Towards Equity in Immunization: The Immunization Reminders Project

Public Health Services,
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Contributors

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Executive Summary

High rates of vaccine coverage among populations, such as children, are important for immunizations to provide herd immunity.[a] In 2006, we found statistically significant differences (i.e., disparities) in immunization coverage rates between two-year-old children in the city of Saskatoon based on where they lived.

A grant was obtained from the Canadian Institutes of Health Research (CIHR), in partnership with Saskatoon Tribal Council (STC), in early 2007 to fund an intervention to increase immunization coverage rates among young children. The intervention, the 'immunization reminders project', involves contacting the parents/guardians of 14-month-olds and 20-months olds in the Saskatoon Health Region (SHR) who are behind in their immunizations.
Since 2007, other interventions aimed at increasing childhood immunization coverage rates have been introduced in SHR (e.g., SHR's Building Health Equity Program). However, this report focuses only the effectiveness of the 'immunization reminders project'.

Key Results

- Since the introduction of the 'immunization reminders project' in October of 2007, immunization coverage rates among two-year-olds for MMR (measles, mumps and rubella) have increased 6.1% from 2007 to 2009 in SHR. Immunization coverage rates among two-year-olds for DaPTP-Hib (Diphtheria, Polio, Tetanus Toxoid, Pertussis, and Haemophilus Influenza type B) have increased 3.4% from 2007 to 2009 in SHR.

- Children from the core neighbourhoods (i.e., six low-income neighbourhoods) in Saskatoon were less likely to have up-to-date immunizations for both MMR and DaPTP-Hib than children from the non-core neighbourhoods. These differences were statistically significant for all seven years studied (2003-2009). Although not yet significant, the gap between the core and non-core neighbourhoods does appear to be decreasing.

- Children from Saskatoon were less likely to have up-to-date immunizations for both MMR and DaPTP-Hib than children in the rural region. However, this difference was only statistically significant for four of the seven years studied (2003, 2004, 2005 and 2008).

[a] Herd immunity is the resistance of unvaccinated individuals to a particular disease due to the immunity that exists in the majority of vaccinated individuals in a population. Coverage rates for herd immunity vary by antigen, but in most cases they are in the range of 80-90%.[2]

Recommendations

Based on feedback obtained from Public Health Services' (PHS) staff and clients, we identified a number of next steps below, in addition to the continuation of the 'immunization reminders project,' that could further increase childhood immunization coverage rates in SHR.

- Saskatchewan Immunization Management System (SIMS) access for other organizations that immunize such as STC and the Westside Community Clinic.

- Increasing access to services by offering evening and weekend hours in immunization clinics in all areas of the city. In addition, extending drop-in clinic hours in Building Health Equity until 5 p.m.

- Exploring other ways to promote access to immunization services (e.g., home visits, mobile access) for families with access and/or socioeconomic barriers.

- Developing a system for keeping foster children up to date with their immunizations by evaluating the current process, as they have the lowest percentage of children up to date in SHR.

- Ensuring there is never more than a two week wait to get in for an immunization appointment at any clinic, and using this benchmark as a trigger to initiate staffing enhancement and/or the frequency of drop-in clinics.

- Creating a PHS policy where PHS staff must confirm current address and phone number of clients at every immunization appointment.

- Creating another PHS policy that ensures when an immunization appointment is missed, the receptionist at the clinic calls or emails the parent and tries to book a new appointment during daytime or evening clinics.

- Expanding the enhanced reminder system (which currently only operates in the core neighbourhoods) to other neighbourhoods within SHR that have low coverage rates.

- Implementing an Immunization Awareness campaign, specifically addressing barriers identified by clients when accessing clinics.

- Exploring other media to connect with young families (e.g., Facebook advertisement, texting, emailing).

- Exploring other options for collecting more detailed contact information during postnatal home visits or phone calls such as a cell number and email address.

- Ensuring consistent application of enhanced reminder system in core neighbourhoods by protecting the time that Community Program Builders spend on reminders.

