Environmental Scan of Obesity Research Funding and Trends

Submitted by:

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1.0 Executive Summary

Background and Objectives

The Heart and Stroke Foundation of Canada (HSFC), and the Canadian Institutes of Health Research (CIHR) Institute of Nutrition, Metabolism and Diabetes (INMD), have both identified obesity research as a priority for strategic investments. Together they initiated an environmental scan in order to:

- assist in addressing specific knowledge gaps, opportunities and capacity issues; and
- help guide future funding priorities for both HSFC and the INMD, and the manner in which these priorities are finalized (e.g., consensus conference).

Examples of specific questions to be addressed included:

- What trends are evident in the peer-reviewed and "grey" literature that can guide the funding process for obesity-related research?
- Which funding agencies support research into obesity and how much are they investing?
- What strategies are they using to invest in research in this area; what kinds of research are they supporting?
- What challenges do researchers and policy makers working in areas related to obesity experience and, from their perspective, what are the strengths, gaps, capacity issues and priorities for obesity research in Canada?
- How have policymakers used findings from obesity-related research and what barriers do they identify in advancing obesity research, and the application of this research?

Methods

A formal literature review of funded obesity research was undertaken, with an emphasis on Canadian work. The review also included the "grey" literature and used a set of key words and data sources consistent with the defined scope of the review.

A total of 29 interviews were completed with Key Informants: funders of obesity research (10); researchers working in obesity (9); and policy makers whose work was closely connected to obesity (10). All but four people were based in Canada – the others being drawn from the United Kingdom (one researcher) and the United States (three funders). A good geographic representation was achieved across Canada: Atlantic Provinces (1), Quebec (2), Ontario (6), Prairie Provinces (3), and British Columbia (1). Twelve people based in Ottawa/Toronto with a national organization or government department were also interviewed. The participating researchers were drawn from diverse backgrounds including basic and clinical research, epidemiology and population health.

Results

(a) Funding for obesity research in Canada

Developing a comprehensive picture of funding for obesity-related research was a very challenging exercise given varying interpretations of the term "obesity–related", different search capacities of the respective databases, and availability of annualized data versus data that showed only the total amount per project. Within these limitations, it was found that:

- An estimated $27.56 million had been directed towards obesity-related research in Canada in 2005-06. The largest percentage of this funding was reported for CIHR (80.3%), followed by HSFC (8.6%). Other Canadian funders accounted for the balance of 11.1%.

- The strategic funding mechanism, as opposed to open competitions, appeared to be used less for obesity than for funding of research generally. For example, the Alberta Heritage Foundation for Medical Research, and the National Cancer Institute of Canada reported 5-25% of overall funding by strategic competition, but no funding via this route for obesity research specifically.

- It was challenging to summarize the data obtained for the four pillars (basic, clinical, population health and health services). For strategic competitions, the two Canadian organizations that rely exclusively on this approach for obesity research (CIHI-CPHI and Chagnon Foundation) reported directing these funds entirely to population health research. For open competitions the trend was for over 60%, and up to 100% of the allocation going to basic/clinical research. The Alberta Heritage Foundation for Medical Research reported the most balanced portfolio at 40% basic/clinical, 10% health services and 50% population health. Funding for health services research never went beyond 10% for any organization.

- Obesity had been declared a priority by five of the participating organizations, including the Chagnon Foundation and CIHI-CPHI (Healthy Weights) in Canada, and the three participating organizations from the US – the NIH (through its Strategic Task Force), the Robert Wood Johnson Foundation (RWJF) and the American Heart Association. To this list, one would add the INMD and HSFC themselves. The Nova Scotia Health Research Foundation was entering a new planning phase and thought obesity may emerge as a priority. For Natural Sciences and Engineering Research Council of Canada (NSERC), obesity was not officially declared a priority but they had recently funded five research teams in the area and two more were expected to move in that direction.

- An important challenge in funding obesity-related research was said to revolve around issues of research capacity, specifically insufficient numbers of trained investigators.

(b) Specific issues and implications for obesity-related research in Canada

Obesity is a population health problem requiring urgent attention

The epidemiological data on obesity among adults, children/adolescents, and selected sub-populations such as Aboriginal people, lend a degree of urgency to the need for a strong Canadian research effort coupled with evidence-based practice and policy. While some funding bodies have declared children and adolescents a priority (e.g., Chagnon Foundation, INMD, RWJF in the US), more support appears to be needed in this area as they were consistently identified as high need sub-populations. Canada's Aboriginal people were also noted as another sub-group with high needs with respect to obesity and related co-morbidities, and therefore requiring additional research investment.

There is not enough research funding and what's available isn't being well spent

Key Informants reported that (a) there is inadequate research funding; and (b) what funding we do have available at a national level is not being targeted so as to yield the kind of information needed to

change policy and practice in a confident way. Key informants pointed to both the process of funding obesity research (e.g., not enough strategic versus open research competitions; not enough personnel awards to free up time of the best researchers to work in this area), and the content or topic area of what was being funded (e.g., the need for more longitudinal studies; and insufficient investment in population health, health services research and evaluation studies of "on the ground" practice and policy implementation.

Balancing the Canadian investment across the pillars

Several aspects of the data suggested that funding for biomedical research on obesity was reasonably well covered in Canada, in contrast to the other pillars. Canadian obesity researchers are held in high regard largely on the basis of their contributions to the basic and clinical pillars. Excellence was evidenced, for example, in the number of Research Chairs in obesity that are held in Canada, the high level of scientific output from the biological pillar, and the many pockets of research excellence (e.g., Laval University, McMaster University, McGill, University of Montreal, University of Ottawa, University of Toronto, University of Calgary and University of Alberta). However, prevention and treatment solutions will, to at least some degree, need to be tailored to the Canadian context and probably funded with Canadian research dollars. This would suggest the need for a prudent and balanced investment of Canadian research dollars across all four pillars, while maintaining our strengths in basic and clinical research.

The research investment must also be balanced across the spectrum of risk and severity

The epidemiological data on obesity in Canada suggest that, while effective upstream (preventive) approaches are needed to reverse the worrisome growth patterns at a population level, there is currently a significant number of adults and children/adolescents who require assistance today with the treatment and ongoing management of being overweight or obese. Thus, the Canadian research effort should be targeted at goals for treatment and health services as well as prevention. Stigma associated with extreme obesity was considered as a potential factor underlying a comparatively low level of support for treatment intervention research, and more research is needed on the attitudes of the general public and health care providers toward obesity. Such research plays a key role in areas such as mental illness, AIDS/HIV, smoking, and alcohol/drug abuse but seems to be lacking in this field.

The major players in the field are "on the same page" with respect to the value of the ecological model for prevention

There is widespread endorsement among researchers, funders, and decision-makers alike of both the *complex nature of obesity* and its causative factors, as well as the need for population-based interventions to be grounded firmly in an *ecological approach*. The ecological intervention model, however, poses significant challenges for researchers (e.g., how to manage the complexity of the many interacting "layers" of the explanatory model(s), and how to tease out the effectiveness of critical ingredients amidst this complexity). The ecological model also poses challenges for research funders such as lack of support for "correlational research" as opposed to experimental studies in a peer-review process, and the trade-offs in distributing research dollars to a number of small scale studies versus funding larger scale, and much more complex, ecological research. While there was high interest for undertaking more comprehensive, multi-level, long-term studies here in Canada, it was acknowledged that it would likely be necessary to pool resources across funders, and probably community partners, to make this happen.

Communication between researchers and decision-makers is critical and needs to be supported
The importance of the *knowledge exchange* process between researchers and decision-makers cut across the vast large majority of documents examined and Key Informants interviewed. The knowledge exchange process itself must be considered an object of fundable research so it can be improved based on documented experience. In addition, some funders are supporting so-called "*policy–research placements*" or "*relationship grants*" in order to help bridge the two communities of researchers and decision-makers. There are many organizations and structures in Canada to support evidence-based practice and policy development such as the Pan-Canadian Healthy Living Strategy; the Chronic Disease Prevention Alliance of Canada (CDPAC); Canadian Population Health Initiative (CPHI); and the Best Practice Observatory of the Public Health Agency of Canada (PHAC). The emergence of the Canadian Obesity Network will also provide a mechanism to connect research and communities of practice specializing in obesity.

There is high need for inter-disciplinary and inter-sectoral work
There was also widespread agreement on the need for *inter-disciplinary* work, as well as strong inter-sectoral *collaborations* at all levels. Key Informants lauded the initiative of the INMD in taking a strong leadership role in obesity research in Canada, and in partnership with several other organizations.

Canadian capacity for obesity research is not optimal
Although the number of researchers working on obesity-related topics has grown substantially in Canada in the past decade, the field is still considered to be under-supplied in key areas. This was said to be particularly evident in prevention and treatment intervention research as opposed to the biomedical area. With respect to prevention, the research capacity issue was connected to challenges faced by young investigators needing more training in the methods compatible with an ecological framework (e.g., mixed methods, ecological research, natural experiments, program evaluation). In the treatment arena, the careers of young clinician-researchers was said to be limited by the lack of a "home" for obesity in the health care setting, and the corresponding need for young investigators to align with a discipline such as endocrinology, cardiology or nephrology in order to advance one's career. There was also an expressed need to reach out to researchers working in "non-health" areas to engage them in the obesity research agenda. This would include, for example, researchers working in urban design, housing, transportation, early childhood education, social welfare, community development, political science, marketing and macro-economics.

Achieving a better marriage between surveillance data and research questions of broad interest
A consistent theme in the document that were reviewed was the need to improve Canada's surveillance systems to better track key risk factors and outcomes associated with being overweight or obesity. There was also an expressed need to better link these surveillance data with research questions, particularly with respect to health outcomes. There was also a call for expanding the scope of traditional surveillance data to non-health areas (e.g., driving time, car ownership, recreation patterns, macro-level trends in the food industry) and, again, this is consistent with the theme of closer engagement with non-health sectors generally, and within a broad ecological paradigm.

The need for more program evaluation and economic analyses

A strong theme emerged for more investment of research dollars in the evaluation of programs and policies as they are implemented in the field, including more economic evaluation and costing analyses. Both researchers and policymakers noted that many opportunities are being lost where one might learn valuable lessons about "what works". Participatory action research was seen as needing support, and several people spoke of the limitations of the randomized controlled trial (RCT) research design, particularly for assessing the effectiveness of multi-level interventions in complex environments.

(c) Specific issues and implications for the INMD and the HSFC

Consider joint strategic planning

A joint strategic plan developed by the INMD and the HSFC could build upon the results of this environment scan in terms of *core principles*, *funding processes* and *priority topic areas.*

Core principles might include making a commitment to partnering with additional funders, placing a premium on multidisciplinary work and knowledge exchange, and declaring a strong commitment to build Canadian research capacity in obesity.

Some suggestions for funding processes would include:

- identifying mechanisms for pooled funding, as well as a review of any current policies that enforce budget caps and which may be limiting progress in both treatment and prevention research by encouraging research output (e.g., the number of studies funded) as opposed to outcome (i.e., usable knowledge for policy and practice);
- creation of a "flexibility fund" administered by the appropriate partner and with strategic targets and criteria for supporting evaluation projects, natural experiments, participatory action research, and surveillance-based research studies;
- development of shared targets for the percentage of their combined funding, and for each partner individually, for each of the four pillars;
- a balanced approach to open and strategic funding, with the strategic funding approach applied initially for population health, health systems and clinical intervention research;
- an increase in the proportion of funding allocated for personnel awards at all levels – young scientists beginning their career, those at the five-eight year career mark and Senior Scientists, including an increase in Research Chairs in Obesity across the country; and,
- mechanisms to support knowledge exchange opportunities for researchers (e.g., "research-policy placements"), strategic partnerships and support for the Canadian Obesity Network as a potential knowledge exchange mechanism.

Some suggestions for priority topic areas would include:

- more long-term, comprehensive prevention studies and, within that domain, an emphasis on horizontal integration strategies as well as non-integrated solutions with promise of quick wins;
- policy research, especially that focus on environmental problems and solutions;
- cost and economic studies that address societal and health care costs related to obesity;
- treatment research, especially interventions embedded in a chronic disease model, including surgical and pharmacological options but an additional focus on post-intervention care, complications and follow up;

- attitudes and practices of health professionals in the management of obesity;
- research on co-morbidities associated with obesity; and,
- research on the gene-environment interaction.

Consider leading a National Plan for Obesity Research

The INMD and the HSFC may also wish to consider taking a collaborative leadership role in the development of a national plan for obesity research. This might include, for example, engagement of the other CIHR Institutes, other NGO's such as Canadian Diabetes Association, and key multi-sectoral groups such as CDPAC. The Canadian Obesity Network could be engaged as a large and potentially quite important network of both Canadian researchers and practitioners.

2.0 Background and Objectives

Obesity, together with its related health disorders and impacts, is a complex and challenging health issue with serious implications for individuals and whole populations (1). In Canada, a conservative estimate of the total direct cost of obesity and being overweight was $1.8 billion in 1997 (2). Obesity research spans a spectrum that includes basic and clinical research as well as research focused on population health and health services and systems. Researchers in Canada and beyond are looking at both the causes of obesity and its effects on people. The search is on for new and effective ways to prevent and treat obesity, and to minimize the serious health consequences of related diseases such as type 2 diabetes.

