

Feasibility of a School-Based Influenza Vaccination Program in Kansas

January 2009

IKK/09-01

Gianfranco Pezzino, M.D., M.P.H.
Tatiana Y. Lin, M.A.



IMMUNIZE KANSAS KIDS

212 SW Eighth Avenue, Suite 300
Topeka, Kansas 66603-3936
(785) 233-5443
<http://www.immunizekansaskids.org>



IMMUNIZE KANSAS KIDS

The Immunize Kansas Kids project is a unique partnership among the Kansas Department of Health and Environment, the Kansas Health Institute and dozens of stakeholder organizations. The goal is simple: to protect every Kansas child from vaccine preventable diseases.

Copyright© Immunize Kansas Kids 2009. Materials may be reprinted with written permission.

TABLE OF CONTENTS

Acknowledgments	iv
Executive Summary	v
Introduction.....	1
The Process of Vaccinating People Against Influenza	2
Benefits of Administering Influenza Immunization in Schools	4
Challenges of Implementing a School-Based Influenza Vaccination Campaign	6
Experience of School-Based Influenza Vaccination Campaigns.....	8
Information Collected from Key Informants.....	10
Cost of Implementing a School-Based Influenza Vaccination Campaign.....	12
Summary and Conclusions.....	18
References	23
Appendix A: List of Key Informants Interviewed.....	A-1
Appendix B: Local Health Department Interview	B-1
Appendix C: School Interview	C-1
Appendix D: Private Provider Interview	D-1
Appendix E: Parent Interview.....	E-1
Appendix F: List of Assumptions Used to Develop the Campaign Cost Projection	F-1

ACKNOWLEDGMENTS

The authors thank Sue Bowden and Charlie Hunt (Kansas Department of Health and Environment) and Sharon Homan (Kansas Health Institute) for the important input provided during the development of this report. The authors also thank the key informants who agreed to be interviewed and provided helpful information for the preparation of the report. Special thanks to Anne Freeze, Allison Alejos and all the staff at the Shawnee County Health Agency for the detailed information that they made available on their county-wide school vaccination campaign.

EXECUTIVE SUMMARY

Influenza is a serious disease that spreads very easily and can lead to serious complications. Children are more prone to complications and play an important role in spreading the infection through their communities. For these reasons, in 2008 the recommendations for annual influenza vaccination have been expanded to include all children 6 months through 18 years of age.

Historically, children have been able to receive influenza vaccine at their doctors' offices or at local health departments (LHDs), as well as at some outreach clinics set up during influenza season. In 2008, public health experts issued for the first time a recommendation to vaccinate all children against influenza. This recommendation creates several challenges, including how to immunize so many people every year in a short period of time. With the increase in the number of children targeted for influenza vaccination, some schools across the nation have started offering vaccine to their students. To address a request from the Kansas Legislature to the Kansas Department of Health and Environment (KDHE), this study examined benefits and costs of immunizing children against influenza at school, assessed barriers to implementation and evaluated strategies for removing them.

After a literature review on the use of influenza vaccination in children and school-based immunization campaigns, staff identified and interviewed by telephone 17 key informants. Individuals interviewed included representatives from five local health departments, KDHE, parents, private providers and school or district nurses. Key informants were carefully selected to ensure that they were knowledgeable and could provide different viewpoints.

In general, the results of the literature review showed that influenza vaccine can be successfully administered in schools. The benefits of immunization to recipients are well documented. However, the studies didn't present a consistent description of benefits to the community and the schools of administering influenza vaccine to children in schools. Some studies were able to show a reduction of the number of people with influenza both among students and their families after a school-based vaccination campaign, while the findings were less clear in others.

The key informants interviewed strongly supported immunizing children against influenza, and also expressed support for school-based influenza vaccination campaigns. Although a “medical home” is recognized as an ideal setting for immunizing children, many key informants agreed that the expansion of influenza vaccination recommendations (to include all children from 6 months through 18 years of age) makes accommodating every child in his or her medical home a challenge. Thus, school-based influenza vaccination clinics can be a viable option for immunizing a higher number of children.

This study found that school-based influenza immunization campaigns are viable options to assure influenza vaccination of large numbers of children in short periods of time, but present several challenges. First, these campaigns can be expensive. Costs include both expenses to organize a campaign, which are fairly constant regardless of its size, and additional expenses to implement the program and immunize students in each school. The cost per child immunized decreases when more children are vaccinated, declining from \$58 per child when 15 percent of students are vaccinated to \$27 per child when that threshold reaches 50 percent. Entities that would be expected to finance a school-based influenza vaccination program in Kansas include local health departments, school districts, KDHE, the state Medicaid/SCHIP program, parents and insurance carriers.

In addition, school-based influenza vaccination campaigns present considerable logistical challenges. In addition to cost, these challenges include advertising the program to students and parents, coordinating activities between school districts and local health departments and scheduling clinics without disruption of regular academic activities. Campaigns are more likely to be successful in addressing these challenges if they are organized and implemented locally and if they combine different organizational models suitable for each local situation. However, state agencies can play important roles by:

- Developing standardized information and educational material for school-based campaigns that schools and LHDs can easily adapt to their own needs.
- Providing technical assistance and training on the value of immunizing children against influenza and the advantages of using schools as settings for vaccination clinics.

