reporting requirements;
- Undertakes performance monitoring, program data analysis and evaluation;
- Supports the Environmental Health Information System (EHIS), an electronic database /reporting system that serves as a national data collection tool for EHOs and managers;
- Provides up-to-date and reliable information about environmental public health issues to REHMs and EHOs;
- Identifies environmental public health training gaps and opportunities;
- Liaises with internal and external stakeholders such as other groups within Health Canada, national Aboriginal organizations and other federal departments and agencies;
- Develops public education materials;
- Provides technical expertise in environmental areas that may impact public health, such as drinking water quality and treatment, wastewater treatment and disposal, and solid waste disposal[7];
- Issues and manages CAs for national First Nations and Inuit organizations (EHRD).

Roles and Responsibilities of RAPB (FNIH Regional Offices) [8]

Regions, in collaboration with First Nations and Inuit, play a lead role in supporting the effective delivery of Cluster programs and services in order to implement, monitor and assess the performance of policies, programs and initiatives in the context of results-based management. Regions:

- Deliver environmental public health services
- Manage the Environmental Public Health Program regionally;
- Develop annual Regional Environmental Public Health Workplans;

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6 FNIHB is not involved in direct delivery of services to First Nations. This is the role of FNIH Regions.

7 Technical expertise is provided by Public Health Engineers (PHEs), who are professionally trained engineers. Public health is not an official designation for professional engineers in Canada. Rather, it is a title used by professional engineers with significant experience providing technical advice from a public health perspective. PHEs are employed by the Environmental Public Health Division, Regions or may be hired as private consultants. Notably, FNIHB EPHD does not have EHO capacity (i.e., certified public health inspector technical expertise) at present.

8 FNIH Regional Offices delivering regional environmental public health programming were previously part of the First Nations and Inuit Health Branch (FNIHB). In 2007, the reporting structure shifted and FNIH Regional Offices became part of the Regions and Programs Branch (RAPB). FNIH Regional Offices maintain a strong working relationship with the national office / FNIHB.

- Determine program objectives, policies, design, implementation and management strategies at the Regional level;
- Share best practices, manuals, procedures, program frameworks and policies with EHOs;
- Identify and facilitate training opportunities for EHOs;
- Update Regional Medical Officers (RMOs), Regional management, other Regions and the EPHD on programming, strategies, gaps and emerging issues;
- Liaise and create partnerships with First Nations Authorities, local and provincial health units and other municipal/provincial departments, municipalities as well as regional offices of INAC and other federal departments regarding environmental public health issues;
- Coordinate Regional Environmental Public Health Program reporting activities at the community and regional levels and respond to reporting requests;
- Manage and monitor contribution agreements through regular contact and discussion with Recipients by means of on-site visits and reporting; and,
- Develop and distribute Calls for Proposals to fund environmental contaminants research by First Nations as well as review, evaluate and fund proposals based upon merit.

Roles and Responsibilities of First Nations Authorities/Communities South of 60°, where environmental public health services are provided directly by Health Canada

First Nations Authorities[9] and communities play a central role in environmental public health programming on-reserve. They work in collaboration with EHOs to identify environmental public health priorities within their communities and to address environmental public health risks. Specifically, they:

- Identify environmental public health priorities within their communities;
- Collaborate with the EPHP to address environmental public health risks;
- Engage and coordinate with the EPHP and other stakeholders to develop, approve and implement Environmental Public Health community and/or regional workplans;
- Work in partnership with EHOs, other health workers and stakeholders to develop and implement recommendations that relate to environmental public health;
- Provide input from a First Nations perspective when consulted;
- Act as stewards of resources; and,
- Develop local policies and by-laws to protect and improve the health of the community.

Roles and Responsibilities of First Nations and Inuit Communities and Organizations as Recipients of Contribution Agreements

As illustrated in Table 4, First Nations Band, Tribal Councils, Health Associations, Inuit Association and Councils, NGOs, education institutions, hospitals, municipal, provincial and territorial governments, health agencies and authorities are all eligible to receive funding to

[9] Includes Chiefs and Councils or any person or group of people with delegated authority to make decisions on behalf of Chiefs and Councils.

manage and control EH-ER programs under the federal Policy on Transfer Payments. The type of funding varies in terms of level of control, flexibility, authority, reporting requirements, and accountability. From 1998 to 2008 three models of Contribution Agreements were in use by FNIHB (i.e., general, integrated and transfer). In 2007, FNIHB introduced a new Contribution Funding Framework with improved flexibility, reduced reporting requirements, and strengthened accountability features. The Framework includes four funding models: set, transitional, flexible and flexible transfer. These models represent a continuum from "low" to "high" level of community control and discretion, based on recipients' capacity in financial and program management and their desired level of responsibility. One or more of the funding models may be accommodated in a single Contribution Agreement, thus allowing a funding arrangement to be tailored to a recipient's capacity to deliver programs and meet specific financial and reporting requirements.

Table 4: Type of Recipient by Funding Model

Eligible Recipient	Set	Transitional	Flexible	Flexible Transfer
First Nations in Canada Bands, District and Tribal Councils, and Health Associations	X	X	X	X
Inuit Associations and Councils	X	X	X	X
Canadian non-governmental, voluntary and non-profit associations and organizations	X			X
Canadian educational institutions and hospitals	X			X
Municipal, provincial and territorial governments and health agencies and authorities	X	X	X	X

For First Nations Authorities/Communities South of 60° delivering environmental public health services via Contribution Agreements, roles and responsibilities include the following:

- Identify needs;
- Design environmental public health programming;
- Plan and manage environmental public health services;
- Monitor and report performance; and,
- Conduct community based evaluation and reporting.

For other recipients of Contribution Agreements:

- Plan and deliver programs, projects and services; and,
- Report on the delivery of services and budgets.

Cluster Resources

As illustrated in Table 5, the expenditures for the Cluster over the five-year period of 2005-06 to 2009-10 totaled approximately $182M. The EPHP accounted for the majority of the expenditures with $152M or 84% in comparison to the EHRP with $30M or 16%. Important to note is that over one-half of the EPHP budget at both the national and regional levels over this period was derived from funding received under the First Nations Water and Wastewater Action Plan (FNWWAP) which is scheduled to end in 2012.

It should also be noted that salaries accounted for the bulk of EPHP expenditures over the five-year period (40%), reflecting its role in direct service delivery and the important role played by EHOs in program delivery. Another 28% of EPHP expenditures were for operating and capital costs; and 27% went towards contributions. For EHRP, the bulk of expenditures over the five-year period were for contributions (63%), reflecting its role in community capacity-building and research funding. Another 20% of EHRP expenditures were for salaries and 15% for operating costs.

Table 5: Cluster Actual Expenditures 2005-06 to 2009-2010

Environmental Public Health Program

	05-06	06-07	07-08	08-09	09-10	TOTAL
Salaries	8 885 737	9 366 304	9 689 813	9 999 499	11 704 751	49 646 104
Student Salaries		18 949	17 305	29 019	31 269	96 542
Non-controllable Salaries	258 130	232 527	251 248	235 866	390 908	1 368 679
Operating	7 689 855	9 114 718	9 350 261	8 084 628	8 021 003	42 260 465
Capital	290 745	157 395	233 361	182 916	294 885	1 159 302
Revenue		- 60 300	- 60 300			- 120 600
Contributions	5 903 658	7 035 038	7 006 646	9 946 518	11 100 657	40 992 517
EBP (20% of Salaries)	1 777 147	1 873 261	1 937 963	1 999 900	2 340 950	9 929 221
Internal Services	1 232 174	1 326 810	1 322 014	1 634 237	1 573 946	7 089 181
EPHP Total	**26 037 447**	**29 064 701**	**29 748 311**	**32 112 583**	**35 458 369**	**152 421 411**

Environmental Health and Environmental Research Program

	05-06	06-07	07-08	08-09	09-10	TOTAL
Salaries	677 612	975 396	918 070	1 136 211	1 194 321	4 901 609
Student Salaries			14 391	9 633	27 877	51 901
Non-controllable Salaries	39 050	11 744	3 839	11 690	56 439	122 762
Operating	769 703	921 134	647 857	1 173 223	1 017 917	4 529 834
Contributions	2 374 674	2 186 957	3 515 564	4 994 683	5 757 235	18 829 113
EBP (20% of Salaries)	135 522	195 079	183 614	227 242	238 864	980 322
Internal Services	65 762	35 754	46 803	162 942	177 882	489 143
EHRP Total	**4 062 323**	**4 326 064**	**5 330 138**	**7 715 624**	**8 470 535**	**29 904 683**

CLUSTER TOTAL	**30 099 769**	**33 390 765**	**35 078 449**	**39 828 207**	**43 928 904**	**182 326 094**

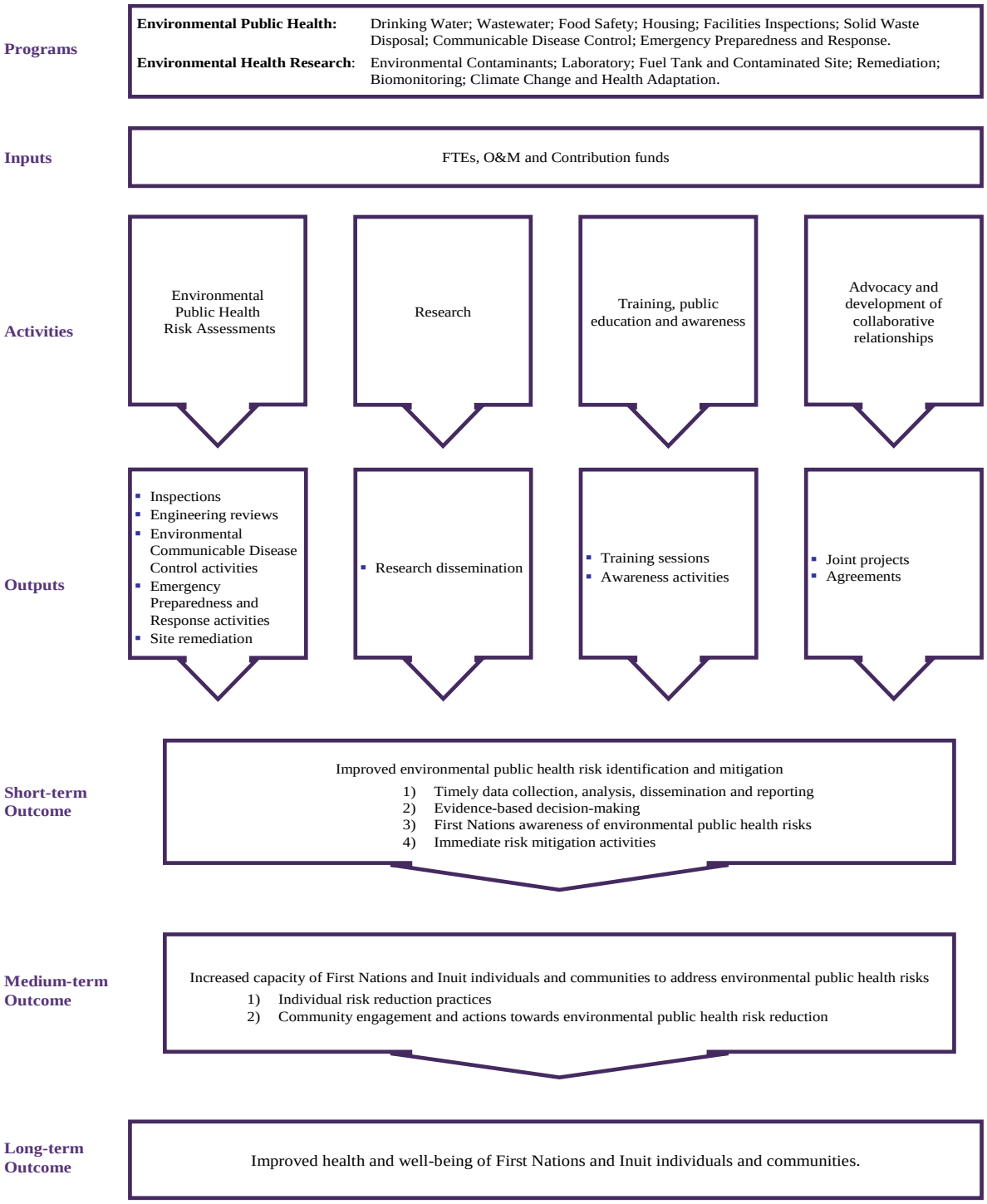
Prepared by the Health Canada Chief Financial Officer Branch, Financial Services (FNIHB unit) (14-10-2010)

Sources: Annual PAA reports (SAP Functional Area Costs) & TB Submissions

1.1.3 Cluster Logic Model

The EH-ER Cluster follows a program logic model, with activities and outputs contributing to specific outcomes (see Figure 1).

Figure 1
Environmental Public Health and Environmental Health and Environmental Research (EH-ER) Cluster Logic Model



Main Activities and Outputs

As per the Logic Model (Figure 1), the main activities of the EH-ER Cluster are:

- Environmental public health risk assessments;
- Research;
- Training, public education and awareness; and,
- Advocacy and development of collaborative relationships.

Various outputs have been identified for the Cluster including inspections, engineering reviews, site remediation, disseminated research, training sessions, joint projects and agreements.

Anticipated Outcomes

The Cluster Logic Model describes anticipated outcomes from the activities and outputs within three time frames: short-term, medium-term, and long-term. The anticipated short-term outcome is **improved environmental public health risk identification and mitigation** and is composed of four main components:

- Timely data collection analysis, dissemination and reporting;
- Evidence-based decision-making;
- First Nations and Inuit awareness of environmental public health risks; and,
- Immediate risk mitigation activities.

The anticipated medium-term outcome for the Cluster is **increased capacity of First Nations and Inuit individuals and communities to address environmental public health risks** which is composed of two main components:

- Individual risk reduction practices; and,
- Community engagement and actions towards environmental public health risk reduction.

The anticipated long-term outcome for the Cluster is **improved health and well-being of First Nations and Inuit individuals and communities**.

Despite the linearity of outcomes depicted in the logic model diagram, the Cluster outcomes are conceptualized as iteratively building on one another. For example, achievement of the short-term outcome of improved risk identification and mitigation may contribute to increased capacity, which in turn would likely contribute to even greater improved risk identification and mitigation.

Contributing factors external to the Cluster

Factors external to the Cluster influence the achievement of intended outcomes, and these must be taken into account when assessing the Cluster's performance. For example, Cluster activities are carried out concurrently and/or in collaboration with other programming (community-based programs, other FNIHB or Health Canada programs, other federal departmental, provincial or regional initiatives). It is therefore challenging to determine the degree to which various outcomes can be directly linked to any one program or service.

External factors can also present significant barriers to the Cluster achieving the anticipated outcomes outlined in the Cluster Logic Model. One significant external factor that has a direct impact on the extent to which the Cluster can achieve the outcome of improved public health risk mitigation is that the funding required to mitigate risks is not located within the Cluster. Although the Cluster has resources to identify risks, mitigation of these risks is funded by other sources (e.g., INAC, Bands, and Tribal Councils). Other external factors that can impact on the achievement of anticipated outcomes include communities with priorities which may or may not align with those supported by the Cluster, and broad structural factors such as the level of community isolation, economic development, leadership and educational attainment.

1.2 Evaluation Context

1.2.1 Evaluation Rationale

Purpose of evaluation

The evaluation is intended to capture commonalities among Cluster programs and to enable reporting of high-level results, demonstrating progress towards the Branch's long-term vision and horizontal goals shared with other departments working with Aboriginal populations, as well as fulfilling accountability requirements. At a program level, the evaluation has attempted to take into account the distinct characteristics of both the EPHP and the EHRP, and how both programs' activities contribute to Cluster outcomes. At the Cluster level, the evaluation has focused on broader, overarching issues and questions reflective of the anticipated short-term, medium-term outcomes and longer term outcomes.

Intended audience and stakeholders

The primary intended audience and stakeholders for this evaluation are First Nations and Inuit partners, Health Canada (national and regional offices), and Treasury Board Secretariat. In addition to fulfilling Treasury Board Secretariat requirements, this Cluster evaluation is intended to be used as a decision-making tool for senior management, as well as communities and regional offices, to assist with priority setting, planning and resource allocation. It will serve as an information base for other reporting exercises such as the Departmental Performance Report, horizontal reviews, and Strategic Reviews. This evaluation may also serve as a means to allow First Nations and Inuit community members, other program participants, staff, and partners to voice their needs, experiences and recommendations for improvement with respect to the Cluster programming.

1.2.2 Objectives, Considerations, Scope and Timing

Evaluation objectives

The objectives of the evaluation are to:

- Assess the Cluster's relevance to First Nations and Inuit needs, federal priorities, and strategic outcomes; and,
- Assess the Cluster's performance, in terms of progress towards expected outcomes, and programming efficiency and economy.

Cluster evaluation considerations

Cluster evaluations are designed to assess the overall achievement of high-level outcomes of a group of programs (or policies). The approach is integrative rather than "additive": instead of evaluating the two program components (EHRP and EPHP) separately and then "adding" two sets of outcomes together, Cluster programming and its combined outcomes are assessed as a whole.

Additionally, the evaluation considers how EPHP and EHRD combined and worked with external resources (e.g., programs from other Clusters, departments and agencies, community initiatives) to contribute to the intended outcomes. As a result, the evaluation speaks to the Cluster's contributions to outcomes, rather than its direct creation of these outcomes.

Finally, the broader structural context in which EPH programming occurs (e.g., inadequate infrastructure and access to resources required for risk mitigation; lack of regulations or legislative authority) are taken into account in assessing the Cluster's relevance and performance.

Evaluation scope

This evaluation examined the relevance and performance of the Cluster over a five-year period from 2005-2010. Given that this evaluation covers a five-year period, it collected both retrospective and current information related to Cluster relevance and performance.

Timing of evaluation

The evaluation was conducted between August 2010 and March 2011, with most of the primary data collection such as surveys and key informant interviews being conducted between October and December 2010.

1.2.3 Evaluation Issues and Questions

As per the evaluation objectives, the evaluation issues were relevance and performance. Under each of these two broad issue areas, the evaluation sought to assess five overarching evaluation questions, and 14 specific evaluation research questions. Three sources of data were identified to assess these questions: an EHO Survey, Key Informant Interviews, and a Literature/Document/Data Review. Table 6 lists each evaluation question and sub-research question, specifying the data sources applicable to each:

Table 6: Evaluation Questions by Method/Source

EVALUATION QUESTIONS		KI Interviews	EHO Survey	Lit/Doc/Admin Data Reviews
R1	**How and to what extent does EH-ER programming address environmental public health risks and issues facing** First Nations and Inuit **communities?**	X	X	X
R1.1	What are the environmental risks, issues and priorities facing First Nations and Inuit communities?	X	X	X
R1.2	To what extent does EH-ER programming address those risks, issues and priorities in R1.1?	X	X	X
R1.3	Is this Cluster of programs responsive to diverse and changing First Nations and Inuit community and regional needs?	X	X	X
R2	**Is EH-ER programming consistent with government priorities and mandates?**			X
R2.1	Are the objectives and activities of the EH-ER cluster consistent with Government of Canada priorities?			X
R2.2	Are the objectives and activities of the EH-ER cluster consistent with departmental strategic outcomes and the branch mandate?			X
R2.3	Is EH-ER programming in line with the Government of Canada's broader roles and responsibilities in health programming for First Nations and Inuit?			X
P 1	**How and to what extent are the EH-ER Cluster Logic Model's Outcomes being achieved?**	X	X	X
P1.1	How and to what extent is the EH-ER Cluster contributing to the short-term outcome of improved environmental public health risk identification and mitigation?	X	X	X
P1.2	How and to what extent is the EH-ER Cluster contributing to the medium-term outcome of increased capacity of First Nations and Inuit individuals and communities to address environmental public risks?	X	X	X
P1.3	How and to what extent may EH-ER Cluster activities be contributing to the long-term outcome of improved health and wellbeing First Nations and Inuit individuals and communities?	X	X	X
P 2	**Is EH-ER Cluster programming efficient and economical?**	X	X	X
P2.1	How has the Cluster demonstrated resource minimization while maximizing outputs?	X		X
P2.2	Were the Cluster's resources managed to ensure the achievement of relevant outcomes?	X		X
P2.3	How has the Cluster demonstrated optimal productivity while minimizing effort and ensuring quality of outputs?	X	X	X
P2.4	Are there alternative, more economical methods which ensure the same achievement of expected outcomes for the Cluster?	X	X	X
P 3	**Are there unintended consequences (positive and/or negative) and broader impacts as a result of carrying out EH-ER Cluster programs?**	X	X	X

2.0 METHODOLOGY

The evaluation drew on multiple lines of evidence, including key informant interviews, a survey of EHOs, and a review of literature, documentation, and administrative data. The approaches to implementing these lines of evidence are described below.

2.1 Key Informant Interviews

One main method used to collect primary data for the evaluation was key informant interviews with a variety of program staff and stakeholders. A semi-structured key informant guide was developed with questions corresponding to the relevant research questions and their associated indicators. Eight tailored versions of the guide were produced so that questions posed to a specific group were the most relevant.

The Project Authority identified potential key informants who could contribute information about either the EPHP or EHRP components of the Cluster. Key informants were contacted by phone and/or email to invite them to participate in the evaluation. If they agreed to participate, an appointment was set and they were forwarded a copy of the relevant interview guide to review prior to the interview.

Community-level key informants were selected from two lists provided by the Project Authority. One list focused on communities that had Contribution Agreements to deliver EPH programming, while the other list focused on those communities that did not have Contribution Agreements. For each group, communities were randomly selected within regions to be invited to participate in key informant interviews. This selection approach ensured that there were interviews conducted in each region and with both types of communities (presence/absence of Contribution Agreement). Similar to the other categories of key informants, data collected from respondents cannot be considered statistically representative of the population. As a result, caution should be used when generalizing the findings from these interviews to First Nations communities south of 60^0. It should be noted that interviewees did not necessarily have similar roles and responsibilities across communities. For example, in some communities the evaluation team interviewed community-based water monitors, while in other communities, representatives included chiefs, health directors, community health representative, public works directors or nurses. While this provided the benefit of having diverse perspectives, information and opinions collected across communities may have differed due to the various roles and responsibilities of the interviewee, including their varying degrees of interaction with EH-ER Cluster programming, rather than aspects such as community characteristics, or the presence/absence of Contribution Agreements.

The initial two interviews for each version of the guide were treated as pilots, allowing the evaluation team to refine and improve interview questions. The refinements were limited to variations and minor changes in interview wording and vocabulary, the ordering of questions, and addition of some probes for a small number of questions.

Interviews in the National Capital Region (NCR) were held in-person unless the interviewee preferred to be interviewed by phone. All key informants outside of the National Capital Region (NCR) were interviewed by phone. Interviewers did not observe significant differences with respect to details provided or quality of information collected from interviewees according to interview method (i.e., in-person vs. phone interviews). Approximately 10% of interviews had more than one key informant present. Interviews lasted on average 60 minutes, ranging from 30 minutes to 120 minutes. Interviewers took notes throughout the interviews which were then entered into a programmed *CallWeb* database according to key informant and question.

