TORONTO

STAFF REPORT
ACTION REQUIRED

Inequalities and Immunization Rates in Toronto School Children

Date:	January 5, 2012
To:	Board of Health
From:	Medical Officer of Health
Wards:	All
Reference Number:	

SUMMARY

Publicly funded immunization programs have significantly improved the health of children in Toronto. High immunization coverage rates are necessary to ensure that these health benefits continue by maintaining herd immunity, a level of protection in a community that prevents dangerous diseases such as measles and mumps from circulating in Toronto. Toronto Public Health (TPH) uses a number of strategies to maintain high immunization rates in Toronto including collecting and assessing immunization records for the immunizations mandated under Ontario's *Immunization of School Pupils Act* (ISPA) (measles, mumps, rubella, tetanus, diphtheria and polio), providing immunizations directly to school students and ensuring that all parents/guardians are provided with clear information about the benefits of immunizing their children and the immunization requirements for school attendance.

A previous report by TPH showed that City neighbourhoods with a larger proportion of people living with a low income had higher rates of disease and greater risk for poor health.[1] Using this same methodology, TPH investigated whether student immunizations follow the same pattern, lower in areas of the City with a higher proportion of low income residents and higher in more affluent areas. Low immunization coverage rates put children at risk of preventable infectious diseases such as measles, which periodically are imported into Toronto through travel and immigration. Inequalities in immunization coverage rates would be a signal that TPH and other health sector organizations may need to refocus immunization programs and services to ensure equitable access to immunizations for all children in Toronto.

Using records gathered during the 2010-2011 school year, immunization coverage rates for children living in areas with different income levels were compared. Income was

measured by the proportion of households with income below the Statistics Canada low income cut-off level (LICO). Comparisons showed that more children living in areas with lower income (higher proportion of households below the LICO) had incomplete immunization records at the beginning of the school year. This is the best indicator that TPH has that a child is not completely immunized with all of the mandatory immunizations required for school attendance. As the proportion of residents in a neighbourhood living below the LICO decreased, the proportion of students with up-to-date immunization records increased, although the differences in immunization coverage rates between the areas were not statistically significant.

After TPH sent reminders to parents of the immunization requirements for school attendance and followed up with suspension of a small proportion of Toronto students still lacking a complete record as per the ISPA, the relationship between income level and immunization coverage disappeared and virtually all school children's records were up to date for the mandated vaccines. The process of informing parents of gaps in their child's immunizations coupled with the possibility of suspension from school was successful at achieving almost complete uptake of the six mandatory vaccines.

The ISPA has been successful in ensuring very high immunization coverage rates for the six vaccines it mandates, however these six now form only a fraction of all those offered to Ontario children through the publicly funded immunization program. Since 2004, immunizations against chickenpox, invasive pneumococcal disease, meningitis, whooping cough (pertussis) for adolescents and adults, rotavirus and human papilloma virus (HPV) have all been added to Ontario's publicly funded immunization schedule. Some of these immunizations are offered through health care providers, and TPH offers HPV immunization to grade 8 girls and meningitis and hepatitis B immunizations to all grade 7 students through school-based clinics.

These additional publicly funded immunizations are voluntary and not included in the ISPA. So, while TPH can collect information from parents about their child's vaccine status, students cannot be suspended for not receiving these immunizations. Experience has shown that the reminders and suspensions linked to enforcement of the ISPA leads to higher immunization coverage rates when compared to vaccines that are offered in school-based clinics but are voluntary. This growing gap between the number of immunizations contained in the ISPA and those offered through the publicly funded immunization program also means that TPH records are less complete. Records are received for all immunizations but are most accurate and complete for the mandated vaccines because the potential for suspension leads to a higher response rate to requests for information sent to parents.

TPH is also mandated to collect and assess immunization information for children attending licensed day nurseries in Toronto. This is not being done due to a lack of resources. A more comprehensive approach to the collection of immunization information directly from health care providers would be more effective at building a complete picture of the immunization status of Toronto children.

RECOMMENDATIONS

The Medical Officer of Health recommends:

1. that the Board of Health call on the Ministry of Health and Long-Term Care to update the immunization requirements described in *R.R.O. 1990, Ontario Regulation 645* of the *Immunization of School Pupils Act* so that they are more closely aligned with the vaccines in the current Ontario Publicly Funded Immunization Schedule.

2. that the Board of Health call on the Ministry of Health and Long-Term Care to strengthen the reporting of immunization information to public health by amending the *Health Protection and Promotion Act* to require mandatory reporting by health care providers to the Medical Officer of Health of the administration of an immunization to anyone below the age of 18.

3. that the Board of Health call on the Ministry of Health and Long-Term Care to ensure that Panorama, the electronic immunization system that will replace IRIS to capture vaccine records for Ontario children, is designed to easily accept electronic information directly from health care provider electronic medical records to allow for the efficient capture and sharing of immunizations provided in the community.

Financial Impact

There are no direct financial impacts flowing from this report.

DECISION HISTORY

At its February 10th, 2009 meeting, the Board of Health discussed a report titled *Childhood Immunization Coverage in Toronto*[2] from the Medical Officer of Health that described the importance of immunization in improving the health of Toronto residents. Refer to: http://www.toronto.ca/legdocs/mmis/2009/hl/bgrd/backgroundfile-18659.pdf. The Board of Health requested that the Medical Officer of Health:

1) report back to the Board of Health on inequalities in vaccination coverage in Toronto; and

2) explore possible links with Toronto Children's Services and the Ministry of Children and Youth Services in order to facilitate the access of immunization information from licensed child care centres.

ISSUE BACKGROUND

Immunization is one of the most life-saving of all public health activities. The incidence of many communicable diseases affecting children has been greatly reduced in Canada since the introduction of publicly funded immunization programs 50 years ago. For example, between 2000 and 2010, on average only five cases of measles and eight cases of mumps were reported to TPH each year. This is a substantial decline from the pre-immunization era when thousands of children were infected with these two viruses and many children died or were severely disabled by their illness. Polio, diphtheria and

tetanus have been eliminated from Canada by successful immunization programs. The number of chickenpox cases reported in Toronto residents has fallen from 5,317 in 2004, the year before a publicly funded immunization program was launched, to 1,885 in 2010. This decline in chickenpox cases will almost certainly accelerate due to the announcement by the Ontario Government in August 2011 that children born after January 1st, 2000 are now eligible for a second dose of chickenpox vaccine.

An immunization coverage rate is the proportion of a particular population, for example grade two students or children less than four years of age, which is appropriately immunized against a particular disease or diseases for their age. The continued success of Ontario's immunization program depends on maintaining high immunization coverage rates. Children and adults who are not optimally immunized are at risk of infection with vaccine preventable diseases such as measles that are still transmitted globally and could be reintroduced into Toronto through travel and migration. An example of this was seen in Quebec in 2011 where a large measles outbreak infected more than 750 people and lead to the need for a large vaccination campaign in Quebec schools. During a large measles outbreak in 1989 in Quebec, 10,000 people were infected and 7 died. This current outbreak has been linked to an even larger outbreak in France where over 14,000 people have been infected and six people died from measles.[3]

High immunization coverage rates lead to "herd immunity", i.e. so few people in a community are at risk of getting infected that a person with the virus or bacteria causing the illness cannot pass it to anyone. When vaccination coverage rates fall below a critical level, herd immunity is lost and the spread of disease can once again occur. This can result in a quick increase in the number of cases of illness and even lead to death in the community. Experience in other countries highlights the impact a decline in immunization coverage rates can have on the health of children. For example, in the United Kingdom (UK) rates of measles, mumps and rubella (MMR) vaccination fell due to a 1998 fraudulent research report linking the MMR vaccine to autism. After sufficient children went unvaccinated due to the unfounded safety concern surrounding the vaccine, measles incidence in the UK increased from 56 confirmed cases in 1998 to 449 confirmed cases in 2006 and measles once again became endemic after being eliminated.[4] This resurgence of measles also included a number of deaths, the first from this disease for many years in the UK.

