

**IN THIS ISSUE****Ontario's Infant Hearing and  
Communication Development  
Program**

Ontario Infant Hearing Program

## COMMUNIQUÉ

**Evaluation of the Women's  
Health and Wellness Program**

Sudbury and District Health Unit

**Statistics**

- September 2002

**2002 REPORT OF THE  
CHIEF MEDICAL OFFICER  
OF HEALTH**

**“Injury: Predictable and Preventable”**, this year’s Report of the Chief Medical Officer of Health (CMOH) was released November 19, 2002 at the Ontario Public Health Association’s Annual Conference. In his Report, Dr. Colin D’Cunha reports on injuries and their impact on Ontarians. More than 2,000 residents of Ontario are injured daily and the vast majority of injuries are both *predictable* and *preventable*. The Report focuses on *unintentional injuries*, as it pertains to age, gender, geography and the determinants of health. Unintentional injury is the leading cause of death for people aged 1 to 34 years. Unintentional injury also ranks fourth among leading causes of death, regardless of age, after diseases of the circulatory system, cancer, and respiratory diseases.

The Public Health and Epidemiology Report Ontario is published monthly, by the:

Public Health Branch  
Ministry of Health and Long-Term Care  
8th Floor, 5700 Yonge Street,  
Toronto, Ontario, M2M 4K5  
Telephone (416) 327-7090  
Facsimile (416) 327-2625  
Email: Mariam.Pingel@moh.gov.on.ca

Editorial Board: C. D’Cunha, G. Kettel, K. Kurji,  
K. Rottensten, H. Brown, R. Jin

Contact: Mariam Pingel

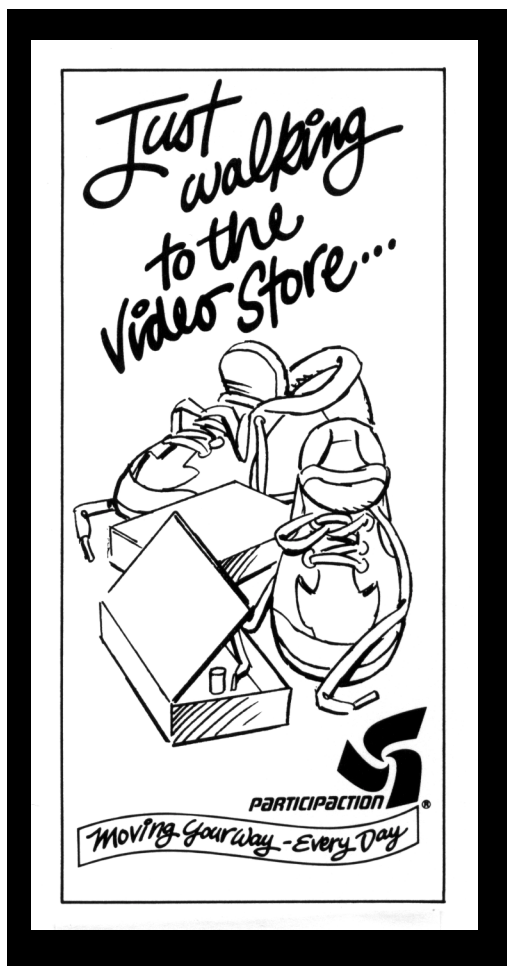
The contribution of scientific articles by the staff of local Boards of Health is invited. Address all inquiries and submissions to the Contact.

Submission of articles to PHERO does not preclude publication elsewhere. The material in this publication does not necessarily reflect the policies of the Ministry of Health and Long-Term Care. It can be reprinted without permission, provided the source is credited.

Mailing Label Goes Here

Injuries incur significant *direct* costs and *indirect* costs to the residents of Ontario and our provincial health care resources. The combined *direct* and *indirect* cost of unintentional injuries in 1996 was almost \$3 billion dollars. Dr. D’Cunha outlines the economic and social burden of injury in Ontario as well as risk factors, challenges in prevention, and future recommendations in his Report.

Additional copies of the report may be obtained from the Government of Ontario, Ministry of Health and Long-Term Care website at [www.moh.gov.on.ca/health](http://www.moh.gov.on.ca/health). Members of the public may order copies through Publications Ontario at 1-800-668-9938, or in Toronto at 416-326-5300.



## Ontario's Infant Hearing and Communication Development Program

### Background

Significant, permanent childhood hearing impairment (PCHI) is one of the most common of the major, congenital disorders<sup>1</sup>. It is more prevalent than all the hemoglobinopathies and errors of newborn metabolism combined<sup>2</sup>. PCHI is not in itself life-threatening, but it has significant consequences for the individual, the family and society at large, especially if it is not detected early<sup>3</sup>. Despite its clear importance, population-based screening for PCHI has not been widely implemented until recently. This omission has been a serious public health deficiency in any society professing concern with optimal development, quality of life, and educational achievement of its children<sup>4,5</sup>.

There are many, diverse sequelae of undetected hearing impairment in early infancy. An infant with significant hearing impairment cannot hear the vast array of environmental sounds, and especially cannot hear speech, song, or any other part of the normal acoustical exchange between parent and child. This is a significant disadvantage in and of itself, but it also has deleterious outcomes. For example, there is clear evidence from animal and human studies that auditory deprivation in early infancy can lead to significant changes in the structural and functional organization of the auditory system, up to and including the cerebral cortex<sup>6,7</sup>. It is also clearly established that hearing impairment that is not addressed promptly can lead to delays in the acquisition of speech and language<sup>3,8</sup>. Further impact in areas such as cognitive development, socialization and later, academic achievement have been reported<sup>9</sup>.

In the absence of systematic screening of newborns for PCHI, the patterns of detection, diagnosis and provision of hearing and communication development services are cause for great concern. A large-sample study from Ontario<sup>10</sup> revealed that mean age of diagnosis in unscreened children referred by physicians because of concern about hearing was 2.8 years in the period 1991-95. This is contrasted with 5.7 months for a screened group of children at risk. For children with moderate impairment and no risk factors, the mean age was about 5 years! It is very probable that most of the undetected impairments were present since birth.

The reasons for this poor performance are many. First, it is impossible for parents or health professionals to detect impaired hearing reliably in the first year of infancy by casual observation or by informal, behavioural tests. Indeed, even computerized behavioural tests with controlled stimuli in the hands of hearing experts have proved to have poor sensitivity or specificity<sup>11</sup>. Second, in the young infant, PCHI may be confused with, or overlaid by, transient impairment associated with middle-ear disorders. Until recently, reliable distinction between transient and permanent components of impairment has been problematic. Third, there is much variation in normal development of overt response to sound, as well as in early vocalization. Apparent delay in milestone achievement, even if suspected by the family, all too often continues to elicit the notorious ‘don’t worry, (s)he’ll grow out of it’ response from health professionals. Indeed, there is evidence that inappropriate professional response has long been a significant source of identification delay<sup>12</sup>.

Over the last 15 years, the situation has changed dramatically as a result of technological advances, especially in the detection and quantification of hearing impairment in the newborn and young infant. It is now possible to screen newborns and young infants quickly, accurately and objectively, using computerized, portable test equipment operated by personnel with limited training. It is also possible to quantify hearing status in detail, both accurately and comprehensively, due to advances in diagnostic assessment procedures. In short, detection and quantification of hearing impairment are no longer an obstacle to early initiation of effective services for maximizing hearing ability and/or initiation of communication development strategies.