As illustrated in Table 7, interviews were conducted with representatives from EPHD and EHRD from the National Office, Regional Environmental Health Managers (REHMs), RMOs, Contribution Agreement Holders for Environmental Health Research Projects, First Nations communities including both communities with Contribution Agreements and those without Contribution Agreements, National Aboriginal Organizations (NAOs), Regional Aboriginal Organizations (RAOs), and other government stakeholders including INAC, Canadian Mortgage and Housing Corporation (CMHC), and the Canadian Environmental Assessment Agency. Overall, 75 interviews with 85 respondents were conducted within the time period allotted for data collection (October to December 2010). Approximately one-third of potential respondents whom the evaluation team attempted to contact either could not be contacted directly or scheduled after five or more attempts/messages (n=37), or declined to be interviewed (n=8). Lower than planned participation rates were obtained for the interviews with the Regional Aboriginal Organizations (40%), RMOs (57%), and First Nations communities that had CAs for EHO services (63%).

Table 7: Key Informant Interview Respondents

Key Informant Type	Planned Respondents	Attempted Contact	Participating Respondents	Completed Interviews	% Participating from Planned
EPHD/EHRD National Office	11	11	9	8	82%
Regional Environmental Health Managers	7	7	7	7	100%
Regional Medical Officers	7	7	4	4	57%
Environmental Health Research CA Recipients	9	9	7	7	78%
Transferred First Nations communities (i.e., have Health Funding Arrangements to administer and deliver EPH programming)	8	9	5*	5	63%
Non-transferred First Nations communities (i.e., receive EPH programming directly from Health Canada)	35	61	35**	30	100%
National Aboriginal Organizations	6	6	6***	2	100%
Regional Aboriginal Organizations	10	10	4	4	40%
Other Government Stakeholders	10	10	8	8	80%
Total	**103**	**130**	**85**	**75**	**83%**

* From 5 communities; ** From 29 communities; ***From 2 organizations

The database of interview notes was programmed to compile notes according to research question and indicator (with some indicators having multiple associated questions). Reports were produced of the compiled raw notes for each indicator (first level evidence matrices). From these reports, the evaluators analyzed content for main themes, by indicator and by key informant groups. In addition identifying key themes, pertinent explanations and examples were noted and carried through into a technical key informant report.

For the present report, the information is reported according to interviews as the base unit of analysis, rather than key informant. The reason for this is that in interviews with more than one person present (mostly interviews with representatives from non-CA communities and NAOs), there was generally one main spokesperson, and the other respondents would add in information specific to their expertise or area. Attempts were not made during the interviews to ensure that all people in the interview concurred with each of the statements and/or opinions of the others. As a result, in order to identify themes, an interview was assessed as the most appropriate unit of analysis.

2.2 Survey of Environmental Health Officers

The second method for primary data collection was an online survey of Environmental Health Officers (EHOs). Unlike the other lines of evidence, the survey focused almost exclusively on the EPHP component of the Cluster given the role and responsibilities of the EHO. The pre-test version of the survey instrument was developed in conjunction with the Project Authority and included items that were designed to address the key research questions and indicators. The pre-test version was tested in French and English with 6 EHOs who provided feedback on length, clarity of questions, and technical issues. The instrument was revised in response to this feedback to obtain the final version.

The survey was implemented online in October and November 2010 using *CallWeb* software. Potential respondents were sent an email invitation that contained a personal hyperlink to log on to the survey website. Potential respondents were sent two email reminders, and regional managers encouraged respondents to complete the survey.

All current EHOs working in communities were invited to participate in the survey. The Project Authority provided an overall list of 106 potential respondents which included email addresses, names, and region. During the implementation, this frame was reduced to 100 EHOs with 6 names removed due to changes in employment status (e.g., retired, special projects). All EHOs on the final list were invited to participate in the survey. As illustrated in Table 8, 93 EHOs responded to the survey for a response rate of 93%. This included 79 Health Canada EHOs and 14 EHOs employed by First Nations Bands or Councils. Responses were received from all regions.

Table 8: EHO Survey Respondents

Region	Health Canada EHOs	Band/Council EHOs	Total EHO Respondents
Pacific	26	0	26
Alberta	16	0	16
Saskatchewan	5	10	15
Manitoba	8	3	11
Ontario	11	1	12
Quebec	7	0	7
Atlantic	6	0	6

Data collected from the online survey were converted to an SPSS dataset, and then reviewed and cleaned. This step required minimal effort given that the collection method automatically implements range restrictions on responses, and controls skips. Open ended questions were coded using a rolling-code system. This involves an initial review of the data from which a small number of categories are constructed. The coders then use this initial set of categories and add categories as they encounter responses that do not fit in the initial set. Once the initial coding is completed, the categories are then reviewed once again and if necessary, recoded into a smaller, more cohesive set of categories. Quantitative data were analyzed using SPSS to determine frequencies and cross-tabulations. Qualitative data were analyzed to identify themes across the EHOs, and to identify key explanations and examples. Key findings were compiled in a technical report for the survey.

2.3 Literature, Document and Administrative Data review

The evaluation also drew on secondary data collected through a focused literature, document and administrative data review. The literature and documents judged to be potentially relevant for the evaluation were initially identified by members of the Evaluation Working Group who developed a bibliography organized by key themes/research questions to guide the review. The method employed for the selection of literature and documents was subjective, and based on the Working Group's knowledge of key program documents and peer reviewed literature that would be potentially relevant to the evaluation questions. The main inclusion/exclusion criteria used were that documents were within the date scope of the evaluation (i.e., 2005-2010). A few documents that were outside of the date range were included if the members of the Evaluation Working Group determined that they were of significant relevance to the evaluation. Systematic searches of the literature using pre-determined key word searches were not undertaken.

The identified documents were reviewed either through the document review or the literature review according to main foci. If the documents were more internally focused on the programming specific to the Cluster and/or federal government priority setting (e.g., past evaluations of cluster activities, performance reports, regional workplans, budgets), they were considered as part of the document review. In contrast, documents focused on activities or

concepts that were broader than the specific activities of the Cluster and/or were from sources outside of the federal government were considered as part of the literature review (e.g., peer reviewed studies, contracted research, conference proceedings).

Once the literature and documents had been identified and allocated to either the literature or document review, a review template was developed upon which various types of information could be documented including evidence from the document or article that corresponded to a specific evaluation indicator. The draft template was pre-tested with two senior evaluators who were assigned to the literature review and document review. In order to calibrate the approach to the reviews and pre-test the review tool, both evaluators reviewed the same three documents separately. When completed, the reviewers met to review each other's work, discussed any differences, and agreed on the common approach to review. The results of the calibration indicated that the interpretations of the indicators were very similar across reviewers. The template was then programmed as an online template in *CallWeb* that captured data in an SPSS database that was then programmed to produce reports according to individual indicator.

Each document and article was reviewed to extract any evidence that could potentially support a specific indicator. This evidence was captured on the review template (one completed per document/report). In addition, reviewers included any additional interpretations or comments that might assist when compiling the information or evidence for the indicator across documents (e.g., challenges with methods, data that was also used in other documents). Once the detailed reviews were completed, the evidence was compiled according to indicator and first level evidence matrices were developed. The study team then analyzed the first level evidence matrices to identify key themes and findings across the various documents and literature according to each relevant indicator. These were them compiled in two separate technical reports, one focusing on the literature review, the other on the document review.

For the document review, 86 documents were reviewed. Almost all of these documents would be categorized as grey literature, such as internal performance and evaluation findings, EPHP and EHRP program documentation, and Branch, Departmental and federal government documents. Other documents reviewed included various awareness and education materials produced by the Cluster.

For the literature review, 107 documents and articles were reviewed. This included 29 articles from peer reviewed sources, with the remaining 78 documents categorized as grey literature. The grey literature was relatively heterogeneous and included contracted and internal research conducted on behalf of the Cluster, research reports and evaluation reports that are relevant to the Cluster content conducted by other agencies and departments, international reports and conference proceedings, and various broad analytic frameworks in which to situate the environmental public health programming and research activities.

The administrative data review relied on performance outputs data for 2007-2009 previously compiled from multiple sources including EHIS reports[10], a web-based survey of EHOs conducted by FNIHB for 2007-08 activities, and a file review by national and regional managers. The data were analyzed using MS Excel to produce frequencies and cross-tabulations. Findings were then aligned with the relevant evaluation questions and indicators. These were reported in a separate technical report for the administrative data review.

2.4 Analytical Approach

The analysis of the multiple lines of evidence was undertaken in two stages. Initially, the findings/data were captured in evidence matrices for each of the lines of evidence (e.g., key informant interviews, survey of EHOs, literature review, document review, and administrative data review). These first level matrices consisted of data/information organized by indicator for each individual respondent or document. The matrices were then analyzed by indicator to develop second level matrices which included sub-group summaries by indicator (where applicable). Second level findings for each of the four lines of evidence were reported in separate technical reports. To develop this final, integrated evaluation report, the technical reports were further reviewed for crosscutting themes, and common and conflicting findings, by indicator. Each finding was triangulated where possible. This included reporting on literature and document review findings in conjunction with interview and survey findings, as a means to verify or identify areas of contradiction. This was particularly effective when contrasting the opinions of various types of key informants and EHOs with evidence from research publications.

2.5 Limitations and Challenges

Overall, the evaluation was able to address the key evaluation issues and questions regarding Cluster relevance and performance. The various lines of evidence were particularly strong for the findings on relevance, and the achievement of immediate outcomes. As with any evaluation of this scope and magnitude, there were some limitations and challenges encountered of which the reader should be aware when reviewing the findings and conclusions. It should be noted that, while these limitations likely had some impact on the findings, they were within the range of normal research limitations. There were no specific indications that they were more serious than what would be common to other strategic program evaluations. The methods and findings are overall sound, and provided an acceptable level of validity and reliability.

- **Performance and financial data availability** – During the period covered by the evaluation, the Cluster invested considerable effort in collecting and analyzing performance data related to program activities and outputs. However, data systems were in a developmental stage for part of this time period, and have only recently been fully

[10] EHIS is an electronic database /reporting system that serves as a program data collection tool for EHOs and managers

implemented[11]. The financial reporting for the Cluster remained at a highly consolidated level which made it challenging to ascertain allocation of funds according to various activities/outputs, or according to planned/actual expenditures by various categories. This was further complicated by the fact that much of the funding is allocated at a regional level to the various activities and outputs. As a result, the specific challenges encountered by the evaluation included:

- **Linking Cluster's activities/outputs to outcomes achieved -** Without an accurate assessment of activities and outputs, the linkages remain tenuous between how the "products" that are under the control of the Cluster contribute to measures of the observed short-term and medium-term outcomes. This limitation was partially addressed by having the evaluation use the more recent Cluster performance data (i.e., 2008-10) which has gone through a validation process to identify key gaps.
- **Assessing economy and efficiency –** Given the challenges with both the performance and financial data, planned analyses of economy and efficiency such as cost/results or cost/activity ratios, planned vs. actual expenditures, decrease in resource wastage/loss could not be undertaken given the lack of detailed financial information and quantifiable data on Cluster activities and outputs. This is a serious limitation for the economy and efficiency analyses. The evaluation was required to limit the analyses to qualitative information provided through key informant interviews, and some information from the literature review.
- **Assessing incremental change in outcomes -** Partially linked to the paucity of performance data was the challenge of not having baseline data or measures of outcomes. The Cluster outcomes are conceptualized as incremental changes (e.g., increased capacity, improved identification). In order to accurately assess this incremental change, the evaluation would have benefited from having baseline measures of these outcomes. This challenge was partially addressed by asking respondents questions that encouraged them to reflect on the past five years. This retrospective questioning can provide some indication of perceived incremental changes.

➢ **Heavy reliance on information from those with vested interest in Cluster** – Many of those participating in the evaluation were directly involved with the delivery of programs and initiatives under the Cluster, or were responsible for implementing components of the Cluster. This allowed for detailed information on the activities, outputs and outcomes of the Cluster; however, there may have been some positive bias in reporting of results. While this may have created some response biases, this was partially mitigated by the key informant interviews conducted directly with First Nations community representatives and organizations, including representatives from communities that have Contribution Agreements to deliver EHP programming. Researchers noted that respondents seemed willing to identify negative aspects of the programming, and seemed to be freely relating their responses overall.

[11] An additional limitation is lack of use of EHIS by Saskatchewan EHOs serving CA communities, resulting in lack of data on activities occurring in CA communities in that Region.

- **Attribution of causal links between Cluster activities and outcomes** – As illustrated previously in Table 3, the defining characteristic of many Cluster activities is collaboration. Cluster activities complement or operate concurrent to a number of other federal and community initiatives. This creates a challenge in determining whether outputs or outcomes can be solely attributed to the work of the Cluster, or whether these outputs or outcomes are the combined effect of multiple initiatives. This is a common challenge for evaluations of collaborative initiatives. For example, under FNWWAP, capital investment in infrastructure and financial support of human resources for drinking water is provided by INAC (e.g. water treatment plants and operators) while funding, support and implementation of the Community-Based Water Monitor (CBWM) program, drinking water sampling, testing, and monitoring; drinking water data interpretation, analysis and reporting; and advisory functions in communities regarding risk mitigation, are provided by the Cluster. Both contributors are essential in influencing health outcomes related to drinking water quality; however it is challenging to measure the incremental impact of each contributor.

3.0 EH-ER Cluster Relevance Findings

3.1 Environmental Risks, Issues and Priorities Facing First Nations and Inuit Communities

The evaluation identified numerous environmental health risks and issues facing First Nations and Inuit communities. These were relatively consistent across the various lines of evidence (key informant interviews, survey of EHOs, literature review and document review). The risks identified included drinking water, housing, environmental contaminants, food safety, wastewater, solid waste disposal, communicable disease, and emergency preparedness and response.

Drinking water risks

The most frequently cited risk was drinking water. Many respondents from First Nations communities identified drinking water as a significant environmental health risk for their communities (18 of 35[12]). The pattern of responses was similar among representatives from First

[12] Throughout the report, the phrase "*respondents/representatives from First Nations communities*" refers to the aggregated responses from interviews with respondents from both the communities that have Contribution Agreements to deliver EPH programming and communities that do not have Contribution Agreements. The term "*respondents/representatives from CA communities*" will be used to identify where unique findings are highlighted for the key informants from communities with Contribution Agreements to deliver EPH programming.

Nations communities where EPH services are delivered by Health Canada (non-CA communities) and First Nations communities that receive CAs to deliver their own EPH programming (CA communities). An area of particular concern was the quality of drinking water from systems relying on wells and cisterns. During interviews with First Nations community respondents, it was nevertheless reported that much effort has been put into addressing drinking water issues over the last five years through the Drinking Water Safety Program which funds and trains Community-based Drinking Water Quality Monitors (CBWMs) and is further supported by EHRD through drinking water data analysis and reports.

The pattern of findings among the other key informant groups was similar with the majority of respondents also having identified drinking water as an environmental health risk for First Nations communities (REHMs 6 of 7; RMOs 3 of 4; AOs[13] 3 of 6). Drinking water risk factors identified during interviews included lack of adequate infrastructure within First Nations communities (e.g., reliance on private wells, trucked water, lack of water treatment plant), and challenges in ensuring that human resources are available and trained for drinking water monitoring at the community level.

In line with the key informant interviews, nearly all of the EHOs surveyed (91%) identified drinking water risks. Drinking water risks identified by EHOs included issues with wells, cisterns, water supply treatment plants and monitoring of public systems.

The findings from the literature and document review provided additional evidence. Various consultations, surveys and studies over the past five years have consistently identified risks and issues with drinking water in First Nations communities. These have included:

- **Identification of risks associated with water cisterns and wells in use on reserves.** [14,15,16] For example, cisterns have a higher potential for public health risks compared with piped distribution systems given that there are no accepted construction standards for cisterns, many are in disrepair, and there are challenges with regular maintenance. Estimates in 2007 were that there were more than 14,800 water cisterns in First Nations communities.

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[13] Throughout the report, "AO" refers to the aggregated responses from interviews with aboriginal organizations (2 National organizations and 4 provincial / territorial). The term "NAO" will be used to identify where unique findings were identified for the National Aboriginal Organzations and "RAO" for the Regional Aboriginal Organizations.

[14] EPHD. (2006). Report on Public Health Risks in Drinking Water Supplies in Four First Nations Communities in Saskatchewan

[15] EPHS. (2008). Saskatchewan Health Protection Report to December 31, 2007.

[16] EPHD. (2007). Summary Report Cisterns in First Nations Communities South of 60°. Internal Report.

- **Documentation of community members' perceptions of poor drinking water quality.**[17,18,19,20,21,22] Various examples identified in the literature included: drinking water identified within the top five environmental concerns for First Nations communities; fewer than one-half of First Nations residents rate the quality of their drinking water as "good"; and First Nations residents are less positive about the quality of the water they receive when compared with residents of other small communities.
- **Compilation and analysis of drinking water advisories on reserve.**[23,24] For example, these studies found over a 12-year period (1995-2007) that the most frequently cited reasons for drinking water advisories were unacceptable microbiological quality (39%), inadequate disinfection or disinfectant residuals (34%), or equipment malfunction (28%).
- **Assessment of quality / quantity of on-reserve drinking water systems.**[25,26 27] These include findings such as only 38% of on-reserve water systems were classified as "low-risk" in 2007. In 2001-02, approximately 25% of First Nations housing units were assessed as having water supply that was not adequate in terms of quantity with respect to hygiene and safety, and/or quality with respect to whether the housing unit's water supply satisfies health requirements as defined in the 2007 *Guidelines for Drinking Water Quality*.
- **Identification of environmental impacts on drinking water quality in First Nations communities.**[28,29,30] Examples from studies include the identification of impacts such as climate change, proximity of First Nations communities to industry or development projects, and the low quality of wastewater systems that can have direct links to drinking water quality.

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17 AFN (for EHRD). (2008). First Nations Environmental Health Resources Project: Feasibility Study Building First Nations Capacity in Environmental Health. Ottawa, Canada.

18 EPHD. (2007). Drinking Water On-Reserve. First Nations On-Reserve Study POR 031-07. Internal Report.

19 Health Canada (2010). First Nations and Inuit Environmental Health Awareness Campaign Baseline Survey.

20 Graham, Mitchell & Edgar (2009). Engagement session on the development of a proposed Federal Legislative Framework for drinking water and wastewater in First Nations communities. (Institute on Governance – unpublished report).

21 AFN. (2007). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition. Assembly of First Nations.

22 EPHD. (2009). Water Quality On-Reserve Quantitative Research POR 095-08. Ottawa, 2009. Internal Report

23 EPHS (2009) Taylor R. Perceptions of First Nations Regarding Water Safety and Quality in the Atlantic Region: A review of the literature and recommendations.

24 Health Canada. (2009). Drinking Water Advisories in First Nations Communities in Canada. A National Overview 1995-2007. Health Canada Pub.: 3598, Cat.: H34-208/2009E-PDF.

25 INAC. (2003). National Assessment of Water and Wastewater Systems in First Nations Communities - Summary Report. Catalogue no. DS-4900.

26 Health Canada. (2009). A Statistical Profile on the Health of First Nations in Canada: Determinants of Health, 1999 to 2003.

27 INAC. (2007). Summative Evaluation of the First Nations Water Management Strategy Project 06/13.

28 EHRD / Stu Solomon (2009). Canadian First Nations on-reserve and Inuit Health - Mapping the top health conditions and their environmental causes – literature review.

29 Health Canada (2004). Canadian Handbook on Health Impact Assessment- Volume 1: The Basics.

30 EHRD (2010). Review of Health Canada's Adaptation Measures Related To The Clean Air Agenda -Final Report. 2010.

Housing and health risks

Along with drinking water, housing was frequently identified as a key environmental health risk within First Nations communities. In approximately one-half of interviews (16 of 35), First Nations community representatives reported that housing issues posed environmental health risks for their communities. The identification of housing and health risks was particularly high among CA community representatives (4 of 5). Overall, First Nations community respondents provided various examples linking housing and health risks, particularly with respect to housing quality and housing shortages. In terms of housing quality, it was noted that mould and air quality issues arise when resources required for repairs are unavailable, when housing is not built to code, or when issues such as humid climate are not taken into account in housing construction, even when built to code. In addition to poor quality housing, an overall housing shortage was also reported. Respondents indicated that this shortage leads to overcrowding, hygiene challenges, infections and air quality issues.

Most REHMs (5 of 7) and EPHD respondents (3 of 4) identified housing and housing-related issues as top concerns. The main concerns included housing that is not built to code, overcrowding and associated infection control issues. RMOs (2 of 4) cited specific concerns about the prevalence of mould in housing, and the overall substandard state of on-reserve housing. They indicated that reduction of risks in housing is in part linked to individual behavior, and in part associated with lack of resources and inadequate infrastructure. Additionally, a few REHMs (2 of 7) reported that most First Nations people do not own their houses on-reserve which may contribute to decreased commitment to home maintenance.

Along with drinking water, nearly all of the EHOs surveyed (92%) reported housing and health risks. They noted various issues such as overcrowding, poor construction, mould, and poor indoor air quality.

The findings from the literature and document reviews corroborated the findings from the key informants and survey of EHOs with respect to housing and health risks. Interrelated risk factors related to health and housing included:

- **Indoor air quality.** [31,32,33] The literature identified an association between poor air quality and ill health effects such as respiratory symptoms, asthma, lung cancer, and skin and eye irritation. The main risk factors for poor air quality in housing in First Nations and Inuit communities were overcrowding, poor housing construction and maintenance, tobacco smoke and wood heating, and higher levels of chemical contaminants.

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[31] EPHS. (2009). Respiratory Health Effects of Housing Improvement on First Nation Reserves in Canada: Literary Review of Intervention Studies.

[32] Verhille, S. (2009). Indoor Air Quality Issues in First Nations and Inuit Communities in Canada. NCCEH.

[33] EPHD. (2007e). Quantitative Research on Indoor Air Quality and Mould in First Nations Households. POR 503-06.

- **Overcrowding.**[34,35,36] Studies found that in 2002-03 and 2006 the rate of overcrowding in First Nations houses on-reserve was higher than the Canadian average. In 2002-03, the mean density of persons per room was 0.76, close to double the Canadian average. Using 2006 Census data, another study found that 26% of First Nations people on-reserve were living in crowded housing compared with 3% of non-Aboriginals.
- **Condition of housing stock.**[37,38] The literature review found that the sizeable proportions of on-reserve housing stock require repairs. 2006 Census data indicated that the prevalence of living in homes that required major repairs was approximately six times higher among First Nations people on-reserve (44%) compared with non-Aboriginals (7%). Similarly, another survey in 2002-03 found that 34% of on-reserve homes required major repairs and another one-third needed minor repairs.
- **Mould.**[39,40,41,42] The literature indicated that mould in homes on reserve remains a serious problem. For example, in a 2010 survey of First Nations and Inuit community members, over one-half of respondents (59%) reported that mould posed the greatest indoor environmental health risk. Another survey conducted in 2002-03 found that 37%-49% of respondents reported issues with mould or mildew.