- Exploring the use of Regina Qu'Appelle Health Region's ImmuTrax website, which allows parents to sign themselves up to receive reminders about their children's immunizations.

- Developing an internal process for acquiring translation of written immunization records when they come to PHS in a language other than English.

- Conducting a cost-effectiveness evaluation to see which form of reminders (e.g., phone calls, letters), if any, are most cost-effective.

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INTRODUCTION

Immunizations are considered one of the most successful public health interventions in the last century, saving more lives than any other public health intervention.[1] High levels of vaccine coverage among populations, such as children, are important for immunizations to be successful and for herd immunity[b] to occur. Immunization coverage is the percentage of a population with the recommended number of antigen doses at a given age. Two years of age is a recognized interval for comparing coverage rates and will be used in this report. This report describes and analyzes the effectiveness of an intervention, the 'immunization reminders project,' that was introduced in Saskatoon Health Region (SHR) to increase overall immunization rates and to promote equity in vaccine coverage rates among two-year-olds.

BACKGROUND

In 2006, we found there were statistically significant differences (i.e., disparities) in immunization coverage rates between two-year-old children in the city of Saskatoon based on area of residence. The average complete MMR (Measles, Mumps, and Rubella) immunization coverage rate for two-year-old children in Saskatoon's six low-income neighbourhoods[c] (i.e., the core neighbourhoods) from October 2000 to September 2005 was 49.9%, in comparison to 80.8% in the city's five affluent neighbourhoods[d]. A similar disparity existed with coverage rates for DaPTP-Hib (Diphtheria, Polio, Tetanus Toxoid, Pertussis, and Haemophilus Influenza type B) over the same time period where the six low-income neighbourhoods had a coverage rate of 49.5%, and the five affluent neighbourhoods had a coverage rate of 83.7%.[e]

After discovery of the disparities between immunization coverage rates for two-year-olds, a phone survey with 689 parents[f] was conducted in June and July of 2006 to determine attitudes towards immunization, as well as to determine which options parents preferred to keep children up-to-date on their immunizations. The survey identified that incomplete immunization in SHR is primarily associated with low-income; however, single parenthood, cultural status and differences in beliefs also contributed to incomplete coverage rates.[2] The solutions that were most strongly supported by parents to ensure more complete coverage rates were: reminder letters, reminder phone calls, reminders from other health care

[b] Herd immunity is the resistance of unvaccinated individuals to a particular disease due to the immunity that exists in the majority of vaccinated individuals in a population. Coverage rates for herd immunity vary by antigen, but in most cases they are in the range of 80-90%.[2]

[c] The core neighbourhoods consist of: Confederation Suburban Centre, Meadowgreen, Pleasant Hill, Riversdale, Westmount, and King George.

[d] The affluent neighbourhoods consist of: Lakeridge, Briarwood, College Park East, Erindale, and Arbor Creek.

[e] These numbers were extracted from the Saskatchewan Immunization Management System (SIMS) in October 2008.

[f] An equal proportion of parents were sampled from the core, affluent and all other Saskatoon neighbourhoods.

practitioners, flexible walk-in clinics, and extended evening and weekend clinic hours.

Using this information, a grant titled, "Disparity of Childhood Immunization Coverage by Neighbourhood Socioeconomic Status", was obtained, in partnership with Saskatoon Tribal Council (STC), from the Canadian Institutes of Health Research (CIHR) in early 2007 to fund an intervention to increase immunization coverage rates among young children. The intervention, the 'immunization reminders project', began in October of 2007 and involves contacting the parents/guardians of 14-month-olds and 20-months olds who are behind in their immunizations. This project covers all of SHR, including rural areas. Initially, these reminders were made via telephone. Up to five phone call attempts were made, and then a letter was mailed out to the last known address. If there was still no response, a reminder home visit was attempted for children living in the six core neighbourhoods.[g] Since January 2009, the intervention protocol has changed and reminders for neighbourhoods outside of the core neighbourhoods are now only sent through the mail.