- Addressing the issue of low and uneven reimbursement to providers for influenza vaccine and administration fees.
- Facilitating the acquisition and timely distribution of vaccine to LHDs.
- Providing financial support for vaccinating underinsured children.
- Involving public health preparedness staff and volunteers to assist in the implementation of school-based immunization campaigns.
- Linking with state programs such as WIC that involve numerous children and parents of young children.

INTRODUCTION

Influenza infection is associated with significant morbidity and mortality in adults, but children, particularly those in preschool and elementary school, suffer the highest attack rates. In addition to being at high risk for infection and complications, children play a critical role in the spread of influenza in the community. Children spread the disease more easily than adults because they have higher attack rates, release the influenza virus in a higher quantity, and are infectious for longer periods of time. The virus spreads easily in settings such as day care centers and schools where children spend several hours every day in close contact with each other. During the seasonal influenza outbreaks that occur every year in the United States, school-aged children are often infected at an early stage of the outbreak, while preschool children and adults are infected later.

Vaccination is the main tool used to control the spread of influenza. In recent years, strategies to reduce the impact of seasonal influenza outbreaks in communities have increasingly focused on children. The national recommendations for the use of influenza vaccine in children have been gradually expanded over the years. But the biggest change in the recommendations occurred this year, when the Advisory Committee on Immunization Practices (ACIP) and the federal Centers for Disease Control and Prevention (CDC) recommended that all children age 6 months to 18 years receive the influenza vaccine annually, a policy referred to as *universal immunization* of children.

Professional organizations, including the American Academy of Pediatrics, endorse universal immunization of children. Children 8 years and younger who are being vaccinated for the first time should receive two doses of vaccine; for everyone else, one dose is sufficient. Because the influenza virus rapidly changes, the vaccine must be altered each year and the vaccination repeated annually. There are two types of influenza vaccine currently approved. One type, the inactivated (i.e., killed) virus, is administered by an injection. The other vaccine, an attenuated virus (i.e., a virus that has been modified so that it will not cause disease) is administered through a nasal spray.¹

¹In this report, the differences between the two influenza vaccines are not included in the discussion of benefits, costs and challenges of influenza vaccination in schools. Both vaccines are effective and safe and can be used in school-age children.

In 2008 the Kansas Legislature requested the Kansas Department of Health and Environment (KDHE) to conduct a study of the feasibility of establishing school-based influenza vaccination campaigns. This report is aimed at assisting KDHE in responding to the legislative request.

THE PROCESS OF VACCINATING PEOPLE AGAINST INFLUENZA

Unlike other vaccines, the influenza vaccine must be administered every year. The ideal time for vaccinating people is restricted to a few months in the late fall and early winter. The expansion of the recommendation for influenza vaccination to larger segments of the population has created challenges and stimulated discussion on the most effective and efficient strategies to deliver the immunization to the largest number of people in the shortest period of time. The recent recommendation for universal immunization of children has added about 30 million children to the list of potential recipients of the vaccine and has caused many to question whether the health care system can sustain such an effort every year. To put this change in perspective, the group of children age 6 months to 18 years includes about 74 million people. Currently only a small fraction receives influenza vaccine. To reach 50 percent coverage in this group would require a 300 percent increase in the number of children immunized.

Some of the challenges related to the expansion of the recommendation for influenza vaccination are:

- Who would administer the vaccine? It is widely accepted that the best place where children can receive their immunizations is where they receive their primary care, called their *medical home*. Despite that, many children receive their routine immunizations outside of their medical home, a practice more common in Kansas than in other states. A report published by the Immunize Kansas Kids (IKK) project found that many primary care providers in Kansas do not offer immunizations in their offices. In those cases children are usually referred to local public health departments. Problems of access to immunization services often cause delays in the administration of the vaccine.² The addition of influenza vaccination to the list of recommended vaccines is likely to

²The IKK project is sponsored by the Kansas Health Foundation, the Kansas Health Institute and the Kansas Department of Health and Environment. For more information please visit www.immunizekansaskids.org.

exacerbate the problem of access to immunization services for many children and their parents. In some states, including Kansas, pharmacists are allowed to administer influenza vaccine, but only to adults.

- Where would the vaccine be administered? The annual need to immunize a large number of people in a short period of time has prompted considering the use of alternative sites for the delivery of the vaccine. Many health care providers, especially in urban areas, already set up special hours and places where their patients can receive the influenza vaccine, including drive-through and drive-in clinics. The advantage of these solutions is that immunization activities do not tie up examination rooms and staff needed for regular patient care activities, but the limited availability of staff and alternative places represents a barrier to the use of these solutions. Some local health departments (LHDs) conduct special outreach immunization clinics in nursing homes and at large places of employment, such as government offices. In many localities pharmacies also provide influenza vaccination. More recently, other settings with a large concentration of people have been used to offer influenza vaccination, including airports, shopping malls, and election poll sites during election day. The use of schools for influenza vaccination is relatively recent.
- Would health care practitioners and parents accept the idea of vaccination outside of the medical home? While many providers and patients prefer to go to their medical home to receive the influenza vaccine, the expansion of the recommendation for vaccination makes it unlikely that everybody who wants the vaccine will be able to be immunized at their doctor's office. The use of non-traditional immunization settings is encouraged by many national experts and public health officials, but may be resisted by some providers and parents.
- If the vaccine is administered outside of regular health care settings, how would reimbursement be provided? Most insurance carriers provide reimbursement for the administration of influenza vaccine to their clients. Reimbursement levels and procedures vary among insurance plans. Health care providers usually have a system in place to file

payment claims with insurance companies, but the same may not be true for other potential non-traditional providers of influenza vaccination, including schools, pharmacies and some local health departments. In these cases the vaccine provider may request to receive payment from the vaccine recipient at the time of the immunization.