Environmental contaminant risks to food and water safety

Many of the key informant respondents reported that environmental contaminants in food, water and air constitute a major environmental health risk facing First Nations and Inuit communities. This was a common theme found among the First Nations community representatives (8 of 35), however it should be noted that none of the representatives from CA communities raised this as a risk or priority. First Nations community respondents that identified environmental contamination as a risk noted that the proximity of mines or agricultural lands concerned First Nations community members. They reported that they lacked resources and information needed to identify the risks, assess impacts on their health, and to remediate if required. Specifically, one First Nations community representative noted: *"There are contaminated areas within our region…but we do not know what those contaminants are and where they are*". Another concern

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34 Gionet, L. (2009). "First Nations People: Selected Findings of the 2006 Census". Canadian Social Trends. Statistics Canada Catalogue no. 11-008-X Ottawa, 2009. Web. November 2009.

35 Clark Michael, P. Riben and E. Nowgesic. (2002). "The Association of Housing Density Isolation and Tuberculosis in Canadian First Nations Communities." International Epidemiological Association 31 (2002): 940-945.

36 AFN. (2007a). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition. Assembly of First Nations.

37 Gionet, L. (2009). "First Nations People: Selected Findings of the 2006 Census". Canadian Social Trends. Statistics Canada Catalogue no. 11-008-X Ottawa, 2009.

38 AFN. (2007). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition. Assembly of First Nations.

39 Berghout J., et al. (2005). "Indoor Environmental Quality in Homes of Asthmatic Children on the Eplsipogtog Reserve (NB), Canada." International Journal of Circumpolar Health. 64.1 (2005):77-85.

40 Office of the Auditor General. (2006). May 2006 Status Report of the Auditor General of Canada. Chapter 5: Management of Programs for First Nations.

41 Health Canada (2010). First Nations and Inuit Environmental Health Awareness Campaign Baseline Survey.

42 AFN. (2007). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition.

expressed by a First Nations community respondent was the presence of environmental contamination beyond their own communities in that animals could drink contaminated water from one region and then be consumed by First Nations community members in another region.

Research CA holders (5 of 7) also identified environmental contamination as a significant risk for First Nations and Inuit communities. For example, one research CA holder stated that the greatest area of concern is with respect to chemical or biological pollution in aquatic foods, and that environmental contaminants generally pose risks in terms of the quality, safety, and availability of traditional foods.

The concern with risks associated with environmental contamination was also expressed in interview with AO respondents (5 of 6), and EHRD representatives (3 of 4). For example, EHRD respondents (2 of 4) suggested that contaminants that can enter First Nations community water supplies are of greatest concern, whereas another EHRD representative stated that contaminants in traditional foods are of major concern. Interviews with AO respondents described how contamination from industrial sources and climate change (e.g., melting, flooding, and erosion) are impacting traditional foods. Concerns were expressed that there are limited ways to control contaminants entering the food chain, yet traditional foods often provide more affordable, healthier alternatives when compared with pre-packaged foods available in the more remote or northern communities.

Findings from the literature and document reviews supported the evidence collected through key informant interviews with respect to the environmental health risks associated with environmental contamination, particularly with respect to impacts on traditional foods. Studies demonstrated that First Nations and Inuit communities that follow more traditional diets are likely being exposed to higher concentrations of environmental contaminants which present increased levels of associated health risk.[43,44,45,46,47,48] This area is of particular concern among northern communities. Contamination sources identified included industry and development projects, climate change which is providing more opportunities for exposure (e.g., flooding), and more local contamination sources (e.g., fuel tanks, inadequate solid waste disposal).

Food safety risks

In addition to the concern with environmental contaminants and food safety, the evaluation found evidence that First Nations communities also face public health risks associated with food preservation, food preparation, and food facilities more generally. Approximately one half of EHOs surveyed (53%) reported risks associated with food safety. Public health issues associated

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43 Health Canada (2004). Canadian Handbook on Health Impact Assessment- Volume 1: The Basics.

44 AMAP. (2003). AMAP Assessment 2002: Human Health in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.

45 AMAP. (2009). AMAP Assessment 2009: Human Health in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.

46 Van Oostdam J, et al. (2005). "Human Health Implications of Environmental Contaminants in Arctic Canada: A Review." Science of the Total Environment 351-352 (2005):165-246.

47 EHRD / Stu Solomon (2009). Canadian First Nations on-reserve and Inuit Health - Mapping the top health conditions and their environmental causes – literature review.

48 Chan, Laurie (2005). Health and Environment Issues with Canada's Aboriginal Communities - Final Version.

with food safety noted by key informants included the need for ongoing food handler training, and risks associated with the fact that most food establishments on-reserve are not subject to provincial regulations or permitting processes. A finding from the literature review was that the methods used for preparation and storage of Aboriginal traditional/country foods may differ markedly from those used for commercially available foods. The review indicated that it is important to identify microbiological food safety issues associated with these methods that may increase the risk of food borne illness such as eating raw or fermented foods.[49]

Wastewater risks

The environmental health risks associated with wastewater were noted by some First Nations community representatives (8 of 35), REHMs (3 of 7) and AOs (2 of 6). First Nations community representatives described issues such as increased flooding (in part attributed to climate change) which are causing over-runs of sewers and taxing sewer systems. The wastewater then gets into homes and wells which impacts the drinking water quality and may cause health problems for First Nations community members. The majority of EHOs surveyed (80%) reported risks associated with wastewater.

Environmental health risks associated with wastewater treatment were also noted in the document review. For example, a recent 2009 Auditor General's report recognized that the "discharge of household sewage and industrial/commercial wastewater into surface water as a significant risk on reserves"[50]. Similarly, a 2002-03 survey of First Nations communities found that 9% of homes did not have a septic tank or sewage services.[51] A 2009 literature review also found evidence that Aboriginal children have higher rates of water-borne diseases due to overcrowding, inadequate sewage and poor hygiene practices.[52]

Solid waste disposal risks

The environmental health risks associated with solid waste disposal were raised by representatives from First Nations communities (12 of 35) and one RMO. They expressed concern that improper disposal of solid waste such as batteries, chemical waste from vehicles/machinery, or medical waste could leach into nearby underground water sources and contaminate the water supply. These respondents also raised concern over potential contaminants generated from the burning of waste both at and away from solid waste disposal sites. Among EHOs, nearly one half (47%) reported risks associated with solid waste disposal.

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49 Food Safety Network (2009). Safe Preparation and Storage of Aboriginal Traditional/Country Foods: A Review. NCCEH.

50 Office of the Auditor General. (2009). Fall 2009 Report of the Auditor General of Canada to the House of Commons. Chapter 6: Land Management and Environmental Protection on Reserves.

51 AFN. (2007). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition. Assembly of First Nations.

52 EHRD / Stu Solomon (2009). Canadian First Nations on-reserve and Inuit Health - Mapping the top health conditions and their environmental causes – literature review.

From the document review, a 2007 report indicated that most First Nations communities do not have solid waste disposal sites that meet commonly accepted standards for construction and operation[53]. This finding was similar to that found in a small 2005 focused study on four First Nations communities. Landfills were built without engineered liners or leachate collection systems, and the site selection process was not based on sound geological information.[54] From a 2002-03 survey of First Nations communities, approximately one fifth of homes (22%) did not have access to garbage collection services.[55] However, some progress is being made with respect to waste disposal. One REHM reported that an EHRP-funded research project in their region, funded through the Regional First Nations Environmental Contaminants Program, looked at contaminants in a solid waste dump and informed better practices for waste disposal in the form of transferring waste to a proper regional landfill. In addition, EPHD Public Health Engineers (PHEs) review project proposals for solid waste disposal facilities from a public health perspective, upon request.

Communicable disease risks

Most of the RMOs (3 of 4) indicated that communicable diseases (CDs) were important environmental health risks in First Nations communities. Examples included poor hygiene practices potentially contributing to spread of infectious and communicable diseases, the potential expansion of Lyme disease due to climate change, and tuberculosis. Other examples of communicable disease risks provided by various key informants included rabies from dog bites, West Nile virus (WNv), Eastern Equine Encephalitis (EEE), and risks associated with pests/rodents. Slightly less than one half of EHOs surveyed (43%) identified communicable disease as key environmental health risks in First Nations communities.

It is important to note that communicable disease risks and control activities cross-cut and are integral to virtually all other program areas covered by EHOs (e.g., the control of CDs and infection is an underlying goal of most housing, food safety, facilities inspections, emergency preparedness and response, drinking water safety, wastewater and solid waste disposal activities, etc). As such, EHOs and key informants may have been less likely to identify CDs as specific risks given that they are inherent in most other areas of programming. Subsequently, the fact that CDs were not frequently reported as risks should not be interpreted as an indication that CD risks are of lower priority in First Nations communities.

The document and literature reviews identified a number of environmental communicable disease risks for First Nations communities. One risk identified was WNv where a 2005 report indicated that eight First Nations communities in Manitoba were at high risk of human exposure to WNv.[56] Concern with WNv among First Nations and Inuit community residents was found to be high in 2005 with 50% of residents surveyed reporting they were *extremely* or *very* concerned

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53 EPHS. (2008). Saskatchewan Health Protection Report to December 31, 2007

54 Bharadwaj, Judd-Henrey, Wismer, and Nilson (2005). Investigation of the effects of landfill practices on environmental health in selected First Nations communities. (draft final report – unpublished report)

55 AFN. (2007). First Nations Regional Longitudinal Survey (RHS) 2002/03 National Report - Results for Adults, youth and Children living in First Nations Communities. Revised second Edition. Assembly of First Nations.

56 EPHD. (2006). The 2005 National Report on West Nile Virus in First Nations Communities South of 60°. WNv Program, FNIHB, Health Canada

about becoming infected with WNv.[57] The risk of tuberculosis infection was also identified. Recent data indicate that in 2008, the tuberculosis incidence rate among Registered Indians was 31 times greater than the rate for Canadian-born non-Aboriginals[58].

Emergency preparedness and response

Similar to communicable disease risks, emergency preparedness and response is a horizontal area that cuts across most of the other environmental health risk areas. Emergency situations that require planning and preparation can occur in many First Nations communities. For example, emergency situations could be caused by flooding contaminating water supplies, pandemics, or evacuation due to mould in housing. Key informants and EHOs alluded to emergency preparedness and response in some responses in relation to pandemic planning, flooding and evacuation due to natural disasters (e.g., forest fires). Approximately one-fifth of EHOs (20%) identified emergency preparedness and response as a priority area for communities. Some First Nations communities may be more at risk for an effective response to emergencies given the remote locations and structural challenges for some communities (e.g., availability of neighboring communities' infrastructure and resources; fewer specialized first-responders and equipment).

3.2 Extent to which EH-ER Programming Addresses Risks, Issues and Priorities

Alignment of programming with identified risks and priorities

On a very broad level, the overall approach used by the Cluster was assessed by the evaluation as conducive to addressing the risks, issues and priorities identified. As noted in the previous section, environmental public health risks are complex and interrelated, with many cross-cutting issues and challenges. From a population health approach that recognizes the full range of determinants of health, these risks require an approach that takes into account the complex interactions between factors that contribute to or detract from health. By emphasizing collaboration and capacity building on many different levels (national, regional, local) with multiple, diverse stakeholders, the Cluster's approach recognizes the complexity of the risks and issues to be addressed, and implements activities in a way that is consistent with a population health model[59], as demonstrated by the examples in Table 9.

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57 FNIHB. (2005). Baseline Survey Among First Nations On-Reserve and Inuit in the North. POR 04-39.

58 Health Canada, First Nations Inuit Health Branch (2011). First Nations and Inuit Health Fact Sheet.

59 Public Health Agency of Canada. *What determines health?* http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php#determinants

Table 9: Comparison between Population Health Model Requirements and Cluster Approach

Population Health Model Requirement	Example of Cluster Approach
A focus on the root causes of a problem, with evidence to support the strategy to address the problem	Collaboration with other federal departments, provinces/territories to address root causes; funding research to develop evidence
Efforts to prevent the problem	Strong emphasis on risk identification and mitigation
Improving aggregate health status of the whole society, while considering the special needs and vulnerabilities of sub-populations	Focus on developing capacity within communities that require additional supports and services
A focus on partnerships and intersectoral cooperation	Considerable efforts in developing, maintaining, and enhancing partnerships and collaborations with diverse stakeholders; First Nations Water and Wastewater Action Plan
Finding flexible and multidimensional solutions for complex problems	Collaborating with multiple stakeholders to generate local, relevant solutions
Public involvement and community participation	Working with organizations and within communities to find solutions that fit within their priorities

In addition, a more detailed assessment of the extent to which the EH-ER Cluster programming and activities are designed to address the specific environmental health risks, issues and priorities is presented in Table 10. Overall, the analysis found that the EH-ER Cluster is designed to address the main environmental health risks, issues and priorities facing First Nations and Inuit communities.

Table 10: Alignment between Environmental Health Risks/Issues and Cluster Activities

Environmental Health Risk/Issue	Associated Cluster Activities	Illustrative Examples
Drinking water	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships In the context of the Drinking Water Program, environmental public health assessment activities include public health engineers reviewing water infrastructure project proposals from a public health perspective; sampling and testing drinking water quality for bacteriological, chemical, physical, and radiological contaminants; reviewing and interpreting of drinking water quality tests; and disseminating test results and providing recommendations to First Nations communities and INAC. CBWMs are funded by Health Canada and trained by EHOs to meet, at minimum, nationally standardized learning outcomes. They are also trained in evaluation strategies and activities as detailed in the *National Framework for the Training and Evaluation of Community-Based Drinking Water Quality Monitor Performance (CBWM Training Framework*). To prevent potential public health risks related to drinking water management in First Nations communities, EPHP provides information and advice for improving drinking water quality to First Nations Authorities, and federal, provincial and municipal departments. The EPHP also develops education and awareness materials and provides them to EHOs for use and/or distribution to First Nations communities. EHRP funds and conducts research and gathers and analyses data to support the drinking water component of the Environmental Public Health Program. It publishes an annual Drinking Water Performance Indicator Report, which tracks progress towards achieving drinking water program goals and objectives. The EHRP also funds community-based research projects on drinking water quality and monitoring to support an evidence base for public health programs and policies.	• Engineering reviews of water infrastructure project proposals from a public health perspective • CBWM Program / drinking water quality monitoring, analysis and reporting • Recommendations for Drinking Water Advisories (issuances, rescindences) • Water quality on-reserve quantitative research • Policy on individual wells and wells with fewer than five connections • Public education and awareness materials on drinking water quality/safety • Membership on INAC's National Assessment of Water and Wastewater Systems Working Group
Housing and health	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships In the context of the Health and Housing Program, EHOs provide advice about site plans for new housing, and public health inspections of new and existing housing, on-request. On the basis of inspections, EHOs provide recommendations and guidance to homeowners, housing managers or other appropriate authorities on how to prevent or mitigate public health risks. EHOs will, whenever possible, take an interdisciplinary approach to housing inspections. This may include joint inspections with building inspectors. EPHP, in collaboration with CMHC, INAC and FNIH Regional authorities, develops culturally appropriate health and housing awareness materials for First Nations communities. FNIH Regions may develop their own public education materials to better meet regional needs. Public awareness and education materials focus mainly on taking personal responsibilities for the health and safety of home occupants in First Nations communities. Materials may also aim at specific audiences such as the construction trade or maintenance personnel.	• On request housing inspections and advice/recommendations and support with respect to mitigation measures • Housing and mould education materials • Education for homeowners on risk reduction • Inspection letters advocating risk mitigation • EHO review of plans for new housing or renovations from public health perspective • Membership on First Nations Indoor Air Quality Committee

Environmental Health Risk/Issue	Associated Cluster Activities	Illustrative Examples
Environmental Contaminants	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships EHRP provides funding for community-based participatory research and risk assessment through the National and Regional First Nations Environmental Contaminants Programs and the Northern Contaminants Program. It funds First Nations and Inuit educational activities such as curriculum development for Health Impact Assessment, the development of the Traditional Food Safety Manual and the ongoing conduct of Traditional Food Workshops. EHRP also provides input and funding for targeted environmental monitoring and community exposure assessments, when necessary. Under the Chemical Safety of Traditional Foods Program, EHRP supports major research initiatives, such as the First Nations Food, Nutrition and Environmental Study, which aims to provide the first regionally representative portrait of First Nations diets and the estimate of potential health risks associated with consuming various country foods that could be affected by environmental contaminants, while promoting the importance of traditional diets. EHRP, in partnership with First Nations research and statistical organizations, implements a First Nations Biomonitoring Initiative to collect baseline information on human exposure to environmental chemicals. EHRP provides human tissue analysis of persistent organic pollutants, including several organochlorines. In partnership with First Nations and Inuit organizations, EHRP is developing a series of environmental health guides for First Nations and Inuit to increase their awareness of environmental contaminants that could affect their health and to identify measures to reduce harmful exposure.	• Exploring traditional food safety information for First Nations • Research on environmental contaminants • Traditional food safety guide • Fuel tanks and contaminated sites remediation • Membership on Interdepartmental Mercury Issues Working Group
Climate Change	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships EHRP provides funding for community-based participatory research for northern First Nations and Inuit communities and organizations to determine the impacts of climate change on their health, to develop adaptation methods, tools and communication materials, which incorporate traditional and local knowledge.	• Climate Change and Health Funding Application Guides • Climate Change and Health Brochures • Capacity-building and results Workshops
Food Safety	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships In the context of the Food Safety Program, environmental public health assessments involves food facility plan reviews which have EHOs review new and upgraded food facility plans, such as grocery stores, restaurants and cafeterias, on request. They also review plans for public/community events, such as Pow Wows and festivals, upon request. In addition, routine and request public health inspections are conducted in food establishments. With respect to food recall and alert notifications, EHOs review and distribute relevant notices in the communities where they work. They inform Chiefs, Councils, food service establishments and community members of the potential public health risks associated with a food product.	• Food facility plan reviews • Public health inspections of food facilities and provision of certificates of compliance • Food Handler Training (including food safety certifications) • Dissemination of food product alerts and recalls • Linking contaminant research to traditional foods • Membership on F/P/T Committee on Food Safety Policy (Food)

Environmental Health Risk/Issue	Associated Cluster Activities	Illustrative Examples
	Public education, provided through information sessions and public education materials, is used to raise awareness and inform the general public of issues associated with food preparation and safe food handling, and how to minimize the associated public health risks. Educational activities may be tailored to specific audiences such as hunters, fishers and trappers. EHOs may provide specific information about food handling in the home during or after housing inspections. Through training, EHOs build capacity and transfer knowledge and skills related to food to First Nations community members. Training on sanitary food practices is provided to food service personnel to enable them to recognize the relationship between food and illness, as well as to gain knowledge on all aspects of food safety.	
Wastewater	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships The EPHP may be involved at all stages of a wastewater system's life cycle, including: engineering reviews of wastewater infrastructure project proposals from a public health perspective; inspecting community and onsite wastewater systems; monitoring wastewater effluent results if there is a threat to public health; and providing advice on system decommissioning. To prevent potential public health risks related to improper wastewater management in First Nations communities, the Environmental Public Health Division develops education and awareness materials and provides them to EHOs for use and/or dissemination within First Nations communities.	• Engineering Reviews of wastewater infrastructure project proposal from a public health perspective • EHO review of plans for new onsite sewage disposal systems • Inspecting community wastewater and onsite sewage disposal systems • *Guidelines for the review of water and wastewater project proposals in First Nations communities* • Membership on Technical Committee on Decentralized Wastewater Systems
Solid waste	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships In the context of the Solid Waste Program, public health engineers can provide comments on plans and practices with regard to site development and decommissioning, on request. EHOs contribute advice regarding local conditions and provide routine and request site inspections from a public health perspective. The EPHP may provide advice, guidance and recommendations to First Nations Authorities, builders, site operators, community members and others about public health issues related to solid waste disposal on-reserve. Targeted education may include the provision of information about public health risks associated with community solid waste disposal sites as well as other disposal alternatives, waste reduction, burning waste, uncontrolled dump sites, and disposal options for specific waste types. General public education and awareness activities could include information on how to reduce public health risks associated with solid waste disposal and promote safe practices. Information/referrals related to recycling programs, disposal of hazardous wastes safe collection and storage of waste is provided by EPHP staff upon request.	• Public health inspections of solid waste disposal sites • Information/referrals to recycling programs, disposal of hazardous waste, and safe collection and storage • Engineering reviews of solid waste infrastructure project plans from a public health perspective • EHO plan reviews for solid waste disposal sites • Research informing better practices for waste disposal • Collaborated with INAC to incorporate solid waste disposal data into EHIS

Environmental Health Risk/Issue	Associated Cluster Activities	Illustrative Examples
Communicable disease	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships All regular EPHP activities aim to prevent illness and the spread of communicable diseases. Specific activities, such as, inspections, outbreak investigations, surveillance and public education are also undertaken to prevent and control foodborne (e.g., salmonella), waterborne (e.g., E. coli), and vectorborne (e.g., West Nile Virus, rabies) environmental communicable diseases. All activities are carried out in collaboration with local, regional, provincial and/or national communicable disease staff (including but not limited to nurses, epidemiologists and Regional Medical Officers). EPHP activities include raising awareness among First Nations Authorities and community residents about environmental communicable diseases and of steps that can be taken to reduce the risk of illness. Communicable disease control is the explicit focus of some education and awareness programming (e.g., West Nile virus community awareness sessions) and constitutes an implicit focus of most other educational activities (e.g., drinking water safety) across environmental public health program areas.	• All public health inspections, plan reviews, and other assessments contribute to the control of communicable disease • WNv mosquito surveillance (sampling, testing, reporting) and intervention (adulticide/larvicide) as required, in collaboration with provinces • Foodborne, waterborne and vectorborne illness and outbreak investigations and follow-ups • Zoonotics public education materials (e.g., WNv, Hantavirus, Lyme Disease) • Membership on Horizontal Pandemic Influenza Sub-Working Group
Emergency preparedness and response	**Activity Areas** • EPH risk assessments • Research • Training, public education, and awareness • Advocacy and development of collaborative relationships The Environmental Public Health Program is not the lead for emergency preparedness and response in First Nations communities; however, environmental public health considerations and activities are crucial to an all-hazards approach to emergency management. For example, during an emergency situation, EHOs provide expertise and guidance to community leaders and other stakeholders on public health issues and risks. Expertise is provided in the areas of: water quality, food safety, communicable disease control, housing and facilities, and solid waste and wastewater disposal. EPHP staff work with stakeholders in an advisory role at the community, regional and national levels to coordinate efforts and assure public health risks posed by emergencies in First Nations communities are eliminated or mitigated.	• Pandemic planning • Water supplies emergency planning • Natural disaster and evacuation planning • Table-top exercises • Membership on Horizontal Health Emergency Management Working Group

Gaps and challenges in addressing identified risks and priorities

The evaluation identified some gaps and challenges with respect to addressing environmental health risks and issues facing First Nations and Inuit communities. These focused on specific areas such as drinking water, occupational health and safety, and injury prevention, as well as gaps that exist between risk identification and mitigation that are due in part to lack of resources and lack of enforceable standards and regulations.[60]

Gaps in addressing drinking water risks

EHOs and key informants identified a few gaps in the current design of Cluster activities with respect to addressing drinking water risks. The main gap identified was that water sampling testing was not sufficiently broad to cover the different water systems in First Nations communities. For example, the absence of systematic monitoring and testing of water systems to include both wells and cisterns results in many of the common water systems on-reserve not being assessed. This gap with respect to wells had been previously identified by the EPHP, and consequently is being addressed by EPHP's recent policy on individual wells and wells with fewer than five connections.[61]

Gaps in occupational health

A gap in coverage noted in the evaluation was occupational health risks. A few of the REHMs (2 of 7), representatives from First Nations communities (3 of 35), and EHOs (5%) reported that occupational health was an area that was not being adequately covered in First Nations communities by either the Cluster or other community programming.