Since 2007, other interventions aimed at increasing childhood immunization coverage rates have been introduced in SHR. For example, SHR's Building Health Equity (BHE) Program introduced the BHE Database in June 2008, which covers the six core neighbourhoods of Saskatoon. The BHE Database alerts staff when a child is two weeks overdue for their two, four or six -month-old immunizations. The parent is contacted via phone call as a reminder. If the child has not been immunized within two weeks, subsequent reminder phone calls, letters, or home visits are made. Furthermore, in January 2009, four-year-old reminder letters were initiated across the Health Region. The focus of this report, however, is on the effectiveness of the 'immunization reminders project'.

METHODS

Coverage rates for MMR and DaPTP-Hib were examined pre- and post-intervention to determine whether the 'immunization reminders project' has been effective at improving immunization coverage rates among two-year-olds in SHR. Data for MMR was pulled from the Saskatchewan Immunization Management System (SIMS)[h] in May of 2010. Data for DaPTP-Hib was pulled from SIMS in August of 2010.[i]

To test for significance, rate ratios and confidence intervals were calculated.

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[g] Children in the core neighbourhoods were targeted for reminder home visits because their coverage rates were well under the recommended rates.

[h] SIMS is a computerized system used to record immunization information in the province.

[i] During the H1N1 pandemic, children who did not have their immunization records recorded in SIMS had their H1N1 vaccinations entered only. As a result, there were a number of children who appeared to be behind in their immunizations when they were not. Data pulled for both MMR and DaPTP-Hib have had H1N1 incomplete records removed to adjust for this.

We compared rates for MMR and DaPTP-Hib for all of SHR, and also among four sub-groups: core neighbourhoods, non-core neighbourhoods, rural SHR, and foster children. Foster children are identified in SIMS as children who have Social Services listed as their address. Foster children cannot be included in the core or non-core sub-groups as their actual address is not listed in SIMS. Currently, information for foster children that are not up-to-date is sent to Social Services with the intention that the case workers will inform the foster parents. However, at this time, we do not receive information as to whether they were or were not contacted.

RESULTS

Since the introduction of the 'immunization reminders project', immunization coverage rates for SHR as a whole have increased among two-year-olds for MMR (refer to Table 1, Table 2 and Figure 1) and DaPTP-Hib (refer to Table 3, Table 4 and Figure 2).[j] The increase in rates for DaPTP-Hib is not as large as the increase in MMR rates. The reason for this is that the MMR vaccine is easier to catch children up on because only one month is needed between the first and second dose, whereas DaPTP-Hib requires four doses and six months are needed between doses three and four.

Some of the sub-groups experienced a slight decrease for both MMR and DaPTP-Hib between 2008 and 2009.[k] This was expected since slight fluctuations were anticipated after the implementation of the 'immunization reminders project' and the initial increase in 2008 for both MMR and DaPTP-Hib coverage rates.

The lowest rates of all sub-groups analyzed were for foster children whose 2009 MMR rates were 28.6% less than SHR as a whole, and whose 2009 DaPTP-Hib rates were 33.6% less than SHR as a whole.[l]

[j] In May of 2009, a pilot project was implemented using minimal interval schedules on children behind in their immunizations. This project was implemented in all health centres in September 2009. This may have had a minor impact (i.e., increased rates) on the immunization rates for children up-to-date at age two in the last part of 2009. The minimal interval schedule intervention has not yet been measured or evaluated.

[k] During the H1N1 pandemic, reminder letters were not sent out from October to December of 2009. They were slowly resumed in 2010 over a four month period. However, this would not have had an effect on the immunization rates for 2009, as the letters were for children turning two in 2010. In addition, immunizations for 18-month-olds were deferred during the H1N1 mass campaign (Oct-Dec 2009). However, this would have minimally affected the overall rates, if at all, because the majority of 18 month olds would have received their immunization prior to October, as they had to have turned two by the end of 2009 to be included in the rates.

[l] Coverage rates for foster children reported may be slightly underrepresented as there were some months where foster children births were not recorded. This under-representation is most likely very small as there are usually less than 10 children in foster care born each month.

Table 1. MMR Coverage Rates (%) for Two-Year-Olds in Saskatoon Health Region by Area.