Ensuring high immunization coverage rates, necessary to reach herd immunity, can be supported by mandatory immunization of school students which can lead to large decreases in disease rates. In Japan, which suffered substantial rates of illness and death from the 1957 influenza pandemic, vaccination of school students was first encouraged and then made mandatory in 1977. During the next 10 years when influenza vaccine was mandatory for Japanese school students, Japan recorded its lowest rates of influenza illness since the 1957 pandemic. Once parents were allowed to exempt their children from influenza vaccine, disease rates quickly increased, further illustrating the impact that mandatory vaccination can have on disease rates in a community or country.[5]

Activities Supporting Ontario's Successful Immunization Program

Ontario's successful immunization program is a result of a number of factors that support high immunization coverage rates. The provincial government funds a large number of vaccines that are free for patients and available through family physicians and other community-based health care providers; these providers administer almost 95% of vaccines given in Ontario. These vaccines include those offering protection against diphtheria, tetanus, polio, pertussis, *Haemophilus influenzae* b, measles, mumps, rubella, pneumococcal disease, meningitis, chickenpox and rotavirus, which was added to Ontario's publicly funded immunization schedule in August 2011. The province also pays for free influenza immunization for everyone six months of age and over starting in the fall each year.

Ontario's provincial immunization schedule is constantly being reassessed, guided by recommendations from the National Advisory Committee on Immunization (NACI), a group of experts who assess the evidence for the use of each vaccine licensed in Canada, and the Provincial Infectious Diseases Advisory Committee's (PIDAC) Immunization Subcommittee. The Ministry of Health and Long-Term Care (MOHLTC) decides which vaccines to add to the publicly funded immunization schedule.

In addition to the routine childhood vaccines administered by physicians and community based health care providers, TPH nurses conduct school-based immunization clinics each school year to offer hepatitis B and quadrivalent conjugate meningococcal vaccines to grade 7 students and HPV vaccine to grade 8 girls. Starting each fall, TPH operates a series of community-based influenza immunization clinics for the general public.

Legislation in Ontario also supports TPH activities that promote and maintain high immunization coverage rates in children and adolescents. The ISPA requires that each student under 18 years of age have up-to-date vaccinations against diphtheria, tetanus, polio, measles, mumps and rubella for school attendance. Students lacking these vaccines can be suspended from school for up to 20 days or until they are appropriately vaccinated. The law allows for exemptions to this requirement for medical, religious or philosophical reasons. Medical exemptions must be verified by a physician and religious or philosophical exemptions must be documented on a notarized provincial form. Susceptible students who are exempted from the immunization requirements may be excluded from school during an outbreak of one of the diseases on the mandatory immunization list.

Collection and Verification of Student Immunization Records

The legal mandate in the ISPA to verify that all students are current with their six required immunizations is achieved through collecting, assessing and maintaining an immunization record for each of the approximately 350,000 students attending school in Toronto. TPH works closely with schools to collect a copy of each child's yellow immunization card, which is presented to the school by parents when first registering their child. The schools forward these documents to TPH and the information is entered into a provincial information system called the Immunization Record Information System

(IRIS). Parents are responsible for directly reporting to TPH any additional immunizations that students receive after they enter the school system.

Each school year, all student immunization records are assessed against the requirements in the ISPA to ensure that students are protected against six diseases; diphtheria, tetanus, polio, measles, mumps and rubella. The parents of children whose records are incomplete are sent two notices (the first is called a "questionnaire" and the second is called a "final notice") approximately 15 days apart, outlining any missing dose(s). Parents are asked to have their child appropriately vaccinated and send TPH this information. Those parents who do not provide the requested information which confirms their child is completely immunized, are sent a suspension order for their child that takes effect in approximately one month. Once any missing immunization information is provided to TPH, a suspended child may return to school. Rarely, the student's record remains incomplete at the end of the 20 day suspension period which can lead to an extension of the suspension to ensure that a student receives their required vaccines.

A study conducted by TPH in 2007[6] showed that many students with incomplete records were appropriately vaccinated but the record held by TPH in IRIS did not accurately reflect their vaccination status. Therefore, a large proportion of the incomplete immunization records in IRIS at the start of each school year are a result of missing information rather than a large number of under-immunized children. However, once parents are reminded to provide TPH with missing information about their child's immunization status, the proportion of complete records is the best approximation of immunization coverage rates for the mandatory vaccines.

TPH further supports high immunization coverage rates by holding immunization clinics in the evenings and on weekends each year between January and April. Students who receive a notice that their immunization record is not complete can receive the dose or doses of vaccine they require at these clinics. These clinics expedite the process of ensuring that students are fully immunized according to the ISPA, provide other immunizations that students may have missed when they were infants and reduce the likelihood that a student will be suspended from school.

Collection and Assessment of Immunization Records in Day Nurseries

Since most childhood immunizations are given before children reach school age, collecting and assessing the immunization records of children attending Toronto day nurseries supports maintaining optimal immunization coverage rates. This activity is also mandated by the Ontario Public Health Standards. However, to meet this mandate, paper immunization records would need to be collected from each day nursery each year and entered into IRIS along with the demographic information (i.e. birth date, gender, address etc.) for each child. Unlike the school boards who have an electronic record for each child's demographic information that can be used by IRIS directly, no central electronic records for all children attending day nurseries exist. The collection of immunization and demographic information from the approximately one thousand day nurseries in Toronto and its entry into IRIS would require a significant amount of resources which TPH does not currently have. As well, the cohort of children attending each day nursery changes

frequently, adding to the resources that would be necessary to maintain their immunization records.

Risks to Ontario's Successful Immunization Program

While TPH strives to maintain high immunization coverage rates, particularly those which are mandated under the ISPA, a number of factors can reduce the likelihood that a child will be completely immunized for their age. Poverty and factors associated with poverty are the strongest predictors of children missing out on receiving their necessary immunizations.[7,8,9,10] Parental attitudes, beliefs and perceptions are also strong predictors of parental immunization behaviour and can lead to children being unprotected.[11,12 ,13] Provider practices such as the use of reminder systems also have been found to influence the immunization status of their patients.[14,15]

The six vaccines that are currently required under the ISPA have been the only ones mandated in Ontario for many years. The number of publicly funded, recommended immunizations offered to Ontario children has grown substantially but the immunization requirements in the ISPA have not kept up. Laws requiring students to receive certain immunizations before attending school have been shown to improve immunization coverage rates.[16,17,18] These studies have been validated in Ontario as high coverage rates have been achieved for the six vaccines mandated in the ISPA. Studies have shown that reminder systems also have a positive impact on immunization uptake including reducing the inequalities in immunizations associated with poverty.[10,19]

Experience in Toronto has confirmed these findings. After information explaining the gaps in their child's immunization record is sent to parents and the risk of school suspension is communicated, the coverage rates for the immunizations mandated by the ISPA reach almost 100%. By comparison, the coverage rates for voluntary immunizations provided by TPH nurses to students in school are lower. During the 2010-2011 school year, 80% of grade 7 students received hepatitis B and meningitis immunizations. During the same school year, 63% of grade 8 girls were immunized against HPV.