These developments have prompted major efforts in several countries to improve hearing and communication healthcare for newborns and infants. While screening of infants at high risk for impairment has been advocated for many years, universal newborn hearing screening (UNHS) programs have proliferated in the last five years, especially in the US. Concurrently, many agencies and organizations have endorsed universal newborn hearing screening (UNHS). In compliance with the well-established principle that population screening should not be undertaken in the absence of accessible and effective services to address the needs of those children and families identified by screening, the most common, current terminology for the overall system of care is ‘Early Hearing Detection and

Intervention’ or EHDI programs. Bodies that have endorsed UNHS/EHDI include the interdisciplinary US Joint Committee on Infant Hearing (JCIH)<sup>3</sup>, the American Academy of Pediatrics (AAP)<sup>1</sup>, consensus development conferences from the US National Institutes of Health<sup>13</sup> and the European Economic Community (EEC)<sup>14</sup>, as well as from several major audiology associations. A large program has been initiated in 20 UK health districts and currently, UNHS is legislated or otherwise mandated in at least 40 US states; over 60% of newborns in the USA are currently screened, usually prior to discharge from the hospital birth admission<sup>15</sup>.

There is a directive overtone to the use of the word ‘intervention’ that is not consonant with the important theme of family-centered health services, so the EHDI term is not considered appropriate in the Ontario context.

A Health Canada national survey in 1999 revealed only a patchwork of local initiatives in newborn hearing screening, covering only 25% of newborns and mainly directed at high-risk groups<sup>16</sup>. However, in May 2000, Ontario took a national leadership position in announcing funding for a major new initiative: the Infant Hearing and Communication Development Program. Before describing the key elements of this important advance, the basic epidemiology and related issues underlying the design of a high-quality program will be outlined.

### **Prevalence of Permanent Childhood Hearing Impairment**

The prevalence of PCHI in the newborn and infant is now understood reasonably well, due to regional and national ascertainment studies in the UK<sup>17</sup>, as well as to large UNHS programs that have been in place for several years in the US<sup>18,19</sup>. The prevalence is a function of many variables relating to the definition of the target disorder, especially the severity, frequency range, type and laterality of the impairment (one or both ears). In summary, the prevalence of congenital impairment of ‘moderate’ degree or worse is about one per thousand live births. As a reference point, such an impairment is more disabling than that which a hearing adult would perceive when wearing typical earplugs and earmuffs combined. For so-called ‘mild’ impairment, comparable to that experienced with earmuffs alone, the prevalence doubles, and if unilateral impairment is included in the target, it increases further by about 50 to 100%. This yields a prevalence of about 3-4/1000 for at least mild impairment in one or both ears. It is important to

detect unilateral impairment for several reasons. For example, a child with PCHI in one ear may acquire a major hearing disability due to otitis media in the previously normal ear, or may be at risk for progression to bilateral PCHI.

PCHI prevalence is about 8-10 times greater in at-risk newborns than in those without any risk indicators. About 15% of newborns may have a known risk indicator. The most common indicators are neonatal intensive care for more than 48 hours, familial PCHI, and major or minor craniofacial anomalies. However, about 40-50% of newborns with PCHI manifest no known risk indicator, and therein lies part of the rationale for universal newborn screening, as opposed to targeted screening of only high-risk newborns<sup>20,21</sup>.

## Screening Tests

It is well-established that casual observation of response to sound or informal behavioural tests of hearing sensitivity are worse than useless in newborns and young infants. The two major, innovative screening technologies in current use are automated otoacoustic emissions (AOAE) and automated auditory brainstem response (AABR)<sup>3</sup>. OAEs are minute sounds that are actively generated in the normal inner ear (cochlea), in response to external sound stimuli. The OAEs radiate out to the external ear canal and may be detected by a miniature microphone in the canal. Any hearing impairment of moderate degree or greater will abolish the OAE, thus yielding a binary screening test ('pass' or 'refer' result). However, the test is not a perfect indicator of hearing: some infants with hearing impairment of mild degree will yield an OAE, as will the small proportion who have impairment arising from dysfunction at a more central location in the auditory system than the site of OAE generation in the cochlea. Conversely, some infants have normal hearing but their OAEs are abolished by minor middle-ear conditions. Furthermore, it is not possible to estimate hearing threshold sensitivity quantitatively with OAEs, which are essentially either present or absent for a range of acoustic stimuli. By their nature, OAEs yield a reasonably accurate binary test for hearing impairment of mild-to-moderate degree or greater.

ABRs are minute, gross (whole-nerve) neuronal action potentials that are generated in response to external sounds. They originate in the neurons of the afferent auditory pathways in the brainstem. They can be recorded using EEG electrodes on the head, after computer extraction from the spontaneous neural activity of the brain. Automated

response detection algorithms render the test completely objective. ABR presence is equated with auditory perception, thus yielding a binary screening test of hearing sensitivity. The stimulus is usually a rapid series of clicks, presented at a low intensity level. In contrast to the OAEs, ABRs can yield fairly accurate, quantitative estimates of hearing thresholds. Thus, AABR screening is a simplified type of ABR testing, wherein a single stimulus level is chosen such that failure to record an ABR implies presence of the target disorder.

Both AOAE and AABR screening are straightforward. AOAE screening is done with a hand-held device and takes 3-5 minutes. ABR screening is done with a laptop computer and hand-held attachment, and takes typically 5-10 minutes. Both screens require a reasonably quiet environment, and best results are obtained in a sleeping baby. Because of its greater instrumentation expense and slightly greater skill requirements for testers, ABR screening is commonly reserved for high-risk newborns, or as a second screen in babies who refer from OAE screening.

Initial screening is usually done during the perinatal hospital admission. It is best done just before discharge home. If it is done within 12 hours of birth, the false-positive rate increases significantly, mainly because of fluid in the middle ear space and possible debris in the external meatus. AABR screening is less affected by minor middle-ear conditions, but its false-positive rate is likely to increase if it is done in newborns under about 34 weeks gestational age.

AABR screening is generally preferred for infants at risk for hearing impairment, because the higher prevalence in that group justifies a test with very high sensitivity, despite increased expense. Also, AABR screening can detect auditory neuropathy (AN), which is a recently-recognised cluster of disorders that are thought to originate in the cochlear inner hair cells or the cochlear nerve<sup>22</sup>. OAE screening cannot detect AN, which may comprise 5-10% of all cases of PCHI in early infancy. Most babies with AN are graduates of neonatal intensive care units.

## Screening Test Performance

For at least moderate hearing impairment, pre-discharge AOAE screening is believed to have a sensitivity of about 80% and a specificity of about 90%; pre-discharge AABR screening has a sensitivity of at least 85% and specificity of 90-95%<sup>23,24</sup>. Performance is better than this for more severe impairment. These sensitivity estimates are likely

to be biased negatively, especially for the ABR, because the only way to determine sensitivity is to adopt a cohort approach in which true hearing status is determined later for all infants screened. Such experimental studies are very demanding, both in terms of sample size requirements and cohort attrition rates. The earliest developmental age at which reliable reference audiometric data can be obtained longitudinally is 8-9 months, and the so-called 'definitive' hearing tests may be inaccurate in infants with any of several concurrent morbidities. Also, there may be intercurrent or progressive impairment that is not present at the time of screening. For specificity, on the other hand, because PCHI is relatively uncommon, cohorts are easier to acquire and screening referral rates approximate the false positive rates closely. Large UNHS programs that have been in operation for several years in the US have provided solid evidence on specificity but cannot determine sensitivity in an unbiased manner because only babies who refer from screening are followed up.

Because PCHI has a prevalence of only about 3/1000, very high screening specificity is desirable in order to achieve a reasonable PPV and keep the number of families experiencing anxiety due to screening refer outcomes to a minimum. One way to achieve this is by maximizing use of AABR, including using it as a series second screen in infants who refer from AOA. The series sensitivity is upper-bounded by that of AOA, and the series specificity is lower-bounded by that of AABR. Actual high-quality UNHS programs, easily better than a guideline target maximum rate of 4% proposed by the AAP. By adding a further series AABR re-screen after about a month, the net referral rate can drop to as low as 1-2%<sup>25</sup>. This is likely to be accomplished with little loss of net sensitivity, because the intrinsic false negative rates of the best AABR response detection algorithms are less than 1%, and the main effect of re-screening is to eliminate false-positives that arise due to transient, perinatal middle-ear conditions.