- How can records of vaccination given outside of regular health care settings be successfully linked to the medical home, public health agencies and vaccine registries? When influenza immunization takes place in non-traditional sites, tracking and linking immunizations to medical records and to the state immunization registry is more challenging. An immunization registry is a central repository of information regarding dates and types of vaccines received by every individual included in the registry. Population-based registries, typically covering entire states, are essential tools to assure that individuals, especially children, receive required immunizations at the right time and reduce the possibility of over-immunization.

BENEFITS OF ADMINISTERING INFLUENZA IMMUNIZATION IN SCHOOLS

Several studies have been published that discuss the benefits of school-based influenza vaccination to reduce the spread of influenza in a community. Some of the large studies have been funded by Medimmune, a drug company that manufactures one of the influenza vaccines on the market. While the benefits for the individuals who receive the vaccine are clear (i.e., protection against infection from the influenza virus), an exact description of the benefits to the community and the schools of administering influenza vaccination to children is difficult because of the spread of influenza in a community or institution is dependent on multiple factors (e.g., classroom size, weather, hygiene practices). Further, monitoring influenza disease in the population and ascertaining how many cases of influenza take place among vaccinated and non-vaccinated students is difficult. For these reasons, studies have defined and monitored the occurrence of influenza disease in different ways, which makes it difficult to compare the results of multiple studies. It is also likely that some of the benefits reported to date in pilot studies may be dependent on the coverage rate achieved by the vaccination program and that some benefits may be achieved only if a sufficient number of children is immunized, but the ideal coverage

required for these benefits to materialize is unknown. Most projects aim at vaccinating between 40 and 50 percent of students, but many fall short of that goal. Finally, some of these results may depend also upon the type of vaccine being used in the campaign. There is good evidence that the live-virus, nasal vaccine may be more effective in protecting children and their close contacts, although no final recommendation on the use of a specific vaccine has been made by the ACIP or the CDC.

Most researchers and public health experts these days agree that vaccinating children is an essential component for the community containment of seasonal influenza. The benefits of vaccinating children by conducting influenza vaccination in schools theoretically are strong, but practical evidence is still scanty. Some benefits related to vaccination in schools reported in some published studies are:

- A reduction in the number of cases of influenza among the students that receive the vaccine, their classmates, and other members of their families;
- A reduction in the number of physician visits and prescriptions for medications among vaccinated students; and
- A reduction in the absenteeism observed in school.

Some of these benefits are related specifically to the fact that children are immunized in schools, while others might be achieved regardless of where the vaccination takes place.

In summary, there is a general consensus among researchers and public health experts that schools are an ideal setting to immunize a large number of children every year. Vaccinating children for influenza in schools appears to be an effective and efficient mechanism to deliver the vaccine to the highest number of children in the shortest period of time. However the overall benefits to society of school-based vaccination versus vaccination in other settings are still unclear. As an added benefit, school-based immunization campaigns can also serve as a good opportunity to test public health response plans to a major outbreak such as an influenza

pandemic, since most of these plans also require the administration of medications or vaccines to a large number of people in a short period of time.

CHALLENGES OF IMPLEMENTING A SCHOOL-BASED INFLUENZA VACCINATION CAMPAIGN

There is a variety of challenges that may represent barriers to the implementation of school-based influenza vaccination campaigns. A good number of projects have used schools to implement influenza vaccination clinics. These projects have not always been thoroughly evaluated. Each project tends to have some unique characteristics that make it difficult extrapolating the results to other settings and geographical areas. Below is a list of the major challenges identified:

- The supply of influenza vaccine is subject to fluctuations from year to year. The vaccine requires a production cycle of several months, and there are few drug manufacturers that produce this vaccine. Any disruption in the cycle of even only one production plant may cause a decrease of vaccine availability or delays in the delivery date. This type of problem has occurred several times in the past, and has led to efforts at the national level to stabilize the production and distribution of vaccine. In part as a result of these efforts, in the last two years the vaccine was widely available and delivered on time.
- To be effective in decreasing the spread of influenza, vaccination campaigns need to take place during a small window of time (late fall and early winter) and need to reach a relatively high number of children (between 25 and 50 percent of the target group). There are discussions among federal agencies and professional organizations about extending the duration of the influenza vaccination season, but no consensus has been reached yet.
- Public awareness about the importance of vaccinating children for influenza is still low. Although in general parents seem to support the concept of school-based influenza vaccination clinics, in some instances attendance at those clinics has been low.