Gaps in injury prevention

Injury prevention was also noted as a gap in First Nations communities by some of the REHMs (3 of 7) and EHOs (10%). The evaluation found that some Cluster activities likely contributed to injury prevention (e.g., dog bite prevention, facilities inspections), but that it was not a defined area of activity under the Cluster.

Gaps between risk identification and mitigation

Most of the information collected from key informants and EHOs with respect to gaps in addressing environmental health risks was related to challenges associated with risk mitigation. Cluster resources and activities are primarily focused on identifying risks and providing communities with advice and recommendations on how to reduce or mitigate them. Once a risk is identified, the decision to address it and the responsibility to mitigate it is rarely in the jurisdiction or capacity of the Cluster. The responsibility lies with other groups (e.g., Chief and Council; INAC which provides funding for infrastructure development and remediation). This need to have those who are responsible for mitigation aware of the risk identified is recognized

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60 EHOs and key informants provided a variety of responses to the questions designed to identify programming gaps in relation to needs. When analysed, we found that many of these responses were related more directly to either performance and effectiveness issues (e.g. need for leader involvement, more training for water monitors), or economy/efficiency issues (e.g. allocation of resources, need for more EHOs), rather than relevance/design issues per se. As a result, these additional comments have been integrated into the appropriate sections.

61 Health Canada. (2010). Questions and Answers: Implementation of the First Nations and Inuit Health Branch's policy on individual wells and wells with fewer than five connections.

by the Cluster, and as a result, considerable efforts are made to collaborate with various stakeholders at multiple levels to try to ensure that the gap between identification and mitigation is minimized. Despite these efforts, challenges in this area remain, with most of them related to two factors: lack of resources, and lack of standards and enforcement.

Lack of resources - Some First Nations community key informants (9 of 35) and all REHMs (7 of 7) described the challenge as primarily one of lack of financial resources available in communities to mitigate risks once they have been identified. All REHMs agreed that Health Canada's role for environmental health in First Nations communities is largely an advisory function and does not include funds for direct risk mitigation (e.g., house repairs, wastewater system repairs). First Nations community representatives indicated that community members may become aware of risks but often do not have the resources to fix the underlying causes (e.g., building a new water treatment plant, bringing existing housing stock up to code). One representative from a CA community described the challenge as a lack of financial, human and educational resources to address identified risks. Another representative from a CA community reported that the gap in resources exists due to a lack of coordination between the federal departments (e.g., Health Canada, INAC). The challenge and gap between risk identification and mitigation was also expressed in some of the quotes collected from EHOs:

- *When we inspect and make recommendations, rarely can the corrective action be taken due to inadequate funds provided by the homeowner, Band or INAC.*
- *Many of the positive outcomes of our work will not be recognized without the support of First Nations communities and other stakeholders such as INAC and Tribal Councils.*
- *Beyond conducting an inspection and writing a report, we are powerless/useless to help people address their problems.*
- *An inspection doesn't guarantee that the issue is going to be addressed.*

Lack of enforceable standards or regulations - The other main challenge related to risk mitigation is the lack of enforceable regulations on-reserve. As a result, the provision of advice and guidance to First Nations communities in accordance with existing provincial legislation/regulations and standards is the main mechanism used to try and ensure that risks are being mitigated and/or addressed. This was a common theme throughout many of the EHOs comments on areas where they identified gaps or limitation in public health programming. Some illustrative quotes from EHOs on this topic included:

- *We are expected to inspect facilities with no federal regs and no authority to actually inspect all facilities.*
- *Most gaps and limitations centre around the issue of jurisdiction and identifying who is responsible for these issues and facilities.*
- *The other gap is the lack of enforcement…there needs to be better mechanisms to address situations for which nothing else is working.*

This challenge in standards and enforcement was also outlined in the document review. The 2009 Auditor General's Report found that "while the federal government has the authority to regulate environmental threats on reserves, it has rarely used this authority to develop regulations to mitigate environmental threats that are regulated off reserves by provincial governments" and concluded that "existing regulations and other measures do not protect First Nations from priority environmental threats".[62] In 2006, the Report of Expert Panel on Safe Drinking Water for First Nations concluded that a regulatory framework for drinking and wastewater was required and described the elements of a comprehensive water regulation framework of the type that should apply to First Nations. The Expert Panel noted that regulation alone will not be effective in ensuring safe drinking water unless other requirements are met, including investment in both human resources and physical assets.[63] Similarly, a 2007 Report from the Senate Standing Committee on Aboriginal People recommended that a comprehensive consultation process be undertaken with First Nations communities and organizations regarding legislative options with a view to collaboratively developing such legislation.[64]

In alignment with the recommendations and findings cited above, Health Canada, in partnership with INAC, has been engaging First Nations, First Nations organizations and Provincial/Territorial officials since 2006 on the development of a legislative framework for drinking water and wastewater in First Nations communities. This is considered the first step towards addressing the legislative gaps that exist in First Nations communities relating to drinking water and wastewater.

At present, the integration of the Cluster activities with provincial health activities varies by region. Tripartite negotiations between First Nations, provincial and federal government are underway in some regions aimed at integrating services, standards and regulations. In some Regions, FNIH RMOs have delegated authority through provincial public health legislation to address certain issues (e.g., communicable disease risks, emergency response) using provincial protocols, and in others, the provincial Medical Officers of Health have certain legislative authorities to address public health issues on-reserve. Finally, some Regions have Memoranda of Understanding or other agreements with provinces to assure delivery of environmental public health services on-reserve (e.g., MOUs for West Nile virus surveillance support and intervention; use of provincial public health inspectors to assess certain facilities on-reserve).

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62 Office of the Auditor General. (2009). Fall 2009 Report of the Auditor General of Canada to the House of Commons. Chapter 6: Land Management and Environmental Protection on Reserves.

63 Expert Panel on Safe Drinking Water for First Nations (2006) Report of Expert Panel on Safe Drinking Water for First Nations (Volume 1).

64 Senate of Canada (2007) Safe Drinking Water for First Nations: Final report of The Standing Senate Committee on Aboriginal Peoples.

3.3 Responsiveness of Cluster to Diverse and Changing First Nations and Inuit Community and Regional Needs

Evidence from the evaluation indicates that, overall, the EH-ER Cluster is responsive to diverse and changing First Nations and Inuit community and regional needs.

While the EPHP is a national program with its eight core program components available to all First Nations communities, the focus of activities is frequently established according to annual community workplans and/or verbally agreed upon priorities between EHOs and communities. The guidance provided by the *National Framework for the Environmental Public Health Program*[65] ensures that there is some consistency of services and programming across communities, while the community planning component ensures that there is flexibility and responsiveness within the overall structure.

The overall findings from the key informant interviews indicate that although needs and priorities vary across communities and regions, the overall risks and issues being addressed by the EH-ER Cluster are considered to be of concern by most First Nations communities. Most First Nations community respondents (26 of 35) reported that the EH-ER Cluster is responsive and flexible in meeting their needs. Some of this responsiveness was attributed by respondents to the role that the EHO played in providing services and support to the community. Some other federal government stakeholders (4 of 8) also positively reported that the Cluster is responsive and flexible. All REHMs (7 of 7) and some other federal government stakeholders (3 of 8) indicated that priorities vary by region and by First Nations community. Similar to the First Nations community representatives, the REHMs and other government stakeholders indicated that EHOs are essential to ensuring responsive programming as they work directly with communities to identify community-specific needs that could be addressed within the activities and areas covered by the *National Framework for the Environmental Public Health Program South of 60º*.

On the research side, the EHRP has multiple funding streams available to support research partners to design and implement research projects that are reflective of diverse regional and community needs. Respondents from EHRD (2 of 4) stated that another significant way in which the research program responds to community needs is through the funding application process. The EHRD respondents (2 of 4) reported that a significant amount of their work involves providing guidance on the development of research proposals.

A review of workplans and administrative data for the Cluster revealed that all regions had activities in each core area monitored for the Cluster performance measurement strategy (e.g., public health inspections public education and awareness, training, plan reviews) for 2007-08 to 2009-10. The data demonstrated that there were similar patterns of activities with slight variations across the regions, reflective of different regional needs and the communities within

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[65] Health Canada (2009) *The National Framework for the Environmental Public Health Program in First Nations Communities South of 60°*.

those regions. For example, while the Pacific Region had 81% of their activities listed as Public Health Inspections and 14% as Public Education and Awareness, the Saskatchewan Region reported 89% and 8% respectively indicating slightly different emphasis, but similar activity patterns.

Gaps in Cluster Responsiveness to Diverse Regional and Community Needs

Cluster responsiveness to diverse regional and community needs may be limited as a result of the current lack of research-based evidence on community needs and desired EPH responses. As noted above, certain public health risks associated with the built and natural environment (e.g., OHS, injury prevention) were identified as programming gaps by some key informants and EHOs surveyed. Notably, injury prevention activities (e.g., those carried out by the FNIHB Chronic Disease and Injury Prevention Cluster) and OHS activities may be present in some communities or Regions more prominently than others, and the degree to which EHO involvement in these areas of potential programming is actually needed or appropriate is unknown.

There may be additional community-specific priorities and needs that this evaluation failed to identify as a result of limitations in the documentation and the limited sample of community-based key informants interviewed. Additionally, some REHMs and other key informants alluded to the inability to adequately address specific community priorities or projects in certain cases because of a perceived over-emphasis on drinking water monitoring and sampling, itself driven by national priorities and funding pressures (e.g., FNWWAP; attention given to drinking water at the national level). Efforts to generate more regular community feedback on priorities, needs and satisfaction with EPH programming would fill this knowledge gap. Finally, work remains to be done to improve coherence and communication of priorities between Regions and HQ.

3.4 Consistency of Cluster Objectives and Activities with Government of Canada Priorities

The overall objective of the Cluster is to identify, mitigate and/or prevent human health risks associated with exposure to hazards within the natural and built environments. This is accomplished through the provision of environmental public health services; community capacity building activities; surveillance and research; and collaboration with partners to address the determinants of health.[66] The document review identified numerous examples of alignment between this objective and activities and Government of Canada priorities. The main areas of alignment identified included:

[66] FNIHB (Winter 2010) *Evaluation Framework: Results-based Management and Accountability Framework - Environmental Health - Environmental Research Cluster*.

- In the October 2007 *Speech from the Throne* (39th Parliament, 2nd Session), one of the main themes was "improving the environment and health of Canadians". During this Speech, a commitment was made specifically "to improve access to safe drinking water for First Nations"[67]. The Cluster's objective to identify, mitigate and/or prevent human health risks associated with exposure to hazards within the natural and built environments aligns with the emphasis on improving the environment and health for Canadians. More specifically, the Speech's emphasis on First Nations safe drinking water aligns with many of the Cluster programs/activities such as EPHP's Drinking Water Program and EHRP's development of the Drinking Water Performance Indicator Report.
- The Government of Canada's *Clean Air Agenda* is an integrated, nationally consistent approach to reduce emissions of both air pollutants and greenhouse gases, working towards making tangible improvements in Canada's environment by addressing the challenges of climate change and air pollution.[68] The Cluster objectives and activities align with the *Agenda* by contributing to the identification and mitigation of risks associated with climate change and air pollution. A specific example of alignment includes EHRP's Climate Change and Health Adaptation community research funding program.
- Canada's investment in International Polar Year 2007-2008 was the largest ever international program of coordinated, interdisciplinary science, research and observations over a 24-month period[69]. EHRP actively participates in the Arctic Monitoring and Assessment Program - Human Health Assessment Group, an international group mandated to monitor human exposure levels of certain priority contaminants in the Arctic.
- Budget Plans for 2005, 2008, and 2009, in which dedicated investments were directed toward First Nations safe access to drinking water, Aboriginal Health Programs, and First Nations social housing projects on reserves.[70,71,72] The Cluster aligns with all of these areas with the EPHP having core program areas in housing and drinking water, and the EHRP supporting community-based research projects on drinking water quality and monitoring. By concentrating on the identification and mitigation of environmental health risks within a health determinants model, the Cluster is aligned with priorities and programs that emphasize overall Aboriginal health.
- *Creating a Healthier Canada: Making Prevention a Priority* - In 2010, Canada's health and healthy living ministers endorsed this declaration which lays out a vision of how governments will work together and with other organizations in the promotion of health, and the prevention of disease, disability, and injury. The Cluster activities emphasize a collaborative, health determinants approach to addressing environmental health risks. This aligns with the *Declaration* of how organizations and jurisdictions will work together to promote health and prevent disease, disability and injury.

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67 INAC. (2007). Summative Evaluation of the First Nations Water Management Strategy Project 06/13.
68 Retrieved from http://www.tbs-sct.gc.ca/hidb-bdih/initiative-eng.aspx?Hi=12
69 EHRD (2010). Review of Health Canada's Adaptation Measures Related To The Clean Air Agenda -Final Report.
70 Government of Canada. Federal Budget (2005).
71 Government of Canada. Federal Budget (2008).
72 Government of Canada. Federal Budget (2009).

3.5 Consistency of Cluster Objectives and Activities with Departmental Strategic Outcomes and the Branch Mandate

Health Canada's mandate is to "help Canadians maintain and improve their health, while respecting individual choices and circumstances", while its mission and vision is to a commitment "to improving the lives of all of Canada's people and to making this country's population among the healthiest in the world as measured by longevity, lifestyle and effective use of the public health care system".[73]

The mandate of FNIHB is to:[74]

- Ensure the availability of, or access to, health services for First Nations and Inuit communities;
- Assist First Nations and Inuit communities address health barriers, disease threats, and attain health levels comparable to other Canadians living in similar locations; and,
- Build strong partnerships with First Nations and Inuit to improve the health system.

The document review found examples of alignment between EH-ER goals, objectives, and principles and Health Canada strategic outcomes and Branch mandate specifically through the following documents:

- **Across all Reports on Plans and Priorities** (2005-06 through 2009-2010), the departmental strategic outcome that is aligned with the EH-ER goals is "Better health outcomes and reduction of health inequalities between First Nations and Inuit and other Canadians."[75] This strategic outcome is closely aligned with the anticipated Cluster outcomes of improved environmental public health risk identification and mitigation, the increased capacity of First Nations and Inuit individuals and communities to address environmental public health risks, and improved health and well-being of First Nations and Inuit individuals and communities. As outlined in the RPPs, Health Canada dedicates its support to environmental health within First Nation and Inuit communities through Cluster programming in the areas such as wastewater management, emergency preparedness (e.g., influenza planning), and drinking water quality.
- **Development a Five-Year Strategic Framework for FNIHB's Public Health Role in First Nations Communities: A Discussion Document,** outlines three clear goals: 1) to reduce the gap in health outcomes between First Nations and Inuit with other Canadians; 2) to provide access to services comparable to other Canadians living in similar areas; and 3) to build strong partnerships with First Nations and Inuit communities to

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73 EHRD. Health Canada Contaminated Sites Management Plans for Treasury Board: 2005-2010.

74 Mandate was obtained from the following Health Canada website: http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/fnihb-dgspni/mandat-eng.php

75 Health Canada. Reports on Plans and Priorities (2005-2010).

increase their participation, management and control of their health.[76] The Cluster activities contribute directly to these goals through the implementation of activities designed to develop the capacity among First Nations and Inuit individuals and communities to address environmental public health risks which will contribute to improved health and well-being of these communities, thus reducing the gap in health outcomes between First Nations and Inuit when compared with other Canadians.

- **Contaminated Sites Management Plans** state that "Health Canada is also committed to managing its physical operations in a manner that protects human health, minimizes risks to the environment, meets or exceeds applicable legislation and standards, and will continually strive to reduce any negative environmental impacts associated with departmental activities" through the Environmental Management Systems Policy and Health Canada's Sustainable Development Policy.[77] The Cluster objective to identify, mitigate and/or prevent human health risks associated with exposure to hazards within the natural and built environments, as well as the implementation of its program for remediation of contamination from Health Canada's facilities on First Nations reserves, align with the Health Canada's commitment under the *Plans*.

3.6 Alignment of Cluster with the Government of Canada's Broader Roles and Responsibilities in Health Programming for First Nations and Inuit

The document review found evidence of alignment between EH-ER programming and federal roles and responsibilities. The mandate and role of the Government of Canada to address First Nations health needs is captured in the Federal Indian Health Policy (1979).[78] The goal of the Policy is to achieve an increasing level of health in First Nations communities. In this Policy, the Government of Canada recognizes its legal and traditional responsibilities, and seeks to promote the ability of communities to pursue their aspirations within the framework of Canadian institutions. In keeping with the Policy, there has been a long-term plan to transfer delivery and administration of health programming to First Nations control. Roles and responsibilities of the Government of Canada and the First Nations are evolving as the transfer process continues.

The Memorandum of Understanding for the Transfer of Health Services to Indian Control (1989) documents the federal commitment to supporting health service delivery that is adaptable to community needs. The financial allocation demonstrates a commitment to developing community capacity to identify and deliver programs that meet their needs.[79]

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[76] FNIHB. (2009a). Developing a Five-Year Strategic Framework for FNIHB's Public Health Role in First Nations Communities: a Discussion Document.

[77] EHRD. Health Canada Contaminated Sites Management Plans for Treasury Board: 2005-2010.

[78] Information for the Indian Health Policy was adapted from information contained on the following Health Canada website: http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/fnihb-dgspni/poli_1979-eng.php

[79] Health Canada (1988) Indian Health Transfer Policy.

The approach used by the Cluster in delivering its programs and activities are in keeping with the intentions outlined in the Federal Indian Health Policy and the Memorandum of Understanding for the Transfer of Health Services to Indian Control. As described previously in Section 3.3, the Cluster programming is generally perceived as flexible and responsive to First Nations and Inuit needs and priorities. For EPH programming in communities north of 60^0, there has been a full transfer with responsibility for environmental public health programming (and other health services) having been devolved to Territorial governments through Territorial transfer or First Nations and Inuit control through self-government/land claim agreements, supported through federal funding commitments. In some First Nations communities south of 60^0 (primarily Saskatchewan, Manitoba and one First Nations community each in Ontario and Quebec), Contribution Agreements are used for EPH administration and delivery. In the remaining First Nations communities south of 60^0, EPHP continues to build capacity through training, education, leadership engagement, and assistance with developing workplans which may lead to additional First Nations communities administering their own EPH services through Contribution Agreements in the future. EHRP uses Contribution Agreements and promotes community-based participatory research, both of which support First Nations and Inuit control over research project implementation and builds capacity towards longer-term First Nations and Inuit control and ownership of research.

Given that it is based on the 1979 Indian Health Policy, the *Department of Health Act* and the federal jurisdiction over "Indians, and Lands reserved for the Indians" under s. 91(24) of the *Constitution Act*, 1867, the Government of Canada does not have any statutory or legislative authority to enforce environmental public health standards or regulations (federal, provincial or otherwise) on-reserve. EH-ER programming is provided at the request and/or with the agreement of First Nations Authorities and in the area of environmental public health risk mitigation, it plays an advisory (rather than regulatory) role.

Although EH-ER programming is not itself legislated, EH-ER activities nonetheless align with federal roles and responsibilities as set out in legislative instruments related to the environment, including:

- The *Canadian Environmental Protection Act* (CEPA), with respect to pollution prevention. The EH-ER Cluster has provided advice on reduction of contaminants from Health Canada facilities on reserve. In addition it contains mentions of inclusion of, or consultation with, Aboriginal groups including a place on a National Advisory Committee, and respect for traditional knowledge.[80] The EH-ER Cluster also provides advice on procedures for consultation with Aboriginal peoples related to contaminants.
- The *Canadian Environmental Assessment Act* (CEAA), in which one of seven purposes of the Act is "to promote communication and cooperation between responsible authorities and Aboriginal peoples with respect to environmental assessment." "In the administration of this Act, the Government of Canada, the Minister, the Canadian Environmental Assessment Agency and all bodies subject to the provisions of this Act, including federal authorities and responsible authorities, shall exercise their powers in a manner that protects the

[80] Government of Canada. Canadian Environmental Protection Act.

environment and human health and applies the precautionary principle." One of 8 objects of the Canadian Environmental Assessment Agency is "to engage in consultation with Aboriginal peoples on policy issues related to this Act." [81] The EH-ER cluster provides advice on consultation processes for Aboriginal peoples. It also provides federal authority advice to responsible authorities and the Agency on the health impacts to Aboriginal peoples resulting from environmental impacts of projects subject to review under CEAA.

4.0 EH-ER Cluster Performance: Effectiveness Findings

4.1 Short-term Outcome: Improved Environmental Public Health Risk Identification and Mitigation

The primary immediate outcome anticipated for the EH-ER Cluster, according to the program logic model, is improved environmental public health risk identification and mitigation. The evaluation measured the Cluster's per formance in contributing to this outcome by examining six groups of indicators designed to assess:

- **Access** to environmental public health and environmental health research activities, including reach and usage, that are conducive to adequate or improved risk identification and mitigation in communities;
- The **quality** of risk assessment activities including the increased availability and usage of training, tools and procedures for risk identification;
- The availability, scope, relevance, use and capacity to collect **program data**;
- The use of **evidence and research** to identify risks, make decisions, and set priorities;
- **Community capacity factors** (knowledge and awareness levels, availability of public education and awareness materials, and use of knowledge to assess risks) related to the outcome of improved environmental public health risk identification and mitigation.
- Program capacity to contribute to **immediate risk mitigation**

[81] Government of Canada. Canadian Environmental Assessment Act.