The Heart and Stroke Foundation of Canada (HSFC), and the Canadian Institutes of Health Research (CIHR) Institute of Nutrition, Metabolism and Diabetes (INMD), have recently identified obesity research as a priority for strategic investments, and initiated this environmental scan in order to assist in identifying specific knowledge gaps, opportunities and capacity issues. This project builds upon findings of a previous environmental scan undertaken by the HSFC in 2004 that was focused on its overall Research Fund (3). Similarly, the INMD has undertaken its own strategic planning and review processes in recent years (4,5), and this work provides important background for the current process and findings. The study also rests on a foundation of excellent reviews, syntheses and policy papers produced by several partners and collaborators of both the HSFC and the INMD (e.g., Health Canada, CDPAC, CIHI, and the Intersectoral Healthy Living Network[1]).

The HSFC and the INMD initiated this environmental scan in order to:

- assist in addressing specific knowledge gaps, opportunities and capacity issues; and
- help guide future funding priorities for both HSFC and the INMD, and the manner in which these priorities are finalized (e.g., consensus conference).

The project plan called for the collection and synthesis of existing relevant work (i.e., documents, reviews, reports) related to obesity research investments and strategic funding priorities. This was to be supplemented with additional information from Key Informants, drawn from three groups (funders, researchers, and policy makers). The following are some of the specific topic areas and questions to be explored within each group:

- Which other **funding agencies** (federal, provincial, institutional, voluntary sector, private, other) support research into obesity and how much are they investing? Further, what strategies are they using to invest in research in this area; what kinds of research are they supporting; and have particular gaps or priorities been identified and targeted?

- Where do **researchers** who are engaged in obesity-related work access funding? What challenges do they experience in doing so and, from their perspective, what are the strengths, gaps, capacity issues and priorities for obesity research in Canada? Further, where are the pockets of high activity in obesity research within Canada?

[1] See Appendix A for a list of acronyms identifying various organizations frequently cited in the report.

- How familiar are **decision-makers** involved in obesity, and healthy weight generally, with obesity–related research? How have they used such research? What barriers do they identify in advancing obesity research, and the application of this research, and what do they consider to be the strengths, gaps, capacity issues and priorities for obesity research in Canada?

This report explores, and expands upon, these questions and topic areas in considerable detail. It concludes with a synthesis of issues and priorities related to funding and research capacity, as well as other aspects of our findings that contribute to the overall project goals.

3.0 Approach

(1) Literature Review and Document Analysis

An Internet search was conducted on key organizations for material related to the funding of obesity research, as well as a search for key obesity research groups and individuals. A formal literature review of funded obesity research was undertaken, with an emphasis on Canadian work. This included the "grey" literature and was based on a set of key words[2] and data sources consistent with the defined scope of the review. As a starting point, the HSFC and INMD were consulted on key reports from previous partners and collaborators. We also searched the following bibliographic sources: MEDLINE-Pub Med, Canadian Research Index, the Cochrane Database of Systematic Reviews, The Canadian Heart Health Database, Current Contents, EMBASE, and the York Centre for Reviews and Dissemination databases. It is important to note, however, that the intent in this literature review process was not to synthesize and report on key research findings, or "best or better practices" *per se*. This has been done admirably in several of the Canadian documents from the grey literature (e.g., 6-8). This is also the subject of the systematic reviews and published literature reviews, from both Canadian and international sources (e.g., 9-13). We were particularly interested in recommended areas for future research made in these various reports, as well as the number and location of Canadian researchers making substantive contributions to the extant literature.

One of the documents reviewed had been prepared previously for the HSFC (3), and it contains a helpful overview of the various strategies that funding bodies use to fund research and its application. We include this overview in Appendix B. Therefore, the review did not cover research funding strategies generally.

(2) Key Informant Interviews

In close consultation with the project team from the HSFC and the INMD, a list of Key Informants was compiled for a semi-structured interview to supplement our document search and analysis. Key Informants were grouped into three categories: (1) representatives of organizations or government bodies that fund research; (2) researchers/academics who conduct obesity-related research; and (3) individuals who do or could develop health or social policy related to obesity. The researcher group

[2] Search terms included: "centres for research" / "centers for research", obesity, prevention, collaborations, "obesity research", Canada, overweight, research funding, funding sources, funding agencies, and overweight,. Bibliographic searches were sometimes limited to review articles, publication dated in the past 5 years.

was subsequently expanded to include two university administrators responsible for research. The target number of interviews was: funders (10-12), researchers (5-8), and policy makers (10-15). Flexibility was allowed in the final balance across the groups based on information gleaned from the interviews, as well as on the practical issues of locating people and securing interviews within a tight project time frame. An "A" list of priority Key Informants was developed initially as well as a "B" list of back-ups that was tapped into based on challenges experienced securing an interview. Additional people were enlisted based on the recommendations of others interviewed. In total, 29 interviews were completed: funders (10), researchers (9), and policy makers (10). All but four people were based in Canada – the others being drawn from the UK (one researcher) and the US (three funders). A good geographic representation was obtained across Canada: Atlantic Provinces (1); Quebec (2), Ontario (6), Prairie Provinces (3), and British Columbia (1). Twelve (12) people were based in Ottawa/Toronto with a national organization or government department. (See Appendix C for a list of those interviewed and Appendix D for the interviews guides used with each group).

Funding databases: Of 15 representatives of funding agencies that were contacted, nine returned information from their database about the specific programs or projects they had funded in recent years[3]. Those sending this information were not always the same organizations that granted an interview. Further, the information that was received was not in a standard form across the responding agencies. For example, some had information annualized while others did not; some reported the amount of funding and others provided only a list of project titles; some distinguished between personnel and operating grants while others provided total amounts only, and not all organizations classify their research in the same manner. Lastly, varying interpretations of the term "obesity-related research", as well as the search capabilities of the respective funding databases, challenged the compilation and use of these data. Sensitivities around the provision of these data from some of the funders included, concerns about reporting the names of the investigators (subsequently removed from the list of information required) and the time frame for responding. In the end, our coverage of funding for obesity-related research in Canada is incomplete. Like others engaged in a similar task before us on behalf of the HSFC (3), we point out the significant challenges and scope of work that is involved in securing and collating funding data on a given health topic across multiple funders in Canada.

Analysis: The first task was to review and summarize the material from the grey and published literature, taking note of consistent themes that surfaced. We then summarized the information from the Funder group, as they provided different information, and responded to different questions than the other two groups of key Informants – the researchers and policy-makers. While the researchers and policymakers answered most of the same questions, we have presented their results separately so as to highlight common areas and differences for the reader. The concluding section of the report then integrates results from all aspects of the analysis, including the literature review.

4.0 Results

[3] Some of those sending this information had declined an interview. Therefore, the group interviewed is different from the group of organizations represented in the funding information.

Our presentation of the findings is organized around two broad sections: (a) results of our literature review and document analysis; and (b) results from our Key Informant interviews separated for funders, researchers and policy makers.

(a) Literature Review and Document Analysis

(i) Epidemiological Background

Adults

- The percentage of adults who are overweight or obese has risen dramatically in recent years in Canada, mirroring a worldwide phenomenon.
- Canada's adult obesity rate in 2004 was 23.1% (an estimated 5.5 million adults 19 years and over). This places us in lower than our US neighbours at 29.7%.
- Although men and women have equal rates of obesity overall, women experience a higher rate of Class III obesity which is the highest, most severe level.
- Obesity rates peak in middle age (45 to 64 years). Obesity rates have been increasing in all age groups but more so among younger and older adults.
- There is a trend for obesity in adults to be associated with lower socio-economic status. The association also interacts with age, gender and marital status. The relationship with SES is, therefore, far from clear cut.
- Low levels of physical activity and poor eating habits are risk factors for obesity and obesity is associated with a number of chronic conditions (e.g., high blood pressure, diabetes, and heart disease)

Children/Adolescents

- The percentage of overweight and obese children and adolescents has also risen dramatically in recent years in Canada, again reflecting a worldwide phenomenon
- In 2004, the rate of overweight was 26% among those aged 2 to 17 and the rate of obesity was 8%. The increase over time has been particularly dramatic for those between the age 12 and 17.
- Rates are similar for boys and girls, and the increase in the rate over time, is also similar for both genders.
- Risk of being overweight or obese decreases with the daily consumption of fruit and vegetables and increases based on time watching TV, playing video games and using the computer

Implications for Canadian obesity research:

Combining the adult obesity rate (23.1%) and the overweight rate (36%), it is apparent that almost 60% of the Canadian adult population is in a weight range associated with poor health outcomes. Coupled with the research findings that those who are overweight are most likely to continue gaining weight, it is clear that the size of the problem is likely to keep growing at a population level. Thus, the epidemiological data on adults lend a certain degree of urgency to the need for a strong Canadian prevention research effort, coupled with evidence-based practice and policy.

In addition to Canadian adults, an additional 34% of children and adolescents are outside their normal weight range. Since the likelihood of losing weight diminishes with increasing age, the younger years are clearly the most important from a prevention perspective. Children and adolescents must be a research priority based on the epidemiological data alone.

The epidemiological data suggest further that, while effective upstream (preventive) approaches will surely be needed to reverse the worrisome growth patterns at a population level, there is currently a substantial number of adults and children/adolescents who require assistance today with the treatment and ongoing management of being overweight or obese. Thus, the Canadian research effort should be targeted at both prevention, as well as treatment goals.

(ii) Canadian Policy and Program Context

In concert with other developed countries, Canada has been very active in the creation of high level, inter-sectoral strategies and structures intended to both promote and coordinate action in the area of chronic disease prevention, including obesity. These strategies and structures, and the many individual organizations in support of them, serve the research community in several important ways. These include:

- advocating for research funding and overall enhancement of research capacity, including investment in research capacity that includes surveillance, prevention interventions and policy tracking;
- conducting priority setting exercises that can help establish the research agenda for research funders and individual scientists and research teams;
- connecting the "two communities" of decision-making and research (both researchers and the funders of research), with explicit goals related to knowledge exchange (e.g., networking to forge long-term relationships; setting the research questions; using the results; training young investigators and young decision makers about "life in the other community"); and,
- supporting the management of research to avoid duplication.

The following are examples of some of these inter-sectoral strategies and structures in Canada and a brief synopsis of their written contributions in the grey literature that bear directly on this environmental scan for obesity research.

The **Integrated Pan-Canadian Healthy Living Strategy** has been developed and launched with an initial emphasis on physical activity, healthy eating, and their relationship to healthy weights. In support of the National Strategy, an Inter-sectoral Healthy Living Network has been formed, and within that network, the Research and Surveillance Working Group (RSWG) was one of four sub-groups. Following an exhaustive scan of relevant national and international literature (14), and a structured priority setting process, this Working Group has identified the following priorities related to research[4]:

- research based on an ecological model which brings into focus the determinants of healthy eating and active living and their interactions (e.g., social, cultural, environmental, biological);
- research and evaluation of policy and program interventions in both the health and "non-health" sectors, with an emphasis on environmental and policy interventions at the population level; and,

[4] This is a synthesis of the seven priority action statements arising from the work of this Working Group

- research and evaluation of effective knowledge exchange approaches, including national/regional systems and resource centres to disseminate and support best practices, and funding support for "research-policy placements" to increase understanding and interaction of the two cultures.

The detailed "matrix" developed by the RSWG to support the development of these priority areas contains considerably more detail derived from an exhaustive document analysis (15). Drawing upon the identified gaps and recommendations from this "matrix" the following additional points are highlighted:

- the need for a coordinated and sustained approach to surveillance, including comparable tools and indicators, enhanced capacity for using the data in evaluations, and support for local data collection systems to guide local initiatives;
- the need for more economic research on the cost of overweight and obesity, and the cost-effectiveness and cost-benefit of policy and programmatic interventions;
- the need for funding for less traditional areas of policy-related research, such as historical research, research on values and synthesis of research findings;
- the emphasis many experts have placed on the prevention of obesity in childhood;
- the need for more assessment of the effectiveness of interventions;
- a call for research syntheses to go beyond the inclusion of only the traditional RCTs;
- the consistent call for inter-disciplinary work; and,
- the determination that research capacity in Canada is low, particularly in the area of obesity research focused on population health.

In 2004, the **Chronic Disease Prevention Alliance of Canada (CDPAC)** co-sponsored a workshop with CIHR-INMD, the CIHR Institute of Population and Public Health (IPPH,) and the Centre for Behavioural Research and Program Evaluation (CBRPE) with the objective of developing a research framework and an integrated "research system" for chronic disease prevention. Although not focused specifically on obesity, the work undertaken is highly relevant to this scan. Preparation for the workshop included commissioning a synthesis paper of relevant work (16), a separate report summarizing interviews with selected (high level) stakeholders concerning research in this area (17), and the workshop report itself (18).

The preparatory synthesis paper (16) emphasized the common call across the many documents reviewed for the development of an integrated system for chronic disease prevention. This included the "research arm", and a stronger surveillance component.

Key findings from the interview component (17) included:

- innovative ways to fund the kind of prevention research that is really needed (e.g., long term, comprehensive) through partnerships among research funders;
- funded research projects that do not shy away from the complexity of the obesity problem and potentially complex solutions. Examples might include multi-level studies that assess how organizational structures and processes support individual behavioural change, or the assessment of environmental conditions associated with high fat diet;
- broadening the scope of what is considered "best practice" and thereby recognize that research can support decision-makers without being a randomized control trial (essentially unworkable for the kind

of complexity described in the ecological model). This sensitivity to the importance of different kinds of research, in particular participatory action research, has a direct bearing on the kinds of criteria being used by peer review committees;

- support for knowledge exchange (e.g., research placements for policy makers; support for graduate students in evaluation of programs);
- engagement of researchers from a broad range of disciplines, including in particular, non-traditional "health" areas such as marketing, geography, political science and economics;
- enhanced capacity to study natural settings such as through better research use of surveillance data, participatory research, qualitative research, and forecasting and modeling the impact of interventions;
- support for evaluations of policy and program interventions;
- studies more oriented to the long-term such as replication in different settings, longer follow-up after interventions, life course and longitudinal prevention studies; and,
- studying new ways of health service organization that facilitate the practice of prevention in the health care system.