The factors, such as poverty, shown to reduce children's rates of protection against vaccine preventable diseases are not evenly distributed in Toronto. Therefore, there is a concern that some areas of the City may have more vulnerable children at risk for these preventable diseases. If too few children in a neighbourhood are vaccinated, herd immunity may be threatened or lost in that area providing an opportunity for a preventable disease to circulate. This places all susceptible Toronto residents at increased risk of being exposed to a disease that could be eliminated by high immunization coverage rates.

COMMENTS

The October 2008 Board of Health report titled *The Unequal City: Income and Health Inequalities in Toronto 2008*[1], described the associations between health outcomes and the distribution of income in Toronto. The report found that individuals living in areas of Toronto that have a greater proportion of people with low income experience greater risk

of illness including higher rates of disease, and death at an earlier age. The report also recommended that more information about health inequalities in Toronto must be gathered and analyzed to help guide service delivery, to monitor trends and to evaluate the effectiveness of interventions. The immunization coverage rate for the vaccines mandated under the ISPA is a health indicator that has the potential to be influenced by low income and therefore be unequally distributed in Toronto.

At its February 2009 meeting, the Board of Health asked the Medical Officer of Health to report back on possible inequalities in immunization coverage rates in Toronto. The immunization records that TPH gathers on the six mandatory immunizations listed in the ISPA for school-aged children that are stored in IRIS can be used to investigate possible inequalities in immunization coverage rates. TPH collects information on childhood vaccinations only after a child enters the school system (usually at age four years) so immunization information for infants is not available. While information is collected from parents about other non-mandatory immunizations, the records for the six mandated immunizations are the most accurate and complete because these records are the focus of the reminder system reinforce by the risk of suspension. The methodology in *The Unequal City: Income and Health Inequalities in Toronto 2008* that separates the City into quintiles or fifths based on the proportion of families in each area living below the Statistics Canada low-income cut off (LICO) was used to describe the distribution of income in Toronto.

Assessment of Immunization Records – 2010-2011 School Year

Table 1 shows the proportion of student immunization records found to be incomplete at the start of the 2008-2009 and 2010-2011 school years. Many more records were incomplete at the start of the 2010-2011 school year because the assessment of records in 2009-2010 was modified as TPH was responding to the H1N1 influenza pandemic. TPH staff did not issue suspension letters during that school year. Instead all records were assessed and one letter was sent to parents of those students with incomplete records requesting the outstanding information. As a result, more immunization records than usual were found to be incomplete when records were again assessed at the start of the 2010-2011 school year.

Table 1: Incomplete Immunization Records as a Proportion of All Student Records for 2008-2009 and 2010-2011 School Years, Toronto

	2008-2009	2010-2011
Immunization Records Assessed	366,573	356,735
Notices Sent Requesting Information	63,145	98,538
Proportion of Records - Incomplete	17.2%	27.6%

The data from the assessment of student immunization records during the most current complete school year, 2010-2011, was used to investigate the potential inequalities in vaccine coverage rates across Toronto.

Table 2 shows the proportion of student immunization records that were complete at all five progressive stages in the record assessment process. At the start of the school year,

71.9% of all records were complete. This increased to 87.8% after a second notice was sent to parents requesting information. After suspension orders were sent informing parents that their child would be suspended from school in one month, 94.5% of records were complete. Once students were suspended from school and immunization information to allow them to return was received, the immunization coverage rate for the six mandated vaccines was 97.3% at the end of the school year. For the 2010-2011 school year, 10,533 students (3.0%) were suspended for an average of 4.7 days. Figure 1 shows the number of notices that were sent out at each stage of the process and the immunization coverage rates by quintiles (explained below) at each step in the assessment process.

Table 2: Status of Student Immunization Records – All Students 2010-2011 School Year, Toronto

Immunization Records (percent complete for age – mandatory vaccines)					
	Start of 2010-2011 School Yr. (before notices)	After First Notice Is Sent Out	After Second Notice is Sent Out	After Suspension Order is Sent	Final Coverage rate
Elementary Schools	75.2%	81.9%	89.0%	95.0%	97.4%
High Schools	63.7%	73.2%	84.8%	93.3%	97.3%
All Schools	71.9%	79.4%	87.8%	94.5%	97.3%

Table 2 also shows that high school student immunization records were less complete at the start of the assessment process. This is likely due to the requirement that adolescents between 14 and 16 years of age receive another dose of immunization against tetanus and diphtheria. This is due 10 years after their final childhood dose against these diseases which usually occurs when adolescents are in high school.

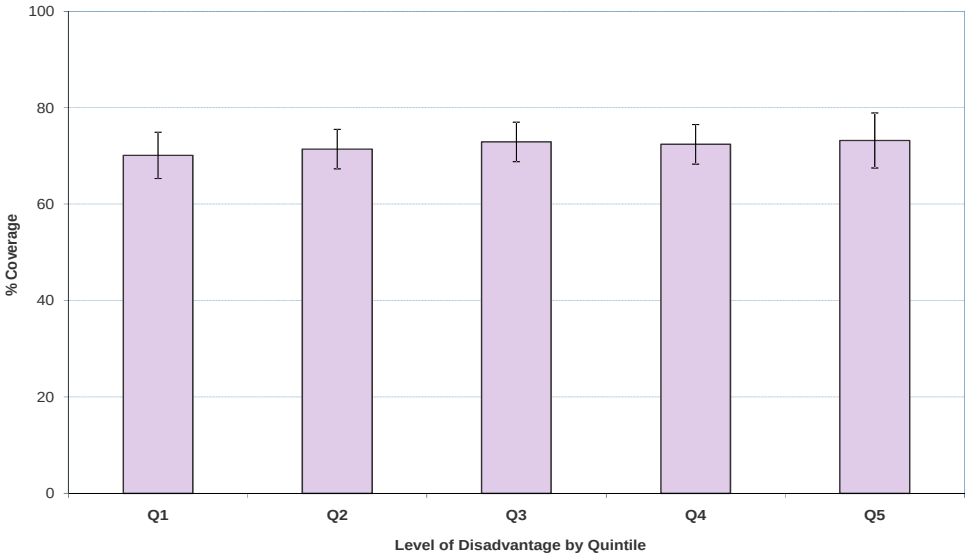
Figures 2 to 6 provide a visual representation in the form of five maps of Toronto neighbourhoods of the increase in the immunization coverage rates for the six mandated vaccines as parents respond to notices explaining the immunization requirements and suspension orders set out in the ISPA. At the start of the process, all neighbourhood coverage rates for students were less than 85%, which may be too low to prevent the circulation of very infectious diseases such as measles and mumps should a person with one of these infections come into the school. Once all records were assessed, 119 out of 140 neighbourhoods had coverage rates above 95% and all but one neighbourhood had an immunization coverage rate above 90%. This would make it much more difficult for a virus such as measles or mumps to be transmitted from one child to another in schools with these higher immunization coverage rates.

Determining the Distribution of Immunization Coverage Rates in Toronto

Utilizing the methodology of *The Unequal City*, Toronto census tracts were divided into five groups or quintiles using the percentage of families in the census track that reported income below the LICO in the 2006 census. The immunization coverage rates for students living in these census tracts were then summarized and compiled at the LICO quintile level.

Figure 7 shows a small gradient across the five LICO quintiles for the proportion of students with complete immunization records at the start of the school year. Students living in census tracts with the highest proportion of low income residents had the lowest coverage rate (as indicated by incomplete records) (70.1%). Students living in the census tracts with the lowest proportion of low income residents had the highest coverage rate (73.2%). With the exception of Q4, each quintile of increasing wealth was associated with an increased proportion of students with complete immunization records although these differences were not statistically significant.