### **Overall effective sensitivity**

A refer result from screening does not, of course, mean that the infant has PCHI, but that the risk of PCHI is very high. The purpose of screening is essentially to deliver all infants who are at very high risk of having a genuine PCHI to comprehensive audiologic assessment. Failure to deliver vitiates the purpose of doing the screening. Thus, there are three major facets of the overall process sensitivity: screening coverage of the target population, the net

sensitivity of the complete screening protocol, and the linkage of screening referrals to the definitive audiologic assessment. Evidence from the large UNHS programs in the US suggests that screening coverage of over 95% is achievable, given commitment and good program design. Logistical difficulties tend to arise not from sheer volume, as in well-baby nurseries, but in unpredictable discharge and transfer that are typical in NICUs. Screening protocol sensitivity has been outlined earlier. The rate-limiting step is usually tracking and referral compliance for audiologic assessment, and a success rate of over 80% for that step is unusual<sup>26</sup>. Because the net sensitivity is the product of the case throughput rates for all the component stages, it follows that great attention must be paid to case tracking and compliance for referral. The key ingredients are the information system that records and flags infants requiring assessment, and a careful process of family information and instruction that promotes compliance yet is sensitive to family anxiety levels.

### **Definitive Audiologic Assessment**

A widely-endorsed goal of early identification programs is to initiate enhancement of hearing and/or communication development by six months of age<sup>3</sup>. This requires that wherever feasible, audiologic assessment should be completed by about 3-4 months. In infants less than about 8 months developmental age, the only method in widespread use at present is electrophysiologic estimation of hearing thresholds, using the ABR. Such methods do not require overt behavioural response, and rely upon the detection of electrical activity in the auditory system that is a correlate and statistical predictor of actual perception of sound. In combination with auxiliary, physiologic tests of middle-ear function, brainstem neuro-myogenic reflex arc integrity, and cochlear hair cell function, ABR estimates of hearing sensitivity can be reliable and accurate<sup>27</sup>.

In most infants with a developmental age over about 8 months, it is feasible to conduct accurate, behavioural testing of hearing using Visual Reinforcement Audiometry (VRA)<sup>28</sup>, a method that relies upon operant conditioning of a head-turn response to controlled sounds. However, in infants with cognitive delay or other neurodevelopmental problems, behavioural methods may remain unfeasible and there must be continued reliance on electrophysiological methods.

Both electrophysiologic and behavioural assessment of hearing in infants require careful technique and considerable expertise, to obtain accurate results. Many errors are

possible and these can have damaging consequences. It is essential that well-designed test protocols be used consistently, and that testers have access to adequate training and continuing education, as well as that they have sufficient case load to maintain and develop skills.

## **Hearing and Communication Development Options**

There are many options for improvement of hearing ability and/or for enhancement of communication in infants with hearing impairment<sup>3,29</sup>. It is important that all these options be accessible and that families of infants with PCHI be familiarized with them in a manner that is sensitive, culturally appropriate, evidence-based and unbiased. Psychological support for families is also important throughout the process of understanding the implication of hearing impairment and developing a positive and proactive role in selecting a course of action and promoting its success.

One option is to pursue maximization of hearing ability and normal development of speech and oral language. This option is commonly, but not necessarily, chosen by families of infants with less than profound impairments. Hearing aids and related assistive devices, if appropriately selected and fitted, improve hearing in most cases and can lead to successful speech and oral language outcomes. In infants with severe and profound PCHI, cochlear implants are often effective, if hearing aids prove insufficient. In this situation, as well as for some infants with lesser degrees of PCHI, it is important to combine the assistive technology with training in auditory perception and speech development that may be extensive and prolonged.

An alternate route to successful communication development is manual communication, which methods include American Sign Language as well as various manual signing aids to speech and oral language. ASL is a distinct language in its own right, not an approximation to spoken English. Families, especially those with affinity for the culture of the Deaf community, may prefer to eschew auditory-oral approaches to communication or to develop ASL as the primary language of their child and consider auditory-oral options at a later stage. The evidence with respect to comparative effectiveness of various approaches to auditory-oral communication development is inconclusive, but there is an increasing evidence base that language stimulation by any means is important in early child development<sup>30</sup>.

## **Ontario's Infant Hearing Program (IHP)**

Funding for enhancement of services for newborns and

infants with impaired hearing was announced in May 2000. The IHP complements and substantially augments existing provincial services for Preschool Speech and Language Development. The key elements of the program are:

1. Secured funding to develop and deliver all necessary program services and supports.
2. Universal newborn hearing screening during the perinatal hospital admission, augmented by followup community screening services.
3. Comprehensive services for confirmation of hearing impairment and diagnostic assessment sufficient to inform medical and non-medical processes, as elected by the family.
4. Family psychological supports and provision of comprehensive, unbiased information about hearing and communication development options.
5. High-quality services for provision of hearing aids and other assistive technologies.
6. Expanded provision of comprehensive and diverse communication development services.
7. Auxiliary sub-programs for detection of emergent hearing impairment in at-risk infants and in those who develop post-natal risk indicators for PCHI.
8. Educational and informational programs for families and hearing healthcare professionals.

Infrastructural elements that facilitate provision of high-quality, integrated services include, but are not limited to: optimal, evidence-based protocols for screening, audiologic assessment and provision of assistive technology, comprehensive information systems to ensure reliable tracking of infants and recording of outcomes, extensive training programs for personnel involved in screening, assessment, assistive device provision, family support and communication options provision, communications development for families and professionals, administrative systems to ensure necessary operations including supplies and services, and a substantial subprogram for evaluation and quality improvement.

The overall IHP model is one of centralized planning, development and quality management, combined with regionally-adapted implementation that reflects local variations in need and infrastructure. The training and services enhancement processes are nearing completion, systematic screening of infant at high risk is now widely implemented, and universal screening has been

implemented in many regions of the province. Full functionality is anticipated in early 2003.

Some 30,000 newborns have been screened to date, and assessment systems are fully functional. A net referral rate to audiologic assessment of about 1% is already among the best achieved in large programs in North America. There is every indication that the Ontario IHP is securing an exemplary position globally in terms of high-quality healthcare for newborns and infants with significant, permanent hearing impairment.



## SOURCE

Dr. Martyn L. Hyde, Ph.D  
Director of Research and Development,  
Otologic Function Unit  
Mount Sinai Hospital, Toronto  
Professor of Otolaryngology and Public Health Sciences  
University of Toronto

## CONTACT

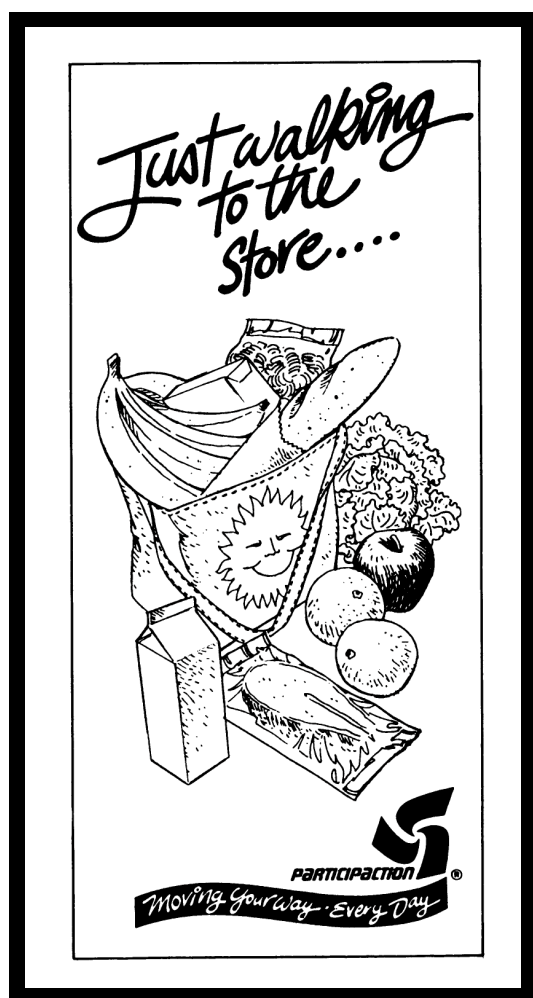
Marlene Stein, BA, DSPA, S-LP(C), Reg. CASLPO  
Program Consultant Speech Language Pathology and Audiology  
Population Health Service  
Public Health Branch, MOHLTC