Lastly, the workshop report (18) reinforced many of these same points but also directed attention more pointedly at the need for a national strategy for career development in population health and chronic disease prevention research. This included personnel awards for researchers as well as capacity development in university-based schools of public health for training Master's-level students in program evaluation.

In addition to CDPAC, which operates at a national level, there are parallel provincial and territorial alliances, networks and organizations supporting chronic disease prevention, including obesity, which advocate for a strong "research arm" in this area. One important body of work from the provinces is the "Review of Better Practices for the Prevention of Obesity and Overweight and the Maintenance of Healthy Weights" released in 2005 by the **Provincial Health Services Authority in British Columbia**. (7). The report does not specifically discuss research gaps. However, it does indirectly point to gaps in the existing knowledge base because it compares the existing best and better practice literature against community needs and current programs in a large region. The gaps that arise in terms of sub-populations (children/adolescents, Aboriginal people, low SES/marginalized) and programs and policies (long-term integrated interventions) clearly point to research priorities. Importantly, the local best practice comparison was undertaken for both prevention and treatment, highlighting the interest of decision-makers in developing a full continuum of interventions beyond prevention alone. The report is also consistent with the other material reviewed, identifying issues of the need for a wider perspective on best and better practice; the need for knowledge exchange activities and the need for more program and policy evaluation.

Another example of an important contribution to the obesity literature in Canada came from the **Centre for Health and Policy Studies at the University of Calgary** in 2004. With funding contributed from a variety of sources, Lindsay McLaren and colleagues undertook a review of the effectiveness of integrated approaches for obesity prevention (5). The authors issued a call for a stronger focus on testing integrated solutions since it was clear to them that "something wasn't working!" given the climbing rates of obesity and overweight. The review yielded several recommendations for funding obesity research. The most salient recommendations concerned the need for more research on horizontal integration (e.g., effectiveness of integration across organizations or sectors such as physical activity interventions that link school, home and other community

interventions). Echoing many of the other reports, this paper also pointed out that the traditional RCT design does not lend itself to research questions in this area. A participatory research method was again lauded.

In 2001, Health Canada's **Office of Nutrition Policy and Promotion** assessed major gaps in the knowledge base concerning the determinants of healthy eating and effective policy and program interventions to promote and support healthy eating (19). Again, the expressed need was for funding partnerships that would support larger scale cross-cutting, multi-level interventions. The need was also stated for knowledge exchange synthesis and support mechanisms for dissemination and sharing of findings. Four sub-populations are noted as needing more research attention are children/adolescents, Aboriginal people, low SES with food access and security issues as well as seniors. Additional research needs were largely in the area of program and policy intervention research focused on both environmental and individual determinants. The report also cited the lack of research funding, the need for more inter-disciplinary work as well as insufficient numbers of appropriately trained and experienced researchers.

A 2003 report from the **National Roundtable on Physical Activity Research** intended to inform the national Healthy Living Strategy (20) echoed many of the points made with respect to nutrition research. Six key areas for expanding the knowledge base were identified, including:

- cost-benefit of physical activity interventions on health and social costs;
- interventions to increase physical activity;
- longitudinal data on intervention strategies for children and youth;
- identification of ways to reduce or eliminate barriers to physical activity;
- research on community capacity related to physical activity and health outcomes; and,
- how a multi-dimensional approach can be used in a population health framework to optimize the role of physical activity and management of chronic disease.

The report concluded with a call for research to underpin all aspects of healthy public policy, interventions and programs targeted at the individual as well as the population as a whole. Particular emphasis was placed on the need to examine the social, economic, political, cultural and environmental factors that help people to maintain physical activity and healthy food choices in the long term. They also noted the need for knowledge development and research is needed to help governments to adapt to the rapidly changing social and cultural context across the country (e.g., ethnic and language diversity, diverse cultural norms, an aging population).

The **Canadian Institute of Health Information (CIHI)** is also active in the area of obesity-related research not as a funder of research, but as an advocate for improving the evidence base related to factors affecting the health of individuals and communities. A 2004 report by Dr. Kim Raine, commissioned through the Institute's Canadian Population Health Initiative (CPHI), is a landmark report on obesity and being overweight in Canada (8). The report advocates for more research which assesses interventions grounded in a broad ecological approach, and which examines individual, social and environmental determinants of obesity. Research-related recommendations of most relevance to this environmental scan included the needs to:

- exploit opportunities for analysis of currently available surveys and develop surveillance mechanisms to fill gaps in data gathering to monitor social trends such as recreation patterns, television viewing, food purchasing patterns, and food supply, and to understand marketing strategies regarding food & physical activity that contribute to the understanding of environmental determinants of obesity;
- evaluate and measure outcomes of programs and interventions using common indicators of success;
- evaluate large-scale interventions, including economic impact evaluations and long-term surveillance of program impacts;
- conduct health impact analyses of social policies influencing income inequality and financial security to assist in developing an understanding of socioeconomic determinants of obesity; and,
- develop best practices for treatment interventions, since obesity leads to significant co-morbidities and health care costs.

The **Canadian Institutes of Health Research** are charged with the responsibility of funding health research in Canada. Within the various Institutes, the challenges of the "obesity portfolio" have been championed largely, but not exclusively, by the **Institute of Nutrition, Metabolism and Diabetes**, one of the co-sponsors for this environmental scan. The strategic planning process undertaken by the INMD in 2001 (4) clearly illustrated the priority placed on obesity among key stakeholders of the Institute (it was the number one priority), and this subsequently translated into priority statements for the Institute itself. Obesity was an area of interest for 40% of researchers who provided input to the INMD strategic planning process. Sub-themes for future work included content areas such as prevention/health promotion, causes, management, complications and vulnerable populations. Most obesity research at the time was investigator-initiated or training grants, although this was not broken out separately for obesity research *per se*. The INMD launched a strategic funding initiative in 2001 setting aside $3 million in research and training grants per year to fund obesity research within all four pillars of CIHR research themes: biomedical, clinical, health systems and services, and the health of populations. Funding was allocated to support multi-disciplinary teams and projects stimulate innovation, establish clinical trials and encourage community-based intervention research.

The Director of the INMD, Dr. Diane Finegood, subsequently prepared a paper entitled "The Agenda for Obesity Research in Canada**"** which re-affirms the priority on obesity for INMD funding, and the magnitude of the gaps in both our knowledge and the mechanisms of knowledge exchange (5). Subsequent to the Institute's strategic planning process, an open-competition Request for Proposals focused on obesity followed in 2002. Historically, the majority of research funding for obesity has gone to the biomedical pillar (about four times as much) and this is consistent with the centres of excellence that have developed in Canada at institutions such as Laval[5] and McMaster universities. The proportion going to biomedical shifted somewhat in 2005–06 when the call was restricted to childhood obesity (45% biomedical for INMD itself and 61% for CIHR obesity research as a whole). The predominance of Canadian research in the biomedical area was noted previously. The number of researchers submitting grants on obesity was also cited as having increased from 81 in 2000-01 to 638 in 2004-05. Again, the call was made for increased support for all kinds of obesity research, from

[5] Laval was ranked 11th among nations from 1991 to 2000 in total research citations and contributed significantly to Canada being ranked 4th overall.

basic science, to prevention, to treatment strategies, and for enhanced capacity development (people, surveillance systems, data infrastructure and knowledge exchange).

The **CIHR Institute of Circulatory and Respiratory Health (ICRH)** released their Strategic Plan for 2002-2003 and included a Strategic Initiative to support multidisciplinary teams through New Emerging Team (NET) grants for research (21). One of the five areas targeted was Obesity-Associated Vascular and Respiratory Conditions. Another Institute within CIHR with a significant stake in research on obesity is the **Institute of Population and Public Health (IPPH).** As with the ICRH, it is unknown at present what, if any, funding has been targeted specifically at obesity or obesity-related work. With respect to its work on chronic disease prevention, the IPPH has been keenly interested in fostering evidence-based decision-making in Canada. Together with the Canadian Population Health Initiative of CIHI (22), a national consultation process identified two priorities for action relevant to the present environmental scan:

- research on the factors contributing to effective knowledge exchange by policy makers and practitioners; and,
- greater investment in knowledge synthesis, diffusion and transfer initiatives such as the development of high quality synthesis and meta-analysis on population and public health interventions.

The **Heart and Stroke Foundation of Canada** commissioned a report in 2004 that summarized findings and key ideas from 30 documents relevant to research funding (3). The report highlighted several key trends in funding, including:

- the increasing complexity of problems and the approaches called for to solve these problems;
- partnerships across funding agencies;
- funding devoted to knowledge exchange to link researchers and end users of research information;
- evidence in favour of multi-disciplinary teams; and,
- the need to build research capacity, including personnel and more funding generally needed.

In 1999, the **Canadian Task Force on Preventive Health Care** reviewed the literature on the effectiveness of prevention and treatment approaches for obesity (10). The resulting guidelines have yet to be updated, although work is apparently underway to do so. The 1999 paper reporting these Canadian guidelines offered the following recommendations for research priorities:

- effective primary prevention methods for individual and communities to reduce the prevalence of obesity in the general population;
- long-term effectiveness of weight-reduction interventions using well designed clinical trials that use pre-determined criteria for successful outcomes;
- relationship between weight reduction methods are reductions in the incidence of major clinical outcomes (e.g., myocardial infarction, stroke and cardiovascular death).

The **Alberta Heritage Foundation for Medical Research** commissioned a paper in 2000 on the effectiveness of laparoscopic adjustable gastric banding (LAGB) for people with severe obesity (23). Surgery is one of the current therapies available for weight management; other approaches being dietary intervention, physical activity and pharmacotherapy. The surgical approach has been the

subject of other published reviews (e.g.,10, 12, 24), and the evidence reviewed there suggests that weight loss surgery should be limited to those patients with clinically severe obesity (i.e., BMI's > over 35-40), and with co-morbid conditions. The substantive peer-reviewed syntheses covering the topic also discuss the issue of post-surgical complications. (e.g.,. it was determined in the Alberta review that future research is needed into the efficacy and safety of LAGB surgery, and whether a sub-group of morbidly obese patients can be identified for whom this method could be employed as an alternative to standard care). It was noted that studies should also include outcomes such as weight loss, improvement in co-morbidity and quality of life assessment. Other research reviews emphasize the need for research to reduce post-operative complications.

The **Canadian Obesity Network (CON-ROC)** (www.obesitynetwork.ca) is a network of researchers and health professionals that aims to be a catalyst shaping the future of obesity research, prevention and treatment by fostering a collaborative model that will have national and international reach and impact. It has goals related to networking and communication, research advocacy and training and seeks to bring together universities, industry, non-government and government organizations on issues related to obesity. The Network is organized around three themes: Environmental and Social Factors; Behavioural and Biological Determinants; and Prevention, Treatment and Rehabilitation. Although at this point it has not identified specific research priorities, the Network is planning a national needs assessment that should further inform research planning and priority setting in Canada. Since it is bringing together stakeholders from multiple perspectives and roles in the field of obesity, the group is also a potentially important forum for knowledge exchange activities.

(iii) Global Context for Canadian Obesity Research

Canada is certainly not alone in its efforts to combat obesity. This is perhaps best reflected in the "Global Strategy on Diet, Physical Activity and Health" endorsed by the WHO in May 2004 (25). The work of the International Obesity Task Force (www.iotf.org) has also been instrumental in highlighting the need for a broad ecological approach that draws attention to the complex political and environmental context in which people make decisions about physical activity and/or energy intake. This complexity is clearly a theme repeated several times throughout the results of this environmental scan: complexity calling for complex solutions and a high degree of partnership among multiple funders, inter-disciplinary researcher teams and decision-makers supported by knowledge exchange processes.

The global battle against obesity is supported by an international research effort. Canadian researchers are important players on the global stage, as evidenced, for example, in their active participation in international meetings and congresses, and their substantive contributions to the international peer-reviewed literature (high citation counts[6]). The contributions to the work in the basic and clinical domains are particularly noteworthy. In addition, the expanding "industry" of systematic reviews (e.g., Cochrane Collaboration, Campbell Collaboration, and others) has truly placed syntheses of international research at the fingertips of researchers and decision-makers alike. Regularly scheduled international symposia bring experts in the field together, and again, Canadian researchers play a significant role in presenting at, if not organizing, these meetings.