- School administrators are under considerable pressure to achieve and maintain high academic standards and may find the financial and logistical requirements of school-based clinics too burdensome and distracting from other school activities.
- School-based campaigns require a high degree of coordination and information exchange between school district and school administrators, local health departments, and parents and children. School-based campaigns are likely to be particularly problematic in districts that include many schools. The communication between schools and parents may be easier in elementary schools because of the higher reliability of paperwork exchange in this age group. For this and other reasons, elementary schools in general tend to have a higher participation rate in vaccination campaigns than schools with older students.
- For optimal protection, children 8 years of age and younger who receive the vaccine for the first time should receive two doses of vaccine. Tracking back those children to administer a second dose may be impractical, while simply referring them to their medical home for the second dose may result in some children not receiving the full cycle of vaccination.
- Ordering, purchasing and collecting reimbursements for the influenza vaccine present multiple challenges. The influenza vaccine is expensive when compared to other vaccines used for children. Vaccines must be ordered and paid for months before the actual vaccination takes place. Orders often cannot be modified or canceled after they are placed, and the vaccine is not refundable or returnable after it is delivered. All these factors mean that the vaccine buyers (school districts, LHDs or state health agencies) must provide a substantial advance payment long before they can recover any revenue, with no assurance that they will be able to generate enough revenues to cover the full cost of the vaccine. While a few school-based projects have been able to secure vaccine donated by drug companies, donations are limited and usually not repeated, so they do not represent long-term solutions. Local health departments and districts usually must purchase the vaccine and try to recover the expenses later by charging the student or his or her insurance.

Some school-based influenza vaccination programs have provided the vaccine free of charge to the students, but this arrangement may not be sustainable in the long term for many schools or government agencies where funds are always short of the needs.

Recovering the cost of the vaccine through insurance billing is an option, but immunization clinics in non-traditional settings such as schools present special challenges for submitting billing claims to the appropriate payer. School districts in general are not set up to submit claims for vaccination. Even health departments, which usually bill government and private insurance carriers for services they provide, may find it difficult to set up a billing procedure compatible with the fast-flowing activity of a school-based clinic, and may not have full, easy access to the necessary information to submit the claim. In addition, insurance plans may or may not reimburse the cost of influenza immunization. The Kansas state law that requires first-dollar coverage for childhood vaccinations does not apply to children older than five years.

- State and local public health agencies have put a lot of efforts into setting up a tracking system to document all the immunizations received by each child that is included in the system. Kansas has an immunization registry that includes a growing proportion of the children in the state. Immunization administered in schools may be difficult to capture by the state immunization registry.

EXPERIENCE OF SCHOOL-BASED INFLUENZA VACCINATION CAMPAIGNS

In recent years there have been some efforts to provide influenza vaccination to children in schools. A few of these projects have been described in peer-review journals or at scientific meetings.

School-based influenza immunization programs have been conducted in several countries, including Italy, Russia and Japan. The Japanese experience is particularly interesting. In 1977 influenza vaccination was made mandatory for Japanese school children. During that period the country experienced an annual reduction of 10,000–12,000 deaths from influenza and pneumonia

(a complication of influenza that can cause death). After the program was discontinued in 1994 the death rate for influenza and pneumonia increased.

In the United States, several small-scale projects have been implemented at the state or local level. Only two projects will be mentioned in this report, one from Hawaii and another from Tennessee. Hawaii is possibly the state with the largest school-based influenza vaccination program so far, which in 2007–2008 involved 90 percent of all 377 schools in the state and immunized over 40 percent of the 146,777 students at those schools. The unique characteristics of Hawaii (including its geographical isolation, the presence of only two major health care providers and payers, and a history of previous school-based vaccination activities) make it difficult to extrapolate the results of that campaign to other states.

A large school-based vaccination campaign has been implemented for three years in Knox County, TN, which includes the city of Knoxville, and an extensive description of the 2005–2006 campaign was published in a peer-review journal. The campaign was in part supported by Medimmune and the vaccine was provided by the company for free. The local health department coordinated the activities and supplied the staff and resources for the administration of the vaccine. The school system in Knox County includes a single district with 81 schools and a total enrollment of about 54,000 students (kindergarten through 12th grade). As a result of an intense outreach and educational effort, 45 percent of students were vaccinated. The local health department reports that this effort was expensive and caused disruption in some other health department services, which were closed periodically to allow staff to be employed in the campaign. Nevertheless, because immunizing children against influenza is considered a priority, the Knox County Health Department has implemented a similar campaign every year since 2005.

In Kansas, school-based influenza immunization activities have been conducted in several cities and counties. No central data repository exists to describe these efforts. Information collected for this report revealed that school-based influenza vaccination projects were conducted in Shawnee, Franklin, Riley, Wallace, Wichita and Pottawatomie counties, but it is possible that additional projects may have taken place. Some of the projects involved only a few schools.

In 2006 and 2007, the Auburn-Washburn school district (Shawnee County) conducted a school-based influenza vaccination campaign. A local physician provided medical support and protocols. After the second campaign, the district concluded that while the initiative was worthy, there were too many challenges for the district to continue the initiative. Barriers mentioned included cost (the district did not bill any insurance carrier and provided free vaccine that it had purchased to children who could not afford payment), paperwork, staff shortages and the need for equipment for vaccine storage. The district did participate in the county-wide campaign organized by the Shawnee County Health Agency in 2008.