## REFERENCES

1. American Academy of Pediatrics. Newborn and infant hearing loss: detection and intervention. *Pediatrics*. 1999;103(2):527-30.
2. Finitzo T, Crumley W. The role of the pediatrician in hearing loss. From detection to connection. *Pediatr Clin North Am*. 1999;46(1):15-34.
3. Joint Committee on Infant Hearing. Year 2000 Position Statement: principles and guidelines for early hearing detection and intervention programs. *Pediatrics*. 2000;106:798-817.
4. Mehl AL, Thomson V. Newborn hearing screening: the great omission. *Pediatrics*. 1998 Jan;101(1):E4.
5. Bamford J, Davis A, Stevens J. Current topic. Screening for congenital hearing impairment: time for a change. *Arch Dis Child:Fetal & Neonatal Edition*. 1998;79(1):F73-6.
6. Sininger Y, Doyle K, Moore J. The case for early identification of hearing loss in children. *Pediatr Clin North Am*. 1999;46(1):1-14.
7. Hardie NA, Shepherd R. Sensorineural hearing loss during development: morphological and physiological response of the cochlea and auditory brainstem. *Hear Res*. 1999;128(1-2):147-65.
8. Yoshinaga-Itano C, Sedey A, Coulter D, et al. Language of early and later identified children with hearing loss. *Pediatrics*. 1998;102:1161-71.
9. Karchmer M, Allen T. The functional assessment of deaf and hard of hearing students. *Am Ann Deaf*. 1999;144:68-77.
10. Durieux-Smith A, Whittingham J. The rationale for neonatal hearing screening. *J Speech Lang Pathol Audiol*. 2000 Jun;24:59-67.
11. Davis AC, Wharrad H, Sancho J, et al. Early detection of hearing impairment: what role is there for behavioural methods in the neonatal period? *Acta Otolaryngologica Suppl (Stockh)*. 1991;482:103-9.
12. Lyon M, Lyon D. Early detection of hearing loss:a follow-up study. *Can J Public Health*. 1986;77:221-4
13. National Institutes of Health. Early identification of hearing impairment in infants and young children. *NIH Consensus Statement* 1993;11(1):1-24.
14. Grandori F, Lutman M. Clinical Focus: grand rounds. The European Consensus Development Conference on neonatal hearing screening. *Am J Audiol*. 1999;8(1):19-20.
15. National Centre for Hearing Assessment & Management (NCHAM): [www.infantheating.org](http://www.infantheating.org)
16. Brown D, Dort J, Sauve R. Newborn hearing screening programs: A truly Canadian perspective. *J Speech-Lang Pathol Audiol*. 2000;24(2):48-58.
17. Fortnum HM, Summerfield AQ, Marshall DH, et al. Prevalence of permanent childhood hearing impairment in the United Kingdom and implications for universal neonatal hearing screening: questionnaire based ascertainment study. *Brit Med J*. 2001 Sep 8;323(7312):536-40.
18. Mehl AL, Thomson V. The Colorado newborn hearing screening project, 1992-1999: on the threshold of effective population-based newborn hearing screening. *Pediatrics*. 2002 Jan;109(1):E7
19. Prieve B, Stevens F. The New York State Universal Newborn Hearing Screening Demonstration Project: Introduction and Overview. *Ear Hear*. 2000;21(2):85-91.
20. Vohr BR, Widen JE, Cone-Wesson B, et al. Identification of neonatal hearing impairment: characteristics of infants in the neonatal intensive care unit and well-baby nursery. *Ear Hear*. 2000 Oct;21(5):373-82.
21. Cone-Wesson B, Vohr BR, Sininger YS, et al. Identification of neonatal hearing impairment: infants with hearing loss. *Ear Hear*. 2000 Oct;21(5):488-507.
22. Starr A, Picton TW, Sininger Y, et al. Auditory neuropathy. *Brain*. 1996 Jun;119:741-53.
23. Thompson DC, McPhillips H, Davis RL, et al. Universal Newborn Hearing Screening. *J Am Med Assoc*. 2001(Oct);286:2000-2010.
24. Norton SJ, Gorga MP, Widen JE et al. Identification of neonatal hearing impairment: summary and recommendations. *Ear Hear*. 2000 Oct;21(5):529-35.
25. Keren R, Helfand M, Homer C et al. Projected cost-effectiveness of statewide universal newborn hearing screening. *Pediatrics*. 2002;110(5):855-64.
26. Prieve B, Dalzell L, Berg A, et al. The New York State universal newborn hearing screening demonstration project: outpa-

tient outcome measures. *Ear Hear.* 2000 Apr;21(2):104-17.

27. Stapells DR, Oates P. Estimation of the pure-tone audiogram by the auditory brainstem response: a review. *Audiol Neurotol.* 1997;2:257-80.
28. Widen JE, Folsom RC, Cone-Wesson B, et al. Identification of neonatal hearing impairment: hearing status at 8 to 12 months corrected age using a visual reinforcement audiometry protocol. *Ear Hear.* 2000 Oct;21(5):471-87.
29. Knott C. Universal newborn hearing screening coming soon: 'hear's' why. *Neonatal Network.* 2001 (Dec);20(8):25-33
30. Ruben RJ, Schwartz R. Necessity versus sufficiency: the role of input in language acquisition. *Int J Pediatr Otorhinolaryngol.* 1999;47(2):137-40.



## Communiqué Public Health Research, Education and Development Program

Sudbury & District

Health Unit

Service de  
santé publique

## Evaluation of the Women's Health and Wellness Program

### INTRODUCTION

The Sudbury & District Health Unit (SDHU) Women's Health and Wellness Program is an outreach project providing primary health care and women's wellness services (including cervical screening, clinical breast examination and sexual health services) to women who currently experience barriers to accessing these services. Services are provided by Nurse Practitioners in community-based clinic settings throughout Sudbury and districts. The program is a combination of two projects: 1) The Women's Health Outreach Demonstration Project, funded by the Ontario Women's Health Council of the Ministry of Health and Long-Term Care; and 2) The Nurse Practitioner Cervical Screening Pilot Project, funded by the Ministry of Health and Long-Term Care (MOHLTC). Funding for both projects terminates in March 2003. This paper summarizes the progress and the preliminary evaluation results for the first year of the Women's Health Outreach project, since the second project is in an earlier phase of implementation.

The Sudbury & District Health Unit has been the host and administrating agency for the project, with involvement of community partners: Victorian Order of Nurses (Sudbury), Canadian Cancer Society, Northeastern Ontario Regional Cancer Centre, Ontario Breast Screening Program (Sudbury), Ontario Women's Health Network, Laurentian University, and consumers.

Key goals for the Women's Health and Wellness Program were to:

1. Deliver primary health care and screening services via mobile clinics.

2. Increase access to health care for underserved and hard-to-reach women in Sudbury and districts through an outreach model.
3. Ensure project sustainability through partnerships.