[6] Between 1991 and 2000 Canada ranked 4th among nations in citations in peer-reviewed journals

Internationally, most researchers are on the same page with respect to the need for a broad ecological framework, such as exemplified by the WHO model. It is also widely agreed upon that both genetic and environmental factors underlie the risk of obesity (e.g., 11, 26), and this has spawned the worldwide call for investigation of gene-environment interactions. The research community is also in agreement on the general parameters of effective prevention, as well as treatment interventions. In particular, the challenges and limitations of prevention solely through individual-based, behavioural approaches are widely acknowledged. There is a recognized need for prevention strategies involving the "built environment" (e.g., urban design; workplace design) that will mitigate poor health behaviours, and sustain good ones. Experts argue that something akin to the integrated, multi-level prevention policies and programs that have lowered the rates of tobacco use in most developed countries will be required to impact the increasing rates of obesity and overweight. Similarly, there is agreement that the full tool-kit for prevention and management of obesity includes treatment options. An important factor underlying the need for effective treatment options is the clear connection between obesity and the various co-morbidities; these co-morbidites put a drain on the health system but appear to be reduced through treatment interventions (27). It is also well supported that many weight loss interventions achieve positive short-term outcomes, but that sustained weight loss is a significant challenge. Thus, a consensus is emerging that severe obesity is a health problem/disease best viewed within a chronic disease management model. This calls for investment in treatment intervention research, as well as studies of the health care system itself and how responsive it is to chronic as opposed to acute health conditions. Health services research is, therefore, also highly relevant to the study of obesity.

Another significant commonality across the global effort on obesity is the call for closer ties between the research community and decision-makers engaged in obesity-related policy and practice. Under the banner of "knowledge exchange", researchers on the international front are becoming more engaged with the community in defining the nature and scope of their work, and applying their findings. However, this work is not without its challenges in both the research and policy/practice communities. For example, it is widely recognized that academic criteria for advancement of researchers could be better aligned with the extra demands placed on researchers who are actively engaged with policy makers and practitioners. Policy makers and practitioners, on the other hand, require skills enhancement and other capacity building to better understand and use research findings. Research funders are exploring ways to bring these communities closer together to facilitate application of research knowledge, and influence the research agenda in concrete ways.

It was beyond the scope of this project to review work underway in a large number of individual countries. Rather, we chose to focus on research funders in the US (see below). That said, we acknowledge the work done previously in the Birdsell report for the HSFC (3), which summarized priority research topics for the Medical Research Council in the UK, as well as the National Heart Foundation of Australia. In both jurisdictions, cardiovascular disease and stroke were identified as a national priority and, within these broad parameters, the importance of obesity was highlighted. The Australian report is the most detailed report and echoes many of the themes to be highlighted below for both the US and Canada. This includes the need for more funding along the full spectrum of prevention, treatment and management approaches; the need to increase research capacity; more research and community partnerships to leverage funds; and the need for knowledge exchange.

The US is investing heavily in obesity related research through the National Institutes of Health (NIH), but also via other major funders such as the Robert Wood Johnson Foundation (RWJF), the American Stroke Association (ASA), and American Heart Association (AHA). The U.S. Surgeon General's Report on obesity in 2001 (28), as well as two landmark documents prepared by the influential Institute of Medicine (IOM) (29,30), have had an impact on funding of research, as well as the planning and delivery of prevention and treatment programs. One of the strongest recommendations from the IOM reports was the need for more evaluation built into local projects. Many of the other recommendations and implications for research funding from the IOM reports are included in one of the Canadian sources already summarized (5). Here, we offer more details of the specific work in the obesity area undertaken in the US by the NIH, RWJF, the AHA, and NASSO, The Obesity Society.

NIH Strategic Plan: The NIH Obesity Research Task Force **(www.obesityresearch.nih.gov)** prepared a strategic plan in 2004 based on a collaborative effort across its Institutes to create synergy and share responsibility for funding obesity research (31). This is indicative of the model of partnership and interdisciplinary work that is coming to characterize work in this area globally. The plan includes very specific short-, intermediate-, and long-term goals for basic, clinical and population-based obesity research. It also included strategies for achieving these goals.

Three thematic areas in which specific research priorities were summarized were:

- research toward preventing and treating obesity through lifestyle modifications (including community health and policy interventions intended to modify lifestyle);
- research toward preventing and treating obesity through pharmacologic, surgical, or other medical approaches; and,
- research toward breaking the link between obesity & its associated health conditions.

Important cross-cutting themes were also identified including, fostering multidisciplinary and interdisciplinary research teams and research consortia (e.g., Bariatric Surgery Research Consortium); emphasis on translational research and knowledge dissemination; investigator training, health disparities, and special populations including, children, racial/ethnic minorities, marginalized populations and the extremely obese.

Robert Wood Johnson Foundation: The RWJF supports training, education, and research projects that demonstrate effective ways to deliver health services, especially for the most vulnerable populations. This is done largely through a grants process, and projects are often undertaken in partnership with other organizations. Importantly, they have identified childhood obesity as a particular focus of their work (32, 33), and have funded a host of projects in this area. No published priorities or research strategies are available so we relied on our interview with a RWJF representative to gain a better insight into their work in this area. This is covered in the next section of the report. The range of projects listed in their project database, and recently summarized in their quarterly newsletter "Advances", show the range of areas being funded. Projects supported cover epidemiological work and surveillance systems, prevention programs with strong evaluation components, community capacity building, including neighborhood design research, and research in the areas of active living, nutrition and food security. They support the development of advocacy infrastructure and knowledge translation for public health, including the obesity field specifically.

American Heart Association: The AHA publishes peer-reviewed medical scientific statements and guidelines on cardiovascular disease and stroke written by scientists and healthcare professionals. Their most recently published review of obesity and cardiovascular disease (11), written by Dr. Paul Poirier from Laval University, provides several research recommendations of value for this process:

- a better understanding of how genes and gene–environment interaction lead to the CVD related to overweight/obesity;
- identification of the optimal biomarkers and non-metabolic markers for predicting overweight/obesity and major CVD co-morbidities, including sub-clinical CVD;
- a better understanding of ethnic/racial differences in the development and progression of CVD in overweight/obesity;
- evaluation of the strategies, efficacy, and side effects of obesity treatment with lifestyle / behavioral intervention and drug therapy and its impact on CVD;
- identification of genetic determinants or biomarkers that predict which obese individuals are at highest risk for heart failure;
- fundamental studies attempting to understand the basis for heart failure in the obese and insulin-resistant individual; and.
- policy research on the impact of overweight/obesity on future health care in people with or without CVD.

In 2004, the journal of the American Heart Association, Circulation, published a report by Caterson and colleagues (27). This report emanated from the Prevention Congress VII, an annual international obesity research conference. The focus of the paper was on co-morbidities of obesity and the paper ended with a list of 10 research recommendations. These were:

- long-term longitudinal studies to determine whether the risks of obesity for cardiovascular disease and metabolic disease, in particular are the same across all population and ethnic groups;
- studies to determine the specific factors that determine weight (adipose tissue) gain and particularly those factors that predispose individuals to abdominal adiposity;
- the development of effective weight maintenance programs and studies to determine whether they will reduce cardiovascular (and other disease) morbidity and mortality;
- the development of strategies for the prevention of obesity , which may be directed at children and adolescents, at-risk populations, or the population as a whole;
- studies at the individual and then the population level to evaluate the effectiveness of intervention in childhood and adolescence in preventing dyslipidemia and hypertension as endpoints;
- studies to determine whether the effectiveness of weight-loss interventions is greater than the benefits of controlling co-morbidities though medical management;
- studies to increase our knowledge of control of fat cell deposition and its relationship to disease risk;
- studies to identify the determinants of why certain individuals do not develop overweight or obesity;
- studies to hep translate improved knowledge into actual lifestyle modification (behaviour change); and,
- studies to assess the relative benefits of weight loss versus physical activity.

NASSO, The Obesity Society: This US-based organization (www.naaso.org) has 1700 members representing basic and clinical researchers, as well as providers of obesity treatment and prevention. It is similar in many respects to the Canadian Obesity Network described earlier, but longer standing and, therefore, larger and more comprehensive in scope. For example, the association publishes a high quality journal (Obesity), holds annual scientific and other meetings, publishes a newsletter, supports an Obesity Treatment Education System and provides other services for members. Although not engaged in funding obesity research, the Association is mentioned here as another example of a group dedicated to both prevention and treatment of obesity, and providing a forum, and direct services and support, for knowledge exchange.

Implications for Canadian Obesity Research

The Canadian research effort must be considered within the context of rapid communication via the Internet, peer-review processes that span national boundaries, and international meetings that facilitate communication and networking among global and North American experts. It is incumbent upon Canadian decision-makers to use research from other countries to maximum value in Canada. It is also critical for Canadian researchers to place their research questions in the context of the extant knowledge base, whether this be the neurobiological knowledge base, or best and better practices for prevention and treatment. Research funders must provide adequate support for networking opportunities to showcase Canadian work and to allow researchers to keep abreast of new international developments.

The global context makes it clear that obesity is highly culture bound, and that prevention and treatment solutions will, to at least some degree, need to be tailored to the Canadian context of our prevention and health care "systems", and our unique sub-populations. The importance of regional and local context in understanding both the effectiveness and critical ingredients of population health programs is widely underestimated and understudied (34). Tailoring solutions to the Canadian context will require the assessment of prevention and treatment interventions in Canada, probably funded with Canadian research dollars. In contrast, new knowledge in the area of genetic and neurobiological mechanisms is more "culture-free". This would suggest the need for a prudent and balanced investment of Canadian research dollars in the biomedical realm. This investment should be based on an assessment of the unique contributions that Canadian researchers and the Canadian research environment can continue to make to biomedical obesity research.

Beyond striking a thoughtful balance of work across the biomedical, prevention and treatment research areas, this global context of obesity research and research funding also triangulates with many of the themes coming from our review of the Canadian scene. This includes:

- the importance of the ecological model for understanding obesity, its causes, and its prevention and treatment;
- the importance of understanding both genetic and environmental causal factors and their interaction;
- partnership models for funding of research;
- trans-disciplinary and inter-disciplinary work;

- the need to build investigator capacity, for example, attracting and training new investigators;
- the development of research teams or consortia;
- investments in knowledge exchange, including capacity building for policy makers and practitioners; and,
- the high needs of children and marginalized populations.

(b) Key Informant Interviews

(i) Feedback from Funders of Obesity Research

This section begins with an estimate of the total amount of obesity-related funding distributed by the various funders involved in the study, including the CIHR and HSFC themselves. As noted in the methods section, this was a very challenging exercise given varying interpretations of "obesity – related", varying search capacities of the respective databases, availability of annualized data versus those reporting only total funding for a grant over multiple years of the project. In some cases estimates were ball-parked by the respondents and in other instances exact figures were provided. Within these limitations, Table 1 shows the estimated funding for obesity-related research in Canada for 2005-2006. A total of $27.56 million was estimated for Canada, the largest percentage of that coming from the CIHR. In the US, the NIH is clearly the largest funder of obesity research.

Table 1. Total estimated obesity-related funding in Canada and selected US funders, 2005-06.

Granting Agency	Estimated Amount in 2005-06 (in Millions)	%
Canadian		
CIHR	$ 22.27	80.8
HSFC[1]	$ 2.21	8.0
Other[2, 3]	$ 3.08	11.2
Total	**$ 27.56**	**100.0**
US		
NIH	$ 519.02	98.5
RWJF	$ 8.00	1.5
AHA	NA	-
Total	**$ 527.02**	**100.0**

[1]2004-05 data were used for HSFC as it better reflects the provincial funding amounts.
[2]This includes reports from seven funders: Chagnon Foundation, SSRHC, Alberta Heritage, NCIC, Diabetes Association, CIHI-CPHI, and NSERC.
[3] The amount for 2005-6 for the Chagnon Foundation was $327,000. While this is below the amount set aside annually for obesity research ($800,000), the lower number was used here as it represents actual expenditures in the year of interest.

Obesity-related funding allocated by both INMD and HSFC has increased dramatically in the past five years (6.3 fold increase for INMD from about $3.5M to$22.2M and a 7.7 fold increase for HSFC from about .3M to $2.2M).

In the interviews and, where possible, through a review of the information submitted from the respective funding databases, the type of funding was explored (e.g., personnel/training awards, operating grants, team/NET grant, researcher-community teams), the relative balance of funding via open versus strategic competitions, and the distribution of funding over the four pillars as defined by CIHR – biomedical, clinical, health services/policy and population health. Given the variation in responding (e.g., few used the CIHR categories, and not all could estimate open versus strategic funding allocations), it is not possible to convert the totals in Table 1 into dollar amounts or combined percentages across these various categories. A written synthesis is provided in which the NIMD and the HSFC has been excluded since the focus here is the external environment outside of these two funding bodies.

Type of Award: Almost all the funding agencies offer some support through *personnel awards*, typically graduate student and post-doctoral awards, but also independent investigator awards. Alberta Heritage Foundation for Medical Research focuses almost exclusively on personnel awards. The Chagnon Foundation reported their exclusive emphasis is on grants bringing researchers and the community together, as did the Robert Wood Johnson Foundation (RWJF). Other than Alberta Heritage, Chagnon Foundation and RWJF, the remaining organizations relied heavily on investigator-initiated operating grants. Investigative team grants were used by only three funders – Nova Scotia Health Research Foundation, Alberta Heritage, and Chagnon Foundation - and typically for only a small proportion of funding. CIHI-CPHI reported that they funded only commissioned work, given an agreement not to duplicate the work of CIHR through the funding of operating grants. In sum, a variety of mechanisms were used, and no doubt the mandate of the organization plays a key role is setting the balance across the types of funding awards.

Open versus Strategic Competitions: As above with respect to the type of award/grant, the balance of funding via open versus strategic competitions was highly variable. In some instances virtually all funding was via a strategic competition process - Chagnon Foundation and CIHI-CPHI. At the other end of the spectrum were a few organizations providing funding only through open competitions (AHA, Nova Scotia Health Research Foundation). The majority used a mixed approach, and the percentage via strategic competition was highly variable. In only one instance (RWJF) was the percentage via strategic funding substantively higher than funding via open competition (80% vs 20%).