Figure 7: School immunization coverage rates before notices based on student address, by level of disadvantage. Toronto, 2010/11

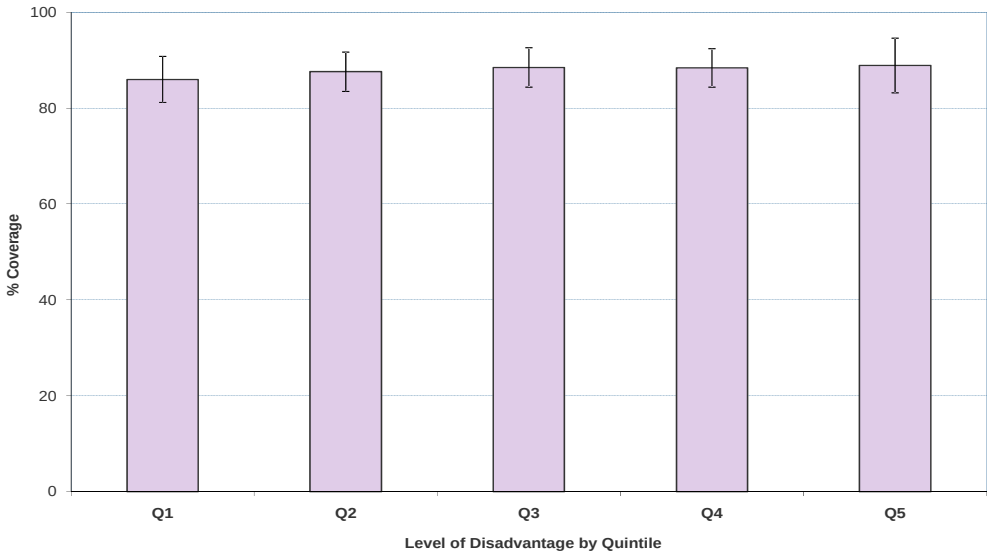


Error bars (|) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

After two notices were mailed to parents indicating their child's record was incomplete, immunization coverage increased (Figure 8) but the gradient across the five income quintiles remained; the gap between the lowest and highest income areas was still approximately 3%. Once suspension orders were sent out to parents, the gap between coverage rates in low-income areas and high-income areas decreased to only 0.8% (Figure 9). The coverage rate for students approached 100% (Figure 10) across all areas of the City once suspensions occurred.

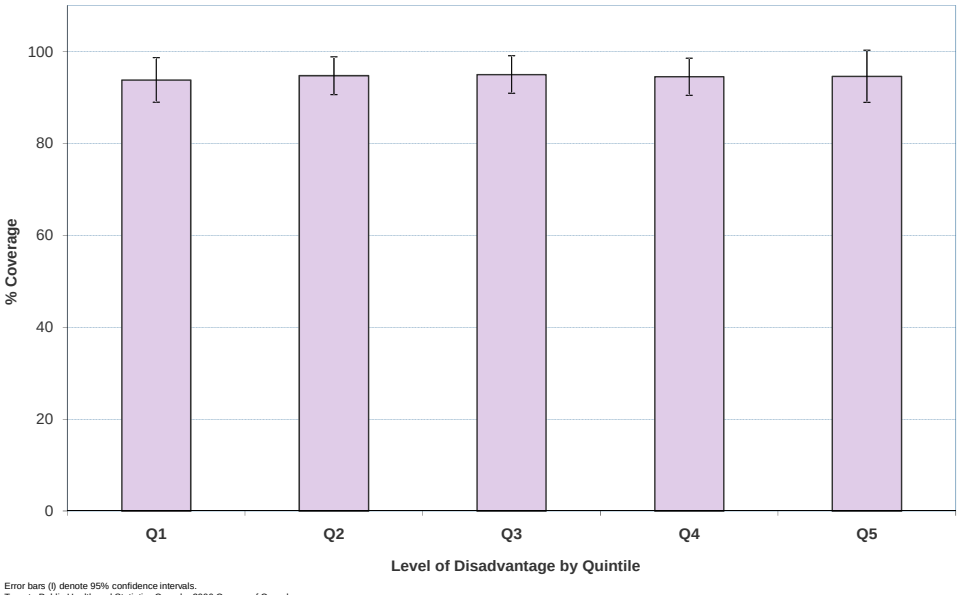
In fact, the coverage rates were slightly higher in areas with the lowest incomes due to fewer exemptions for students in these areas. Exemptions are the main reasons students remain unvaccinated by the end of the program. There are also a very small number of students remaining without a complete immunization record at the end of the school year likely due to their family moving during the assessment process, which resulted in losing track of these students for follow-up. Figure 1 also shows the coverage rates at each point in the assessment process for all five quintiles along with the number of letters and orders sent out.

Figure 8: School immunization coverage rates after notices based on student address, by level of disadvantage. Toronto, 2010/11



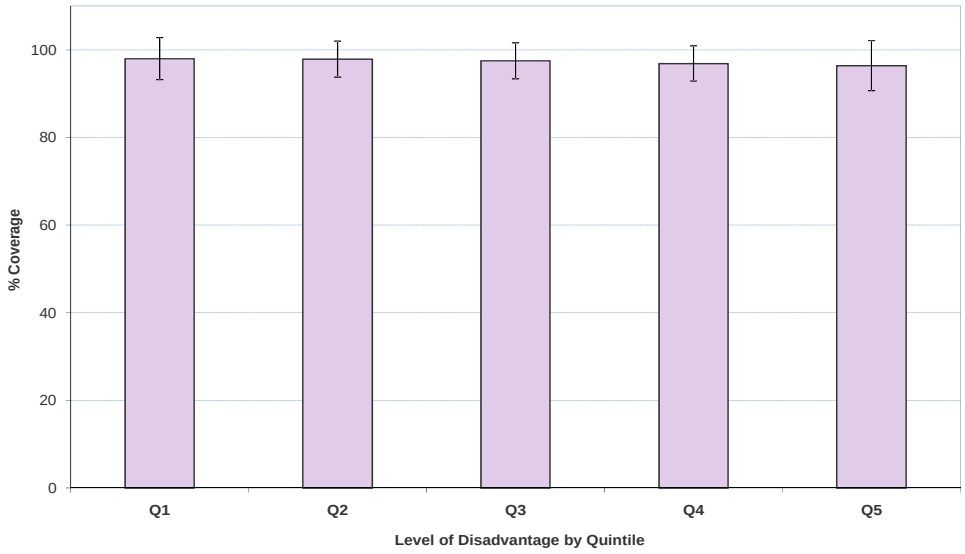
Error bars (I) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

Figure 9: School immunization coverage rates after suspension orders based on student address, by level of disadvantage. Toronto, 2010/11



Error bars (I) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

Figure 10: School immunization final coverage rates based on student address, by level of disadvantage. Toronto, 2010/11



Error bars (I) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

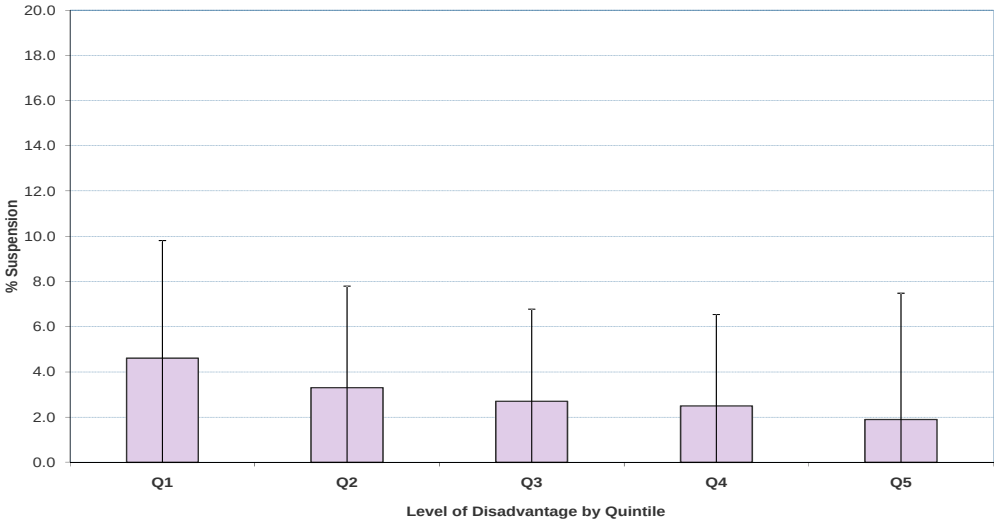
Suspensions from School

During the 2010-2011 school year, 10,533 students (3.0% of students) were suspended for at least one day of school. The proportion of students suspended during the school year was highest in the lowest income areas (4.6%) and lowest (1.9%) in the highest income areas (Figure 11). This difference was not statistically significant and the average length of suspension for the 2010-2011 school year, 4.7 days, did not vary by income level.