### **Context**

Residents of Northern Ontario, including women living within the Sudbury & District Health Unit area, have poorer health status than other residents of Ontario on many health status indicators. More women in the SDHU area are overweight (Body Mass Index 25-29.9) as compared to Ontario (31% vs. 26%)<sup>1</sup>, and more women in this area consume fewer than five fruits and vegetables per day (64% vs. 57%)<sup>1</sup>. Similarly, in the SDHU area, more women are daily smokers (27% vs. 18%)<sup>1</sup> and more women binge drink (5 or more drinks on one occasion, 12 or more times a year) (14% vs. 10%)<sup>1</sup>. More women in the SDHU area as compared to Ontario had their last Pap smear three or more years ago (19% vs. 10%)<sup>1</sup>, and the rate of cervical cancer is higher (12.4/100,000 in Northeastern Ontario vs. 10.1/100,000 in all of Ontario)<sup>2</sup>.

The Ministry of Health and Long-Term Care designates many areas within Sudbury and districts as underserved by physicians, including the City of Greater Sudbury, Chapleau and Espanola, where this program has provided service.

The Sudbury & District Health Unit area comprises approximately 50,000 square kilometres, and covers approximately 300 km from north to south and 300 km from east to west. Over 80% of the area's population of just fewer than 200,000 people live in the City of Greater Sudbury. The poorer health status, lack of physicians and geographic challenges for this area mean that access to health care will be limited for many of the area's residents. In order to address these access issues effectively, the Women's Health and Wellness Program took an outreach approach to providing health services. The program holds clinics in underserved communities, and goes to locations that are most likely to be convenient to women who have limited access to health care.

### **Project Implementation**

In the initial phases of the project, a needs assessment drew from existing statistics, research literature, and community informant knowledge about barriers to accessing health care, and unmet needs in areas across the region. Based on the findings, it was determined that the target population for the project would be women with the following

characteristics or experiences: no family physician; rurality; isolation; Aboriginal; minority ethnicity; recent immigrants; minority language groups; age groups under-screened for cervical cancer (< 25, > 65); low educational level; poverty/low income; homelessness; and transience.

In order to reach women in our target groups, the program has used a community development approach, working with health care providers, existing groups and organizations in the communities we serve to make our program known among their membership or client groups. With many groups, educational presentations about women's health and our clinic services were made to the group members. The program has used only minimal media advertising. Most women heard about the clinic through a family member or friend, or through a health provider.

The Nurse Practitioner sees between 70 and 90 clients per month. In the year in question, the Nurse Practitioner saw more than 625 individual clients for over 800 appointments. Clients can attend the clinic more than once, for follow-up, receiving results, etc.

### **Clinic Site Summaries**

Clinics have been held at eight sites distributed across the region: three permanent sites and five mobile or occasional locations. Permanent sites include Chapleau, Val Caron, and the YMCA in Sudbury. Mobile sites include Foyer Notre Dame, the Action Centre/The Point, and the Corner Clinic, all of which are located in Sudbury. Occasional clinics were held at the Sudbury & District Health Unit main office and at the branch office in Espanola, a rural community about one hour away from Sudbury.

As can be seen in Table 1, YMCA Sudbury and Val Caron

**Table 1. Number of Clients by Clinic Site**

CLINIC SITE	# CLIENTS
YMCA Sudbury	247
Val Caron	208
Chapleau	106
SDHU	21
Corner Clinic	15
Espanola	13
Foyer Notre Dame	12
Action Centre for Youth	5
<b>TOTAL</b>	<b>627</b>

are the sites with the highest volume, with Chapleau as a third large volume site.

Clinics at the Action Centre, Foyer Notre Dame, and Corner Clinic locations have been less frequent (generally monthly), and have a lower number of clients, but the level of need is high. Clinics in Espanola and at SDHU have been offered on an occasional basis only.

The **YMCA** site is located in downtown Sudbury, in clinic space within the recreational facility. Because of the downtown location, the site is acceptable to a wide range of clientele. **Val Caron** is located within the geographic boundaries of the City of Greater Sudbury, and is approximately 20 km from the core city. It has a significant Francophone population, with a total population of 23,500. The clinic is centrally located in the former town office, near the local secondary school. **Chapleau** is an isolated lumber community with a population of 3,000 and is located approximately 400 km by road northwest of Sudbury. The community has a significant Francophone population. Although the community is underserved, the two physicians have not closed their practices to new patients. Therefore, all community members have a family physician. The Nurse Practitioner and Project Assistant travel to Chapleau (a 5-hour trip) for three clinic days, including evening appointments, on a bi-monthly basis. The clinic is located in space donated by the local hospital. The **Corner Clinic** in Sudbury is managed by the Centre de santé communautaire. A variety of community health and social service agencies share the space to provide front line service for a generally transient client base. It is located beside the city's Soup Kitchen. **Foyer Notre Dame** in Sudbury provides transitional housing up to three months duration for 16 to 19 year old females who are homeless or under-housed. They also have an active street outreach program. Clinics are held onsite in an office. The **Action Centre/The Point** in Sudbury is a joint employment agency for street involved/low income people and needle exchange program. Clinics are held in existing staff offices. The **Sudbury & District Health Unit** main office and **Espanola** branch office in Espanola were used as occasional clinic sites, serving primarily clients referred by existing Health Unit sexual health clinics.

### **Evaluation Methodology**

A comprehensive evaluation of this project is underway. The evaluation committee consists of the project evaluator and other staff from the SDHU Public Health Research,

Education and Development (PHRED) Program, and two professors from Laurentian University who have expertise in evaluation and health research. The Project Evaluator attends meetings of the project's External Advisory Committee as needed to provide updates and to consult with community partners about the direction of the evaluation.

An evaluation plan linked to the project logic model was developed as part of the proposal process and has been refined by the Evaluation Committee. A key outcome objective is to address the health and wellness needs of women who have experienced barriers to accessing regular health care. To measure our success in reaching this outcome, questionnaire data are collected from clinic clients, assessing their current access to health care and wellness services, reasons for attending the clinic, demographic profiles, and satisfaction with the service. During the year in question, 583 new clients provided evaluation questionnaire data, a consent rate of 95%. Chart reviews and clinic logs are used to determine risk factors, services provided, follow-up and referrals. Qualitative data will be collected from clients and key informants at the termination of the program through focus groups and interviews.

Along with outcome measures, the process of establishing the program in each location is being assessed. Process evaluation data such as numbers of clients attending and client suggestions on satisfaction forms are used to modify the program as it progresses, aiming to offer the best possible service to the target groups.

Recognizing that the effectiveness and long-term sustainability of these programs requires community involvement and support, the process of building community capacity is also being assessed as part of the evaluation. With each community development contact, level of interest and capacity to provide in-kind support are tracked.

### **Findings**

In order to give a snapshot of the Women's Health and Wellness program, this report presents the data for one full-time Nurse Practitioner over the course of one year (August 22, 2001 – August 21, 2002). Clients were women from various age groups: one third were under 25 years of age, with another third aged 25-39, and the remaining third aged 40-78. The age distribution varied by site, with only 8% of the Chapleau clients aged under 25, and 15% of them aged 55 and over. Preliminary results

are provided in this report with respect to the three goals outlined earlier.

### ***1. Did we deliver primary health care and screening services via mobile clinics?***

The public has overwhelmingly supported the project and clinics are booked several weeks in advance. Women had many reasons for attending the clinics. Pap screenings were the most common reason given for attending the Women's Health and Wellness Clinic (77% of clients gave this as a reason), although seeing a female provider (50%) was another very common reason that women gave for choosing to attend this clinic. For women in Chapleau, where both physicians are male, "seeing a female health provider" was the most common reason for attending the clinic (83%). One of the objectives of the clinic was to improve access by holding clinics in convenient locations. Although convenience was not the most common reason for attending the clinic (34% overall), in some sites, convenience was frequently given as a reason for attending (48% in Val Caron). It should be noted that women's self-reported reasons for attending the clinics do not always reflect the services offered based on the Nurse Practitioner's assessment. Clients could give more than one reason for attending the clinic.

#### **Screening for Cervical Cancer**

Data on Pap screening are available for the 7-month period August 22, 2001 – March 31, 2002. Data are not available for the full year in question because there is a 4-month delay, on average, between the Pap test and receiving the result, and Pap test data are not entered in the database until the results have been received. For patients who do not attend the clinic for Pap screening reasons, data on time since last Pap test is not always available.