Respondents were challenged to delineate the percentage of funding specifically for obesity research that was via open versus strategic competitions. It would be fair to say that the strategic funding mechanism was used less for obesity than for funding of research generally. For example, Alberta Heritage, and NCIC reported 5-25% of overall funding by strategic competition, but no funding via this route for obesity research specifically.

The Four Pillars: Participants were asked to report the type of research they fund using the four pillars as adopted by CIHR. They were also asked to do this separately for strategic versus open competitions. It was challenging to summarize the data obtained. For strategic competitions, the two

Canadian organizations relying exclusively on this approach for obesity research (CIHI-CPHI and Chagnon Foundation) reported directing these funds entirely to population health research. For strategic competitions, RWJF reported 90% population health and 10% health services research.

For the data on open competitions the two categories of "basic" and "clinical" research had to be combined for two organizations, these being the Alberta Heritage and the Nova Scotia Health Research Foundation. For open-competition funding, the trend was for percentage allocations to basic/clinical to be over 60% and up to 100% (Diabetes - 69%; AHA - 65%, NSERC - 100%). NIH did not report any funding data but would undoubtedly predominate in the basic and clinical categories as well. Alberta Heritage had the most balanced portfolio at 40% basic/clinical, 10% health services and 50% population health. Funding in the health services research category never went beyond 10% for any organizations. For open competitions, RWJF reported 90% population health and 10% health services research.

Priority Setting

Virtually all organizations reported some form of data gathering to help set priorities. The most commonly employed approaches were group consultation processes such as consensus meetings (3), stakeholder workshops (2), think tanks (1), visioning exercises (1), or just "consultation with key informants" (1). Other approaches cited included environmental scans (3), research syntheses/white papers (2), on-line surveys (1), and internal meetings (1).

Obesity had been declared a priority by five of the participating organizations, including the Chagnon Foundation and CIHI-CPHI (healthy weights) in Canada, and the three participating organizations in the US – NIH (through its Strategic task Force), RWJF and the AHA. The remainder surveyed had not made obesity a particular priority. The Nova Scotia Health Research Foundation was entering a new planning phase and thought obesity may emerge as a priority. Alberta envisaged a potential emphasis on children and youth and the environment as well as a general increase in priority for healthy living/healthy weight. For others, such as the Diabetes Association and NCIC, "prevention" was a priority, and obesity would be considered in that umbrella. In NSERC, obesity was not officially declared a priority but they had recently funded five research teams in the area, and two more were expected to move in that direction.

An important challenge in funding obesity-related research was said to revolve around issues of research capacity, specifically insufficient numbers of trained investigators. Three participants mentioned this, two of whom were from Canadian organizations. One stated "*we need people who can study interventions – insignificant investigators trained in this area making it difficult to do research*". This same person went on to add: "*people need to ban together to get the big things done*". Another mentioned the lack of trained researchers/evaluators.

> *"It's easy to throw money at gaps but need to stand back and make sure there is a critical mass to actually do the research*".

When queried as to innovation in funding that they may be aware of, few had comments to offer. One noted that the Centers for Disease Control and Prevention had recently funded several long-term community grants, as well as a health econometric study to assess contribution of obesity to health care costs. The RWJF was also cited as being innovative for its funding of program development and

evaluation of a project that brought community organizations and schools together with local food growers to increase the supply of fruits and vegetables for children.

Seven respondents offered suggestions as to where obesity research funding should be targeted. Five offered comments along the general theme of "intervention research". This term was sometimes used in a general way whereas, at other times, the respondents added comments such as "*policy and community environmental approaches*". "*Behavioral research*" was mentioned by two people, and more biological research by two people as well – "*gene environment interaction", "pharmacological approaches*".

ii. Feedback from researchers working in obesity

The researcher sample (n=7) was drawn from diverse backgrounds, including epidemiology and population health (3), neurobiology (2), and one who was engaged in both basic and clinical research[7]. One researcher referred to their background as simply "childhood evidence base".

Perceived gaps and capacity issues

Most researchers commented on the type of research not being funded, with the majority citing intervention studies of prevention programs or policy. This was cited by six of the seven people, citing such things as "*community interventions*", "*policy interventions (e.g., schools, food advertising…*) and "*lifestyle interventions that intersect diet and exercise*". Related concerns were the lack of longitudinal studies and the need for more research that would address the determinants of health, in particular, income, urban design and other aspects of the built environment. Three researchers made comments relevant to this theme. Three of the researchers also commented on the need for research on improved treatment interventions, with one person specifically decrying the lack of research on post-surgical management of complications. Additional researchers commented on the need for health systems studies of the impact of obesity on health care costs and another commented that more was needed on the epidemiology of obesity. Finally, one person mentioned the need for research on sub-groups (e.g., urban/rural, ethnic) since "*one size doesn't fit all*".

"Clinical research is starved but population research is starved the most"

Another dominant theme among the researchers was the lack of capacity in terms of trained and experienced scientists and infrastructure. This arose in both the direct question about research capacity, as well as indirectly in the question concerning research gaps. There were several dimensions to the research personnel issue but it tended to take two directions. One was a lack of young investigators coming into the field, citing for example, the lack of training programs, a shortage of training awards, and the lack of a clear career path for clinical researchers in this area. Along these lines one respondent from the university sector recommended that CIHR "*bring back the grants for young researchers 5-8 years after Ph.D.*". Related to this issue of young investigators was the shortage of mentors and the need for more Research Chairs and established investigator awards to attract people from other countries. The

[7] This question re: background was not asked of the two university representatives in the researcher group.

people in these senior positions would then, in turn, attract younger scientists to their teams. Two people also called for more researchers to be engaged from non-traditional areas such as political science, education, geography and urban design.

These two areas (type of research needed and the lack of trained investigators) covered the responses of the researcher group with the exception of three comments concerning gaps in education and knowledge transfer. For example, one person noted the gap between "*basic research, and clinical research getting to the health professional"*. Another commented that: "*if we want funds, we must have knowledge transfer and programs that work"*

Strengths and opportunities

The most salient issue with respect to perceived strengths and opportunities that arose from the research interviews was the excellent reputation of the obesity researchers in Canada. As one person put it "*we have good scientific talent*". The Laval group in particular was acknowledged for its international leadership and excellence in research, as well as other groups at McMaster University, University of Calgary, UBC and the University of Ottawa.

Canadian researchers were also described by two researchers as being strong in collaboration and interdisciplinary work, and one noted further that is was important to acknowledge CIHR, not only for its leadership role in obesity, but for encouraging collaboration. In commenting on the importance of collaboration one respondent noted "*this was a feature of an RFA from INMD but it needs to be sustained*".

Three of the seven researchers also commented on the Canadian Obesity Network as a strength or opportunity upon which to build. They mentioned the potential value to Canada of such a strong cadre of researchers working together (estimated 100), and that it will both "*stimulate and steer obesity research*".

Also among the researchers, three noted that Canada had a diverse population (ethnic mix, urban-rural, class structure), and that this had advantages for population health research. Two researchers also noted the research expertise in health services research in some parts of Canada, and suggested this could be better utilized in the field of obesity. Finally, in terms of opportunities, two researchers acknowledged that there was now an opportunity for broad strategic planning at a national and provincial level that would involve multiple funders, and broader than INMD and HSFC.

Suggestions and priorities for funding

Two themes dominated the suggestions offered by researchers as priorities for specific research topics areas or funding mechanisms.

The major theme focused on prevention intervention research (5 respondents). Sometimes it was expressed in general terms such as "*community-based interventions*" or "*we take the vending machines out of schools but does it have an impact*?". Alternatively, they sometimes phrased this around the need to evaluate with a determinants perspective, for example, "*societal and social determinants of obesity*" and "*need a significant body of research about psychology and social determinants of obesity and how these can be overcome. Not just metabolic*." To these comments on prevention research,

should be added an important sub-theme about the call for more policy research (2 respondents) and, from one person, the need for multidisciplinary long term studies.

The second common idea shared by researchers was the need for research on treatment interventions for weight loss (three respondents). This was variously described as "*interventions to reduce incidence of chronic disease in those who are overweight*", "*weight eminence and weight reduction of cardiac patients with or without diabetes*", "*medication and drugs, management*", and the need to treat obesity "*within a chronic disease model*".

A wide range of specific suggestions for research topics was also offered by one or two respondents. These included:

- child health or child obesity (2);
- studying obesity along the life course (1);
- assessing stigma and societal perceptions and bias (1);
- health services research (1);
- how to assess obesity, how to define it, using menopausal women as the example (1); and,
- gene-environment interactions (building upon strengths in that area) (1).

Lastly, there were a few ideas expressed about priorities for how research should be funded. This included:

- funding new investigator-driven ideas to human research and human trials (1);
- identifying obesity research "*as a national canvas*" to pin other strategies onto – "*now masked but needs its own profile*" (2);
- need to work on all four pillars (1); and,
- create research opportunities to train people, have team grants and establish Chairs of obesity research (1).

Suggestions for support from CIHR versus HSFC

Both researchers and policymakers were asked to comment on special research topics or funding mechanisms that may be more appropriately led and funded by HSFC versus CIHR. The predominant idea emerging for the researchers was for both organizations to partner together and with others, such as NGOs (Diabetes, Arthritis) (four respondents). One person commented: " *should do joint projects to increase scope of funding*".

> *"Working together is better than working in two separate streams"*.

No other theme could be identified in the researcher responses to the question about CIHR and HSFC. Several other ideas were, however, advanced by one or two respondents:

- HSFC should focus more on treatment (2), especially among those with chronic disease and hypertension; CIHR should do more prevention and treatment in the general population (1);
- CIHR should do more basic science research (1);
- HSFC has more barriers in its structures. Can't work across the provinces without applying for funding from each jurisdiction and the $200K funding cap was seen as a sign that large studies were not wanted (1); and,

- CIHR is better positioned to lead a national initiative (1).

iii. Feedback from policymakers working in obesity

Members of the policymaker group (n=10) all reported being engaged in policy-making and/or knowledge exchange in some capacity. Two had direct experience in research on obesity. Three members of this group reported being currently in a position to commission obesity-related work, and the nature of this work was research synthesis or analysis of existing data rather than new research. Seven of the 10 policy makers reported being "somewhat familiar" with Canadian research on obesity, and three were "very familiar". They felt about the same with respect to obesity research findings emanating from outside the country.

Perceived gaps and capacity issues

As with the researcher group, the major thematic area revolved around the type of research that was not being supported or implemented, and most notably, intervention studies of prevention programs or policy. Seven policy makers cited this gap. More than one person couched this in terms of the need for more comprehensive studies: "*we must have comprehensive well- done studies that provide evidence of the need to change systems and reallocate resources*". Additional, related concerns were the number of small-scale studies that don't include long-term follow-up, and which fail to address the complexity of the context in which the interventions were being implemented.

"B*e strategic and do something substantial*"

Three policy makers also commented on the need for more natural experiments, which would build upon surveillance data, although the data systems were also said to need improvement to be used in this manner. Another sub-theme in terms of the type of research was the need for more research that would address the determinants of health, for example, initiatives that "*cross boundaries*", test "*integrated solutions*", look at "*urban design*" or involve "*programs re: multiple determinants of health*". Five policy makers made comments relevant to this theme. One policy maker also commented on the need for research on improved treatment interventions and three of the policymakers cited the need for more work in specific settings (schools and the workplace), or specific sub-populations (Aboriginal people (especially among women), children, new immigrants to Canada).

The second dominant theme among policy makers was the lack of coordination, although this was expressed in different ways. Two commented on the poor coordination amongst current funders of obesity research. Two others also referred to the lack of integration of those currently funding obesity research with other sectors of research funding in order to truly expand the multi-disciplinary talent. One policy maker noted an over-reliance on investigator-initiated awards, and two others called for funders to be pooling resources.

In terms of research capacity, it was said that Canada has pockets of excellence but that "*depth is not great*", and that the concerted effort to fund obesity research in Canada was not yet long enough to build such depth. The issues around research personnel were also nuanced by comments concerning lack of experience in certain areas (e.g., Aboriginal health, research synthesis at the population level, and those experienced in knowledge translation).

"R*esearchers are networked but how well are they networked with us*"

Knowledge exchange was noted as a gap by a small number of policy makers. One person connected the issue to the scope of research being funded and transferability of findings: "*There are too many demonstration projects where we put in bits of money to learn something and then transfer it somewhere else where they do not have the same resources and expect it to work*"

Strengths and opportunities

The predominant theme among those participants in a policymaking role was the key organizations and structures that are supporting obesity-related work in Canada. The following organizations were cited: CIHR and/or INMD (five respondents); CDPAC (three respondents), HSFC (two respondents); and CIHI (two respondents). INMD in particular was lauded for its emphasis on obesity. Several other supportive organizations were also noted by individual respondents (e.g., Obesity Canada, CIHR Institute on Aboriginal Health).

"*INMD identified obesity as a primary interest – this is a huge advantage for Canada*"

Another noteworthy theme was the disposition among Canadians for collaboration and inter-sectoral work. This was exemplified by the Think Tank sponsored by HSFC, CDPAC and others, which brought together urban designers and those working in health. Key organizations (e.g., NCIC, HSFC, CCS and the CIHR) were said to be "getting it", that is, that they needed to work differently, and more collaboratively. The comparatively small size of Canada, and the small number of researchers in the obesity area, was also seen as an advantage for working together. A related theme mentioned by two people was the history in Canada of working on the determinants of health, and the understanding of the complexity of the problem and required solutions.