During the 2008–2009 influenza season, Shawnee County conducted the largest school-based influenza vaccination campaign in Kansas to date. The Shawnee County Health Agency developed a partnership with the five school districts to offer influenza vaccine in all 64 schools in the county with a total enrollment of over 27,000 students. Students enrolled in Medicaid or the State Children’s Health Insurance Program (SCHIP) were not charged for the vaccination; the Vaccine for Children (VFC) program provided vaccine for these students free of charge. The health department submitted charges for the administration fee to the state Medicaid program. All other students were charged a flat rate of \$20. The program was scheduled to take place over a period of five weeks in October and November and was still ongoing at the time that this report was written.

INFORMATION COLLECTED FROM KEY INFORMANTS

In order to acquire information on the potential benefits and challenges of school-based immunization campaigns, KHI staff identified and interviewed 17 key informants by telephone. Key informants were selected to represent a variety of points of view and experience. Interviews were conducted with representatives from five local health departments (six individuals), KDHE (two individuals), three parents, three private providers and three school or district nurses. A list of the individuals interviewed is contained in Appendix A. The questions that were discussed in the open-ended interviews are listed in Appendix B, C, D, and E.

In general, all the people interviewed expressed understanding of the importance of immunizing children against influenza and supported the idea of school-based influenza

vaccination campaigns. Several individuals mentioned that they believed that medical homes represent the ideal setting for immunizing children. One parent expressed a preference to have her child immunized in their family doctor's office. Most respondents agreed, however, that in practice it is difficult to take school-age children to see a doctor on a regular basis, and school-based immunization provides an excellent setting for yearly influenza vaccination.

School nurses (two of which had been involved in school-based influenza vaccination activities before the interviews) were very interested in cooperative efforts between school districts and local health departments. They thought that local health departments could provide essential expertise in planning the campaign and communicating with parents, as well as support the vaccination clinics with staff, vaccines and equipment. One school nurse mentioned that she was appreciative of having local health department staff administering the vaccine; some children, especially the youngest, are fearful of injections and she did not want students to become afraid of school nurses. School nurses who had been involved in influenza vaccination campaigns in the past reported that parents in general were supportive and happy that they did not have to take time off work to accompany their children to receive the vaccine somewhere else.

The state and local health department representatives interviewed understood the key role that their agencies have for the successful implementation of school-based immunization. These respondents clearly expressed a commitment to assure that more children are immunized against influenza, and they described the health department as a hub to achieve this goal. Several people mentioned that it was important that children have multiple opportunities to receive the vaccine and that schools were an important component in this effort. Health department representatives were well aware of the fact that it would be difficult for schools and school districts to implement immunization campaigns without the support of public health agencies and they were willing and eager to provide that support.

The physicians interviewed supported the concept of providing influenza vaccination to more children. Given the reality of their busy practices, they saw schools as viable options to expand the range of opportunities to administer the vaccine. When asked about the possibility that they

could lose revenues if local health departments and school districts vaccinate more children, the physicians did not express such a concern; they said that there is still a lot of opportunities to provide vaccination to their patients in their offices, and that the margin of profit on influenza immunization is usually very low.

Other interesting pieces of information collected during the interviews were:

- The importance of starting planning activities very early (before the spring). This was expressed both by school representatives and by physicians. The latter group pointed out that they have to place their orders for influenza vaccine in January, and knowing whether schools will immunize students or not would help them decide how much vaccine to order.
- The importance of making support material (like consent forms, information about the vaccine, clinic dates, etc.) easily accessible through multiple venues, including an easy-to-navigate Web site.

COST OF IMPLEMENTING A SCHOOL-BASED INFLUENZA VACCINATION CAMPAIGN

The exact cost of school-based campaigns is difficult to determine, because there is little information available on the resources that were used for past campaigns. Even when financial information is available, wide differences in the organizational models adopted in each campaign make comparisons more difficult. For these reasons the cost projection included in this report is necessarily based on a series of assumptions. These assumptions were developed from a review of the available literature and information collected during the development of this report and may have a different degree of accuracy when applied to different parts of the state. The full list of assumptions is listed in Appendix F.

In summary, it is assumed that the campaign will be planned and conducted in partnership by the local health departments and the school districts, with the support of KDHE. The health department will lead the planning of the campaigns, supply the vaccine for children not eligible

for VFC, and provide nurses and clerical support for the immunization clinics. Children eligible for VFC program will receive free vaccination and the health department will bill the state Medicaid office for reimbursement of the administration fee. For non-VFC eligible children, the health department can either bill the child's insurance or collect a fixed charge from each student.³ KDHE will provide free vaccine for VFC-eligible students to the LHD.⁴ The school district will conduct information activities for parents, print, distribute and collect consent forms, and provide support staff for the clinics.

The entities affected financially by a campaign are:

- 1) Local health departments. For each LHD, the cost of a campaign has been divided into the following components:
 - A fixed component, covering the planning and start-up costs for a campaign, independently of how large the campaign or the county is;
 - An additional per-district component, covering the costs that the LHD has to cover to reach out to each school district in its jurisdiction;
 - An additional per-school component, covering the cost to the LHD of setting up and running an immunization clinic in each school; and
 - An additional per-student component, covering the cost of the vaccine and supplies necessary to immunize each child.