Seventy percent of the 422 clients seen during this time had a Pap test as part of their visit. Of those who had a Pap test, 36% had exceeded the Ontario Cervical Screening Program guidelines recommended two-year interval between Pap tests. A further 9% had never previously had a Pap test, for a total of 45% for whom a Pap test was overdue. This finding suggests that the program is providing access to screening for women who had previously not been able to access screening services on a regular basis.

#### **Primary Health Care**

Although screening for cervical cancer is the most common reason that women give for attending the clinics, and

approximately 70% of clients had a Pap test as part of their clinic visit, the program is actually providing a much broader range of health and wellness services to women in locations throughout Sudbury and districts.

Clinics are staffed by a Nurse Practitioner, who works either alone or with support from a Public Health Nurse or the Project Assistant. Nurse Practitioners practice under the Expanded Services for Patients Act (1998). They are autonomous health care providers, whose scope of practice includes prevention of illness, wellness care, diagnosis of illness, monitoring of stable chronic illness, episodic illness care, and rehabilitation. Nurse Practitioners can prescribe medications and order tests within established parameters.

Services at all sites include Pap tests, breast exams, mammogram referrals, pelvic exams, contraception and access to low cost contraception, treatment of genital warts/HPV, STD/HIV testing and menopause counselling, and other "well-women" services. For clients with a family physician, a letter of information is sent to the family physician, with the client's consent, in the case of unusual examination findings. For clients without family physicians (about one-third of the client group), the full scope of Nurse Practitioner primary health care is provided, and these clients can receive ongoing care with the Nurse Practitioner or the NP/MD team. The Women's Health & Wellness Clinic Nurse Practitioner collaborates with a local female physician when problems are identified outside her scope of practice. Referrals to specialists are made via the collaborating physician.

Although the clinic is billed as a "well-women's clinic", there have been significant abnormalities diagnosed. As an indication of the range of abnormalities identified, referrals have been made to: Gynaecology (regarding Pap test abnormalities and other abnormalities, including cancers of ovary, cervix and vulva, ovarian cysts, uterine fibroids, abnormal uterine bleeding, multiple vaginal warts), Obstetrics, Internal Medicine, Cardiology, Diabetes Education/Nutrition Counselling, Sudbury Regional Breast Health Clinic, Ophthalmology, ENT, General Surgery, Hepatology, Neurology, and Urology.

### ***2. Did we increase access to health care for underserved and hard-to-reach women in Sudbury and Districts through an outreach model?***

Preliminary analyses show that the goal of reaching

underserved and hard-to-reach women is being met: many of the clients do not have a family physician, and a large proportion is in a low-income bracket. In addition, the program is reaching Aboriginal women in greater numbers than expected for the population. Aboriginal women are known to be at higher risk of cervical cancer and on average have poorer health status than the remainder of the population. In our client group, 8.6% identify as North American Indian, and 4% as Metis, for a combined total of 12.6%. Most respondents indicate another ancestry as well: we do not know to what extent these women identify as Aboriginal. For comparison, Aboriginal people make up 2.7% of the population of the Regional Municipality of Sudbury area, and 6.3% of the population of the District of Sudbury (which encompasses Chapleau).

### **Underserved by Physicians**

Among our client group, 76.5% had contact with a physician in the past year. By comparison to females in our region, our clients are less likely to have seen a physician: Canadian Community Health Survey (CCHS) data for our region showed that 85.6% of women had contact with a physician in the past year. In our client group, 36% have no family physician (excluding Chapleau, where everyone has a family physician). At the YMCA site in downtown Sudbury, 46% of clients do not have a family physician.

We have learned that although clients may have a family physician, this does not ensure that they have necessary access to primary health care, screening or health promotion. Appointments with physicians often need to be booked several weeks or months in advance, and this means that timely access is not always possible. Also, given the limited time that physicians have to spend with patients, health promotion and screening services often are not possible within an office visit.

### **Low Income**

Income is an important determinant of health. As shown in Table 2, among our client group, 39% have family incomes less than \$20,000. This income level puts these families at or below the *individual* “low-income cut-off” for the region, which is \$19,834 for females in Chapleau, and \$18,775 for females in the former Regional Municipality of Sudbury (roughly equivalent to the present City of Greater Sudbury)<sup>3</sup>. At most of the Sudbury locations, (YMCA, Corner Clinic, Foyer Notre Dame, and Action Centre), the majority of the clients had *family* incomes below the *individual* low-income-cut-off, suggesting that they were

living well below an adequate individual income. Sixteen percent of respondents did not answer the income question.

**Table 2. Percentage With Family Incomes Less Than \$20,000, by Clinic Site**

<b>CLINIC SITE</b>	<b>INCOMES LESS THAN \$20,000 (%)</b>
YMCA Sudbury	52
Val Caron	24
Chapleau	21
SDHU	46
Corner Clinic	100
Espanola	33
Foyer Notre Dame	86
Action Centre for Youth	100
<b>TOTAL</b>	<b>39</b>

### **3. Did we ensure project sustainability through partnerships?**

At this point in the project, we have only a few months until the end of the funding. Throughout the life of the project, we have been building on existing relationships and forming new relationships in the communities we serve. Our objective has always been to maintain the continuity of services, recognizing that the health care needs of the women in our communities cannot be met completely in two years. Women need permanent access to primary health care and wellness services, and we have been using our evaluation data to demonstrate the viability of this outreach model and the use of Nurse Practitioners as primary health care providers.

At this time, the MOHLTC has announced funding for Nurse Practitioners for communities across Ontario. Currently, one of our project partners is planning to apply for such funding in order to continue the work begun by the Women’s Health and Wellness Program. We are hopeful that the proposal will be successful, and that the funding will recognize the advantages to the outreach model we have demonstrated. Such a model is more costly than one-site, office-based services, but the benefits to underserved and isolated communities that have been demonstrated through this project are reason to move beyond traditional funding formulae.

---

## Challenges

There are overwhelming health care needs in the SDHU area. Physician shortages, coupled with low health status and social indicators, create a situation that could not begin to be addressed comprehensively through this project. We have been cautious about advertising and doing public education for the simple reason that we did not wish to create demand for services that our resources would not allow us to meet.

Given the high demand for primary health care and screening services, we have had to juggle the desire to provide service to as many clients as possible and the project objective to serve those in greatest need. One option for managing client numbers would have been to restrict the scope of practice to only screening and well-woman services. However, other screening-focused clinics have found that in order to provide a viable service to high-need clients, the scope of practice must expand to encompass services beyond screening<sup>4</sup>. In the Women's Health and Wellness Program, sexual health has not been the exclusive focus of our services because it is not the exclusive need of the clients we serve.

For our clinical staff, many challenges are associated with managing care at multiple sites. Equipment and supplies must be monitored to ensure that all sites will be adequately stocked. Because the clinics do not operate in a medical office setting, the Nurse Practitioner cleaned examination rooms, delivered samples to the lab, moved portable examination tables into our mobile sites, and did other tasks outside of patient care. Managing follow-up on test results also proved challenging, as there was minimal office time available for contacting clients.

There were challenges associated with providing primary health care under a health unit umbrella, given that the public health mandate focuses on health promotion and disease prevention. The Nurse Practitioner role was also unfamiliar to many health unit staff at the start of the program. Although the need for primary health care through this program was never in question, there were adjustments to be made when dealing with the different scope of practice for the Women's Health and Wellness Program.

## Conclusion

By using an outreach model and by conducting clinics in multiple community-based locations, the Women's Health and Wellness Program has been successful at reaching women with barriers to accessing health care and screen-

ing, including women without family physicians, low-income women and women who are underscreened and never-screened for cervical cancer.