As noted by the researchers themselves, the excellent quality of Canadian researchers was acknowledged by two of the policymakers, in particular those working in the biomedical area and in Quebec. The epidemiological work in Canada was said to be strong by another person. However, it was also noted that while Canada has a critical mass, the weakness was in community interventions, policy development and knowledge exchange. Along the same lines it was noted by one person that Canada had lots of people working in health policy, economics, tobacco control and chronic disease prevention and they could perhaps be enticed to work in the obesity area.

Another theme supported by comments from three policy makers was that obesity seemed to now be on the radar screen of the general public (via the media), as well as policy makers and politicians. Obesity was said to be: "*on the agenda of decision makers*". Two also mentioned the many opportunities in Canada for natural experiments but only if good surveillance data were available.

Suggestions and priorities for funding

As with the researcher group, the major theme was to support prevention intervention research (7 respondents), sometimes expressed in general terms but often with additional descriptors such as: "*intervention research – have done the descriptive well*" "*long-term and comprehensive research*"; "*intersectoral and multi-disciplinary*", "*comprehensive, determinants-based"* and "*in the Aboriginal community"*. Further, as with the researcher group, there was also a call for more policy research. To this one should add an important sub-theme about the call for more policy research (5 respondents), again sometimes described in general terms, as well as qualified as being about "*engineered environments"*, or "*setting-based research*" (e.g., schools, workplace),".

Also, similar to the researchers, two participants called for research on treatment interventions for weight loss. This was described further as "*pharmacological (as in smoking)*" or the need to establish the "*clinical effectiveness of weight management and treatment programs"*.

Two respondents also offered suggestions for improved research and research funding (and included several specific suggestions, including the need for "more "*international collaboration*", and "*enhanced skill sets such as epidemiology*".

A wide range of specific suggestions were also offered by one or two respondents. This included:

- knowledge translation (2)
- preventing childhood obesity (1)
- looking at obesity through disparities lens (1)
- assessing stigma and societal perceptions and bias (1)
- assessing and defining obesity (1)
- gene-environment interactions (building upon strengths in that area) (1)
- capacity development for networks, data systems and assessing natural experiments (1).

Suggestions for support from CIHR versus HSFC

As with the researcher group, three of the 10 policy makers replied to this question by suggesting that the ideal situation is for the CIHR and HSFC to work together. One of these people saw this happening now. Another replied: "*most important to work together as it's a bigger fund*".

Another idea emerging across these respondents was that the HSFC was in a better position to fund certain kinds of work and to be more "*flexible*" or "*nimble*". For example, two respondents thought it was able "*to move money faster*" and one considered it in a better position to fund smaller scale pilot projects involving the community. The same person commenting on the ability of HSFC to fund smaller scale pilot projects mentioned that "*once you have the data apply to CIHR (to do the hard science*".

Two respondents also thought the HSFC should focus more on treatment, especially among those with chronic disease and hypertension. One person mentioned that, in contrast, CIHR should do more prevention and treatment in the general population (1).

Finally, two respondents felt that HSFC was better positioned to fund advocacy research or to themselves do the advocacy role.

Challenges related to knowledge exchange

Policy makers were also asked about barriers that exist to the advancement of knowledge and application of new knowledge in the obesity area. No one theme predominated in the feedback to this question. In order to help organize this material, the many points have been clustered into three sections: societal challenges, research related challenges and policy/practice related challenges. Beside each point, we identify the number of respondents making a comment in this area.

Societal challenges included:

- stigma associated with obesity; bias that it's "only" a personal lifestyle problem (2);
- attitudes among health care workers; need to start knowledge exchange with health care workers (2);
- free market economy for toxic food; competing interests, especially between powerful business and economic interests and those advocating health promotion (2); and,
- the "Fit versus Fat" debate – what balance are we trying to achieve? (1).

Research-related challenges included:

- not enough evidence – need more work on determinants and longer term studies (5);
- research funding not set up to support natural experiments and strong program evaluations (3);
- not enough resources to allow researchers to do uptake and application (1);
- look to the Tobacco Control Initiative – pool the money and connect control of it to stakeholder groups (1);
- narrow scientific paradigm – RCT inappropriate for the kind of work that is needed (1);
- need behavioual scientists on board to address obesity (1);
- granting agencies and universities do not reward people for applied research or team research (1);
- not enough researchers to take advantage of funding opportunities (1);
- researchers too competitive and disconnected (1);
- need for more international exchange experiences for graduate students – start them off in a different space (1); and,
- need to evaluate research itself (1).

Policy/practice-related challenges included:

- need buy in from government. Government must show leadership and society must take responsibility (e.g., pop in the schools) (2);
- lack of inter-sectoral cooperation (2);
- make information more user-friendly for the end user (1); and,
- Clearinghouse of information would be good (1).

Specific suggestions for improving funding for obesity research

As the interview with policy makers drew to a close, the question was posed as to what suggestions they might offer to improve funding of obesity in Canada. Several prompts were provided such as more funding, longer grants, pilot grants, infrastructure and more salary support.

A consistent theme that arose was the perceived need for more partnerships and collaboration (five respondents). In this regard, some mentioned the need for partnerships with the food industry (2), pharmaceutical companies (1), other parts of CIHR (1), government generally (1), and NGOs generally (1). Two people also called for reaching out to non-traditional partners such as city planners.

Aside from this partnership issue, a variety of specific suggestions were made for the type of research, the most common being for longer-term grants and/or longer term interventions (five respondents).

Other individual suggestions included:

- grants that can be applied to faster so funds can be put to natural experiments;
- the need to get away from investigator-led projects in order to "*build a research system*";
- the need for demonstration projects;
- the need for comprehensive approaches to demonstrate efficacy; and, the use of data that exist such as on maternal and child health and in the Canadian Nutrition Program.

5.0 Discussion and Conclusions

There are several consistent themes running through the data from the various groups interviewed, the information gleaned from the grey and published literature and the funding data for obesity research. We have separated the themes of particular relevance to obesity research in Canada, and then conclude with some additional issues and implications that may be more germane to INMD and HSFC at this point in time.

(a) Specific issues and implications for obesity-related research in Canada

Obesity is a population health problem and the epidemiological data convey a strong sense of urgency and alarm

Combining the adult obesity rate (23.1%) and the overweight rate (36%), it is apparent that almost 60% of the Canadian adult population is in a weight range associated with poor health outcomes. The links between obesity and many health risks are irrefutable, and disturbing in their reach and cost to the health care system. Coupled with the research findings that those who are overweight are most likely to continue gaining weight, it is clear that the size of the problem is likely to keep growing at a population level. Thus, the epidemiological data on adults lend a certain degree of urgency to the need for a strong Canadian research effort coupled with evidence-based practice and policy.

Children and adolescents must be priorities

In addition to the data on Canadian adults, a further 34% of children and adolescents are outside their normal weight range. Since the likelihood of losing weight diminishes with increasing age, the younger years are clearly the most important from a prevention perspective. Children and adolescents must be a research priority based on the epidemiological data alone. The Robert Wood Johnson Foundation in the US has invested heavily in obesity research on children, after declaring this an organizational priority and working diligently towards this goal with their strategic funding competitions. In Canada, the Chagnon Foundation devotes all its work toward children and their parents, including their annual obesity commitments distributed by strategic competitions. The INMD

targeted childhood obesity in a strategic call for proposals in 2005-6. The Alberta Heritage Foundation for Medical Research, which also relies heavily on the targeted funding strategy, reported that a focus on children, youth and the environment might emerge as a priority in the near future, although this would not be for obesity research specifically. This focus on children and youth among a small group of funders of obesity-related research is well placed. However, more targeted support to this important sub-population is likely needed as children and youth were the most consistently identified sub-populations mentioned by the Key Informants and in the documents reviewed.

Aboriginal people and other marginalized sub-groups

In addition to children and adolescents, Canada's Aboriginal people were highlighted as another sub-population with high needs with respect to obesity and requiring additional research investment. This also applied to people of low income or who were otherwise marginalized from society.

There is not enough research funding and what's available isn't being well spent

Key Informants reported that (a) there is inadequate research funding; and (b) what funding we do have available at a national level is not being targeted in such a way as to yield the kind of information needed to change policy and practice in a confident way. Key informants pointed to both the process of funding obesity research (e.g., not enough strategic versus open research competitions; not enough personnel awards to free up time of the best researchers to work in this area), and the content or topic area of what was being funded (e.g., the need for more longitudinal studies; and insufficient investment in population health, health services research and evaluation studies of "on the ground" practice and policy implementation).

Understanding neurobiological and genetic mechanisms remains a key research goal and Canada has a strong international reputation in this realm

Many branches of biomedical research have an essential place in the field of obesity. In general, the Key Informants, many of whom were themselves experienced in biomedical research, felt this domain was reasonably well covered in Canada. For example, funding available through traditional sources such as the CIHR, HSFC, and funders such as NSERC is supplemented with support from drug companies. One person interviewed referred to the biological realm as "*plodding along*". In many respects, this phrase provides appropriate imagery of the slow but steady progress being made in our understanding of the many complex mechanisms that place someone at risk of being overweight or obese, and of the wide array of associated health consequences. Canadian researchers are held in high regard among the international obesity research community largely on the basis of the contributions in the neurobiological realm. Excellence is evidenced, for example, in the number of Research Chairs in obesity that are held in Canada, the high level of scientific output from the biological pillar and the many pockets of research excellence (e.g., Laval University, McMaster University, McGill, University of Montreal, University of Ottawa, University of Toronto, University of Calgary and University of Alberta).

Balancing the Canadian investment across the pillars

It is incumbent on Canadian researchers to place their research questions in the context of the international knowledge, whether this is the biomedical knowledge base, or best and better practices for prevention and treatment. However, the global research effort makes it clear that obesity is highly culture bound and that prevention and treatment solutions will, to at least some degree, need to be tailored to the Canadian context of our prevention and health care "systems", as well as our unique

sub-populations. The importance of regional and local context in understanding both the effectiveness and critical ingredients of population health programs is widely underestimated and understudied. Tailoring solutions to the Canadian context will require the assessment of prevention and treatment interventions in Canada, probably funded with Canadian research dollars. In contrast, new knowledge in the area of genetic and neurobiological mechanisms is more "culture-free". This would suggest the need for a prudent and balanced investment of Canadian research dollars across all four pillars, while maintaining our strengths in basic and clinical research.

The research investment must also be balanced across the spectrum of risk and severity

The epidemiological data on obesity in Canada suggest that, while effective upstream (preventive) approaches are needed to reverse the worrisome growth patterns at a population level, there is currently a significant number of adults and children/adolescents who require assistance today with the treatment and ongoing management of being overweight or obese. Thus, the Canadian research effort should be targeted at goals for prevention as well as for treatment and for health services and systems. Although challenging to sort out on the basis of the funding data made available to the project team, the conclusion is drawn that there is comparatively low investment in research in Canada that is focused on the treatment of extreme obesity (e.g., pharmacological and surgical interventions). This is despite solid research evidence pointing to evidence-based practices, and the many unanswered questions for the management of obesity in the context of a chronic disease management model. This seems to contrast sharply with the balance of funding, and overall interest in, the treatment and management of obesity in the US. Key Informants involved in clinical work, as well as some of those more interested in population health, acknowledged the need for more work in this area. Stigma associated with extreme obesity was considered as a potential factor underlying the low support in this area, and more research is needed on the attitudes of the general public as well as health care providers toward obesity. Such research plays a key role in other areas such as mental illness, AIDS/HIV, smoking and alcohol/drug abuse but seems to be lacking in this field.

The major players in the field are "on the same page" with respect to the value of the ecological model for prevention

There is widespread endorsement of both the *complex nature of obesity* and its causative factors, as well as the need for population-based interventions to be grounded firmly in an *ecological approach*. This was evident among the decision-makers and funders, and also among the researchers interviewed, regardless of the research pillar in which they specialized. The peer-reviewed literature also supports a broad ecological framework and evidence abounds on the failure of older models of health education to lead to sustainable impacts on physical activity, healthy eating and, therefore, healthy weight. The ecological intervention model, however, poses significant challenges for researchers (e.g., how to manage the complexity of the many interacting "layers" of the explanatory models and how to apply analytic paradigms capable of teasing out the effectiveness of critical ingredients amid the complexity). The ecological model also poses challenges for research funders. These challenges include lack of support for "correlational research" as opposed to RCTs in a peer-review process, and the trade-offs in distributing research dollars to a number of small scale studies versus funding larger scale, longitudinal studies.

One step forward would be to work towards a common ecological model for Canadian research on obesity and which could serve as an integrative and communication tool among researchers and with policy makers. It would be important in developing such a framework that it be created and adopted

through an inclusive process with the major funders. It should also engage policy-makers and practitioners in the process and enlist their support in using it for designing and implementing treatment and prevention activities and policies. This would go some measure in facilitating the integration of research evidence in policy and practice.

The call for partnership and pooled resources

Another important theme related to the above points is the need, not only for a partnership model among research funders, but also across researchers and those engaged in policy-making and practice. While there was high interest for undertaking more comprehensive, multi-level, long-term studies here in Canada it was acknowledged that it would likely be necessary to pool resources across funders, and probably community partners, to make this happen.