	2003	2004	2005	2006	2007	2008	2009
SHR Total	66.8	65.5	65.9	67.8	71.1	75.1	77.2
Core neighbourhoods	43.2	47.0	44.8	50.0	48.0	60.1	57.9
Non-core neighbourhoods	66.9	65.2	65.7	68.9	72.9	74.6	78.9
Rural SHR	73.5	71.5	72.5	71.7	74.4	81.2	80.3
Foster Children	42.6	48.2	41.3	36.4	54.3	57.9	48.6

Table 2. Total Number of Two-Year-Old Eligible for MMR in Saskatoon Health Region by Area.

	2003	2004	2005	2006	2007	2008	2009
SHR Total	3535	3323	3578	3460	3421	3473	3750
Core neighbourhoods	227	198	221	220	225	253	278
Non-core neighbourhoods	2042	1958	2169	2059	1978	2047	2278
Rural SHR	1099	1030	1053	1042	1021	986	1057
Foster Children	61	54	63	66	70	76	70

Figure 1. MMR Coverage Rates (%) Among Two-Year-Olds in Saskatoon Health Region by Area.

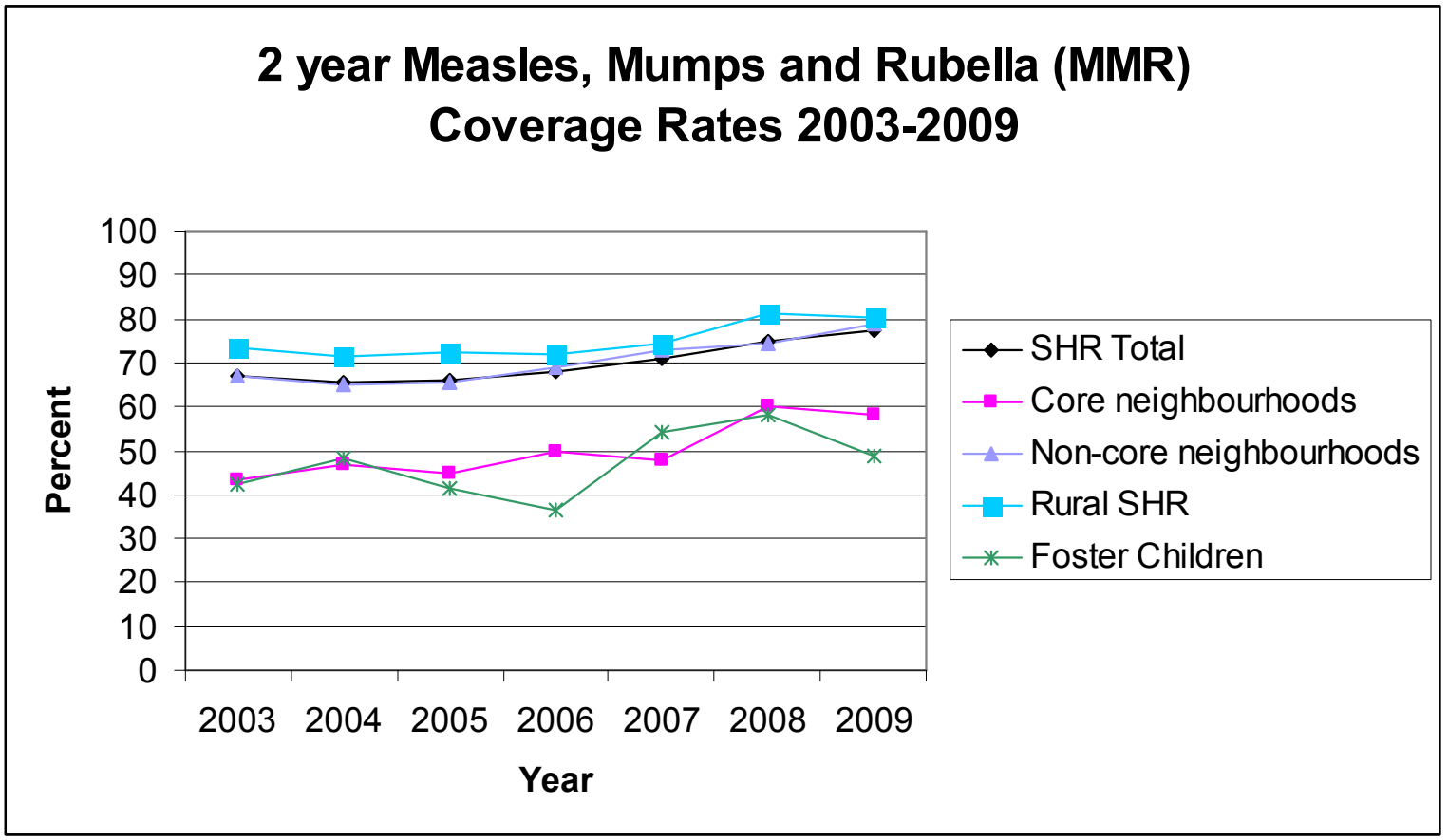


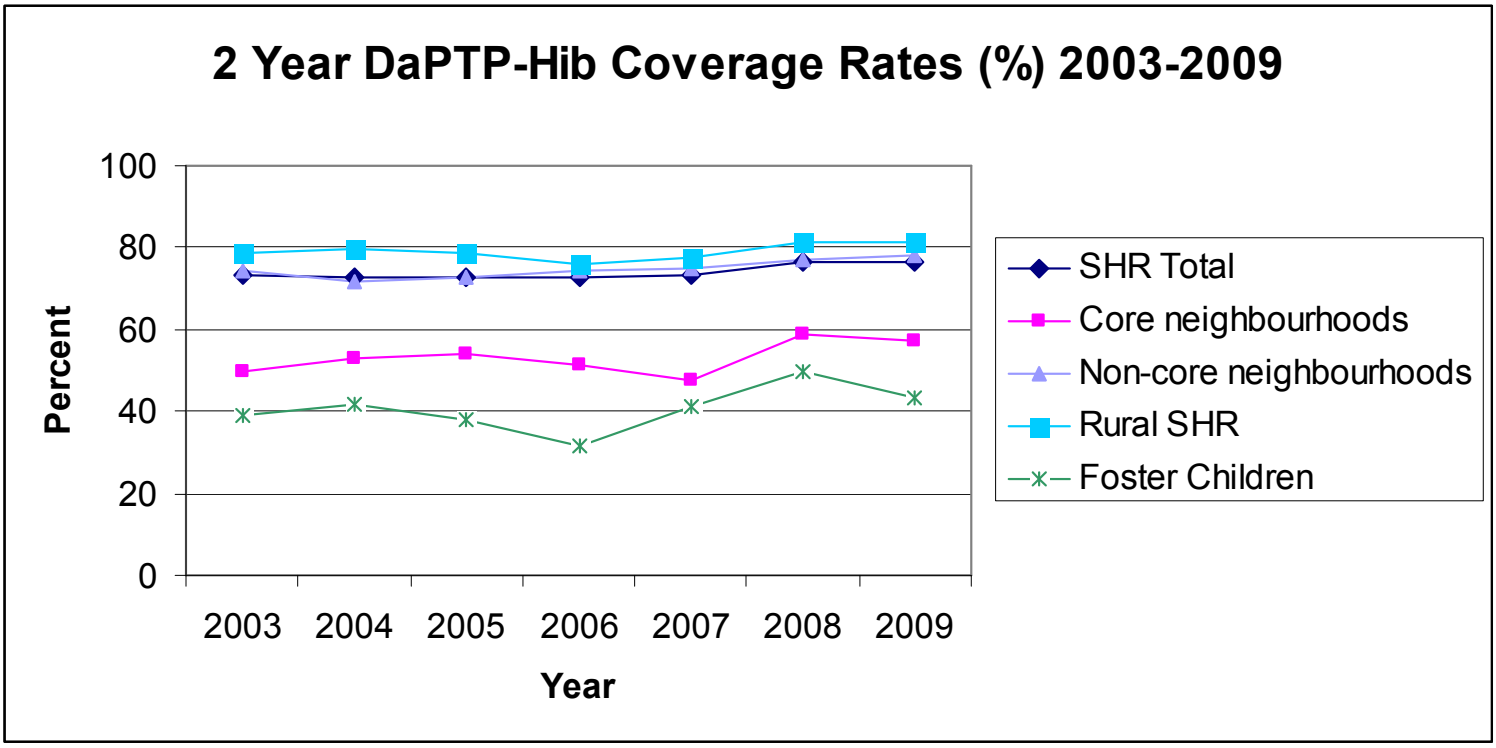
Table 3. DaPTP-Hib Coverage Rates (%) Among Two-Year-Olds in Saskatoon Health Region by Area.