As we enter the remaining months of the Women's Health and Wellness Program, we will be continuing to provide primary health care and screening services to our clients, with evaluation continuing throughout the life of the project. A complete report on the program and the findings of the evaluation will be available through the Sudbury & District Health Unit in Summer 2003.

## ACKNOWLEDGEMENTS

Thanks to the other members of the Project Evaluation Team: Dr. Mary Powell and Dr. Bob Segsworth, Laurentian University; Isabelle Michel and Louise Picard, Sudbury & District Health Unit (PHRED Program). Thanks also to the rest of the Women's Health and Wellness Team: Marilyn Butcher, Claire Warren, Aisha Alladin, Kelly Reilly, Isabelle Michel. This project was made possible with financial support from the Ontario Women's Health Council of the Ministry of Health and Long-Term Care.



---

## SOURCE AND CONTACT

Susan Snelling, PhD  
Project Evaluator, Women's Health & Wellness Program  
Public Health Research, Education and Development (PHRED) Program  
Sudbury and District Health Unit  
Telephone: (705) 522-9200, ext. 353  
E-mail: [snellings@sdhu.com](mailto:snellings@sdhu.com)

## REFERENCES

1. Canadian Community Health Survey, Cycle 1-1. (2000/2001). Ottawa: Statistics Canada.
2. Northern Ontario Cancer Profile Report. Sudbury, ON: Northern Health Information Partnership (NHIP) and Cancer Care Ontario, 2000.
3. Census 1996. Ottawa: Statistics Canada.
4. Bottorff, JL, Balneaves, LG, Sent, L, Grewal, S, Browne, AJ. An Exploration of Women-Centred Care in the Context of Cervical Cancer Screening in Ethnocultural Groups. Vancouver: British Columbia Centre of Excellence for Women's Health, no date.



## Summary of Reportable Diseases in Ontario - August, 2002

Health Units by Region	Population 2000	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./ Meningitis	GAS	Gonorrhoea
Algoma	125,109		9	1	26	1		
North Bay	93,505		1	1	13			
Northwestern	91,920		2		17	1	1	3
Porcupine	93,680				8	1		
Sudbury	199,619		4	2	33			
Thunder Bay	158,698	1	4		40	2	1	3
Timiskaming	37,721							
<b>Total - Northern</b>	<b>800,252</b>	<b>1</b>	<b>20</b>	<b>4</b>	<b>137</b>	<b>5</b>	<b>2</b>	<b>6</b>
Eastern Ontario	194,945		4	3	5			
Hastings & Prince Edward	159,088		5		11			
Kingston, Frontenac & Lennox	180,225				25	1		
Leeds, Grenville & Lanark	163,143		3					
Ottawa	779,274		37	4	98	2		17
Renfrew	101,131		1		10			
<b>Total- Eastern</b>	<b>1,577,806</b>		<b>50</b>	<b>7</b>	<b>149</b>	<b>3</b>		<b>17</b>
Durham	512,271	1	13	85	65			12
Haliburton-Kawartha	168,120		1		9			
Muskoka-Parry Sound	86,218			2				
Peel	1,008,163		50		96	14	1	22
Peterborough	128,881		1		22	3		3
Simcoe	377,405		13	26	24	6	2	1
Toronto - total	2,542,844	2	158	71	562	35	5	192
<i>North</i>	627,021	1	41	14	126	2		28
<i>South</i>	688,584	1	54	10	190	19	3	85
<i>West</i>	509,302		53	11	152	6	2	51
<i>East</i>	717,937		10	36	94	8		28
York	724,969		60	18	31	3		4
<b>Total - Central East</b>	<b>5,548,871</b>	<b>3</b>	<b>296</b>	<b>202</b>	<b>809</b>	<b>61</b>	<b>8</b>	<b>234</b>
Grey Bruce	157,664		9		18			2
Elgin-St. Thomas	84,182		7	2	5	2		
Huron	61,097		5		1			
Chatham-Kent	112,897		2	1	11	1		1
Lambton	131,643							
Middlesex-London	412,976		3		43	20		13
Oxford	102,561		3		14			
Perth	75,238		1	1	6			
Windsor-Essex	381,672		24		40	11		1
<b>Total - Southwest</b>	<b>1,519,930</b>		<b>54</b>	<b>4</b>	<b>138</b>	<b>34</b>		<b>17</b>
Brant	126,481		5	7	12		1	1
Haldimand-Norfolk	109,536		8		5			
Halton	375,705		15		15			
Hamilton	498,553	2	12	8	71	4		12
Niagara	423,600		19	144	24			5
Waterloo	446,833		16		59	1		6
Wellington-Dufferin-Guelph	241,777		17	5	31	2		1
<b>Total - Central West</b>	<b>2,222,485</b>	<b>2</b>	<b>92</b>	<b>164</b>	<b>217</b>	<b>7</b>	<b>1</b>	<b>25</b>
<b>September 2002</b>	<b>11,669,344</b>	<b>6</b>	<b>512</b>	<b>381</b>	<b>1,450</b>	<b>110</b>	<b>11</b>	<b>299</b>
<b>* Total YTD 2002</b>	<b>-</b>	<b>60</b>	<b>3,538</b>	<b>11,203</b>	<b>13,228</b>	<b>476</b>	<b>285</b>	<b>2,238</b>
<b>* Total YTD 2001</b>	<b>-</b>	<b>102</b>	<b>3,783</b>	<b>8,960</b>	<b>12,211</b>	<b>390</b>	<b>252</b>	<b>2,220</b>

The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

\* Adjusted for deletions and late reports.

## Summary of Reportable Diseases in Ontario - August, 2002

Health Units by Region	Population 2000	PPNG	Hepatitis A	Hepatitis B	Hepatitis C	Hib	Influenza	Measles	Meningo-coccal
Algoma	125,109				5				
North Bay	93,505				1				1
Northwestern	91,920				3				1
Porcupine	93,680				1				
Sudbury	199,619				4				1
Thunder Bay	158,698	2			5				
Timiskaming	37,721								
<b>Total - Northern</b>	<b>800,252</b>	<b>2</b>			<b>19</b>				<b>3</b>
Eastern Ontario	194,945			1	4				
Hastings & Prince Edward	159,088								
Kingston, Frontenac & Lennox	180,225								
Leeds, Grenville & Lanark	163,143				4				
Ottawa	779,274	1	1	1	25		1		
Renfrew	101,131		1		2				
<b>Total - Eastern</b>	<b>1,577,806</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>35</b>		<b>1</b>		
Durham	512,271		1						
Haliburton-Kawartha	168,120				5				
Muskoka-Parry Sound	86,218				3				
Peel	1,008,163		2		25				
Peterborough	128,881				6				
Simcoe	377,405	1			28				
Toronto - total	2,542,844	9	16	6	85				2
<i>North</i>	627,021	2	3	2	20				
<i>South</i>	688,584	5	7	1	28				1
<i>West</i>	509,302	1	4	2	19				
<i>East</i>	717,937	1	2	1	18				1
York	724,969	3	3		5				
<b>Total - Central East</b>	<b>5,548,871</b>	<b>13</b>	<b>22</b>	<b>6</b>	<b>157</b>				<b>2</b>
Grey Bruce	157,664				4				
Elgin-St. Thomas	84,182				3				
Huron	61,097								
Chatham-Kent	112,897				1				
Lambton	131,643								
Middlesex-London	412,976		2		12				
Oxford	102,561								
Perth	75,238		1		1		1		
Windsor-Essex	381,672				11				
<b>Total - Southwest</b>	<b>1,519,930</b>		<b>3</b>		<b>32</b>		<b>1</b>		
Brant	126,481								
Haldimand-Norfolk	109,536				1				
Halton	375,705				8				
Hamilton	498,553		2		17				
Niagara	423,600				22				
Waterloo	446,833				10				
Wellington-Dufferin-Guelph	241,777			2	2				
<b>Total - Central West</b>	<b>2,222,485</b>		<b>2</b>	<b>2</b>	<b>60</b>				
<b>September 2002</b>	<b>11,669,344</b>	<b>16</b>	<b>29</b>	<b>10</b>	<b>303</b>		<b>2</b>		<b>5</b>
<b>* Total YTD 2002</b>	<b>-</b>	<b>158</b>	<b>112</b>	<b>92</b>	<b>3,687</b>	<b>4</b>	<b>2,173</b>		<b>45</b>
<b>* Total YTD 2001</b>	<b>-</b>	<b>147</b>	<b>135</b>	<b>135</b>	<b>4,129</b>	<b>4</b>	<b>762</b>	<b>6</b>	<b>92</b>

The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

\* Adjusted for deletions and late reports.