Exemptions

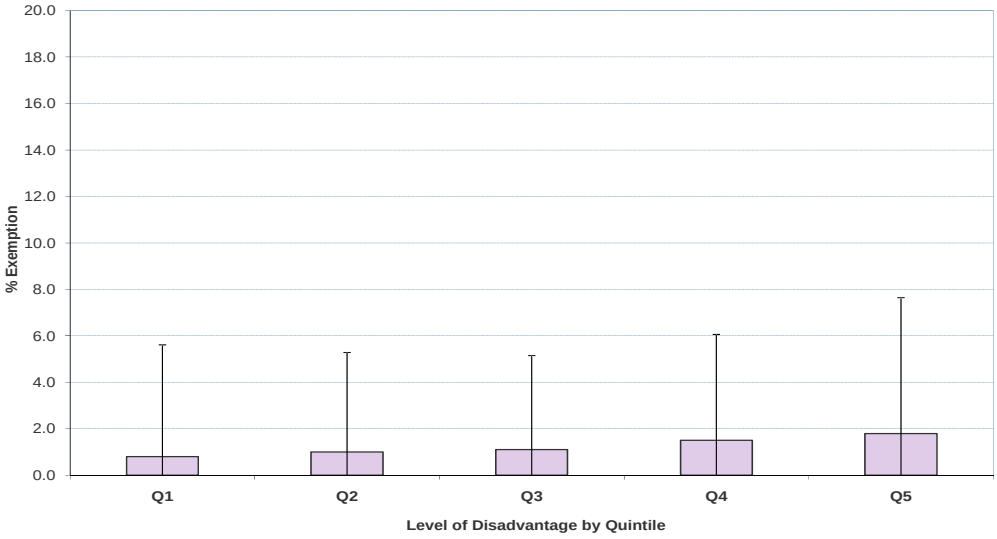
During the 2010-2011 school year, 1.2% of the students attending school that year had an exemption on file with TPH. The percentage of students with an exemption on file is highest (1.6%) in areas of the City with the highest income and lowest (0.9%) in areas with the lowest income (Figure 12). The proportion of exemptions that are medical or religious/philosophical for each quintile of income is not known as this information was not collected in a way that would allow it to be associated with each quintile of income.

Figure 11: School immunization suspension rates based on student address, by level of disadvantage. Toronto, 2010/11



Error bars (I) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

Figure 12: School immunization exemption rates based on student address, by level of disadvantage. Toronto, 2010/11



Error bars (I) denote 95% confidence intervals.
Toronto Public Health and Statistics Canada, 2006 Census of Canada.
August 11, 2011.

TPH Efforts to Reduce Suspensions

During the period when immunization notices and suspension orders are being issued, TPH offers evening immunization clinics at four City Civic Centres (East York, North York, Etobicoke and Scarborough) so that children who may have barriers to accessing

health services can receive the required immunizations from a TPH nurse. These barriers can include; lack of coverage through the Ontario Health Insurance Plan (OHIP), no primary care provider, or a lack of timely access to a health care provider. The clinics prevent students from being suspended due to a lack of access to the health care system, reduce the length of suspension and ensure that students receive the vaccines that are required for them to return to school. During the 2010-2011 school year, TPH conducted 29 of these clinics and provided 2,831 immunizations to 1,500 students (1,477 different families). 13% of the 994 families who completed a survey when they attended these clinics reported that they lacked OHIP coverage and 22% lacked a primary care provider. Close to half of the students who attended these clinics had lived in Canada for less than three years, highlighting the importance of outreach to newcomer communities.

Communication with schools ensures that they understand the process of immunization record assessment and the importance of all students receiving their complete vaccinations so that the school's population is protected. Information packages explaining the reminder and suspension processes are sent to each school each fall. TPH managers have met with groups of school board representatives at all levels to describe the roles and responsibilities of school board staff, principals and TPH nurses. This has reduced the challenges faced by school personnel when communicating with parents about the immunization assessment process.

While school personnel can provide substantial information about the assessment process, TPH staff are primarily responsible for managing the collection of immunization information to minimize the impact of the suspension process on students, families and schools. TPH nurses work diligently to connect with parents once students at risk for suspension are identified. TPH nurses attempt to understand the circumstances of each family with a student at risk for suspension. For example, cultural or language barriers may have prevented a family from understanding the student vaccination requirements. One example of this work is described below:

> "During the 2010-2011 assessment of immunization records, I found that there were a large number of Hungarian Roma students without OHIP coverage attending Parkdale Junior/Senior Public School. This resulted in 58 children being at risk for suspension as the suspension date approached for this school. Most of the Roma students and their parents did not speak English nor had they provided a telephone number to the school. I had a meeting with the school principal to strategize ways of reaching these hard to reach families. With the school's support, I was provided with a Hungarian-speaking translator and spoke to each child to get a current telephone number for their parents. The translator and I contacted all the parents with telephones and invited them to a TPH clinic at East York Civic Centre on March 28th 2011, five days after the suspension date for this school. Flyers and maps with TTC information were given out to the students to take to their parents. Information on the clinic was sent home with the students whose family did not have access to a telephone. On two occasions, the translator went to the students' homes to speak with family members. While the East York clinic was after the suspension date for this school, we held suspensions for all students at this school until the day

> after the clinic to give families an opportunity to come to the clinic to get their children immunized. Through the efforts of the school, the translator and TPH staff, half of the families came to this clinic. Seven days after the suspension date the number of students still suspended was down to one quarter of those who were at risk of being suspended. After this we continued to work closely with the school and parents to get the remaining students immunized."
>
> Toronto Public Health Registered Practical Nurse

The substantial work of TPH nurses to prevent suspensions results in many orders being rescinded before the suspension takes effect. Nurses talk to community doctors to schedule appointments for families; they speak to doctors to ensure that students receive the vaccines they need; staff translate immunization documents from many countries to avoid students from having to receive vaccines that they have already received; and they assist families to access community health care providers who are accepting new patients to obtain the immunizations their children need to attend school. The results of all of these efforts are clearly shown by the substantial proportion of suspension orders that never take effect. During the 2010-2011 school year, for example, close to 37,000 suspension orders were mailed but almost 26,500 (or 72.5%) of all suspensions were averted. As well, these actions described above undertaken by TPH staff ensured that the average suspension lasted only 4.7 days during the 2010-2011 school year.