	2003	2004	2005	2006	2007	2008	2009
SHR Total	73.4	72.6	72.7	72.7	73.3	76.3	76.7
Core neighbourhoods	50.0	52.8	53.8	51.1	47.7	58.8	57.0
Non-core neighbourhoods	74.4	71.7	72.9	74.4	75.1	76.9	78.0
Rural SHR	78.8	79.8	78.4	76.0	77.7	81.5	81.1
Foster Children	39.1	41.8	38.1	31.7	41.2	50.0	43.1

Table 4. Total Number of Two-Year-Olds Eligible for DaPTP-Hib in Saskatoon Health Region by Area.

	2003	2004	2005	2006	2007	2008	2009
SHR Total	3533	3327	3575	3459	3426	3475	3752
Core neighbourhoods	234	199	221	221	222	250	284
Non-core neighbourhoods	2039	1960	2181	2077	1990	2083	2266
Rural SHR	1107	1043	1056	1042	1034	980	1069
Foster Children	64	55	63	60	68	72	65

Figure 2. DaPTP-Hib Coverage Rates (%) Among Two-Year-Olds in Saskatoon Health Region by Area.



When comparing children from core neighbourhoods to children from non-core neighbourhoods in Saskatoon, we found that children from the core neighbourhoods were less likely to have up-to-date immunizations for both MMR and DaPTP-Hib than children from the non-core neighbourhoods (Table 3). These differences were statistically significant for all seven years studied. Although not yet significant, it is important to note that the gap between the core and non-core neighbourhoods does appear to be decreasing.

When comparing children from the core and non-core neighbourhoods of Saskatoon to the rural areas of the SHR, we found that children from core and non-core neighbourhoods were less likely to have up-to-date immunizations for both MMR and DaPTP-Hib than children in the rural region. However, this difference was only statistically significant for four of the seven years studied (2003, 2004, 2005 and 2008; see Table 3).

Table 3. Rate Ratios and Significance among Two-Year-Olds in Saskatoon Health Region for MMR and DaPTP-Hib by Area

	2003	2004	2005	2006	2007	2008	2009
MMR Rate Ratios							
Core neighbourhoods vs. Non-core Neighbourhoods	0.65*	0.72*	0.68*	0.73*	0.66*	0.81*	0.73*
Saskatoon vs. Rural SHR	0.88*	0.89*	0.88*	0.94	0.94	0.90*	0.95
DaPTP-Hib Rate Ratios							
Core neighbourhoods vs. Non-core Neighbourhoods	0.67*	0.74*	0.74*	0.69*	0.64*	0.77*	0.73*
Saskatoon vs. Rural SHR	0.91*	0.91*	0.89*	0.93	0.93	0.90*	0.92

* = Statistically Significant

Limitations of our data

It is important to note that there are limitations in our data, which can be divided into four themes.

1. Attribution

It is difficult to attribute the increase in immunization rates to the 'immunization reminders project' alone, as there could be other unaccounted explanations for the increase. This is a limitation from a research perspective, although from a public health perspective an increase in immunization rates regardless of cause is extremely positive.

2. Contact Information

Contact information on health cards is often not up-to-date. Moreover, it is often not clear if a child has remained in SHR or moved to another region/province. There may be children that remain in SIMS even though they no longer reside in SHR, and this could potentially decrease overall coverage rates, as there wouldn't be up-to-date information on the child's immunizations.