Access

The Cluster's contribution to the outcome of improved environmental public health risk identification and mitigation was evaluated by assessing a group of indicators related to *accessing* EPH and EHR activities. This included programming *reach* and *usage* that are conducive to adequate or improved risk identification and mitigation in communities. The lines of evidence supporting this assessment included key informant interviews, the EHO survey, document review and administrative data review.

Access to EHRP research funding increased substantially over the 5-year period covered by the evaluation. The funding associated with contributions under the EHRP component more than doubled rising from approximately $2.3M in 2005-06 to nearly $5.8M in 2009-10. With this increase in funding came a notable increase in the number of funding streams or programs, and an increase in the target recipients. Research CA holders (4 of 7) and EHRD respondents (4 of 4) reported that access to research funds had increased in terms of both increased funds and increased funding streams. The funding streams, each with a different focus and purpose, allow communities and First Nations organizations to work with research partners to design and implement research projects that are reflective of regional and community needs. Research initiatives/streams cited during interviews included:

- **National First Nations Environmental Contaminants Program** coordinated by the First Nations University of Canada and is driven by a community-based approach to environmental health research designed to assist First Nations people to assess the extent of their exposure to environmental contaminants and the potential for associated risk to their health and well-being;
- **Regional First Nations Environmental Contaminants Program** This funding steam is coordinated by EHRP and administered by the REHMs in each regional office of Health Canada. The purpose of this stream is to support research on regionally-relevant issues related to environmental contaminants;
- **Northern Contaminants Program (North of 60)** has Health Canada partnering with INAC to allocate funds for research and related activities in the areas of human health research, environmental monitoring and research, education and communications, and national/regional coordination and Aboriginal partnerships;
- **First Nations Environmental Health Innovation Network** which links First Nations with environmental health researchers to build capacity within First Nations communities to participate in environmental health research and to make use of data and knowledge regarding environmental health issues and concerns for decision making that will lead to health improvements;
- **First Nations Food Nutrition and Environment Study** in which Health Canada is one of several partner organizations that aims to gather information with 100 randomly selected First Nations communities;

- **Climate Change and Health Adaptation for Northern First Nations and Inuit Communities**[82] which takes a community-based approach to assist northern communities in understanding the effects of climate change on their health and developing adaptation plans and communication materials using both traditional knowledge and scientific methods;
- **Drinking Water Quality Program** coordinated by the First Nations University of Canada which funds research projects specifically related to drinking water quality on First Nations communities south of 60°. The goal of the DWQP is capacity-building; the research projects will provide information to help First Nations communities further understand water quality issues, and to search for a better-adapted water-monitoring process to suit a specific community's needs; and,
- **First Nations Biomonitoring Initiative** being implemented in partnership with the Assembly of First Nations exclusively for First Nations peoples on reserve (south of 60°). This initiative is addressing the need for nationally representative data regarding exposure of First Nations to environmental chemicals. The FNBI serves to complement the Canadian Health Measures Survey which is a national survey exclusive of Inuit and First Nations on reserve.

Overall, most representatives from First Nations communities (22 of 35) reported that there has been greater access to and usage of EPH services over the past five years. Greater access and usage was reported by all representatives from CA communities (5 of 5). Among First Nations community respondents, commonly cited EPH services accessed included water testing, food safety programming, solid waste management, and mould-related activities – all of which would be conducive to adequate or improved risk identification and mitigation in communities. The factors identified by communities as contributing to increased access and usage of EPH services were:

- **Improved, more collaborative relationships between the EHO, field workers, leadership and First Nations community members** – A majority of First Nations community respondents (18 of 35) including most CA community respondents (4 of 5) indicated in interviews that greater awareness and usage of EPH services were primarily due to a good or better working relationship between the EHO, First Nations community members, other field workers and leaders.
- **Increased presence/visibility, responsiveness and availability of EHOs** – EHOs were described by several First Nations community respondents (12 of 35) as being more responsive to public health issues, more present in the First Nations communities and more readily available when the need arose, all of which contribute to increased awareness of EPH services within communities. Several First Nations community respondents (5 of 35) indicated that as a result of the greater responsiveness and availability of the EHO, community members know who to contact if they need information or assistance. Some of

[82] "Northern" meaning that applicants must be located north of 60˚N or if south of 60˚N situated in the Continuous Permafrost Zone. This would include Nunavik and Nunatsiavut as well as some parts of Ontario, Manitoba and Quebec.

the representatives from CA communities (3 of 5) noted that the best way to improve access or use of EPH services would be to increase the EHOs availability. Two respondents from CA communities suggested that the EHO live in their community, or be responsible for their community exclusively and be available on a day-to-day basis (which is not possible within current funding amounts).

- **Improved communication of key information** – First Nations community respondents (8 of 35) also indicated that access was improved due to improved communication of key information. Communication mechanisms cited included postings in the community, manuals designed for First Nations community health staff, EHO participation in health fairs, and EHOs providing leaders with inspection/assessment reports and contact information after their community visits.

Some First Nations community respondents (7 of 35) reported no significant change in the usage of EPH services, and a few First Nations community respondents (2 of 35) stated that usage of EPH services had decreased in their community over the past five years. One reason provided for having no significant changes in usage was that EPH services had always been a big component of services available within their community and, as a result, there had been no need for an increase. Another First Nations community respondent stated that for several years the EHO had many communities to cover, and, as a result, could really only deal with emergency issues. Reasons provided for decreases in services included staff turnover which means that the new EHO has to work to gain community's trust, and limited involvement of the EHO in the community. Challenges with EHO involvement in the community included EHOs taking a "hands-off approach" (e.g., community health workers told to look things up on the Internet, slow response to questions), challenges with aligning EHO's schedule and timing with community health staff's availability, and the EHO providing recommendations without fully explaining the rationale for them.

During key informant interviews, REHMs, EPHD program managers, and other federal government stakeholders attributed most of the increased access to EPH services over the past five years to an increased number of EHOs and CBWMs. This in turn has resulted in increased activities within First Nations communities. This increase in numbers of EHOs and CBWMs is due to the funding attached to the FNWWAP which accounts for over one-half of the EPHP's funding at both the regional and national levels. Two REHMs noted that access to services has increased due to the development and dissemination of communication materials which have resulted in improved service access and increased availability of resources when an EHO is not in the community. Additionally, two REHMs indicated that access to services increases as communities become more aware of services they can request, such as housing and facilities inspections and food safety training.

Respondents from EPHD (3 of 4) reported that access has been variable as there are differences in capacity between communities, challenges with the recruitment and retention of EHOs, and differences in how engaged EHOs become with communities which is partially related to the recruitment/retention issues with EHOs (e.g., EHO engagement with the community is based on building trust and a relationship with a particular community which is made more challenging with EHO turnover). A few EPHD representatives (2 of 4) stated that access has improved as the EPH programming has evolved. One EPHD representative remarked that EHOs are actively

transferring knowledge across communities as more tools become available to assist with awareness, education and training. One respondent noted that access to research programming has improved noticeably.

Other evidence related to access was derived from results from the EHO survey with respect to availability, awareness and usage of EPH services in communities. Approximately two-thirds of EHOs (67%) reported that *availability* of EPH services in communities had increased either "somewhat" (31%) or "significantly" (33%) in the past five years. The majority of the EHOs (65%) indicated that this increased accessibility to services was in part due to the EPHP. Similarly, three-quarters of EHOs (75%) reported that communities' *awareness* of EPH services had increased either "somewhat" (47%) or "significantly" (28%) over the past five years with the majority (58%) reporting that the EPHP had contributed to these changes. As well, EHOs (77%) noted that communities' *use* of EPH services had increased either "somewhat" (54%) or "significantly" (23%) over the past five years, with 58% indicating that the EPHP had contributed to these changes. The strategies EHOs reported using to increase usage of EPHP services by communities primarily focused on active involvement in the community, and taking advantage of various opportunities to create awareness of the importance and availability of EPHP services. Some examples included:

- *In my communities, I take a considerable percentage of time to meet with all community members who wish to speak to me, ask if there are problems and if I can be of help and make people aware…I try to create a trust with my clients by talking to them about the issues they are concerned about;*
- *I always attempt to accept all invitations to community events or gatherings in order to promote public health;*
- *Be in community regularly, make contacts with as many community members as possible, be willing to be on site even with short notice, help out at educational events.*

The document review provided evidence that increased First Nations communities' access to EH-ER programming had been conducive to improved risk identification within these communities. This has included access to study results on the potential benefits and risks of the diets of First Nations people,[83] increased access to trained environmental health staff such as CBWMs,[84] increased participation by communities in monitoring and surveillance activities for communicable diseases such as mosquito surveillance for WNv,[85] and successful remediation of contaminated sites reducing FNIHB's liability by approximately 60% over a two-year period (2004-05 to 2005-06).[86]

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83 AFN FNFNES 2008-09 Activity Report – pdf.

84 EPHD (2008) First Nation Water Management System 2006-2007 Performance Indicators Report.

85 EPHD. (2006a) The 2005 National Report on West Nile Virus in First Nations Communities South of 60°. WNv Program, FNIHB, Health Canada.

86 EHRD (2005/06) Fuel Tanks and Contaminated Sites Remediation Program Annual Summary Report.

Increased access, usage and reach of activities were noted in the available administrative data for many activities over the three year period.[87] For example, training delivered to First Nations community members increased from 226 events in 2007-08 to 394 in 2009-10, an increase of 74%. Similarly, participation in these training events rose from 2,439 participants in 2007-08 to 3,185 in 2009-2010, an increase of 31%. The preparation for H1N1 saw emergency and preparedness activities jump from 24 in 2007-08 to 354 in 2009-2010, an increase of 1375%. As well, over this three year time period there were increases in collaborative activities (33% increase), engineering plan reviews (450% increase), funded research projects (14% increase) and research dissemination activities (45% increase). Increases in these types of activities (e.g., training, emergency preparedness and response, engineering reviews, research) are all conducive to contributing to improved identification and mitigation of risks within First Nations communities.

Another main area of Cluster activity at the community level for which there was reliable administrative data was public health inspections. The number of public health inspections remained relatively constant, showing only a slight decrease between 2007-08 (8,877) and 2009-2010 (8,089) of approximately 9%. The evaluation interpreted this finding as being conducive to adequate or improved risk identification and mitigation in First Nations communities. Unlike some of the other activity areas such as education and training where an increase in activity can be associated somewhat directly with improved risk identification and mitigation, an increase in inspections may not necessarily have the same association. Given the nature of inspections, increases in this particular activity are likely more reflective of increases in actual risks, rather than an indicator of improved risk identification. According to the administrative data, approximately 40% of the inspections are routine, whereas the remainder (60%) are actually requested inspections. The prevalence of requested inspections indicates community awareness of the EPH services available to them, community usage of services, and community motivation to identify EPH risks and potentially mitigate them.

Gaps and challenges with ensuring access

The evaluation found that while access to EH-ER programming and services was conducive to improved risk identification and mitigation, there remain some gaps and challenges according to key informants and EHOs. These included:

- **Gaps in awareness of RFNECP** – As noted in Section 3.1, 8 of 35 First Nations community respondents identified environmental contaminants as a key risk and they also reported lacking the resources and information required to identify those risks, assess health impacts, or to remediate as required. Given that these respondents (who work in areas related to environmental public health) did not appear to be aware of research funding in this area, indicates that the Regional First Nations Environmental Contaminants Program (RFNECP) may require additional publicity and communication to ensure adequate community awareness and potential access.

[87] The administrative data review covered three fiscal years (2007-08, 2008-09, and 2009-2010). Some of the data reported for this period should be used with caution given the uncertainty with respect to accuracy. Performance data were not available for the other two years (2005-06, 2006-07) that fell within the scope of the evaluation.

- **Insufficient number of EHOs given demand and current workload** – A common theme running throughout the key informant interviews and comments on the EHO survey was that the main step that the EPHP could take to increase the access and usage of EPH services was to increase the number of EHOs. The high demand for EHO services in communities and EHOs' heavy workloads combine to create a situation where many EHOs must work "reactively" in response to requests and emergencies as they occur, rather than "proactively" with respect to training, awareness and education. In addition to being unable to deliver educational or training sessions or special projects in communities, some EHOs do not currently have the capacity (ie., time) to deliver all 8 core programs as per the National Framework for the EPHP. Other challenges included not being able to spend enough time in communities to build relationships and engage in constructive discussion, and spending more time on administrative tasks and less in the field.
- **Gaps in awareness of the role of EPHP programming among leaders, general public and youth** – Some comments were received from EHOs with respect to gaps that exist at the decision-making levels in the community with respect to EPH programming, and environmental health responsibilities and liability (e.g., housing, drinking water quality, wastewater). These include gaps in awareness of First Nations community leaders and decision-makers with respect to the role of the EHO in communities as a resource and source of information.

  A few EHOs[88] also reported confusion among members of the general community with regard to titles, roles, responsibilities of EHOs compared to CHRs and CBWMs. A few key informants also identified a lack of awareness among community members of the existence, scope and availability of EPH services, suggesting that this could be improved through more awareness-raising aimed at the general population through face-to-face sessions and better advertising of services (e.g., through Band newsletters, local cable stations).

  Four key informants and one REHM identified First Nations youth as a group less likely to access or use EPH services. With shifting demographics in First Nations communities where youth form the majority of the population, it was suggested that youth be targeted (e.g., through targeted publications) to ensure their awareness of EPH risks and increase the likelihood of their future access and usage of EPH services.
- **Challenges in integration of EHO in community** – Among First Nations community key informants, there were some (7 of 35) that identified challenges in integration of the EHO in the community. These challenges were attributed to staff turnover, limited involvement of the EHO in the community beyond an inspection role (e.g., "they come, do their inspections and then leave"), limited time for the EHO to spend in community resulting in an emphasis on emergencies. Some representatives from First Nations communities (6 of 35) expressed similar challenges such as a lack of collaboration between EHO and community leadership which was attributed to EHO's lack of time spent in communities, and the cyclical turn-over in First Nations community leaders. A few REHMs (2 of 7) reported that EHOs work over time to build trust with community contacts. One REHM (1 of 7) suggested that the main barrier to building trust is the high turnover of staff, management and leadership in some communities.

[88] "A few" refers to 1-10% in this report.

Quality

Evidence on the extent to which quality of risk assessment had improved over the scope of the evaluation was collected via the survey of EHOs, administrative data review, and the document review. The indicators were increased quality/control and standardization of EHO's risk assessment activities, and increased availability and use of training, tools and procedures for risk identification for both EHOs and communities. The document and administrative data reviews provided information on the types of tools and training that had been developed and were available, whereas the EHO survey provided information on the extent to which these tools/training overall had been used and the actual outcome of their use (e.g., improved standardization, quality, etc.). In addition, some information was collected from key informants on how the scientific quality of EHRP projects is ensured, and the extent to which this had improved over the past five years.

EHRP funded research projects undergo a scientific review process to ensure that the proposed projects are of acceptable scientific quality. The review process for all research proposals includes a mandatory eligibility review, a scientific peer review, and selection committee review. The whole process is intended to be responsive to research needs identified by First Nations and Inuit communities. The Proposal call and review process for the Drinking Water Quality Program and the National First Nations Environmental Contaminants Program are coordinated by the First Nations University of Canada (FNUC), with Health Canada serving as the Secretariat. FNUC runs the call for proposals, updates the guide for the call for proposals, and manages the steering committee (Assembly of First Nations (AFN), Health Canada, FNUC, 2 elders and 2 youth members). FNUC also establishes the selections committee. Once the project is awarded Health Canada provides the funding and provides project oversight.

Most EHRD respondents (3 of 4) and some Environmental Health Research CA Recipients (2 of 7) cited that the most noticeable change as a result of the Environmental Health and Environmental Research Program over the last five years has been an increase in First Nation and Inuit community participation via research projects. This increased participation has occurred, in part, due to extensive work by the EHRD staff to provide guidance to funding applicants to ensure a high quality research project is being proposed. Increased participation in projects has contributed to an increase in the communities' awareness and knowledge of environmental health risks and issues. According to one (1 of 7) Environmental Health and Environmental Research CA Recipients, half of the observed changes in community capacity of First Nations and Inuit communities can be attributed to EHRD programming. As more programs have been implemented through the EHRP over the last five years, the ability of the program to identify environmental health risks has also improved (1 of 4 EHRD representatives). The following changes, specific to each of the six EHRP program elements, were reported by EHRD respondents:

- Delivery of food workshops under the Research and Monitoring element has evolved into the First Nations Food, Nutrition and Environmental Health Study over the last five years. In turn, the study has encouraged First Nation and Inuit communities to collect data and do risk assessments of the sources of contamination.

- In 2010, EHRD started to collect data for the drinking water program, which has addressed a research gap for the water component of the EPHP. In addition, EHRD drinking water data analysis has increased the responsiveness in issuing drinking water advisories over the last few years.
- Over the past few years the FNIHB laboratory has increased its services and led to advancements in human health exposure data related to organic chemicals and mercury, specific to Northern communities.
- Over the past five years, the Climate Change and Health Adaptation stream has encouraged community-based research to evolve into community-based adaptation based on research. In this way, the program has contributed to increasing community capacity through research.

- The implementation of the EHRP's First Nations Biomonitoring stream in 2007, has assisted in closing the gap on community-based biomonitioring data. One EHRD respondent noted that historically, large pan-Canadian studies (e.g. Canada Health Measures Survey) have concentrated on cities rather than First Nations and Inuit communities.

The document and administrative data reviews outlined numerous training, tools and procedures that had been designed and developed between 2005 and 2010 to improve the quality of risk assessments and improve risk identification by EHOs and communities. Table 11 includes the examples of the main training, tools and procedures designed, developed and undertaken by the Cluster as identified during the document and administrative data reviews.

Table 11: Examples of Tools, Procedures, Guides and Training

Tools/Procedures/Guides
Requirement for all EHOs to be certified with the Canadian Institute of Public Health Inspectors (CIPHI)
National Framework for the Environmental Public Health Program in First Nations Communities South of 60^0
Framework for West Nile Virus Activities in First Nations Communities South of 60^0
National Framework for the Review of Water and Wastewater Infrastructure Project Proposals in First Nations Communities – Revised 2009
Guidelines for Canadian Drinking Water Quality
On-site Drinking Water Test Kits
Tool Kit for Individual Wells for First Nations
Water Advisory Tool Kit
Your Health at Home. What you can do! A Guide to reducing exposure to environmental contaminants in the home.
Mould and Your Health. What you need to know for a healthier home (Mould Tool Kit)
Traditional Food Safety Guide
Funding Application Guide For the Drinking Water Quality Program
Guidelines for the Review of Water and Wastewater Project Proposals in First Nations Communities South of 60^0
Procedure Manual for Safe Drinking Water in First Nations Communities South of 60^0
Various inspection checklists and considerations such as Housing Inspection Checklist; Minimum Requirements for Health in First Nations On-Reserve Housing; EPHP and Occupational Health and Safety Activities; Solid Waste Disposal Site Checklists

Research Funding Application Guides (National First Nations Environmental Contaminants Program; Regional Environmental Contaminants Programs; Climate Change Program; Drinking Water Quality Program)		
Environmental Health Learning Needs Assessment		
Numerous public education and awareness materials		
Training	**Description**	**Delivery**
Training Sessions offered to community members by EHOs	Different types of training sessions offered: • Food safety training (41%) • Drinking Water-related training (23%) • Transportation of Dangerous Goods (21%) • General EPH (6%)	1,007 sessions delivered to 8,304 participants over a 3-year period (2007-08 to 2009-2010)
Health Impact Assessment Courses	On-line training courses based on the Canadian Handbook on Health Impact Assessment	EHRD and University of Laval
Environmental health and Environmental research	• Traditional food safety • Environmental contaminants • Climate change and health	EHRD and Aboriginal organizations (AOs)
Training Program in Environmental Public Health	Co-developed 4-year program in environmental health to promote career choice of EHO among members of First Nations communities in Quebec.	New Brunswick Community College (Bathurst Campus)
Fuel Tank Training	Safe operator training	Centre for Indigenous Environmental Studies delivered in Ontario, BC, and MB (68 First Nations communities)

As noted previously, while the document and administrative data reviews provided information on which tools, procedures, guidelines and training had been designed and developed, the EHO survey was used as the main line of evidence for the evaluation to determine the overall extent to which these had been accessed and used, and the outcomes as they related to improved quality. Slightly over one-half of EHOs reported that the standardization, scope and quality of their risk assessments had increased over the past five years. With respect to standardization, 54% reported that it had increased "somewhat" (45%) or "significantly" (8%). The most frequently cited reason was the standardized reporting forms used for capturing data through EHIS. Another reason provided was being able to spend more time in the community:

- *The increase in numbers of EHOs has allowed for more frequent and regular visits to the communities resulting in the ability to implement a more structured environmental health program.*
- *You immerse yourself in the community and begin to understand the dynamics unique to the community. Once you can focus on the needs of the communities, the standardized risk assessments follow naturally.*

A similar proportion of EHOs (55%) reported that the scope of their risk assessments had changed over the past five years either increasing "somewhat" (39%) or "significantly" (16%). Some of the explanation for increased scope included:

- *The majority of our time is spent dealing with drinking water, however in the past five years, we have started to spend more time dealing with wastewater disposal, solid waste, housing and food safety issues.*

- *More recreational activities such as gyms and community playgrounds are being implemented.*
- *Larger, more frequent, and complex community gatherings with increased outside or tourist participation and attendance.*
- *The communities ask for my input on more projects.*

A slightly higher proportion of EHOs (59%) reported that the quality of their risk assessments had increased over the previous five years either "somewhat" (48%) or "significantly" (11%). The reasons EHOs provided for improvements in quality tended to focus on gaining more experience in the field, in-house and external training opportunities, and keeping up to date with the latest scientific research and development in environmental health. Other reasons provided for improved quality were:

- *Providing a quick response to all risks and emergencies;*
- *Involved in more interaction;*
- *With more data capture, gaps in information are more easily identified and closed.*

The largest proportion of EHOs reported that training on procedures and standards for conducting risk assessments had essentially stayed the same (46%) over the past five years. Approximately one-third of EHOs (36%) reported increases, while a smaller proportion reported decreases (18%).

Gaps and challenges with ensuring quality

The evaluation did not identify major gaps or challenges with respect to tools, procedures, guides, or training. EHOs and key informants did not identify any major gaps or challenges, with the one exception previously described of EHOs not having sufficient time to provide training and educational services to First Nations communities.

The document review also noted a number of guidelines, policies and programs that at the time of the evaluation were under development. The following are presently being designed to contribute to improved risk identification including:

- Revision of the Quality Assurance Program for Microbiological Monitoring in First Nations Communities South of 60^0.
- Procedural Guidelines for Waterborne Disease Events in First Nations Communities South of 60^0.
- Guidance on Drinking Water Cisterns and Trucked Water Delivery.
- Implementation of FNIHBs policy on individual wells and wells with fewer than 5 connections.
- Tool Kit for Individual Wells for First Nations.
- Information for the Wells Pilot Project.
- Food Safety for Aboriginal People of Canada: A manual for healthy eating practices.