- 2) School districts. For each school district, the cost of a campaign has been divided into the following components:
 - A fixed component, covering the planning and start-up costs for a campaign, independently of how large the district is; and
 - An additional per-school component, covering the cost to the school district of assisting in setting up and running an immunization clinic in each school.

³Because of the complexity of setting up a billing system for a multitude of insurance carriers, most LHDs in Kansas and elsewhere involved in school-based immunizations do not bill private insurance for clients who receive vaccination during the outreach campaign.

⁴The cost for VFC vaccine is allocated in this projection to KDHE, but the vaccine is purchased by KDHE using federal funds.

- 3) KDHE. KDHE cost has been assumed to be only the cost of providing free vaccine for VFC children. The vaccine is obtained from the federal government free of charge to the state. Since KDHE already runs the VFC program, the additional expense of supplying the vaccine for the school campaigns (aside from the cost of the vaccine) should be minimal and it is not included in this financial projection.
- 4) State Medicaid program. Almost all VFC eligible children in Kansas are enrolled in Medicaid or SCHIP. For these children, the state Medicaid program reimburses to the VFC provider an administration fee for each vaccination conducted.
- 5) Parents or insurance carriers. Depending on whether the child is insured, the insurance covers influenza immunization, and claims are submitted to and approved by private insurance carriers, the cost charged by the LHD for the vaccination will affect parents or insurance carriers. For practical purposes, in this projection it is assumed that the payment from a private insurance carrier and the out-of-pocket charge (whichever applies) would be in the same amount (\$25). Each LHD can decide whether to collect that amount directly from the student or from the insurance company.

Tables 1, 2 and 3 show a summary of the projected cost for a school-based campaign. The tables assume that the campaign would be conducted by each LHD in every county of the state. The cost is grouped by the source of payment. Since the Medicaid, insurance reimbursements and out-of-pocket payments flow to the LHD, the net cost for the LHD is reduced by these amounts. Each table presents a scenario of 15, 25 and 50 percent of all students immunized (coverage rate), respectively. A 50 percent coverage represents the best-case scenario and has been reported only from the most successful programs in the country. In Kansas, coverage in previous school-based influenza initiatives has varied between 10 percent and 25 percent.

Table 1. Projected cost for a school-based influenza vaccination campaign in Kansas by source of payment, 15% of all students immunized (coverage rate)

	LHDs	School districts	KDHE	Medicaid	Out-of-pocket or insurance reimbursement	TOTAL
Fixed cost	\$2,178,750	\$71,456				\$2,250,206
Additional cost to include districts	\$354,816					
Additional cost to include schools	\$208,510	\$241,584				\$450,094
Additional cost to include students*	\$212,204					\$212,204
Vaccine	\$611,147		\$198,057			\$809,204
Reimbursement	\$(1,550,502)			\$277,280	\$1,273,223	\$1,550,502
TOTAL	\$2,014,924	\$313,040	\$198,057	\$277,280	\$1,273,223	\$4,076,524

*Excluding vaccine cost

Table 2. Projected cost for a school-based influenza vaccination campaign in Kansas by source of payment, 25% of all students immunized (coverage rate)

	LHDs	School districts	KDHE	Medicaid	Out-of-pocket or insurance reimbursement	TOTAL
Fixed cost	\$2,178,750	\$71,456				\$2,250,206
Additional cost to include districts	\$354,816					
Additional cost to include schools	\$208,510	\$241,584				\$450,094
Additional cost to include students*	\$353,673					\$353,673
Vaccine	\$1,018,578		\$330,095			\$1,348,673
Reimbursement	\$(2,584,171)			\$462,133	\$2,122,038	\$2,584,171
TOTAL	\$1,530,157	\$313,040	\$330,095	\$462,133	\$2,122,038	\$4,757,462

*Excluding vaccine cost

Table 3. Projected cost for a school-based influenza vaccination campaign in Kansas by source of payment, 50% of all students immunized (coverage rate)

	LHDs	School districts	KDHE	Medicaid	Out-of-pocket or insurance reimbursement	TOTAL
Fixed cost	\$2,178,750	\$71,456				\$2,250,206
Additional cost to include districts	\$354,816					
Additional cost to include schools	\$208,510	\$241,584				\$450,094
Additional cost to include students*	\$707,346					\$ 707,346
Vaccine	\$2,037,156		\$660,190			\$2,697,346
Reimbursement	\$(5,168,341)			\$924,265	\$4,244,076	\$5,168,341
TOTAL	\$318,237	\$313,040	\$660,190	\$924,265	\$4,244,076	\$6,459,808

*Excluding vaccine cost

The total estimated cost to conduct local campaigns statewide ranges from \$4,076,524 to \$6,459,808, for 15 and 50 percent coverage, respectively. The cost per child immunized decreases when more children are vaccinated, ranging from \$58 per child when coverage is set at 15 percent to \$27 per child with a 50 percent coverage.⁵ This range reflects the economy of scale that characterizes a school-based vaccination campaign, in which there are some substantial planning, start-up and implementation costs that don't change much when the number of vaccines administered increases; spreading out those fixed costs across more children decreases the unit cost per child. If school-based programs become more common it is possible that best practices and organizational models will emerge that may reduce the cost of future campaigns.