Another issue is attempting to contact people from vulnerable populations. Challenges include lack of telephone, lack of a permanent residence, as well as often being highly mobile. Many families have not been located and their current location of residence remains unknown. The children who were not located could in fact be fully immunized in another region or province and be falsely pulling SHR immunization coverage rates down.

3. First Nations Health Organizations

First Nations health organizations do not regularly record immunizations in SIMS. While First Nations health organizations immunize a significant number of children, health regions have no access to these immunization records. For First Nations children that are registered in SIMS, this can result in complete records being labelled as not up to date. This may disproportionately affect coverage rates in certain areas of SHR such as the core neighbourhoods, as children from First Nations communities move in and out of these neighbourhoods frequently. At this time, we do not have access to data that would allow us to calculate the number of children that this may affect.

4. In-Migration to Saskatchewan

There are two issues associated with children new to Saskatchewan. First, children new to the province, either from within Canada or from outside of Canada, will not have their previous records entered in SIMS. As a result, the database may not be an accurate reflection of the number of children immunized. Second, children that come from out of province, or more specifically, out of country, do not always follow the same immunization schedule as Saskatchewan. These children can then lower the immunization rates, both current and historical, if they are not up-to-date with the Saskatchewan schedule.

CONCLUSION

Overall, immunization coverage rates in SHR have increased for both MMR and DaPTP-Hib since 2007, when the 'immunization reminders project' was implemented. However, more work is needed to further increase the immunization coverage rates in SHR, particularly in the core neighbourhoods where rates are still significantly lower than the rest of the city. This study demonstrates that implementing a few key changes in services and policy has the potential to increase immunization coverage rates in SHR to 80-90%, which could provide herd immunity region wide.

Recommendations for Further Increasing Immunization Coverage Rates among Children in SHR

Based on feedback obtained from staff and clients, we identified a number of next steps, in addition to the continuation of the 'immunization reminders project' that could further increase childhood immunization coverage rates in SHR. These are listed as recommendations below.

- Saskatchewan Immunization Management System (SIMS) access for other organizations that immunize such as STC and the Westside Community Clinic.

- Increasing access to services by offering evening and weekend hours in immunization clinics in all areas of the city. In addition, extending drop-in clinic hours in Building Health Equity until 5 p.m.

- Exploring other ways to promote access to immunization services (e.g., home visits, mobile access) for families with access and/or socioeconomic barriers.

- Developing a system for keeping foster children up to date with their immunizations by evaluating the current process, as they have the lowest percentage of children up to date in SHR.

- Ensuring there is never more than a two week wait to get in for an immunization appointment at any clinic, and using this benchmark as a trigger to initiate staffing enhancement and/or the frequency of drop-in clinics.

- Creating a PHS policy where PHS staff must confirm current address and phone number of clients at every immunization appointment.

- Creating another PHS policy that ensures when an immunization appointment is missed, the receptionist at the clinic calls or emails the parent and tries to book a new appointment during daytime or evening clinics.

- Expanding the enhanced reminder system (which currently only operates in the core neighbourhoods) to other neighbourhoods within SHR that have low coverage rates.

- Implementing an Immunization Awareness campaign, specifically addressing barriers identified by clients when accessing clinics.

- Exploring other media to connect with young families (e.g., Facebook advertisement, texting, emailing).

- Exploring other options for collecting more detailed contact information during postnatal home visits or phone calls such as a cell number and email address.

- Ensuring consistent application of enhanced reminder system in core neighbourhoods by protecting the time that Community Program Builders spend on reminders.

- Exploring the use of Regina Qu'Appelle Health Region's ImmuTrax website, which allows parents to sign themselves up to receive reminders about their children's immunizations.

- Developing an internal process for acquiring translation of written immunization records when they come to PHS in a language other than English.

- Conducting a cost-effectiveness evaluation to see which form of reminders (e.g., phone calls, letters), if any, are most cost-effective.

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