Alongside the enforcement of the ISPA, TPH nurses work through various channels to increase the awareness of the importance of vaccinations, particularly for new Canadians. Working in partnership with the TPH Newcomers' Initiative, staff provided school settlement workers, who received many inquiries from their clients about the ISPA and the mandated vaccines, with training on the immunization process. In 2010, a poster was created by TPH and translated into the 24 most frequently spoken languages as identified by the school boards. This was distributed to all schools to help explain the school immunization requirements. A card was created that was distributed to newcomers explaining in plain language and pictures the importance of providing immunization information for students to TPH. School staff were given resources in the same 24 languages to use when helping families in their school. TPH staff also continue to provide information to medical clinics that specialize in serving newcomers, and to health care providers who have practices where newcomers seek care.

TPH Efforts to Minimize Suspension Duration

To minimize missed school days once a child is suspended, TPH nurses provide support to school staff, mostly school principals, who have the responsibility for suspending students. They also communicate with physicians who provide vaccinations to suspended students and with parents, particularly those of elementary students who may not understand the importance of receiving all of the mandatory immunizations, and the students themselves. TPH nurses communicate with busy physicians to guide them on the vaccines that individual students require. They call physicians to access immunization records in patient charts and ensure that once scheduled, information from immunization visits is promptly relayed from doctors’ offices to TPH so a student can return to school

quickly. All this is done with the full knowledge and consent of parents. Nurses talk directly to parents both at the time that students are suspended and throughout the suspension period to describe in detail what is missing in a child's immunization record and the importance of children receiving all of their mandatory vaccinations. Students who require multiple vaccinations that cannot be provided at one appointment are allowed to resume attending school pending receipt of their complete vaccination series.

Assessment of Immunization Records of Children Attending Day Nurseries
The *Ontario Public Health Standards* mandate the collection and assessment of immunization records for children attending day nurseries in Toronto but TPH lacks the resources to undertake this activity. Gathering immunization information in day nurseries would lead to more complete immunization records for school-aged children reducing the likelihood of suspension. The Board of Health asked the Medical Officer of Health to initiate discussions with Toronto Children Services (TCS) and the Ministry of Children and Youth Services to explore the collection of immunization information for their day nurseries.

TPH staff met with TCS and determined that while they collect demographic information on children in subsidized child care spaces (about half of their child care spaces or approximately 24,000 children), no immunization information is inputted into the Child Care Information System (CCIS). This demographic information could be transferred to TPH to populate IRIS and this sharing is allowed under the privacy legislation that guides both organizations, the *Municipal Freedom of Information and Protection of Privacy Act* (MFIPPA) as well as the *Personal Health Information Protection Act* (PHIPA). If information was to flow from TCS to TPH, a privacy impact assessment could be required. So while electronic demographic information could be obtained from TCS for a subset of children, manual collection of immunization information would still be required at each day nursery. TPH currently lacks the resources to do this.

TPH staff also contacted the Ministry of Children and Youth Services and was informed that the Ministry does not maintain records for individual children attending day nursery in the province.

Even with sufficient resources, the gathering of immunization information for children attending day nurseries would leave TPH with records for only a subset of all children living in Toronto. More comprehensive immunization information could be gathered by requiring health care providers to report immunizations directly to TPH as they are given, rather than have parents report the immunizations given to their children to TPH when entering school, as is the current requirement. While this would place a greater burden of reporting on already busy health care providers it would result in more comprehensive reporting of the immunization status of children living in Toronto.

CONCLUSION

A clear, although not statistically significant, association between the proportion of low-income families in an area of the City and the initial immunization coverage rate for the

six mandatory school immunizations as reflected in TPH records has been shown for Toronto school students. This association disappeared after parents were notified of the immunizations their child were missing, families were supported and assisted with getting the required immunizations, and students were suspended to ensure that all students received these mandatory vaccines. At the end of the process, virtually all students had received these immunizations. In fact, a higher proportion of children in low income areas were fully immunized due to the higher exemption rate in higher income areas, although the gap between income quintiles was very small.

The diseases on the mandatory immunization list continue to circulate globally. Very high immunization coverage rates are necessary to achieve herd immunity, a rate of immunization coverage that prevents a disease from circulating in a community if it is introduced by immigration or travel. TPH uses a variety of strategies to achieve high immunization coverage rates. The mapping of immunization coverage rates from the 2010-2011 school year showed that most Toronto neighbourhoods had immunization coverage rates that would likely prevent even very infectious diseases such as measles from circulating amongst school students.

The immunization schedule in the ISPA is out of date and does not include the immunizations such as chickenpox that have been added to the publicly-funded schedule since 2004. Without the ability to enforce a school suspension, TPH is unable to reliably collect and assess the immunization records of children for these more recent public-funded immunizations which now make up a substantial portion of the immunizations that each child receives. Therefore, the proportion of a child's immunization record accurately compiled by TPH has declined and so has TPH's ability to ensure Toronto school children are completely vaccinated. Further challenges to assuring Toronto's children are fully immunized come from a lack of resources to collect and assess immunization records for day nursery attendees in Toronto. This gap in information prevents TPH from gathering a more comprehensive picture of childhood immunizations and responding in a timely fashion to declines in immunizations before children reach school age.

Using the 2010-2011 school year, this report shows that the current system is achieving a high level of immunization coverage in Toronto students, even amongst those living in the most disadvantaged areas of our City. To maintain these high immunization coverage rates in this diverse City, TPH reaches out to communities in a number of ways to increase awareness of the immunization requirements for school attendance and ultimately to maximize immunization coverage.