Most of the fixed costs involve activities that the LHDs plan and conduct. In our model, the share of total campaign cost that the LHD would pay is the highest when the coverage rate is the lowest (49 percent share for the 15 percent coverage scenario). When the number of children immunized increases, the LHD is able to recover a larger proportion of costs through out-of-pocket and third-party payments, while the cost for the other entities increase; the LHD share for

⁵The \$27 per child figure is consistent with the limited published data from other states for campaigns that reached about 50 percent of the students, providing support to the validity of the model developed for this report.

the 50 percent coverage scenario drops to 5 percent, while the out-of-pocket and third-party payments account for two-thirds of the total campaign costs.

Figures 1, 2 and 3 show the relative distribution of costs among the affected entities for coverage rates of 15, 25 and 50 percent, respectively.

Figure 1. Distribution of costs for a school-based influenza vaccination campaign in Kansas by source of payment, 15% of all students immunized (coverage rate)

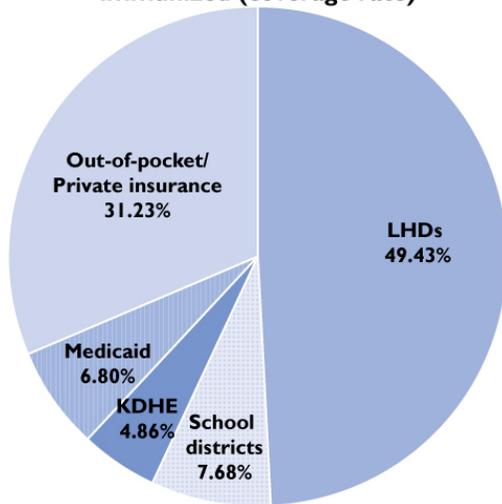


Figure 2. Distribution of costs for a school-based influenza vaccination campaign in Kansas by source of payment, 25% of all students immunized (coverage rate)

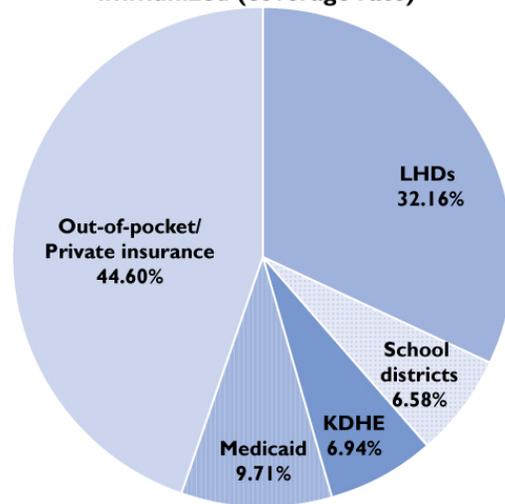
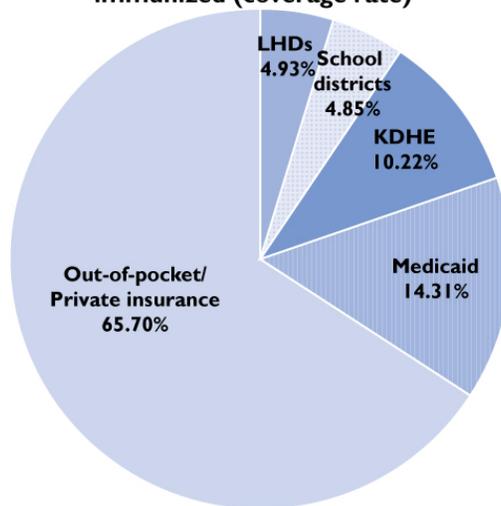


Figure 3. Distribution of costs for a school-based influenza vaccination campaign in Kansas by source of payment, 50% of all students immunized (coverage rate)



This projection only accounts for the direct costs of a campaign. There are indirect costs and benefits that may affect society at large, rather than the entities directly involved in the campaign. These costs are not considered in this report. Although research findings on the costs and benefits of school-based campaigns have been mixed, a peer-review article published in 2008 that factored in household protection, loss of wages and productivity, and other factors suggested that such programs were cost-effective from the society point of view.

SUMMARY AND CONCLUSIONS

This report identifies potential benefits and challenges related to running school-based influenza vaccination campaigns. The recent recommendation that all children between 6 and 18 be immunized annually against influenza has created a challenge for the health community. Most experts agree that the use of outreach clinics and non-traditional settings will be necessary to effectively deliver the immunizations. While there are only a few evaluations of school-based immunization programs that can be generalized, there is considerable evidence that school-based immunization campaigns are a potentially effective way to reach large numbers of children in short periods of time.

Previous experience, including small-scale campaigns in Kansas, strongly suggests that schools and school districts would have difficulty mounting vaccination campaigns without additional support, primarily from LHDs. In all the successful campaigns reported to date, LHDs have played central roles in mobilizing other partners, planning activities, procuring and storing vaccines, staffing clinics and evaluating the results of the campaigns. Staff at LHDs is accustomed to immunizing children and have good systems in place for handling vaccines and collecting reimbursements from clients or third-party payers. They also have easier access to medical professionals who can assist by producing standing orders and screening children for contraindications. Many LHDs already conduct regular outreach campaigns during influenza vaccination season, and school-based campaigns could represent a natural extension of their current outreach activities.