Communication between researchers and decision-makers is critical and needs to be supported and nurtured

The importance of the *knowledge exchange* process between researchers and decision-makers cut across the vast large majority of documents examined and Key Informants interviewed. The knowledge exchange process itself must be considered an object of fundable research so it can be improved based on documented experience. In addition, some funders are supporting so-called "*policy–research placements*" or "*relationship grants*" in order to help bridge the two communities of researchers and decision-makers. There are many organizations and structures in Canada to support evidence-based practice and policy development (e.g., the Pan-Canadian Healthy Living Strategy, the Chronic Disease Prevention Alliance of Canada, Canadian Population Health Initiative, the Best Practice Observatory of the Public Health Agency of Canada). The emergence of the Canadian Obesity Network will also provide a mechanism to connect research and communities of practice specializing in obesity. Precedence for this appears to have been established in an effective way in the US through NASSO, The Obesity Society.

There is high need for collaboration and inter-disciplinary work

There was also widespread agreement on the need for *inter-disciplinary* work, as well as strong inter-sectoral *collaborations* at all levels. Several Key Informants noted that the ability of Canadians to collaborate is an important strength of an emerging system for chronic disease prevention in this country. CDPAC, for example, is not only founded on the principles of "*collaborative leadership*" but has also been very active in promoting a national "*research system*" for chronic disease prevention. Key Informants lauded the initiative of the NIMD in stepping up to the plate to take a strong leadership role in obesity research in Canada, and in partnership with several other organizations. However, the results of the environmental scan leave open the question as to the strength of partnerships and joint planning across the 13 arms of the Canadian Institutes of Health Research. The lack of synergy between the Institutes in the area of obesity arose in both our interview data and the document review, and stands in marked contrast to a strong collaborative effort targeted at obesity across the National Institutes of Health in the US.

Canadian obesity research capacity is not optimal

Although the number of researchers working on obesity-related topics has grown substantially in Canada in the past decade, the field is still considered to be under-supplied in key areas. This was said to be particularly evident in prevention and treatment intervention research as opposed to the

biomedical area. With respect to prevention, the research capacity issue was also closely connected to challenges faced by young investigators needing more training in the methods that will move this field forward in concert with an ecological framework (e.g., mixed methods, ecological research, natural experiments, program evaluation). In the treatment arena, the careers of young clinician-researchers was said to be limited by the lack of a "home" for obesity in the health care setting, and the corresponding need for young investigators to align with a discipline such as endocrinology, cardiology or nephrology in order to advance one's career. In moving forward with obesity research in Canada it will be important to build upon the strengths we have in the neurobiological areas.

Outreach to the "non-health" community is needed to support the obesity research agenda

The document analysis as well as the Key Informant interviews highlighted the need for research and evaluation of policy and program interventions in both the health and "non-health" sectors, with an emphasis on environmental and policy interventions at the population level. In the Key Informant interviews, this theme was coupled with the research capacity issue and the need to reach out to researchers working in "non-health" areas to engage them in the obesity research agenda. This would include, for example, researchers working in urban design, housing, transportation, early childhood education, social welfare, community development, political science, marketing and macro-economics.

Achieving a better marriage between surveillance data and research questions of broad interest

A consistent theme in the documents that were reviewed was the need to improve Canada's surveillance systems to better track key risk factors and outcomes associated with obesity or being overweight. High quality surveillance systems were seen as key to taking advantage of naturalistic opportunities to study health outcomes. There was also a call for expanding the scope of traditional surveillance data to non-health areas (e.g., driving time, car ownership, recreation patterns, macro-level trends in the food industry) and, again, this is consistent with the theme of closer engagement with these non-health sectors generally, and an ecological prevention model.

The need for more program evaluation and a broader view of quality research generally

A strong theme emerged for more investment of research dollars in the evaluation of programs and policies as they are implemented in the field. Both researchers and policymakers alike noted that many opportunities are lost where we might have learned valuable lessons about "what works". Further, the need was expressed for the development of a common outcome measurement system for field evaluations of programs and policies so that results can be compared. Development of such a system would benefit from a collaborative approach with other major stakeholders such as CIHI-CPHI, who are clearly interested in championing work in this area.

Another important point expressed several times was the limitations of the randomized controlled trial (RCT) research design, and the need for other research approaches for some situations. Field evaluation does not lend itself easily to randomized control trials, nor is the RCT the only kind of research that can contribute to evidence-based practice and policy. Most importantly, however, participants relayed their opinion that RCT's are not the kind of research design that will be helpful in assessing the effectiveness of multi-level, integrated interventions in complex and interactive environments. Participatory action research was seen as needing more support.

The need for more economic evaluation and cost data

The document analysis and Key Informant interviews were also consistent in expressing the need for improved evaluation tools and more rigorous economic evaluation. Examples were cited such as the need for research into such topics as the burden of illness associated with overweight and obesity, cost and cost-effectiveness of interventions, and the impact of economic incentives for diet and physical activity. While one Key Informant cautioned against giving too much credence to economic arguments, the opinion was widely voiced that economic data "gets the attention" of policy makers and health care administrators. Such data were thought to be largely under-developed in Canada.

(b) Specific issues and implications for the INMD and the HSFC

Consider joint strategic planning

A joint strategic plan developed by the INMD and the HSFC could build upon the results of this environment scan in terms of *core principles*, *funding processes* and *priority topic areas.*

Core principles might include making a commitment to partnering with additional funders, placing a premium on multidisciplinary work and knowledge exchange, and declaring a strong commitment to build Canadian research capacity in obesity.

Suggestions for funding processes would include:

- identifying mechanisms for pooled funding, as well as a review of any current policies that enforce budget caps and which may be limiting progress in both treatment and prevention research by encouraging research output (e.g., the number of studies funded) as opposed to outcome (i.e., usable knowledge for policy and practice);
- strategic funding targeted at children/adolescents, Aboriginal people and people with low income and/or otherwise marginalized from Canadian society;
- creation of a "flexibility fund" administered by the appropriate partner and with strategic targets and criteria for supporting evaluation projects, natural experiments, participatory action research, and surveillance-based research studies;
- a more balanced approach to open and strategic funding, with the strategic funding approach applied initially for population health, health systems and clinical intervention research;
- development of shared targets for the percentage of their combined funding, and for each partner individually, for each of the four pillars;
- a separate target for clinical intervention research, as opposed to clinical research on neurobiological mechanisms which may have eventual clinical application;
- a review of the composition of review committees and the nature of review criteria to ensure the appropriate assessment of non-RCT intervention studies that takes into account the complexity of the intervention and its community/cultural context, as well as the potential gain for policy and practice with the proposed methodology;
- an increase in the proportion of funding allocated for personnel awards at all levels – young scientists beginning their career, those at the 5-8 year career mark and Senior Scientists, including an increase in Research Chairs in Obesity across the country;
- mechanisms to support knowledge exchange opportunities for researchers (e.g., "research-policy placements"), strategic partnerships and support for Canadian Obesity network as a potential knowledge exchange mechanism;

- a shared monitoring system for tracking expenditures, as well as research outputs, using an agreed upon system for classifying obesity research that is more detailed than provided for by the "four pillars" approach;
- a strategy for attracting researchers and expertise from established Canadian health services researchers, including those with expertise in health economics;
- mechanisms to provide support to international training and educational opportunities for young investigators; and,
- a strategy for attracting researchers from outside traditional health research.

Some suggestions for priority topic areas would include:

- more long-term, comprehensive prevention studies and, within that domain, an emphasis on horizontal integration strategies as well as non-integrated solutions with promise of quick wins;
- policy research, especially that focus on environmental problems and solutions;
- cost and economic studies that address societal and health care costs related to obesity;
- treatment research especially interventions embedded in a chronic disease model, including surgical and pharmacological options with an additional focus on post-intervention care, complications and follow up;
- attitudes and practices of health professionals in the management of obesity;
- research on co-morbidities associated with obesity; and,
- research on the gene-environment interaction.

Consider leading a National Plan for Obesity Research

The INMD and the HSFC may also wish to consider taking a collaborative leadership role in the development of a national plan for obesity research. This might include, for example, engagement of the other CIHR Institutes, other NGO's such as Canadian Diabetes Association, and key multi-sectoral groups such as CDPAC. The Canadian Obesity Network could be engaged as a large and potentially quite important network of both Canadian researchers and practitioners.

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7.0 Appendices

Appendix A
List of Acronyms

AHA	American Heart Association	**IPPH**	Institute for Population and Public Health
ASA	American Stroke Association	**LAGB**	Laproscopic Adjustable Gastric Banding
BMI	Body Mass Index	**NGO**	Non-Government Organization
CBRPE	Centre for Behavioural Research and Program Evaluation	**NCIC**	National Cancer Institute of Canada
CDPAC	Chronic Disease Prevention Alliance of Canada	**NIH**	National Institutes of Health
CIHI	Canadian Institute for Health Information	**NSERC**	Natural Sciences and Engineering Research Council of Canada
CIHR	Canadian Institutes for Health Research	**PHAC**	Public Health Agency of Canada
CON-ROC	Canadian Obesity Network – Reseau Canadien en Obesite	**RCT**	Randomized Control Trial
CPHA	Canadian Public Health Association	**RSWG**	Research and Surveillance Working Group
HSFC	Heart and Stroke Foundation of Canada	**RWJF**	Robert Wood Johnson Foundation
INMD	Institute for Nutrition, Metabolism and Diabetes	**WHO**	World Health Organization

Appendix B

Birdsell Framework for Funding Strategies

The following section describes the range of most common strategies employed by funding organizations. These of course are not mutually exclusive i.e. a particular funding program may employ more than one strategy. For example, a request for application inviting applications for New Emerging Teams addressing palliative care uses two strategies: a strategic focus (palliative care) with a focus on teams and groups. These strategies are grouped according to which part of the research enterprise is primarily addressed (inputs, processes, outputs).

Input Orientation

Inputs are those things put into a system which are expected to contribute to the accomplishment of the ultimate outcomes desired. Financial resources are of course the fundamental input, wed in a variety of ways to support direct costs, personnel, infrastructure and indirect and administrative costs.

Personnel Capacity Development. In general, approaches often focus on the two extremes of the personnel career path – **early and senior**, ensuring there is a good critical mass of young people entering the research enterprise and also that there are adequate mentors and leaders in senior research categories. Some organizations specifically set out to support personnel programs, which enable support of successful individuals through their entire career. The Alberta Heritage Foundation for Medical Research (AHFMR) (#1) and the Michael Smith Foundation for Health Research (MSFHR) (#27) have adopted this as their primary core strategy. A specific substrategy under this category is that of identifying and supporting 'star performers' in the research enterprise, recognizing that they are essential in creating nurturing environments to attract more junior investigators. The Canada Research Chairs program is one example of a funding program to adopt this strategy (www.chairs.gc.ca). The Medical Research Council (MRC) (UK) has historically taken this approach by creating Research Units centered around one of their 'stars' at universities (www.mrc.ac.uk).

Receptor Capacity Development. As the research enterprise increasingly includes research transfer, uptake and impact as part of its purview, some organizations put focus on **enhancing the ability of users to make effective use of research results**. This has been a strategic focus of the AHFMR in recent years, and is a stated direction in Saskatchewan (#15), and is implicit in the work of the Canadian Health Services Research Foundation (CHSRF) which requires partners from the 'users' community for its projects. The province of Ontario has committed significant resources (about $25 million per year) in the cancer field to creating the Ontario Cancer Research Network (OCRN) that focuses on translational research – taking promising ideas from the laboratory, developing them into new treatment approaches, and then testing the new approaches to see how well they work. This network has economic development objectives as well, and ultimately aims to be financially self-sustaining (www.ocrn.on.ca) .

Infrastructure Support. Access to certain **facilities and tools** are essential to support a healthy research enterprise. Research space, equipment, databases (e.g., disease surveillance statistics, hospital utilization data, human genome sequences), shared facilities (e.g., tissue banks) are all essential to

research process, but do not in and of themselves, produce research. The Canada Foundation for Innovation (CFI) was created specifically to address this need.

Process Orientation

Processes describe the varied activities in which the inputs described above are involved.

Curiosity Driven Projects. This type of project represents the standard and most commonly used approach to funding research. It is typified by an investigator (and often now, multiple investigators) proposing **research in an area that is inherently of interest to them**. Their own interests and expertise are the primary driver of the direction that research takes. Curiosity driven projects should be differentiated from 'investigator initiated' projects, which reflect initiative of one or more investigators. All curiosity driven projects are investigator initiated. However, investigator initiated projects can also be in response to strategic initiatives of funding agencies; in this case, the approach and topic of the research is influenced at least partially by the directions designated for funding by a funding agency.

Strategic Focus (Enabling or content). Funding organizations identify areas of specific interest and often **allocate specific funds** to these areas. Strategic foci can include either topics (e.g., palliative care, vascular health and dementia) or mechanisms that are deemed valuable in shaping the research done. For example, New Emerging Team (NET) grants are meant to promote the formation of new research teams or the growth of small existing teams. Interdisciplinary Capacity Enhancement (ICE) grants are intended to provide support for new or existing groups conducting multi-disciplinary research. There have been a variety of this type of strategic funding streams since the creation of CIHR.

Focus on Teams and Groups. This is really a subset of the item above, but reflects the perceived importance of providing incentives for researchers to **work together across boundaries**; disciplinary boundaries, geographic boundaries, and with other sectors, presumably to be responsive to the increasing complexity of research questions and the desire to accelerate progress.

Contract Research. This mechanism allows a funder to specify within a very focused topic the research that they would like done. This mechanism is useful if the funder needs very **specific research to support their organizational priorities**, so they specify many parameters in such a way that the proposals will fulfill their needs. This mechanism is used by the National Institutes of Health (NIH) (US) (not clear if used significantly or not) but is not used very often by research funding agencies in Canada. It is however, used by organizations such as Health Canada, although this type of research was not considered in the overview of federal funding noted earlier.