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SIGNATURE

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Medical Officer of Health

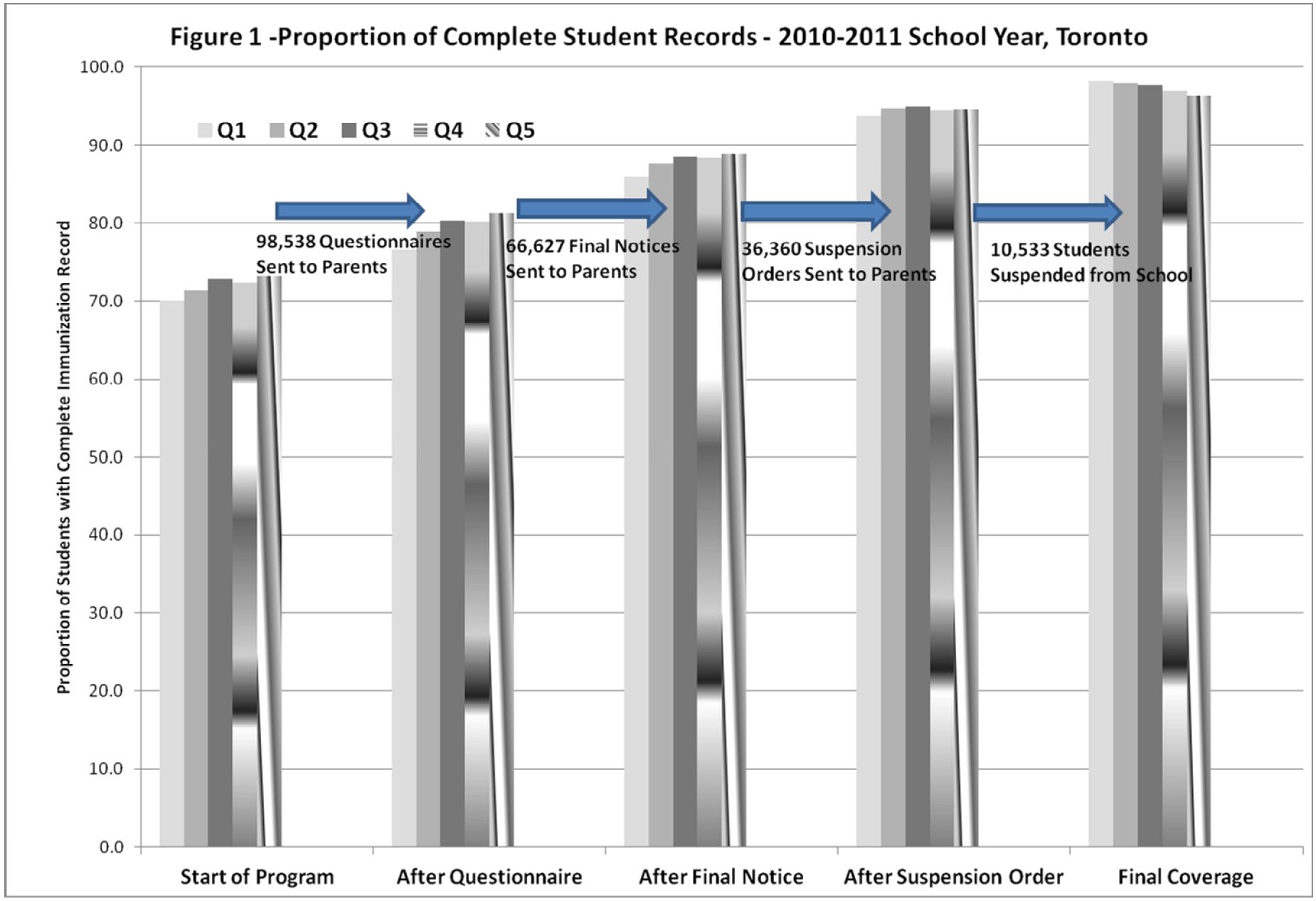
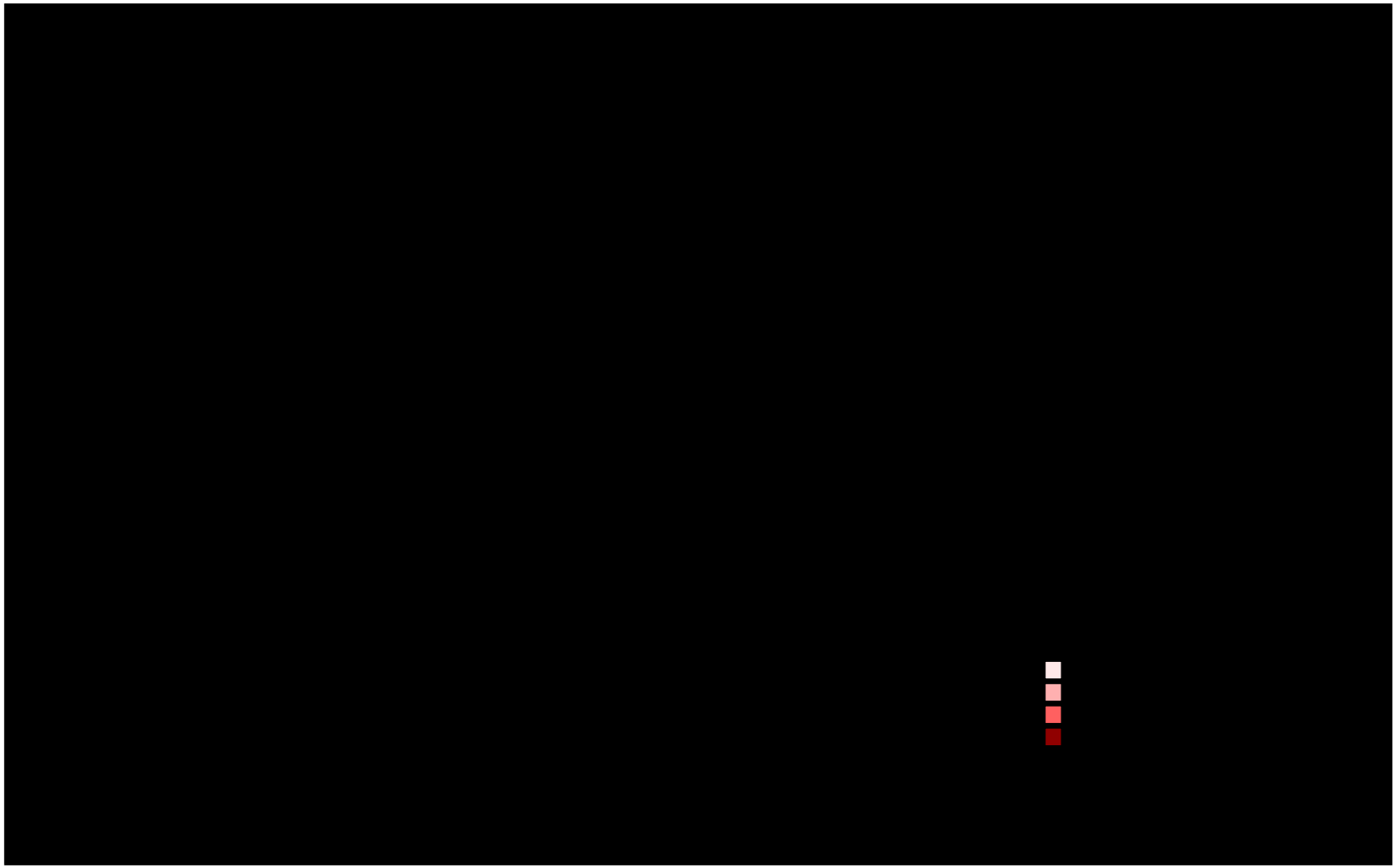


Figure 1 -Proportion of Complete Student Records - 2010-2011 School Year, Toronto
Proportion of Students with Complete Immunization Record
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Q1
Q2
Q3
Q4
Q5
98,538 Questionnaires Sent to Parents
66,627 Final Notices Sent to Parents
36,360 Suspension Orders Sent to Parents
10,533 Students Suspended from School
Start of Program
After Questionnaire
After Final Notice
After Suspension Order
Final Coverage

What does the invalid postal code mean?



Sources: School immunizations and enrollment data: VPD [IRIS].
Data as of August 2011.
Spatial data: City of Toronto.
[Enterprise Geospatial Repository –2006 Census Region Boundary Files].
Prepared by: Communicable Disease Surveillance Unit, Toronto Public Health.