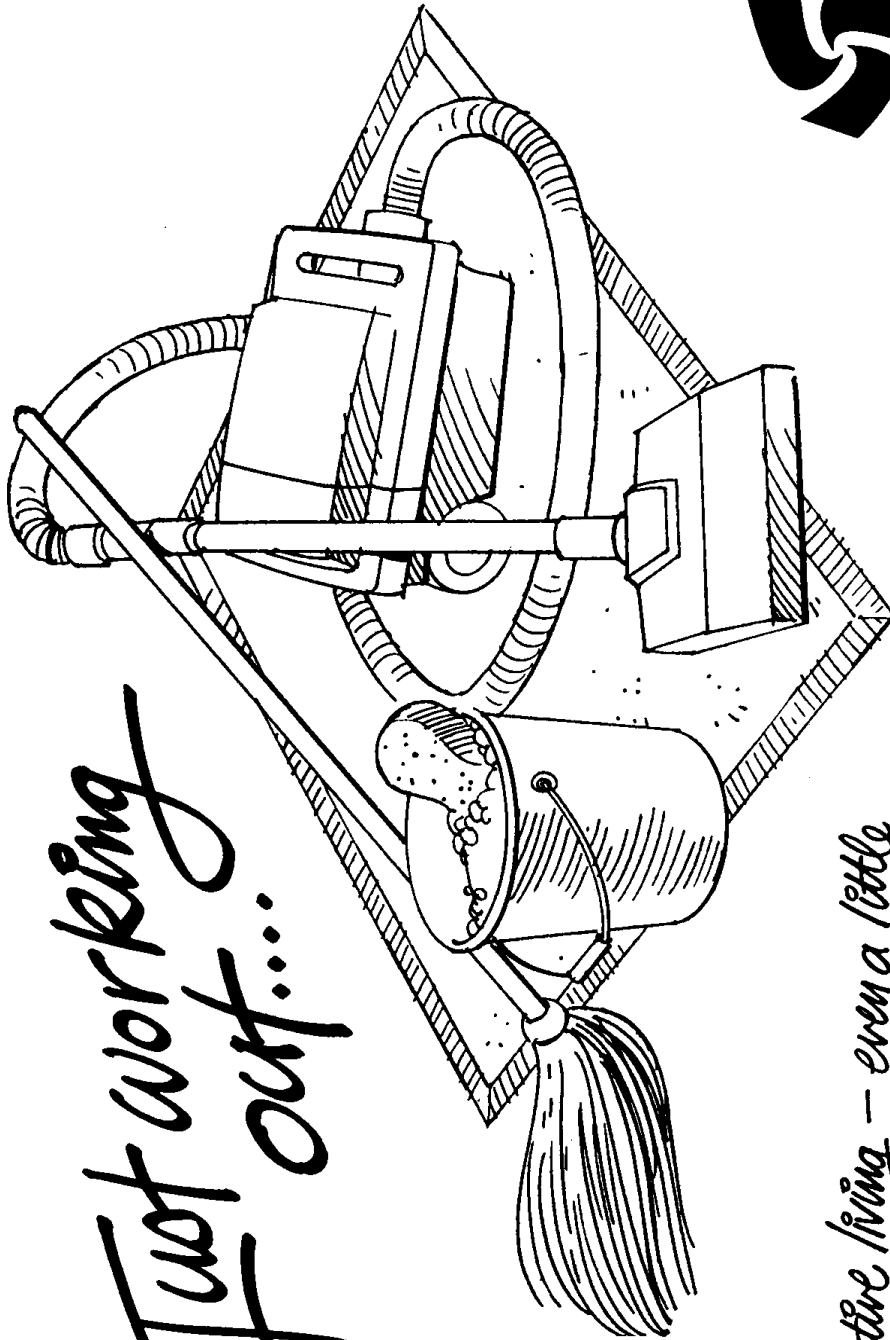
## Summary of Reportable Diseases in Ontario - August, 2002

Health Units by Region	Population 2000	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis (Prim/Sec)	VTEC
Algoma	125,109							1
North Bay	93,505		1		1			
Northwestern	91,920				1			
Porcupine	93,680		2					
Sudbury	199,619		4		2			
Thunder Bay	158,698				2			1
Timiskaming	37,721							
<b>Total - Northern</b>	<b>800,252</b>		<b>7</b>		<b>6</b>			<b>2</b>
Eastern Ontario	194,945		1		7			1
Hastings & Prince Edward	159,088				5			4
Kingston, Frontenac & Lennox	180,225		1					
Leeds, Grenville & Lanark	163,143				1			
Ottawa	779,274		5		16	3	1	3
Renfrew	101,131		1		1			
<b>Total- Eastern</b>	<b>1,577,806</b>		<b>8</b>		<b>30</b>	<b>3</b>	<b>1</b>	<b>8</b>
Durham	512,271				8	4		1
Haliburton-Kawartha	168,120				2	1		3
Muskoka-Parry Sound	86,218		1		23			
Peel	1,008,163				33	2		4
Peterborough	128,881		8					
Simcoe	377,405		1		6			2
Toronto - total	2,542,844	1	14		76	11	18	2
<i>North</i>	627,021		6		23		1	2
<i>South</i>	688,584		6		19	8	14	
<i>West</i>	509,302	1	1		13	2	3	
<i>East</i>	717,937		1		21	1		
York	724,969		4		24			4
<b>Total - Central East</b>	<b>5,548,871</b>	<b>1</b>	<b>28</b>		<b>172</b>	<b>18</b>	<b>18</b>	<b>16</b>
Grey Bruce	157,664				1			
Elgin-St. Thomas	84,182		3		2			4
Huron	61,097		2		1			
Chatham-Kent	112,897				2			
Lambton	131,643							
Middlesex-London	412,976				1			
Oxford	102,561				2			3
Perth	75,238				1			3
Windsor-Essex	381,672				4			2
<b>Total - Southwest</b>	<b>1,519,930</b>		<b>5</b>		<b>14</b>			<b>12</b>
Brant	126,481				6			3
Haldimand-Norfolk	109,536				4			1
Halton	375,705		1		5	2		5
Hamilton	498,553		4		18			2
Niagara	423,600		1		8	1		5
Waterloo	446,833		1		13			2
Wellington-Dufferin-Guelph	241,777				5	1		3
<b>Total - Central West</b>	<b>2,222,485</b>		<b>7</b>		<b>59</b>	<b>4</b>		<b>21</b>
<b>September 2002</b>	<b>11,669,344</b>	<b>1</b>	<b>55</b>		<b>281</b>	<b>25</b>	<b>19</b>	<b>59</b>
<b>* Total YTD 2002</b>	<b>-</b>	<b>10</b>	<b>349</b>	<b>2</b>	<b>1,861</b>	<b>772</b>	<b>99</b>	<b>294</b>
<b>* Total YTD 2001</b>	<b>-</b>	<b>7</b>	<b>343</b>	<b>15</b>	<b>1,997</b>	<b>182</b>	<b>12</b>	<b>277</b>

The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

\* Adjusted for deletions and late reports.

*Just working  
Just out...*



*...active living - even a little  
regular physical activity makes  
a healthy difference!*