Output Orientation

Although not a major focus of funding strategies, linking research endeavors with outcomes other than new knowledge is increasingly common. Outcomes are often described as being related to health, health systems or societal (and often in this case, benefits are described as economic in nature).

Health Outcomes. Many projects implicitly link in some way to health outcomes, or the intention is to contribute in some tangible way to health outcomes. Clinical trials directly focus on health outcomes, for example. A prominent Canadian project focusing on outcomes is the Canadian Cardiovascular Outcomes Research Team (CCORT) whose focus is to measure and improve the

quality of cardiac care in Canada (www.ccort.ca). This is a project that was funded under the MRC / CIHR transition programs. It is an Interdisciplinary Health Research Team (IHRT) and is partially funded by HSFC through the Research Fund.

Health System Outcomes. Some research aims to influence health system outcomes. An example of this in the cardiovascular area is the Cardiovascular Health and Services in Ontario done in 1999 by the Institute for Clinical Evaluative Sciences (ICES). This institute is a nonprofit organization whose core business is to conduct research that contributes to the **effectiveness, quality, equity and efficiency of health care and health services** in Ontario[8].

Societal Outcomes. The Network of Centres of Excellence Program (under which the Stroke Network is funded) was established 15 years ago. It is designed as an investment in research and entrepreneurial talent that generates economic and social benefits for Canadians. Although research is the mechanism through which these benefits are pursued, the success of the networks is measured on outcomes that cross sectors and go beyond research. Outcomes of interest in addition to excellent research are bringing ideas to market more quickly; training highly qualified people for the knowledge economy, and attracting investment from Canadian companies and organizations and international partners (www.nce.gc.ca).

[8] http://www.ices.on.ca/webpage.cfm?site_id=1&org_id=67&morg_id=0&gsec_id=0&item_id=1390&type=atlas .

Appendix C

List of Key Informants

Policy Makers	Funding Organizations	Researchers
John Millar BC Provincial Health Services Authority	Krista Connell Chief Executive Officer Nova Scotia Health Research Foundation	Dr. Arya Sharma McMaster University Department of Medicine Hamilton General Hospital
Mary Bush Director General Office of Nutrition Policy and Promotion Health Canada	Dr. Jacques Magnan Director Grants and Awards Alberta Heritage Foundation for Medical Research	Dr. Peter Katzmarzyk School of Physical, Health Education Department of Community Health and Epidemiology Queens University
Dr Gregory Taylor Director General Director General's Office Public Health Agency of Canada	Lisa Sullivan Manager, Research and Policy Analysis Canadian Institute on Health Information Canadian Population Health Initiative	Dr. Denis Richard (D.B. Brown Research Chair in Obesity) Université Laval Laval Hospital Research Centre Anatomy and Physiology Department Faculty of Medicine
Dr Claude Rocan Director General Centre for Healthy Human Development Public Health Agency of Canada	Serge Villemure Director, Research Grants and Scholarships Directorate NSERC (Natural Sciences and Engineering Research Council of Canada)	Dr. Salim Yusuf McMaster University Hamilton General Hospital Hamilton Health Science Corporation
Elizabeth Gyorfi-Dyke Director Canadian Population Health Initiative	Dr. James Marks Senior Vice President and Director of the Health Group Robert Wood Johnson Foundation	Dr. Bruce Reeder University of Saskatchewan Department of Community Health Epidemiology
Dr. Mark Tremblay Senior Scientific Advisor on Health Measurement Statistics Canada	Dr Stuart Edmonds Assistant Director Research Programs Canadian Cancer Society-NCIC (National Cancer Institute of Canada)	Dr. C. Summerbell School of Health and Social Care University of Teesside, UK
Eleanor Wilson Chief Executive Officer Canadian Public Health	Paula Dworatzek Senior Manager Strategic Communications Media Relations	Dr. David Jenkins Dept of Nutritional Sciences University of Toronto

Association	Canadian Diabetes Association	
Dr. Roy Cameron Centre for Behavioural Research and Program Evaluation University of Waterloo	Dr. Rose Marie Robertson Chief Science Officer American Heart Association	Dr. Denis Prud'Homme Dean, Faculty of Health Sciences and Associate Professor at School of Human Kinetics University of Ottawa
Katherine Stewart Director General, Health Canada Dr Jocelynn Cook Senior Policy Analyst Health Canada First Nations and Inuit Branch	Dr. Roch Bernier Executive Director Fondation Lucie et André Chagnon (Chagnon Foundation)	Dr. Jack Jhamandas University of Alberta Associate Dean Research in the Faculty of Medicine
Millicent Toombs Senior Project Manager, Office for Public Health Canadian Medical Association	Dr Lisa Gansheroff Office of Scientific Program and Policy Analysis National Institutes of Health (NIH) Institute of Diabetes and Digestive and Kidney Diseases Organizational Co-Chair of the NIH Obesity Task Force	
	Provided funding information only: Carole Ann Murphy Director, Research and Dissemination Grants Social Sciences and Humanities Research Council (SSHRC)	

Appendix D

Interview Guides

The following is a sample of the cover page to the interview guide providing background to the project. It was sent to each prospective participant prior to the interview and also reviewed with each participant before the interview began. This cover page was adapted slightly for each group.

Background:
Thank you for agreeing to be interviewed for this important environmental scan on obesity research in Canada.

As explained previously the Heart and Stroke Foundation of Canada (HSFC) and the Institute of Nutrition, Metabolism and Diabetes (INMD) have identified obesity research as a priority for strategic investment and are seeking to further refine their focus to appropriately address specific knowledge gaps, opportunities, and capacity issues in order to advance the science in this area. The HSFC and INMD have commissioned an environmental scan of research funding activities across organizations in Canada (and some abroad) to gather input from researchers and policy makers on areas of priority.

We are interviewing three distinct groups as part of this environmental scan. They are Funders, Researchers/Academics and a group we call Decision Makers who are those involved with policy and practice. You have been identified as a key stakeholder in the area of funding for obesity research and we are pleased you have agreed to participate in a telephone interview. We are seeking broad, strategic perspectives and will be asking for "big picture" input beyond personal areas of focus/interest. Some questions are specific to amounts and type of funding and we recognize some additional activity will likely be required for that information either prior to or following the interview.

The interview should last about 30 minutes and I would like your permission to tape the call and take notes for future reference. Please know that the tapes and notes are confidential and will be used only in preparation of the project report. They will be destroyed following the completion of our report. While the information we gather will be reported in aggregate form we may select anonymized quotes to demonstrate key themes.

Do you have any questions before we get started?

Key Informant Interview Guide for Funders

As indicated in previous correspondence your organization has been identified as one that is likely to fund some research in the area of obesity.

1. How much money is invested annually in research, overall, by your organization (excluding administration costs)? Please provide most recent annualized information and, if available, any additional information that may be available over the past five years.

2. (a) What types of funding mechanisms do you use?
- Personnel awards
- Operating grants
- Large research investigator team/network grants
- Researcher/community network grants
- Others?

(b) Is there a reason one approach has been selected, or emphasized, over another?

3. (a) Do you have both "open" (investigator-initiated grants-in-aid; personnel awards etc.) and "strategic" competitions (special competitions aimed at addressing specific areas of priority)?

Open competition _____

Strategic competition _____

If yes, how much is invested in each category overall?

Open competition $_____

Strategic competition $_____

(b) Using the following key words as a search mechanism in your funding database (obesity; healthy body weight), how much money is invested specifically in obesity annually by your organization within your:

Open competition $ _____

Strategic competition $_____

If possible, we ask that you provide a list of the obesity-related projects funded over the past 5 years *(a list/spreadsheet with researcher names/institution/ project title/ key words, funding amounts)*

4. Roughly what percentage of the obesity-related research funding identified above is allocated to each of the following 4 pillars (basic biomedical, clinical, health services/systems; population health). Please provide a breakdown across the four pillars for each of the categories of open and strategic competition.

	Open competition	Strategic competition
Basic biomedical	_____%	_____%
Clinical	_____%	_____%
Health services/systems	_____%	_____%
Population health	_____%	_____%
	100%	**100%**

5. If your organization has identified obesity as a strategic priority, how did this transpire?

a) Has your organization embarked on any scans, research syntheses, or held any "consensus conferences" to arrive at specific research priorities?
(Probe for information as appropriate…and also to get a copy of this information)

b) What are your plans for the future re obesity research? Do you see an increase, decrease or similar level of funding being available? Is there any change in strategic direction on the horizon?

Increase_____
Decrease_____
Similar Level_____

Changes in strategic direction:

c) Have you experienced any particular challenges in your efforts to fund obesity related research?

6. If your organization does not currently have obesity as a strategic priority, is this part of any future plans? Please comment as to why or why not.

7. Are you aware of any particularly innovative/different/unique approaches other funding agencies have used in supporting the area of obesity?

8. If you were to give other agencies who fund obesity research one piece of advice regarding where to allocate their resources in terms of obesity research, what would you suggest?

9. Are there other research funders that you would recommend who may be focusing on funding obesity research that I contact in connection with this scan?

Key Informant Interview Guide for Researchers

1. What areas of obesity research do you specialize in? Please give me an idea of the specific research areas you have worked on (within the last 5 years) or are working on currently.

2. What have been the source(s) of funding for your obesity research over the past five years?

3. Are there particular challenges you face in accessing funding here in Canada? Please describe.

4. What are the unique Canadian strengths in obesity research that set Canada apart on an international front?

5. From your perspective what gaps exist in obesity research in Canada? Why? (lack of researchers, lack of funding…)

6. What areas of obesity research are not currently being adequately addressed that should be?

7. From your perspective what are the opportunities that currently exist in the area of obesity research? (e.g., areas where there is capacity that could be applied, but isn't; an area that could be a niche for Canada; a new data set that is ready to be explored…)

8. Do you have suggestions on how to improve funding for obesity research in Canada? (more $, longer grants, larger grants, pilot grants, infrastructure, salary support, RCT)

9. What would you identify as capacity issues in obesity research here in Canada?

10. What barriers exist to the advancement of knowledge and application of new knowledge in new policies or practices

11. From your perspective what are the three most urgent funding priorities for obesity research that funding agencies like HSFC and INMD should be investing in?
    1.
    2.
    3.
12. Are there specific research topic areas or funding mechanisms that you think are more appropriately led and funded by HSFC versus the CIHR? Why?

13. Are there other researchers you would recommend that I contact as part of this environmental scan?

Key Informant Interview Guide for University Academic Administrators

1. What areas of obesity research do you specialize in? Please give me an idea of the specific research areas you have worked on (within the last 5 years) or are working on currently.

What are the main areas of obesity-related research conducted by investigators at your institution?

2. What have been the sources(s) of funding for your obesity research over the past five years?

What are the main sources of funding for obesity-related researchers at your university ?

3. Are there particular challenges you (researchers) face in accessing funding here in Canada? Please describe.

4. What are the unique Canadian strengths in obesity research that set Canada apart on an international front?

5. From your perspective what gaps exist in obesity research in Canada? Why? (lack of researchers, lack of funding…)

6. What areas of obesity research are not currently being adequately addressed that should be?

7. From your perspective what are the opportunities that currently exist in the area of obesity research? (e.g., areas where there is capacity that could be applied, but isn't; an area that could be a niche for Canada; a new data set that is ready to be explored…)

8. Do you have suggestions on how to improve funding for obesity research in Canada? (more $, longer grants, larger grants, pilot grants, infrastructure, salary support, RCT, etc)

9. What would you identify as capacity issues in obesity research here in Canada?

10. What barriers exist to the advancement of knowledge and application of new knowledge in new policies or practices

11. From your perspective what are the three most urgent funding priorities for obesity research that funding agencies like HSFC and INMD should be investing in?

1.
2.
3.

12. Are there specific research topic areas or funding mechanisms that you think are more appropriately led and funded by HSFC versus the CIHR? Why?

13. Are there other researchers you would recommend that I contact as part of this environmental scan?

Key Informant Interview Guide for Decision Makers

1. (a) In what ways do you use obesity research in your work?

   (b) Have you conducted/contracted research yourself in the area of obesity? If so, please describe.

2. How would you rate your familiarity with obesity research?
   Canadian: very familiar____, somewhat familiar _____, unfamiliar_____
   Outside Canada: very familiar____, somewhat familiar _____, unfamiliar___

3. What are the unique Canadian strengths in obesity research that set Canada apart on an international front?

4. From your perspective what gaps exist in obesity research, or what areas of obesity research, are not currently being adequately addressed?

5. From your perspective what are the opportunities that currently exist in the area of obesity research in Canada?

6. From your perspective, what barriers exist to the advancement of knowledge and application of new knowledge in the obesity area?

   Examples of this might include lack of Canadian researchers working on particular types of obesity research? Lack of funding in general? Limited capacity or strategies for knowledge transfer (e.g., synthesizing research for decision-makers)

7. What would you identify as capacity issues in obesity research here in Canada?

8. From your perspective what are the three most urgent funding priorities for obesity research that funding agencies like HSFC and INMD should be investing in?

   1.
   2.
   3.

9. Are there specific research topic areas or funding mechanisms that you think are more appropriately led and funded by HSFC versus the CIHR? Why?

10. Do you have suggestions on how to improve funding for obesity research in Canada? (more $, longer grants, larger grants, pilot grants, infrastructure, salary support, RCT, etc)

11. Are there other decision makers you would recommend that I contact as part of this environmental scan?