N
W
E
S

Number of invalid Toronto postal codes: 328

† Total number of neighbourhoods: 140

TORONTO Public Health

Date of Publication: August 2011
Prepared by: John Farrugia
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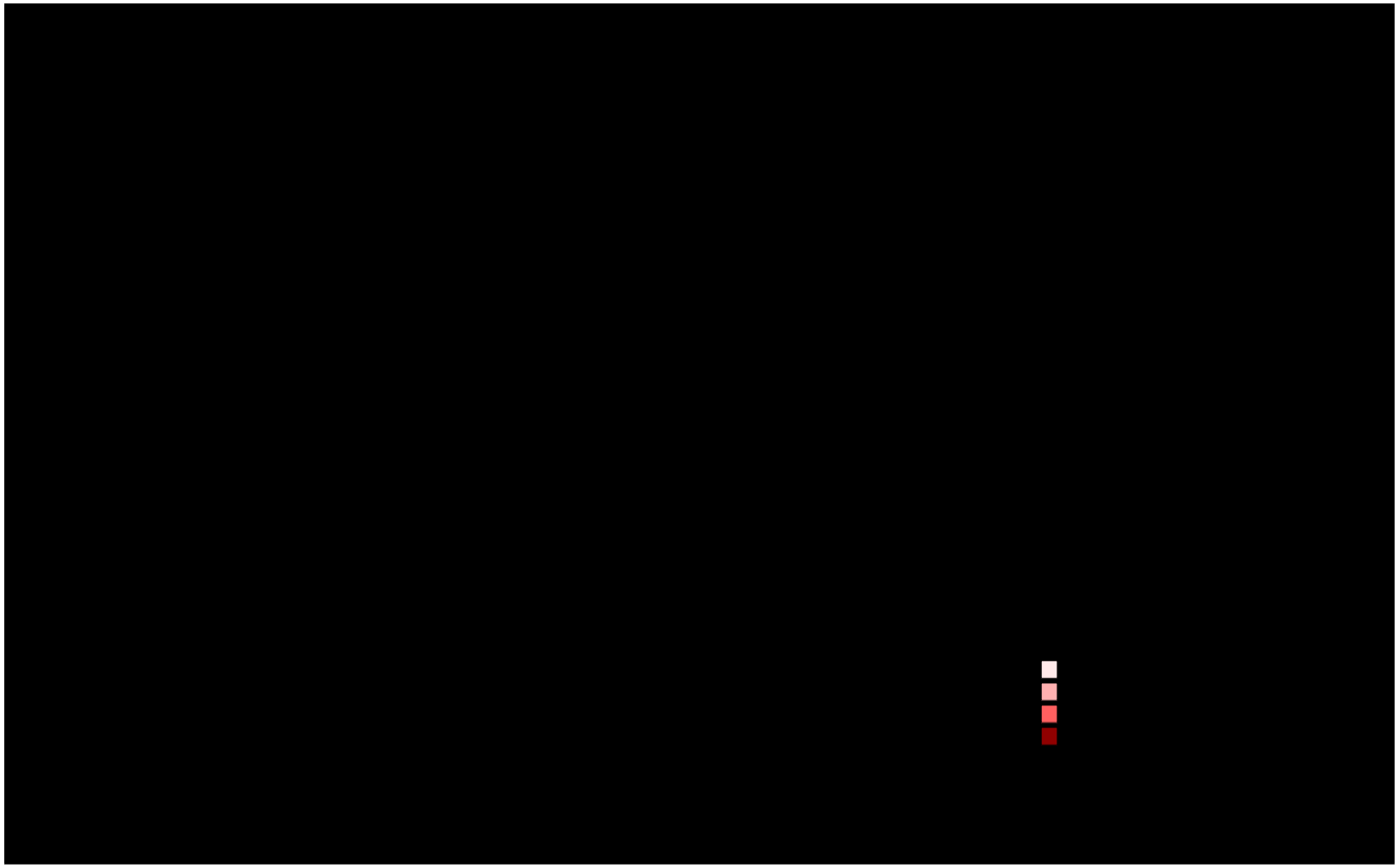

Sources: School immunizations and enrollment data: VPD [IRIS].
Data as of August 2011.
Spatial data: City of Toronto.
[Enterprise Geospatial Repository –2006 Census Region Boundary Files].
Prepared by: Communicable Disease Surveillance Unit, Toronto Public Health.

Number of invalid Toronto postal codes: 400

† Total number of neighbourhoods: 140

TORONTO Public Health

Sources: School immunizations and enrollment data: VPD [IRIS].
Data as of August 2011.
Spatial data: City of Toronto.
[Enterprise Geospatial Repository –2006 Census Region Boundary Files].
Prepared by: Communicable Disease Surveillance Unit, Toronto Public Health.

N
W
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Number of invalid Toronto postal codes: 468

† Total number of neighbourhoods: 140

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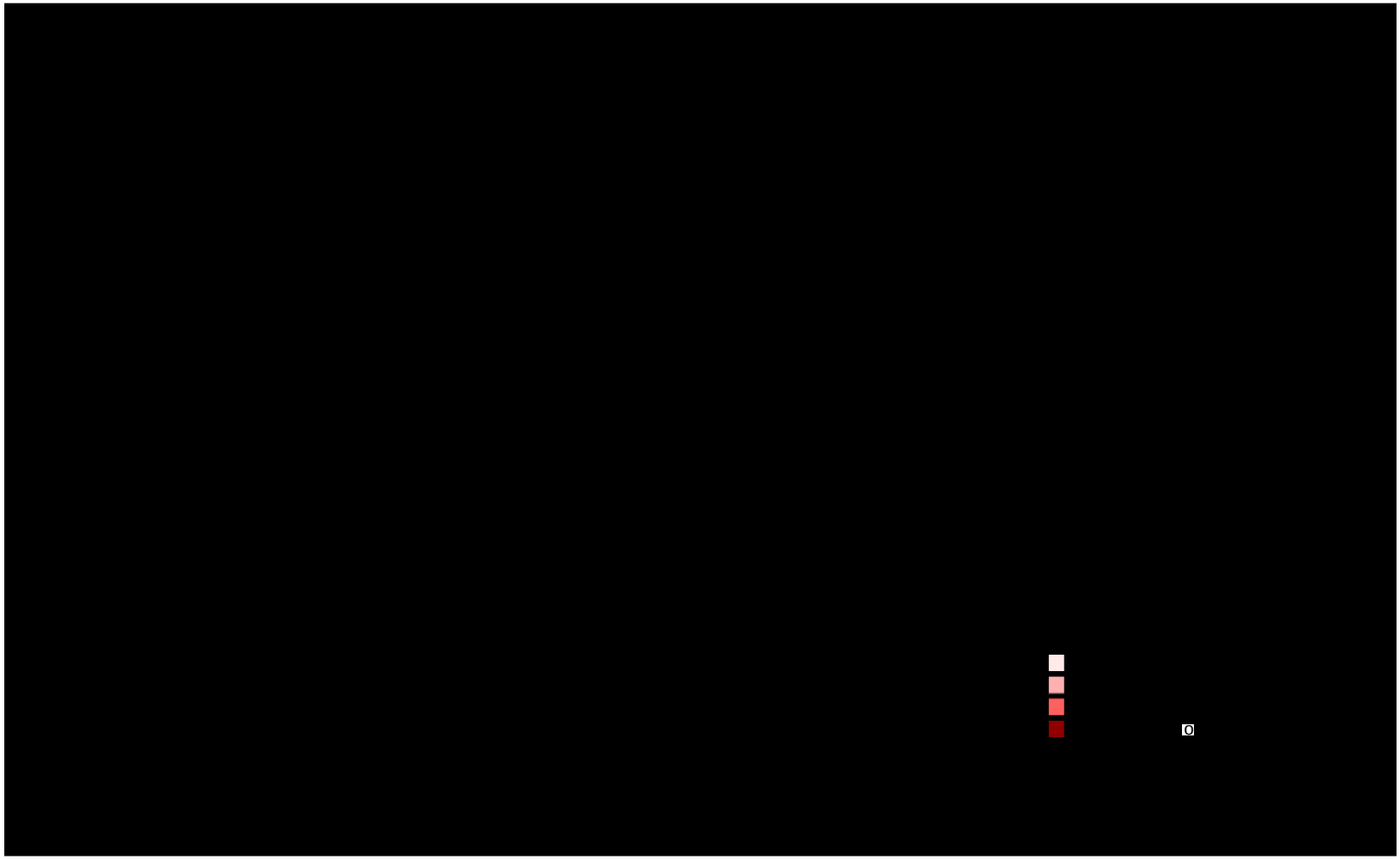

Sources: School immunizations and enrollment data: VPD [IRIS].
Data as of August 2011.
Spatial data: City of Toronto.
[Enterprise Geospatial Repository –2006 Census Region Boundary Files].
Prepared by: Communicable Disease Surveillance Unit, Toronto Public Health.

N
W
E
S

Number of invalid Toronto postal codes: 493

† Total number of neighbourhoods: 140

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