Program Data

The availability, scope, relevance, use and capacity to collect, analyse, and report on program data were assessed as indicators of the extent to which the Cluster is contributing to the outcome of improved environmental public health risk identification and mitigation. The evidence collected for the evaluation was primarily from the document and administrative data reviews, and to some extent, the key informant interviews.

The main observation from the evaluation was that while progress appears to have been made during the five-year scope of the evaluation with respect to the capacity to collect program data, the quality of the data (e.g., reliability, completeness, accuracy) at this stage remains a challenge.

The document review provided some context for the current situation. The requirement for a national system for data collection was initially identified in 1998, when the First Nation Inuit Health Information System was not deemed a good fit for environmental health programming. Various options were explored including a commercial off the shelf product (*HedgeHog*). EHIS was initially developed in 2005 and is currently implemented in all Regions (with the exception of Alberta which has been using *HedgeHog* since 2003 and has the capacity to collect and generate data equivalent to the EHIS). However, where Alberta has 100% usage of Hedgehog (because it is mandatory for EHOs to use it in that Region), uptake and/or full usage of EHIS by all EHOs in the other six Regions has not yet been achieved. EHOs working within CA communities are provided with the opportunity to use EHIS for their own use, but in most cases, Health Canada does not have access to their servers or data.[89]

All regions have a mechanism for collecting and reporting on drinking water quality data. *Watertrax* is the system used by Ontario, Manitoba, and the Atlantic and Pacific regions. Saskatchewan also recently implemented *Watertrax*, but EHRD does not yet have an agreement in place to access the data directly. Alberta uses the ELPHIS database to report monitoring results and CNPHI to record drinking water advisories, whereas and Quebec uses the database, *Eau-Water*. EHRD representatives stated that although regions are using different collection systems, data are collected based on common indicators.

Increased availability, scope and relevance of program data collected

The administrative data provided for the evaluation covered the three fiscal years 2007-08 to 2009-2010. There were no data available for the initial two years of the scope of the evaluation (2005-06 and 2006-07) which would indicate that the *availability* of program data collected has increased over this period. This was confirmed through key informant interviews with EPHD and REHMs. The scope and relevance of the program data collected through EHIS (and *HedgeHog*) appear to be appropriate on a number of levels:

- REHMs (4 of 7) reported that data collection systems that have been implemented over the past few years (e.g. EHIS and Watertrax) have set the foundation for improved reporting.
- At national and regional levels, the data collected align with the main performance indicators outlined by the Cluster RMAF which allow for performance reporting.

[89] Health Canada. (n.d.). EHIS Summary.

- At the community level, the data collected can be compiled to provide reports back to the community on key activities and outputs.
- At the activity or programming level, the data collected can be compiled to provide individual activity reports such as inspection letters.

The relevance of the program data collected through EHIS was confirmed by interviews with some of the REHMs who stated that they found EHIS data useful for monitoring regional trends (2 of 7), and reporting back to communities (1 of 7). A few REHMs (2of 7) suggested that use of EHIS is increasing among EHOs in their region and they noted that EHIS data will become more useful as EHOs in their regions enter data more systematically. Other REHMs (2 of 7) indicated that they perceived EHIS more as a mechanism of recording data to meet the needs of EPHD, rather than the regions.

With respect to the collection of water quality data, there are a few different systems implemented by the regions, however, all regions feed in to a common set of indicators. Despite common indicators, representatives from EHRD reported that creating a national picture of water quality is challenging because the data from the various applications need to be compiled, and not all databases are accessible on a timely basis. The main reason identified for not receiving water data in a timely fashion is linked to the turnover of CBWMs who are largely responsible for reporting water data. This high rate of turnover impacts the consistency of both service delivery and reporting. Additionally, drinking water data reporting by transferred communities in some Regions has been irregular and inconsistent given that use of databases to report on water has not been stipulated in contribution agreements and/or because communities did not report on results as required. Despite the current challenges with collecting water data, EHRD key informants indicated that there has been significant improvement in data quality over the past five years.

Increased capacity to collect program data

Overall, the evidence collected for the evaluation indicates that the capacity to collect Cluster level program data has increased over the past five years, due largely in part to the development and implementation of EHIS. EHIS provides a platform for program data collection in a multitude of areas such as community data, facility data, public health inspections data, training delivered by EHOs, professional develop/training activities undertaken by EHOs, sampling data communicable disease control activities, food risk categorization for food facilities, on-site sewage system applications/design/approvals data, and various other types of EHP activities such as education and awareness activities, or emergency preparedness and response activities.[90]

The capacity to collect water quality data from First Nations communities has also increased over the past five years with the implementation of various data collection systems and the increased number of CBWMs who are primarily responsible for collecting and reporting water quality data.

[90] Health Canada. (n.d.). EHIS Summary.

Increased program data analysis and reporting
Given the EHIS is in a developmental stage, there appears to have been limited data analysis and reporting of program data. A Performance Report was compiled in 2008[91] for the Cluster, however further compilation and analysis of the performance data for the evaluation confirmed that the some of the data used in that report were likely not reliable/accurate. The more recent analyses of the administrative data for the evaluation confirmed that some of the program data is likely not accurate (particularly in 2007-08), and should be used with caution in reporting Cluster results.

Under the EHRP component of the Cluster, the Data Analysis and Program Support group develops an annual *Drinking Water Performance Indicator Report*. This report compiles the regional data and is used to track progress towards achieving drinking water program goals and objectives. Additionally, EHRP's Research and Monitoring section develops an annual summary report for the program activities (national, regional and northern programs).

Additional gaps and challenges with program data
The program data available for the Cluster has progressively improved over the time of the Cluster, with more recent data (2008-09 and 2009-2010) being more reliable, and representative of overall trends in activities and outputs taking place within the Cluster. Some of the noted gaps and potential challenges with program data more generally and the EHIS more specifically include:

- Some REHMs (3 of 7) noted that the EHIS is not widely used. Two REHM (2 of 7) suggested limited use of EHIS is due, in part, to its complexity and the insufficient technical support for the system.
- Use of EHIS is not mandatory for EHOs, which reduces EHO motivation to enter their activities data and limits availability of community, regional or national-level data;
- Program information and data provided by CA communities is not as complete as the information that could be collected through EHIS.
- Program data collection to-date has focused on outputs rather than outcomes (ie., the degree to which programming is contributing to risk identification, mitigation, capacity-building) or public health status in communities.
- Financial data available for the Cluster (e.g., allocations and expenditures) is currently unreliable and inconsistent (see also Section 5.0 on Economy and Efficiency) due to difficulties tracking engendered by the flexible design of programming (e.g., at regional level, funds transferred by HQ for EPH may end up distributed to different priority areas outside the Cluster; at the community level, CA funds may be allocated to activities outside the Cluster mandate to meet competing priorities).

[91] EPHD-EHRD. (2008). Results-based Management and Accountability Framework – Performance Report 2007-2008.

Evidence and Research

To assess the contribution that Cluster has made to improving environmental public health risk identification and mitigation, the evaluation assessed the indicator of use of *evidence and research* to identify risks, make decisions, and set priorities. Both the document review and key informant interviews provided evidence for this assessment.

The document review found that the EH-ER Cluster provides funding support to various entities to conduct research activities to identify environmental health risks present in First Nations and Inuit communities. These include both community-based participatory research projects, and public opinion research (POR). During the period of 2007-08 to 2009-10, the Cluster funded 94 community-based participatory research projects, engaged in 34 dissemination activities, and supported three biomonitoring surveys. A review of the topics covered by the research projects and the nature of the disseminations activities indicated a logical link between the projects/activities and increased identification and mitigation in First Nations and Inuit communities. For example, according to interviews with contribution agreement holders for the research projects, some of the research projects focused on contaminants in traditional foods. The findings from these research projects informed communities of which foods carried higher risks of contamination while simultaneously resolving uncertainties and boosting confidence in some other traditional foods. An example of activities contributing to the dissemination of research project findings to broader audiences is the biannual newsletter *Environmental Research Matters.* The Cluster has produced and distributed to EHOs and REHMs (the main purveyors of information on environmental health risks in communities) nine volumes of the newsletter. The publication serves as a tool to highlight upcoming research initiatives, share information and showcase the findings from completed projects.

POR has also been conducted to provide additional information and data on perceptions and actions with respect to environmental health risks in First Nations communities. The document review found examples of POR that used methods such as focus groups, surveys and workshops to investigate diverse topics such as behaviors and attitudes towards West Nile Virus and Lyme Disease that may contribute to risk,[92] knowledge, attitudes and practices regarding food safety in the collection and preparation of traditional foods,[93] and satisfaction levels with on-reserve drinking water.[94]

There was some evidence found within the document review with respect to how program data, evidence and research findings identify program priorities and/or address EPH risks. The most prominent example was how the findings from the Environmental Health Core Program Evaluation[95] contributed to the development of the *National Framework for the Environmental Public Health Program in First Nations Communities South of 60^0*.[96] Similarly, the findings from

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92 EPHD. (2007). The 2006 National Report on West Nile Virus in First Nations Communities South of 60°. WNv Program, FNIHB, Health Canada.

93 EPHD. (2009). Exploring Traditional Food Safety Information for First Nations POR 096-08.

94 EPHD. (2009). Water Quality On-Reserve Quantitative Research POR 095-08.

95 EPHD. (2007). Environmental Health Core Programs Evaluation.

96 EPHD. (2009e). National Framework for the Environmental Public Health Program in First Nations Communities South of 60° Ottawa, 2009.

the Summative Evaluation of the First Nations Water Management Strategy informed changes in various areas of Cluster programming such as EHO recruitment and retention strategies, and QA/QC programming.[97] Other examples of how research has contributed to program priorities include the Survey on Wells[98] that led to the development of EPHP's Wells Policy[99], and research on cisterns and trucked water[100] that led to the a new policy on cisterns and trucked water[101].

Findings from the key informant interviews corroborated the benefits obtained from the Cluster's emphasis on conducting and disseminating research findings on risk in First Nations and Inuit communities. CA holders for research projects (4 of 7) indicated that some communities are quite reluctant to trust information on risks coming from sources outside of the community. By having the community identify the research topics and areas of risk to be investigated, hire the researchers, participate directly in the research, and play a large role in the communication of findings, the community is more likely to translate the research findings into increased awareness, identification and mitigation of risks within the community.

Gaps and challenges with evidence and research

As previously noted in Section 3.3, EPHP's responsiveness to diverse regional and community needs may be limited given the current lack of research-based evidence on community priorities, needs and desired EPH responses. Efforts to generate more regular community feedback on priorities, needs and satisfaction with EPH programming would fill this knowledge gap, and contribute to more evidence-based programming.

The main challenges identified for EHRP related to community-based participatory research project funding process and design issues. Some challenges identified in the key informant interviews included:

- **Timing of funding in relation to environmental field work season** – Key informants who worked directly on the research projects noted that the research funding is usually approved in the spring; however, funds are often not transferred to the research CA holders until the late summer or fall. This has implications for the community, as research projects have to be cash-managed by the project proponents if field work is to be successfully implemented during summer/autumn, the traditional timing for environmental field work that involves sample collection.
- **Length of funding** – At present, the standard community-based participatory research project funding agreement is 12 months. This is a relatively short period of time in which to design, implement, and analyse findings for even a small scale research project, particularly within a collaborative, community-driven context. As well, one of the main benefits of the research project was identified as building community capacity for conducting research. If a

[97] INAC. (2007). Summative Evaluation of the First Nations Water Management Strategy Project 06/13.
[98] EPHD. (2006). First Nations Water Management Strategy Survey of Reserve Residents Served by Wells POR-05-74.
[99] Health Canada. (2010). Questions and Answers: Implementation of the First Nations and Inuit Health Branch's policy on individual wells and wells with fewer than five connections.
[100] EPHD. (2007). Summary Report Cisterns in First Nations Communities South of 60°.
[101] Health Canada. (2010). EHO Conference: Guidance on drinking water cisterns and trucked water delivery.

project has to be delayed to get funding for a second phase, then often the community capacity in the form of research assistants is lost to the project, and training has to occur again at a novice level, rather than building additional capacity with more extensive skill sets and knowledge within the community.

- **Amount of funding** – Key informants (7 of 7 research CA holders; 3 of 7 REHMs) reported that only a limited number of communities can participate in research projects each year due to what informants consider is a very small budget for research spread across multiple streams and, for some streams, regional allocations. EHRD respondents (3 of 4) acknowledged that research dollars are limited and they do what they can with limited resources.

Program capacity to contribute to the immediate mitigation of risks

The identification of environmental public health risks can sometimes result in the rapid mitigation of those very risks. As such, "immediate mitigation of risks" (which should be differentiated from other forms of mitigation and remediation requiring longer term solutions and often additional resources from sources external to the Cluster) is an indicator of the short-term outcome of improved risk identification and mitigation. The main source of evidence for this indicator was the EHO survey. EHOs reported observing risks being mitigated or eliminated "on the spot" or in the short term as a result of their own risk assessment activities, advice or recommendations.

As illustrated in Table 12, the activity area most frequently cited as producing rapid mitigation of risks was the area of drinking water monitoring where two-thirds of respondents (66%) indicated that they had "frequently" (33%) or "very frequently" observed rapid mitigation. Other activity areas where this was frequently observed by EHOs included food handler training sessions (59%), plan reviews (54%) and communicable disease investigations (47%).

Table 12: Frequency of rapid mitigation/elimination of EPH risks by activity area (EHO Survey)

Activity Area	Frequently Observe	Very Frequently Observe
Drinking water monitoring activities	33%	33%
Food handler training session	44%	15%
Plan review	46%	8%
Communicable disease investigation	43%	4%
Public health inspections	30%	6%
Community education session	26%	3%
Emergency planning or response	18%	7%

Community Capacity Factors related to EPH Risk Identification and Assessment

Community capacity as an outcome in and of itself (medium-term) is explored in Section 4.2.

The evaluation also assessed community capacity factors related to the immediate outcome of improved environmental public health risk identification and mitigation. These included community knowledge and awareness levels of EPH risks/hazards, availability of public education and awareness materials, and communities' capacity to identify and assess risks on the basis of knowledge and awareness. The main lines of evidence used to provide findings for these indicators were key informant interviews, the document review, and survey of EHOs.

Community knowledge and awareness levels of EPH risks/hazards
First Nations community representatives (33 of 35) reported that community awareness of environmental health risks had increased over the past five years as a result of the Cluster programming. All representatives from CA communities (5 of 5) reported increased awareness. According to First Nations community representatives, some of this increased awareness is attributable to the transfer of knowledge from EHOs to Band employees. For example, one First Nations community respondent indicated that the community's capacity to independently identify and assess environmental health risks has been enhanced through the mentoring of public works staff by EHOs. Other examples include bulletins or letters distributed to community members, classes and training on safe food handling, offering an office to the EHO in the local health centre and the openness of some EHOs to taking and answering community member's questions on an ongoing basis.

Contribution agreement holders for EHR projects noted that the community-based participatory research projects are essentially risk awareness and identification projects that will gradually lead to risk mitigation. Some CA holders (2 of 7) reported that as a result of participation in research projects, community members were more aware of environmental health issues and were motivated to be involved in future projects. For example, one researcher reported that they studied contaminants in country foods and were able to identify what was contaminated, what was not, and what potential alternative country food people could eat to reduce health risks associated with environmental contaminants. The project was community driven which contributed to the community's awareness levels of EPH risks, and included community members in the data collection and reporting phases of the project.

Most other federal government stakeholders (5 of 8) indicated increased community knowledge and awareness levels of EPH risks as a result of First Nations and Inuit community education. While the respondents cited an increase in community capacity to identify risks, they also noted that sufficient resources (both financial and human) to deal with such risks are lacking in most communities.

Similarly, the finding from the EHO survey was that approximately three-quarters of EHOs (76%) reported that communities' awareness levels of EPH risks had increased "somewhat" (70%) or "significantly" (6%) over the past five years. One half of respondents (52%) reported that the EPH program had contributed to changes in awareness either "considerably" (41%) or "significantly" (12%). Examples of how the EHOs perceived the EPH program contributing to increased levels of awareness and knowledge of risks included:

- *Education of public works and water plant operators has resulted in more knowledge by these parties and greater response with reporting of issues related to drinking water.*
- *Frequent visits by EHOs in the communities to inspect, produce reports and then discuss the results with people allows them to explain and describe the risks associated with exposure to potential contaminants.*
- *Education sessions, working one on one with community members, providing information to community organizations and members.*
- *Consultations with community leaders.*

Availability of public education and awareness materials
The document review found a number of examples of public education and awareness materials that have been made available to communities. Examples include:

- Housing and mould education and awareness materials as part of the National Strategy to Address Mould in First Nations Communities – the materials are designed to raise community awareness of the relationship between prolonged exposure to indoor mould and the risks to personal and family health; and to provide knowledge on how to identify, prevent and/or remediate;
- WNv education, awareness and media kits – materials designed to raise awareness about WNv including pamphlets, booklets and children's activity sheets and storybook;
- Drinking Water Quality Program education, awareness and tool kits (e.g., Tool Kit for Individual Wells for First Nations; Water Advisory Tool Kit) for communities
- Traditional Foods and Environmental Contaminants Workshops delivered in various locations;
- Food Handler Training
- Adaptation Measures related to Climate Change – these included handbooks, films, newsletters and reports.
- Your Health at Home. What you can do! A Guide to reducing exposure to environmental contaminants in the home.

Community capacity to identify and assess risks on the basis of knowledge and awareness
Most First Nations community representatives indicated that there had been an increase in community capacity to independently identify and assess EPH risks (29 of 35) over the past five years as a result of the Cluster programming. Within the CA communities, most respondents (4 of 5) reported increased capacity. Examples provided by respondents included:

- having CBWMs in communities provides internal capacity to identify drinking water quality issues quickly and reliably, as well as having the capacity to mitigate risks;
- providing food handlers in the community with safe food handling training;
- responding to risks produced by an unexpected frost with appropriate dead livestock clean-up; and,
- identification of lake pollution from adjacent cottage areas.

The results from the EHO survey also outlined similar findings. Over one-half of respondents (54%) reported that communities' capacity to independently identify and assess EPH risks had increased either "somewhat" (51%) or "significantly" (4%) over the past five years. The majority of respondents (87%) reported that the EPH program had made at least some contribution to this change in capacity ("some" 57%; "considerable" 24%; "significant" 6%).

Gaps and challenges with community capacity factors related to EPH risk identification and assessment

Respondents to the EHO survey perceived a number of gaps and challenges with respect to communities' awareness and knowledge of EPH risks, and community capacity to independently identify and assess EPH risks. Examples of gaps and challenges identified with respect to communities' awareness and knowledge of EPH risks included:

- Exposure to contradictory or competing messages regarding EPH risks (e.g., from interest groups, government, media, Internet, cultural discourse, etc.) For example one EHO indicated: *A good example is mould, where in some cases a simple repair would eliminate the problem, but the general thinking is it has destroyed the house and is no longer livable. In other cases, it is cultural, such as cases where drinking untreated surface water is acceptable because it is a way of life. Two contrasts in the most problematic areas, one is acceptable, the other a terrible beast that is invading. Both could be easily (in many cases) rectified.*
- Only partial awareness of some aspects of a risk (e.g., drinking water safety) but then decide on a less safe alternative. For example, one EHO described how "*there is the belief that safe water relates to the visible clarity of water*", and another explained how the misconception of "[the] *belief that community water supply is unsafe, so drinking water is obtained from a stream*".

The main challenges and gaps outlined by EHOs with respect to the capacity of First Nations communities to independently identify and assess EPH risks included:

- High turnover of health staff such as health directors and Community Health Representatives.
- Cyclical nature of turnover among community leaders such as Chief and Council.
- Education and literacy levels of community staff and community members.
- Lack of training and credentials.
- Funding gaps with respect to being able to address identified risk – "*why identify hazards in a community playground, when there is not money to provide a fix*".

- Competing and different priorities – "*overwhelming assortment of issues in need of attention*".
- Challenges with community leaders taking ownership of issues and solutions.

Respondents from First Nations communities reported that community capacity is usually developed from experiencing specific incidents, and can be very content or area specific. For example, one First Nations community respondent reported that the community possesses capacity to identify and mitigate risks only in the areas with which they have had direct experience. If a certain risk has not previously affected or impacted the community, then the respondent reported that their community does not have the capacity to identify these. A few other First Nations community respondents (3 of 35) stated that additional resources are required in order to proactively build capacity.

4.2 Medium-term Outcome: Increased Capacity of First Nations and Inuit Individuals and Communities to Address Environmental Public Health Risks

The main anticipated intermediate outcome for the EH-ER Cluster is that the Cluster will contribute to the increased capacity of First Nations and Inuit individuals and communities to address environmental public health risks. The main indicators assessed by the evaluation for achievement of this outcome were: theoretical linkages between the activities and outputs produced by the Cluster and increases in capacity building; processes in place for Cluster that are conducive to capacity building; community and individual capacity to address environmental health risks; and community capacity to manage and administer research projects and EPH programs.

Theoretical linkages between activities/outputs and capacity building

The literature review was the main line of evidence for determining theoretical linkages between the Cluster activities and outputs and capacity building. Overall, the literature found linkages among:

- Activities such as advocacy, development of collaborative relationships, and capacity building;
- Training, public education, and awareness, and the development of capacity;
- Ensuring access to science to make informed and effective decisions and increasing capacity; and,
- Activities such as workshops, building networks and the building of capacity.

The linkage between activities such as advocacy and development of collaborative relationships and capacity building was reported in a 2002 thesis written on source water characteristics and gastroenteritis in Aboriginal communities. The author called for an emphasis on improving partnerships between Government and First Nations as an essential element in ensuring adequate potable water supplies to First Nations communities. Only through these improved partnerships would capacity be built in the areas of increased vigilance in monitoring of health outcomes and enhancing networks for communicating potential risks within Aboriginal communities.[102]

This linkage is also supported in the report from an international workshop on social determinants of Aboriginal health. An overview of the papers presented at the conference outlined the theory and application of community development approaches (similar to community capacity building), and demonstrated that outcomes and increased control can be fostered using this approach. There was an emphasis on two types of participation leading to community development: participation as a "*means*" (cooperation and collaboration on externally introduced programs), and participation as an "*end*" (people take greater responsibility for their development through acquisition of skills, knowledge and experience).[103] These two types of participation are reflected in the Cluster activities of training, public education and awareness, and advocacy and development of collaborative relationships.

In an article published in 2004, the authors outline various dimensions of community capacity with respect to environmental health promotion which they support with various case studies. The implications outlined for public health were that in order for community groups to progress in the area of community capacity in environmental health, they need access to science to make informed and effective decisions on actions, and strong linkages with health agencies.[104] These requirements are linked closely with many of the research, training, public education and awareness activities implemented by the Cluster.

A 2010 article reviewed outlined how the EHRD component of the Cluster is contributing to building research capacity in communities. Activities identified included funding workshops, the development of university courses, and networks that act as bridges between communities and researchers.[105]

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[102] McLean, Ian Donald. (2002). "Source Water Characteristics and the Incidence of Gastroenteritis in Aboriginal Communities". MA thesis. Royal Roads University, 2002. ISBN: 0612713873.

[103] Anderson, I, F Baum, an M Bentley. Eds. (2004). Beyond Bandaids: Exploring the underlying Social Determinants of Aboriginal Health. Social Determinants of Aboriginal Health Workshop, Adelaide July (2004). Cooperative Research Centre for Aboriginal Health, Darwin Australia.

[104] Freudenberg (2004). "Community Capacity for Environmental Health Promotion" in Health Education & Behaviour, 31: 472.

[105] Kwiatkowski, R. (2010) "Indigenous community based participatory research and health impact assessment: A Canadian example". Environment Impact Assessment Review (in press).

Processes conducive to capacity building

The literature and document reviews examined the PHAC Community Capacity Building Tool[106] to outline nine dimensions of community capacity building against which the Cluster was assessed to determine the extent to which it had processes or activities that were conducive to community capacity building. It should be noted that the Tool reviewed refers more to a "project" rather than a "program" *per se*, however, many of the dimensions are likely relevant. As illustrated in Table 13, there were examples found from the Cluster for each of the nine dimensions.

[106] PHAC. (2007b) Analyzing data collected from the Community Capacity Building Tool; and; MacLellan-Wright et al (2007). The development of measures of community capacity for community-based funding programs in Canada. *Health Promotion International.*

Table 13: Alignment of EH-ER Cluster activities with nine dimensions of community capacity building

Description of Dimension	EH-ER Cluster
Participation - active involvement of people in improving their own and their community's health and well-being.	• Cluster actively involves communities in the work planning process, research project design and development, and consults communities on programming activities and decisions that will affect communities. • CA holders in KI interviews indicated that community member participation in research projects results in them becoming more aware of environmental health issues and motivates participation in future research projects • EHO survey found that 35% of EHOs indicated that communities' participation in setting priorities and developing workplans had increased "somewhat" (30%) or "significantly" (5%) over the past five years. No change was perceived by 60% of EHOs, while 5% indicated "somewhat" decreased participation.
Leadership - includes developing and nurturing both formal and informal local leaders during a project.	• EHOs work with community leaders, nurturing relationships to support their work in the community and ensure leaders' support for programming • Research CA holders and EHRD respondents report that research projects are community-based with researcher working with local community members to design, implement and report on projects.
Community structures - refers to smaller or less formal community groups and committees that foster belonging and give the community a chance to express views and exchange information.	• The Cluster actively engages existing community groups in program planning, joint projects, etc. • EHO survey found that 51% of EHOs indicated that communities' joint projects, partnerships, initiatives and coordinated efforts between the EPH program and other sectors in the communities had increased "somewhat" (44%) or "significantly" (6%) over the past five years.
External supports - (funding bodies) such as government departments, foundations, and regional health authorities can link communities and external resources.	• Research funding streams link communities to various funding agencies, researchers and other relevant organizations (e.g., First Nations University of Canada) • EHOs are able to provide advice and support to communities in approaching other departments or organizations for funding for environmental health issues such as INAC, CMHC. • EHO survey found that 49% of EHOs indicated that communities' linkages with external supports that provide technical and/or financial support in the area of EPH increased "somewhat" (46%) or "significantly" (3%) over the past five years.
Asking why - refers to a community process that uncovers the root causes of community health issues and promotes solutions.	• Research CA holders and EHRD respondents report that the research component of the Cluster works to systematically address questions related to environmental health that are relevant to community-identified needs.. • Public awareness materials and tools outline for community members the root causes of EPH issues and concerns • EHO survey found that 46% of EHOs indicated that communities' understanding of the root causes of EHP risks had increased "somewhat" (39%) or "significantly" (7%) over the past five years.
Obtaining resources - includes finding time, money (other than from funding bodies), leadership, volunteers, information and facilities both from inside and outside the community.	• The Cluster plays a facilitative role in linking communities with potential external supports such as Memorandums of Understanding on WNv, and use of provincial laboratories for drinking water testing. • EHO survey found that 51% of EHOs indicated that communities' joint projects, partnerships, initiatives and coordinated efforts between the EPH program and other sectors in the communities had increased "somewhat" (44%) or "significantly" (6%) over the past five years.
Skills, knowledge, and learning - are qualities in the project team, the target population, and the community that the project team uses and develops.	• The Cluster engages in providing public education, awareness and training at the community level • EHO survey found that 47% of EHOs indicated that communities' access to skills development and training activities in EPH had increased "somewhat" (44%) or "significantly" (3%) over the past five years.

Description of Dimension	EH-ER Cluster
Linking with others - refers to linking with individuals and organizations.	• The Cluster fosters collaboration, agreements and joint projects with other FNIH groups, other federal departments, First Nations groups, and provinces • EHO survey found that 51% of EHOs indicated that communities' joint projects, partnerships, initiatives and coordinated efforts between the EPH program and other sectors in the communities had increased "somewhat" (44%) or "significantly" (6%) over the past five years.
Sense of community - within the context of a project, is fostered through building trust with others.	• Examples would include the implementation of the CBWM program, and research project design and implementation • EHO survey found that 49% of EHOs indicated that communities' shared purpose and motivation to work on EPH issues had increased "somewhat" (46%) or "significantly" (3%) over the past five years. • Research CA holders reported that research projects receive direction from communities which assists in building trust within and among communities.

Increased community and individual capacity to address environmental health risks

As discussed in Section 4.1, EHOs and key informants both reported that community knowledge, awareness and capacity to assess EPH risks increased over the five year period.

In terms of community capacity to *address* risks, the evaluation relied on the key informant interviews and EHO survey as the main lines of evidence. The First Nations community representatives during key informant interviews were more likely to indicate that community capacity to address environmental health risks had increased over the past five years when compared with other key informants and EHOs. Almost all First Nations community respondents (31 of 35) noted that community capacity to address and mitigate risks had increased over the time period covered by the evaluation. All CA community respondents reported increases in this area (5 of 5). Examples provided by First Nations community respondents as to how they had been involved in risk mitigation included:

- Conducting a water survey to assess the level of pollution of the lakes in order to measure the degree of influence from an adjacent cottage area;
- Rapid clean-up of dead livestock after a surprise frost;
- Implementation of a prevention and clean-up policies with respect to fuel tank spills;
- Issuing boil-water advisories due to the rapid and reliable identification of drinking water quality issues by the CBWMs; and,
- Improved communication and negotiation with neighbors in an agricultural area which was cited as important to be able to mitigate the potential EPH risk associated with run-off of pesticides and fertilizer into the drinking water supply.

Approximately one-third of EHOs (33%) reported that First Nations communities' capacity to address and mitigate EPH risks had increased either "somewhat" (32%) or "significantly" (1%). Slightly less than one-quarter of EHOs (24%) reported that the Cluster had contributed to this change. Additionally, some other government stakeholders (3 of 8) reported increased capacity among First Nations and Inuit communities to address EPH risks.

Along with most REHMs (5 of 7) and other federal government stakeholders (3 of 8) interviewed, respondents from First Nations communities most frequently cited lack of funds and resource limitations as the main challenge or barrier identified for communities attempting to address identified risks, particularly in the area of housing. This was similar to the responses obtained from EHOs who most frequently cited both human and financial resources as gaps in terms of communities' capacity to address and mitigate EPH risks. Some examples of EHO statements include:

- *No funds available to fix the majority of problems. The limited funds they receive are not enough to meet minimum public health guidelines in facilities on First Nation reserves.*
- *Most communities have the knowledge, but unable to carry out the programs due to lack of funding.*

- *On the large capital projects where there is high risk, the community is able to address the issues, however, the numerous risks associated with O&M are left unaddressed until essentially they can be rolled into a new capital project – for example, no maintenance in a school until eventually the risk and the cost of repair is so high that a new structure is required.*
- *The availability of funding and the time it takes to get it is the biggest part of it – it often takes years to decades to deal with some issues, in the meanwhile, the problems get worse.*

In interviews with other federal government stakeholders (2 of 8), respondents reported that the lack of capacity to address risks impacts on the decision to identify risks. While First Nations communities are being trained to identify and assess EPH risks, given the challenges in findings resources to actually address identified risks (particularly with respect to housing), some First Nations communities will be less likely to actually work on identifying risks. For example, in knowing that there is a lack of funding to get rid of mould, there is a disincentive to do housing inspections, in some First Nations communities.

4.3 Long-term Outcome: Improved Health and Wellbeing of First Nations and Inuit Individuals and Communities

The anticipated long-term outcome for the Cluster activities and outputs is improved health and well-being of First Nations and Inuit individuals and communities. The two main indicators for this outcome were theoretical linkages and perceptions of linkages between the Cluster activities and outputs and improved health and well-being. The main lines of evidence for the evaluation included the literature review and key informant interviews.

The overall approach used by the Cluster to conceptualize and implement its activities is conducive to a population health approach that emphasizes multiple health determinants[107] (see Section 3.2). Of the 12 main identified determinants of health, the Cluster is positively contributing to a considerable number such as physical environments, personal health practices and coping skills, health services and culture. The Cluster's work in collaboration and community capacity development are also likely contributing to other determinants in indirect ways such as social support networks, social environments, education and literacy, income and social status.

[107] Public Health Agency of Canada. *What determines health?* http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php#determinants

The literature found theoretical linkages between the various approaches and activities employed under the Cluster and improved health and well-being. These included:

- Using a community-level perspective rather than individual housing or income perspective when understanding influences on health and human development;[108]
- Improving substandard housing conditions such as decreases in overcrowding or less mould exposure contributes to human health;[109,110,111]
- Improving basic hygiene through better personal, domestic and community hygiene, disposing of dirty or stagnant water, sewage and litter, and provision of clean drinking water contributes to improved health outcomes;[112,113] and,
- Reducing environmental contamination and increasing the purity of the traditional foods and medicines has an impact on both the physical and spiritual health of people.[114,115,116]

The literature review also provided information on some of the challenges and considerations that should be taken into account when evaluating the linkages between environment health initiatives and improved health outcomes.[117] These include:

- Taking into consideration that environmental health interventions are often preventative which results in outcomes that can be characterised as the absence of an effect (e.g., not being exposed to mould, avoiding contaminated food) – this may require extensive periods of time to see an intervention's impact at a population or community level;
- Understanding that these interventions may also convey considerable non-health benefits as well, such as saving time, preventing costs, etc.;
- Realizing that the primary responsibilities for funding and implementing interventions are often outside the domain of health; and,

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108 Dunn J.R., et al. (2006). "Housing as a Socio-Economic Determinant of Health". Canadian Journal of Public Health 97.S3 (2006): 11-15.

109 Fuller-Thomson ED, JD Hulchanski, and S. Hwang. 2000. "The Housing/ Health Relationship: What Do We Know?" Environ Health 15.1-2 (2000):109-133.

110 EPHS. (2009f). Respiratory Health Effects of Housing Improvement on First Nation Reserves in Canada: Literary Review of Intervention Studies

111 Osterberg PM. (2009). "Indoor Mould, Dust Mite and Endotoxin Exposure in Aboriginal Housing in British Columbia: An Assessment in the Heiltsuk First Nation Community". MA Thesis, 2009 . Univ. of British Columbia

112 Gracey, M. And M King. (2009). "Indigenous Health Part 1: Determinants and Disease Patterns." Lancet 374 (2009): 65-75

113 Yee, Joan. (2008). "Housing and Health in Alberta First Nations Communities: Examining the Relationship Between Enteric Disease and Environmental Factors". MA Thesis. 2008. Ottawa: Library and Archives Canada ISBN: 9780494332382

114 Richmond, CAM and NA Ross. (2009). The Determinants of First Nation and Inuit health: A Critical Population Health Approach. Health & Place 15 (2009) 403-411

115 AMAP. (2009a). AMAP Assessment 2009: Human Health in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway

116 Chan, Laurie (2005). Health and Environment Issues with Canada's Aboriginal Communities - Final Version.

117 World Health Organization. (2000). Considerations in Evaluating the Cost-effectiveness of Environmental Health Interventions. Geneva.

- Remembering that the effectiveness of these interventions are more challenging to evaluate than core health services as they are less amenable to the more rigorous methods of controlled experiments or may have a relatively small effect over a large population; and understanding that these interventions are successful if they can hold gains already achieved and prevent "back-sliding".

During key informant interviews, most respondents from First Nations communities (28 of 35) reported that the Cluster programming had contributed to the health and well-being of community members. Some observations from First Nations community representatives included:

- Connections between the amount of time that the EHO is in the community and the larger the improvement in the health and well-being of community members;
- Improved health and well-being resulting from the activities such as food handling courses, awareness activities, drinking water testing, and various other prevention activities;
- Improvements in basic sanitation, drinking water supply, and housing have made impacts on the health of community members; and,
- From activities that have increased awareness levels in the community, community members are now actively requesting environmental health services and supports where they see a need, rather than passively waiting for services to be offered.

Other key informants including REHMs, RMOs, other government department stakeholders, EPHD and EHRD representatives, and NAOs also perceived linkages between Cluster activities/outputs and improved health and well being. The linkages with health and well-being included:

- Development of community capacity;
- Improved frequency of surveillance for communicable disease (e.g., WNv) through collaboration with the EHO, which contributes to risk identification;
- Development of relationship between EHO and community;
- Drinking water improvements and drinking water program activities;
- Identification of community needs and community participation to address those needs;
- Emergency planning, response and recovery; and,
- Greater awareness of risk factors among community members which contributes to improved detection of health risks.

4.4 Unintended Consequences and Broader Impacts

The evaluation did not identify many unintended consequences or broader impacts of the Cluster. When key informants were asked to describe unintended consequences and broader impacts, the majority of observations could actually be categorized into the intermediate and longer-term outcomes for the program. The few that were identified in key informant interviews included:

- **Relationship building within communities** – increased relationship building and community building has occurred as a result of community-based participatory research projects. This has included elders and youth participating together on research projects resulting in knowledge sharing and friendships.
- **Trust building between communities and government** – increased trust of government organizations among First Nations communities has resulted from having a First Nations organization (FNUC) act as an intermediary in leading and coordinating calls for research projects.
- **Barriers to research applications** – The research application process could be discouraging to some communities that do not already have a strong research capacity, which could be contributing to a lower number of research applications.
- **Positive broader community impact from CBWMs** – there have been positive reactions from First Nations communities with the community-level capacity building resulting from the hiring and training of CBWMs. Given the focus on training First Nations community members, it is anticipated that this capacity will be more likely to remain in the community, and indirectly impact other areas of the community such as employment and skill development.
- **Negative media attention resulting from water monitoring activities** – Water monitoring activities that are important (e.g., boil water advisories) can draw negative media attention. While boil water advisories are an indication of risk identification and potential for mitigation, media will often portray the advisory as a failure of the water system, rather than as the capacity to identify and address risks.

5.0 EH-ER Cluster Performance: Economy and Efficiency Findings

Given the challenges with the availability of performance and financial data, many of the planned analyses of economy and efficiency could not be undertaken. These included analyses for indicators such as cost/results or cost/activity ratios, planned vs. actual expenditures, and decrease in resource wastage/loss. The evaluation was required to limit the analyses to qualitative information provided through key informant interviews, and some information from the literature review.

5.1 Cluster's Demonstration of Resource Minimization While Maximizing Outputs

A question designed to assess economy of the Cluster was whether there had been demonstration of resource minimization while maximizing Cluster outputs. The main line of evidence for the question was the key informant interviews with REHMs and EPHD and EHRD representatives. Indicators examined included steps taken to minimize costs, and stakeholder satisfaction with resource allocations in terms of relevance, activities and outputs.

Steps taken to minimize costs

Key informants involved in the management and delivery of the Cluster activities noted that the activities and outputs achieved by the Cluster are accomplished with limited resources. A few of the REHMs (2 of 7) noted that the EPHD is getting a lot out of limited costs overall, with one example being the sharing of equipment between EHOs within a region. Other examples of resource minimization provided by REHMs included the development of project officer positions that focused on one area of responsibility which appears to have increased efficiency (e.g., position focused on contribution agreements); hiring of CBWMs rather than having EHOs do the testing; and the establishment of distance education and training opportunities which have increased access to training while minimizing the resources required for these activities.

In most interviews (3 of 4), EPHD representatives noted that the implementation of the *National Framework for the Environmental Public Health Program* was intended to contribute to the maximization of outputs by providing EHOs with more guidance and clarity on program activities. In addition, a few EPHD representatives (2 of 4) reported that as EHIS data becomes more complete, it will contribute to more evidence-based programming and improve the quality of program reporting.

Research contribution-holders noted two main examples of how resource minimization and output maximization had occurred. Examples included employing community members to implement aspects of the research project such as data collection, establishing research project budgets based on technical outputs, and leveraging EHRP funds with in-kind or cash contributions from communities and other research institutions.

The majority of EHOs (67%) reported that the efficiency of their work methods had increased either "somewhat" (41%) or "significantly" (25%) over the past five years. The most commonly cited factors that contributed to this improved efficiency were increased knowledge of the communities in which they worked, and improved relationships and communication with leaders and community staff. A few EHOs[118] also noted EHIS had improved the efficiency of their work methods by making them more consistent in their reporting, and more easily able to follow workplans and activities.

[118] "A few" in relation to survey results typically refers to between 1-10% of EHOs.

Satisfaction with resource allocations

The majority of EHRD and EPHD respondents (5 of 8) felt that financial and human resources are adequate and are utilized efficiently in order to achieve outputs. A few of the respondents (3 of 8) noted that the financial and human resources are not sufficient. One example provided was that both the national and regional offices are relying heavily on drinking water funding in order ensure that other core programs are delivered at the community level. This may not be sustainable given that drinking water funding is contingent on renewal by Treasury Board every few years and is not from A-based funds.

Most REHMs (6 of 7) reported that the present level of resources that go into EPH programming (which includes FNWWAP resources) are adequate to achieve desired results. However, similar to national representatives, concern was raised that a significant proportion of the current resources are tied to FNWWAP funding which is scheduled to expire in 2012. In addition, REHMs cited the need for more resources toward equipment (1 of 7) and research (1 of 7).

Some examples of resource minimization limiting outputs were provided during key informant interviews. The main mechanism for producing EPHP outputs at the community level is via EHOs' activities in the communities. According to REHMs and EHOs, the EHOs activities and outputs at the current resource level are directly correlated to the number of visits per year per community, and the amount of time they can spend in the community. When EHOs workloads are such that they are stretched thin, they are often dealing with only the most urgent issues when they visit the community. This limits the number of activities and outputs achieved, and ultimately limits the scope and depth of risk coverage outlined in the *National Framework for the Environmental Public Health Program*. Similarly, it was noted for the EHRP that resource minimization with respect to limited research dollars and many single phase projects may be limiting the outputs achieved and their sustainability with respect to capacity building in the community.

Other challenges noted by REHMs pertaining to resource allocation included:

- The amount of EPHP resources available presents challenges to regions to be able to address national level priorities and regional priorities;
- A new radon gas initiative is anticipated to be rolling out soon which will require resources but will not come with additional funding;
- Research does not have much funding resulting in community allocations that are inadequate for good research results; and,
- No new resources are issued as community population's rise and their infrastructure expands.

5.2 Cluster's Management of Resources to Ensure the Achievement of Relevant Outcomes

The main indicators used to assess the extent to which the Cluster's resources were managed to ensure achievement of relevant outcomes were the identification of cost drivers, evidence of redundancy or duplication, and perspectives on barriers and challenges to the achievement of relevant outcomes. The main line of evidence for these indicators was key informant interviews.

Cost drivers

The majority of REHMs identified the main cost drivers as salaries (EHOs and CBWMs), travel, and external service provider agreements (e.g. hazardous materials disposal, laboratories, equipment providers). EPHD representatives identified similar cost drivers of staff salaries, travel/vehicles and equipment. First Nations community respondents (14 of 35) reported that salaries, equipment and contracts with service providers were the most significant cost drivers. EHRD respondents indicated a major cost driver to be corporate costs (e.g., 20% of program budget to cover areas such as communications, IT, HR), and the resources required to respond to reporting requirements (notably, this holds true for EPHD and regional offices as well). Research CA holders identified the two main costs drivers as travel/accommodation and sample analysis.

Evidence of redundancy/duplication

Key informants identified minimal redundancy and duplication within the Cluster or between the Cluster and other services/organizations. EPHD representatives noted how the eight core programs of the EPHP at the national level can at first glance appear to be duplicative given their overlap (e.g., communicable diseases and emergency preparedness and response overlap with each of the other six core program areas; solid waste disposal activities may occur in the context of housing or facilities inspections). However, the eight core program areas were identified by EHOs in the 2005 Core Programs Evaluation as key areas of activity requiring specific parameters and guidance (provided by the National Framework for the Environmental Public Health Program) while recognizing and promoting their horizontal integration. Other areas that could be identified as potentially overlapping were perceived as complementary (e.g., INAC and Health Canada roles at the community level in drinking water testing; CMHC and Health Canada roles in housing). Most other government stakeholders (5 of 8) agreed that INAC and Health Canada roles (including FNIHB) are complementary rather than overlapping.

Another potential area of minimizing redundancy and overlap while contributing to the strategic outcome of reduction of health inequalities between First Nations and Inuit and other Canadians is the integration of provincial services and regulations where applicable for First Nations communities. At present, the integration of the Cluster activities with provincial health activities varies by region. Tripartite negotiations between First Nations, provincial and federal government are underway in some regions aimed at integrating services, standards and regulations. In some Regions, FNIH RMOs have delegated authority through provincial public health legislation to address certain issues (e.g., communicable disease risks, emergency response) using provincial protocols, and in others, the provincial Medical Officers of Health have certain legislative authorities to address public health issues on-reserve. Finally, some

Regions have Memoranda of Understanding or other agreements with provinces to assure delivery of environmental public health services on-reserve (e.g., MOUs for West Nile virus surveillance support and intervention; use of provincial public health inspectors to assess certain facilities on-reserve).

Stakeholder/expert perspectives on barriers/challenges

Most REHMs (6 of 7) noted some challenges with respect to drinking water program reporting. The challenge noted was that the drinking water monitoring funding is such a small proportion of overall funding in stacked contribution agreements that communities do not always concentrate on their reporting responsibilities specifically related to water. In addition, REHMs reported that this challenge increased with the lack of defined roles, responsibilities and reporting expectations with funding agreements with communities.

Challenges identified by some REHMs (4 of 7) in managing resources to ensure achievement of outcomes were the gaps among EPHD staff with respect to content expertise, public health experience, and experience with First Nations communities and the Regions. This presents challenges with setting relevant strategic directions for EPHP, working with other federal departments, and understanding the needs of the Regions and First Nations. Example quotes from REHMs included:

- *They [EPHD] set the budget and national direction, but there are very few people in EPHD at HQ with public health training. In addition, most people setting the program direction have no First Nations experience.*
- *HQ and Regions seem to be working counter-productively: they work for minister's office and we work for FN so they are rushed while working for FN communities requires a different approach to time. Not a lot of cohesiveness and collaboration between groups.*

These findings point to the need for improved communication and increased coherence between regional and national priorities.

The other main area identified as a challenge is the timing, length and amount of funding for community-based participatory research projects as outlined previously in Section 4.1.

5.3 Cluster's Demonstration of Optimal Productivity While Minimizing Effort and Ensuring Quality of Outputs

The main indicators used to assess the extent to which the Cluster was demonstrating optimal productivity while minimizing effort and ensuring quality of outputs was by examining the indicators of flexibility in funding models/funding allocation, and increase in delivery and access to programs and services.

Flexibility in funding models/funding allocation

There was some demonstration of Cluster flexibility in funding models including the delivery of programming via contribution agreements with Tribal Councils and First Nations communities. Two REHMs involved in these Contribution Agreements questioned their efficiency by noting there is too much flexibility with respect to allocation and movement of funds to meet community priorities, and no standardization of funding allocations between program areas. A few of the RMOs (2 of 4) also voiced concerns with transferred funding given the limited means to monitor how funding is spent, and jurisdictional issues that arise.

Increase in delivery and access to programs and services

As previously illustrated in Section 4.1, there have been increases in access to various programs and services offered under the Cluster over the past five years. As well, increases in the standardization and quality of risk assessments conducted by EHOs were found to have occurred during this period. In addition, approximately two-thirds of EHOs (63%) reported that the quality and level of service they have been able to provide to meet communities' needs has increased either "somewhat" (45%) or "significantly" (18%) over the past five years. More frequent community visits and more time spent in communities were the main factors that EHOs attributed to the increase.

5.4 Potential Alternative Methods for Program Delivery

The evaluation was not able to identify potential alternative methods of programming in the literature or through key informant interviews that would produce similar outcomes for the Cluster. This is in part due to the unique nature of environmental health programming, a desire to ensure that First Nations communities receive comparable services to other Canadians, certification requirements for the professionals involved, and the fact that environmental public health is a required program by the Branch.

It is widely recognized in most public health models that the Public Health Inspector or Environmental Health Officer play a vital role in the public health team and delivery system. All Canadian provinces and jurisdiction employ PHIs/EHOs to carry out various activities such as public health inspections, food handler training, foodborne, waterborne and vectorborne illness investigations, drinking water quality monitoring, response to complaints of potential public health hazards, delivery of awareness and public education, and ensuring compliance with public health legislation and regulations. To assure that First Nations communities have comparable services on-reserve as those available to the rest of the Canadian public, FNIHB delivers the EPHP using the public health models most commonly used in other jurisdictions in Canada. The EPHP is a mandatory public health program which means that Health Canada assures that every community receives the services of an EHO. Communities receiving contributions must hire an EHO and assure the delivery of the range of EPHP programming, and all other First Nations communities south of 60º receive EHO services directly from Health Canada.

Finally, PHIs/EHOs must be entitled to practice in accordance with the professional governing body (Board of Certification of Public Health Inspectors of the Canadian Institute of Public Health Inspectors/CIPHI) and/or the laws of the province and/or territory where the services are to be provided. PHIs/EHOs must maintain their certification with CIPHI through the completion of continuing professional competencies (skills development and training) credits on an annual basis[119]. The educational and certification requirements attached to EPH service delivery preclude the engagement of non-qualified individuals to deliver these essential public health services.

6.0 Conclusions and Recommendations

A number of conclusions and recommendations have been developed based on the findings obtained from the evaluation. Main conclusions are cited below, followed by recommendations flowing from the conclusions.

6.1 Conclusions

The Cluster has been appropriately designed to contribute to addressing many of the environmental public health risks that are identified as issues and priorities in First Nations and Inuit communities.

The evaluation found that the EHRP and EPHP Cluster components aligned with the key environmental public health risks, issues and priorities identified among First Nations and Inuit. These included both specific risk areas such as drinking water, wastewater, housing, solid waste, food safety, and more horizontal, cross-cutting areas such as communicable disease, environmental contaminants, climate change and emergency preparedness. While the EPHP component focuses exclusively on addressing these risks within First Nations communities south of 60^0, the EHRD component also reaches to more northern First Nations communities and Inuit.

The complexity of the environmental health risks identified requires approaches that take into account multiple determinants of health within an overall population health model. The evaluation concluded that the Cluster design successfully demonstrates the implementation of a population health approach given its heavy emphasis on community involvement and participation, collaboration and partnerships at multiple levels, capacity building, flexibility,

[119] Notably, Quebec provincial government and municipalities do not recognize CIPHI exclusively in the hiring and certification of EHOS.

prevention, and evidence. By continuing to focus on integration, collaboration, and the broader health determinants, the Cluster is more likely to successfully contribute to the health and well-being of First Nations and Inuit individuals and communities.

While the Cluster overall is well aligned with the priority risks identified, the evaluation identified several gaps that warrant further consideration to determine whether the Cluster can make additional contributions. These include water sample testing that covers the diverse drinking water systems in First Nations communities such as cisterns and wells, occupational health and safety, and injury prevention. Another key gap was the lack of necessary resources or enforcement standards required to actually mitigate EPH risks that are identified (this is discussed in further depth below).

The Cluster design balances sufficient structure with flexibility to be responsive to most First Nations and Inuit community and regional needs, though challenges remain in terms of assuring regular community feedback is accounted for in program planning, and improving coherence of priorities between regions and HQ in order to facilitate regional flexibility to respond to community priorities.

The evaluation concluded that both components of the Cluster balance structure with flexibility in a manner that allows them to respond to various needs. The EHRP demonstrated flexibility and responsiveness by supporting community-driven research projects in which communities identify the need, research questions, and implement the projects. Additional evidence of responsiveness and flexibility included having various research streams with different target groups to ensure greater access and usage, and research funding allocated at both national and regional levels. This flexibility was balanced with the structure of various types of review processes to ensure the quality of research projects.

The EPHP component demonstrated flexibility by having EHOs work directly with communities to identify priorities on an annual basis and/or develop workplans. Flexibility is also demonstrated in the funding models used for some First Nations communities who receive Contribution Agreements to implement their own EHP programming. The overall flexibility is balanced by the structure provided by the National Framework for the Environmental Public Health Program[120] that guides the implementation of the EPHP component outlining roles and responsibilities, activities, and common tools. As well, additional structure is provided by ensuring that all EHOs are certified and entitled to practice in accordance with the professional governing body and/or the laws of the province where the services are provided.

Despite overall Cluster programming responsiveness to varying needs and priorities across communities and Regions, the evaluation identified on-going challenges in this area that should be addressed. First, Cluster responsiveness may be limited as a result of the current lack of

[120] Health Canada (2009) *The National Framework for the Environmental Public Health Program in First Nations Communities South of 60^0*.

research-based evidence on community needs and desired EPH responses. There may be additional community-specific priorities and needs that this evaluation failed to identify as a result of limitations in the documentation and the limited sample of community-based key informants interviewed. Additionally, some REHMs and other key informants alluded to the inability to adequately address specific community priorities or projects in certain cases because of a perceived over-emphasis on drinking water monitoring and sampling, itself driven by national priorities and funding pressures (e.g., FNWWAP; attention given to drinking water at the national level). Efforts to generate more regular community feedback on priorities, needs and satisfaction with EPH programming would fill this knowledge gap. Finally, work remains to be done to improve coherence and communication of priorities between Regions and HQ.

The Cluster objectives are in alignment with Government of Canada priorities, roles and responsibilities in health programming for First Nations and Inuit communities, Health Canada's strategic outcomes, and FNIHB's mandate.

The evaluation concluded that the Cluster activities and objectives were in alignment with the current Government of Canada priorities as identified in recent Budget Plans, and recent announcements in the area of health and the environment. Similarly, the Cluster was found to align with the Government of Canada's roles and responsibilities and policy decisions with respect to health programming in First Nations and Inuit communities. Finally, the evaluation concluded that the Cluster activities clearly aligned with Health Canada's strategic outcomes and FNIHB's mandate.

The Cluster contributes significantly to the short-term outcome of improved identification and immediate mitigation of environmental public health risks. Critical to this outcome is the community-driven approach to research, EHOs' interactions and communication with communities, and the hiring and training of CBWMs. However, significant challenges remain in this area.

The evaluation concluded that the Cluster directly contributed to increased awareness and identification of environmental health risks in First Nations and Inuit communities. The success in this area over the past five years was judged to be substantial and has likely contributed to both benefits and challenges for communities with respect to risk mitigation, particularly where identified risks require substantial investments in infrastructure, or a re-ordering of community priorities in order to be adequately addressed.

One key critical success factor identified in this area with respect to the EHRP component has been the community-based, participatory nature of the research conducted. The evaluation determined that by having First Nations and Inuit communities define the need for research and the main research questions, and be actively involved in the implementation and reporting of research results, the communities become more aware and are able to identify key environmental

health risks potentially impacting their health. The growth of the EHRP over this period enabled the Cluster to extend funding and support for research to additional First Nations and Inuit communities in diverse areas within the scope of environmental hazards and climate change.

Another critical success factor identified by the evaluation was the presence of EHOs in First Nations communities. The presence of an EHO in the community encourages relationship and capacity building on a number of levels (e.g., community members, community health staff, leaders, external resources). Building on the relationships and connections established in the community, the EHO is able to identify and introduce relevant tools and knowledge that communities require in order to address their priorities and needs. By introducing relevant tools and knowledge, the EHO contributes to building capacity which appears to mainly focus on awareness and identification of environmental health risks, as well as immediate mitigation where possible.

The use of CBWMs in First Nations communities was also identified by the evaluation as key to improving environmental public health risk identification and mitigation. Positive feedback was received on how having a resource based in the community assisted not only with improved risk identification and mitigation, but also had longer-reaching impacts on capacity building for the community.

While considerable achievements have occurred in improving risk identification and immediate mitigation at the community level, the evaluation identified some barriers and challenges to achieving success with this outcome which should be considered for future improvements to the Cluster programming. These included:

- **Potential gaps in awareness of RFNECP, which may influence access** – Community-based key informants (ie., not research CA holders) who identified contaminants as a priority for their communities indicated lack of awareness of research possibilities through RFNECP.
- **Gaps in awareness of the role of EPHP programming, which may influence access and usage** – Some respondents noted a lack of awareness of the roles and responsibilities and services available through EPHP among some leaders, the general public in some communities, and youth as a demographic group.
- **Timing, length and amount of funding associated with community-based participatory research projects** – The evaluation found that transfer of funds to Contribution Agreement holders was not always in time for the often time-limited field work seasons (particularly in northern communities). This challenge was then compounded by limiting the project funding to 12 months which is a short time to design, implement and analyse findings within a community-driven participatory context. As well, the funding amounts are relatively small which presents the challenge of being able to do quality scientific research with very tight budgets (often in remote locations), and the limited number of communities that can participate.

- **An insufficient number of EHOs given current demands and workloads** – the current workloads of many EHOs are such that they are working "reactively" responding to emergencies and requests, rather than in a more preventative "proactive" manner with respect to awareness, education and training. This was reflected in some of the First Nations community comments where they reported that they had the capacity to identify risks that had occurred in their communities, but did not have the capacity to be aware and identify risks that potentially could occur. This issue could be addressed by enabling EHOs to focus more on education and training in communities, rather than being in a reactive mode.
- **Challenges in integrating EHOs in First Nations communities** – Partially related to having an insufficient number of EHOs and their limited time is the challenge of EHOs being less integrated with communities. The evaluation found that this was also related to retention of EHOs, and turnover of community staff and leaders.
- **Transferred communities** – Challenges in ensuring EPH activities in all core program areas and reporting requirements (including those associated with FNWWAP funding and CBWMs' roles) are implemented in transferred communities.

The Cluster contributes to First Nations communities' capacity to mitigate and address environmental health risks through the provision of assistance and support for immediate risk mitigation, community capacity building, and advocacy. The degree to which communities can leverage Cluster supports for actual risk mitigation is contingent on numerous factors external to the Cluster such as availability of resources for infrastructure improvements, and community priorities.

The evaluation concluded that the Cluster contributes to addressing environmental health risks primarily through assistance and support in areas such as immediate risk mitigation, community capacity building and advocacy. The evaluation findings indicated that the Cluster was relatively successful in contributing to *immediate* (e.g., in the short-term) risk mitigation where the most appropriate interventions were education and awareness along with pragmatic, low-cost interventions (e.g., venting dryers in houses, consuming alternative fish species, developing food handling procedures for a daycare, using insect repellent).

When risk mitigation required more resource intensive efforts, the Cluster contributed by assisting in developing community capacity in areas such as accessing external supports and developing networks to advocate for resources or changes in priorities to adequately mitigate these risks. This work of the Cluster takes place on a number of levels (community, regional, national) and involves collaboration between multiple stakeholders including First Nations communities, First Nations regional and national organizations, academics, provinces/territories, and other federal departments and agencies.

As previously indicated, the contributions of the Cluster to mitigation of risks can be severely impacted by situations and contingencies that are not within the control of the Cluster. For example, the evaluation found that substantial environmental health risks were associated with housing. Many of the housing issues were related to the overall degradation and shortage of

housing stock on-reserve, issues of responsibility for maintenance, community priorities, and lack of resources for repairs and renovations. While the Cluster can play an advocacy role and concentrate on immediate risk mitigation that requires limited resources, many of the housing-related health risks may require more substantial investments and agreement on priorities which are beyond the control of the Cluster.

Continued efforts are required by EPHP to enhance community capacity in the area of risk mitigation (e.g., through risk communication and engagement of community leaders; provision of resources / liaison activities to link communities with other supports). Additionally, the EPHP can continue its activities at the national, regional and community levels towards the development of enforceable standards to assure public health risks are mitigated as required.

The Cluster contributes to the longer term outcome of improved health and wellbeing of First Nations and Inuit individuals and communities through its contributions to determinants of health such as physical environments, personal health practices, health services and culture, and through its collaborative work with partners.

While the evaluation was not able to directly assess the Cluster's contributions to the longer term outcome of improved health and wellbeing of First Nations and Inuit individuals and communities, the conclusion based on alignment with a population health model was that the Cluster had contributed to known health determinants such as physical environments, personal health practices, health services and culture. By demonstrating the contributions in these areas, it is plausible that contributions are being made overall to improved health and wellbeing.

The Cluster's contributions to physical environments were demonstrated through the increased awareness and identification of environmental health risks such as environmental contamination, climate change, and drinking water. Contributions to personal health practices included changes in awareness and identification of risks associated with areas such as communicable diseases. The Cluster contributed to health services by providing relevant environmental health services through EHOs and CBWMs. Additionally, the Cluster contributed to supporting culture through the funding of community-based participatory research, ensuring the cultural relevancy of tools and educational activities, and providing flexibility in EPHP programming and workplan development to ensure the priorities of communities are supported and respected.

Finally, by emphasizing collaboration, partnerships, inter-sectoral collaboration and capacity building, Cluster programming reflects a population health approach which recognizes the complexity of issues requiring attention by multiple stakeholders/sectors in order to affect change in the area of public health.

Although considerable progress has been made over the past five years, program data collection requires improvements in order to facilitate monitoring, reporting and evaluation of the actual activities, outputs and outcomes being achieved. This will also enhance Cluster accountability to First Nations communities and funders, and facilitate evidence-based approaches to programming planning, implementation and monitoring.

The collection and analysis of Cluster performance data has improved considerably over the past five years; however, additional efforts will be needed to ensure that the data collected are reflective of the Cluster's activities, outputs and outcomes. Performance monitoring should focus not only on activities and outputs, but also consider what immediate outcomes, including environmental public health status indicators, could be measured on an ongoing basis to enable evidence-based decision-making for programming and allow for monitoring of public health improvements associated with EPH programming over time. This will require, among other strategies, improved completeness, timeliness and quality of program data reporting (into water databases, EHIS. Additionally, improved financial data (allocations and expenditures) tracking is required at the Cluster level to enable linkages to be made between program costs, outputs and activities at the national and regional levels, and to ensure future analyses of economy and efficiency can be undertaken.

The evaluation found that while some EHOs and REHMs are quite supportive of the developments in this area and reported benefits such as improved quality of work activities, and improved reporting back to communities, there are others who perceive the program data collection processes as burdensome and less useful. The evaluation identified some challenges that included the fact that regions have yet to make use of EHIS a mandatory aspect of EHO work activities, and on-going needs for EHIS system improvements. Another challenge will be to collect similar data from the communities that deliver EPH programs under Contribution Agreements.

The evaluation concluded that significant progress has been made over the past five years with respect to collection of water quality data. The main challenge identified was that the national level reporting is often hampered by the degree to which regional systems are kept up to date. Input of water data is generally the responsibility of the CBWMs who unfortunately have a relatively high turnover rate. This impact directly on the timeliness and the quality of reporting.

Cluster programming demonstrates economy and efficiency with steps having been taken to minimize costs and duplication while attempting to maximize outputs produced and outcomes achieved. One main challenge identified as negatively impacting on outcomes was the heavy workload of EHOs which results in them working reactively rather than proactively in communities. Other challenges identified included insufficient resources available for research, and gaps in expertise and experience among EPHD staff.

The evaluation concluded that the Cluster activities have demonstrated economy and efficiency. The evaluation found evidence of steps that had been taken to minimize costs such as sharing of equipment, hiring CBWMs to conduct bacteriological drinking water testing rather than EHOs, and delivering distance education which permits increased opportunities while minimizing the costs of delivery.

One critical factor identified by the evaluation that contributes to the overall economy and efficiency of the Cluster is the amount of time spent in communities by EHOs. According to the findings, the outputs and outcomes achieved by the EPHP are proportional to the amount of time EHOs are able to spend in communities. When workloads are too heavy, the EHOs' activities in communities become more reactive rather than proactive which decreases the potential for success in areas such as relationship building and transmission of knowledge, key to the achievement of various desired outcomes such as capacity building. An increase in the number of EHO positions that permits more time in communities focused on proactive activities such as education, training and network/relationship building would produce improved outcomes.

Although the success of the EHRP was noted throughout the evaluation, the limited funding available for community-based participatory research appears to be detrimental to the actual outcomes that can potentially be achieved. The small amounts combined with the time limit of 12-months are not conducive to building and sustaining community capacity to identify and mitigate risks. As well, the evaluation found evidence that there are some communities that appear to be unaware of the research funding, but are asking to participate in research to assist them in identifying risks, particularly in the area of environmental contaminants. This suggests that the potential demand for the research component may be even larger if awareness levels increased.

The other main challenge was in the area of human resources at the EPHD. Regions noted that there are gaps among EPHD staff with respect to content expertise, public health experience, and experience with First Nations communities. This was reported to present challenges in setting relevant strategic direction for the EPHP, working with other federal departments, and understanding the needs of the Regions and First Nations.

One of the greatest risks faced by the Cluster design is its heavy reliance on FNWWAP funding that will sunset in 2012. Without either a renewal or alternate source of funding, the EPHP program would likely need to decrease to approximately one-half of its current size, or less. This would impact not only water and wastewater services and support, but also overall environmental health risk identification and mitigation given the integrated nature of these risks.

There is currently a heavy reliance on FNWWAP funding for the EPHP programming at both the national and regional levels. Over one-half of EPHP funding is attributable to FNWWAP. While the FNWWAP funding was targeted at water and wastewater risks, within this focus, the EPHP has taken a comprehensive approach to environmental risk identification and mitigation given the integrated nature of risk (e.g., water and wastewater risks related to a myriad of other risks such as environmental contaminants, housing, solid waste, communicable disease, and emergency preparedness). As a result, much of the FNWWAP funding has gone to hiring additional EHOs who provide training and support to CBWMs, as well as assist First Nations communities to identify and mitigate *multiple* areas of environmental health risks. Should this source of funding that is set to conclude in 2012 be no longer available for the EPHP, the impact would reach significantly beyond water and wastewater risks in First Nations communities.

One of the Cluster's main challenges is its dependence on external sources including other departments and authorities to achieve the anticipated outcomes of increased First Nations and Inuit capacity to mitigate and address environmental health risks. Two key issues are the lack of resources allocated to EPH risk mitigation, and the lack of enforceable standards or regulations in First Nations communities.

The Cluster activities have been designed primarily to focus on the initial steps of risk awareness and identification resulting in advice and recommendations on how to reduce or mitigate identified risks. Ideally, once risk awareness and identification has occurred via Cluster activities (e.g., research projects, EHO services), communities can work towards mitigation. The evaluation concluded that it is at this point where most of the challenges are encountered for two main reasons: 1) lack of resources for mitigation (primarily related to housing and infrastructure), and/or 2) lack of enforceable standards or regulations in First Nations communities. Both of these factors are outside the direct influence and control of the Cluster.

In order to contribute to risk mitigation, the Cluster works on multiple levels (locally, regionally, nationally) with communities, First Nations and Inuit organizations, provinces/territories and various federal departments/agencies to advocate and to identify potential resources for risk mitigation, and to contribute to developing acceptable, relevant standards and/or regulatory frameworks for use by First Nations. One example includes discussions with the provinces regarding integrative models for health service delivery and tripartite arrangements which would incorporate provincial regulations and authorities into First Nations health programming. Another example includes Health Canada and INAC currently proposed legislative framework for Drinking Water and Wastewater for which there have been ongoing engagement with First Nations communities, organizations and leaders since 2006.

6.2 Recommendations

The following recommendations have been developed based on the findings and conclusions of the evaluation.

1. **Expand and enhance community-based service delivery model for environmental public health programming**

   The strength of the EH-ER cluster has been its ability to deliver community-based programming across Canada. Expanding and enhancing the community-based service delivery model by increasing EHO presence in communities and tailoring programming to address community-specific needs will help ensure the cluster's effectiveness and efficiency moving forward.

2. **Continue and enhance efforts to build community capacity in the area of environmental public health risk mitigation.**

   The EH-ER cluster has realized significant successes in risk identification. Moving beyond risk identification into risk mitigation to protect public health could be advanced through federal legislation, integration/tripartite agreements, community-level bylaw development and knowledge sharing.

3. **Assure evidence-based decision-making in environmental public health program and policy development and delivery.**

   The EH-ER Cluster has taken important steps towards evidence-based decision making. The Cluster has basic performance indicators but can continue linking work to public health through systematic and timely collection and analysis, of data, reviewing public health implications, and adapting programming accordingly.

4. **Explore options for ensuring long-term funding for Cluster programming**

   Much of the EH-ER Cluster's program funding is set to expire in the coming years. Without a continued source of long-term funding, the Cluster will be unable to move forward with existing programming and will be unable to implement other recommendations put forward in this evaluation. Long-term funding is critical for the ongoing effectiveness and efficiency of the EH-ER Cluster to contribute to improve health and wellness of First Nations and Inuit people.