Typically public health and school officials have conducted school-based campaigns by visiting schools during the school day and immunizing as many students as possible in the

shortest period of time. A few campaigns have utilized schools as sites for after-hours influenza vaccination clinics open to everyone, including parents, students, staff and the general public. The benefits of this approach have not been evaluated, but proponents of the after-hours model argue that it would decrease disruption in the school day and allow parents to be with their children when they are being vaccinated. This model should be further tested and evaluated before a determination is made of its value.

A few key elements are necessary for any school-based immunization campaign to be successful.

1. Education, information and communication are essential for the smooth implementation of a campaign. Parents and providers need to be kept informed about the goals of the campaign, the plans for implementation, and what is required for a student to receive the vaccine. Much of the communication exchange between schools and parents is usually mediated through the students, who receive written notices that they are expected to pass on to their parents. In practice, this often does not work well, particularly when students are older. Therefore, schools should use additional ways to communicate with parents. Possibilities include distributing information at the time of enrollment and taking advantage of automated telephone systems that are already used by some schools to report student absences.
2. Buy-in and commitment from top school administrators is important to signal to the staff and the families that the school considers the vaccination program a priority. Principals can be particularly important to assuring success.
3. While the primary goal of school-based campaigns is to immunize children, participation rates may be higher if campaigns also offer immunizations to school staff and parents.

School-based campaigns require strong commitment and participation from multiple local entities. For this reason it is unlikely that one statewide campaign organized and coordinated by a

state agency would be successful. Even so, state agencies and government have important roles to play in facilitating successful vaccination campaigns. Actions to be considered include:

- Standardized information and educational material could be developed for school-based campaigns that schools and LHDs can easily adapt to their own needs. Informed consent forms should be reviewed by legal staff to assure that they are consistent with current federal and state requirements. This could cut the considerable amount of time spent in each local campaign developing letters to parents and consent forms.
- State agencies, particularly KDHE, could provide technical assistance and training on the value of immunizing children against influenza and the advantages of using schools as settings for vaccination clinics. A partnership effort with professional medical organizations could help inform and educate private practitioners on their role in promoting immunization of children against influenza. KDHE also could act as an information warehouse to gather and share information throughout the state on the success of and best practices emerging from local campaigns. Finally, KDHE could set up a standardized campaign evaluation module, to allow a thorough evaluation of each local campaign and learn what best practices could be adopted in other localities.
- The issue of low and uneven reimbursement for influenza vaccine and administration fees could be addressed at the state level, either through regulatory actions or by encouraging insurance carriers to increase voluntarily reimbursement fees and make them more consistent across different plans.
- KDHE could act as a hub to facilitate the ordering and the even and timely distribution of vaccine to LHDs throughout the state and minimize the risk of some areas running out of vaccine while others have surplus. An even better option, if feasible, would be if LHDs could purchase influenza vaccine “on consignment” so that the local agencies would not have to worry about being liable for the cost of the vaccine not utilized. These options would require additional resources that have not been calculated for the purpose of this report.

- Financial concerns may still represent a barrier for some families. Children who do not qualify for free VFC or SCHIP influenza vaccine may incur out-of-pocket costs that could prevent parents (especially if several siblings are involved) from having their children vaccinated.
- School-based campaigns could be linked to public health emergency preparedness activities. Public health preparedness plans, staff, expertise, tools, and volunteers (such as those registered in the Medical Reserve Corps) could be used to assist in the implementation of school-based immunization campaigns.
- State programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (better known as WIC) that involve numerous children and parents of young children could be used to extend the options of children and their parents and siblings to receive or be referred for the influenza vaccination.

In conclusion, the value of school-based influenza immunization programs is potentially great, but it needs to be weighed against the direct costs of such programs and the logistical and organizational challenges that they present, which are substantial. While the CDC and other national professional and public health organizations now recommend universal influenza immunization of children, currently no national recommendation exists to utilize schools as a primary means of achieving that goal.

Still, if school-based campaigns are undertaken, they are more likely to be successful if they are organized and implemented locally. For example, small counties may be better positioned to have successful school-based campaigns during school hours in each school, while larger counties may need to adopt a multipronged approach using a variety of strategies and interventions. Given the nature of these crosscutting initiatives, the existence of strong local networks including private providers, public health agencies and schools, combined with the presence of strong, motivated leaders are the best predictors of success.

REFERENCES

- American Academy of Pediatrics. (2008). Prevention of influenza: Recommendations for influenza immunization of children, 2007–2008. *Pediatrics* 121:e 1016–e1031.
- Centers for Disease Control and Prevention. (2008). Prevention and control of influenza. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Rep.* 2008/July 17; Vol 57: 1–59.
- Carpenter, L., Lott, J., Lawson, B., Hall, S., Craig, A., Schaffner, W., et al. (2007). Mass distribution of free, intranasally administered influenza vaccine in a public school system. *Pediatrics*, 120(1), 171–178.
- Davis, M., King, J. Jr., Moag, L., Cummings, G., & Magder, L. (2008). Countywide school-based influenza immunization: Direct and indirect impact on student absenteeism. *Pediatrics*, 122, e260–e265.
- Ghendon, Y., Kaira, A., & Elshina, G. (2006). The effect of mass influenza immunization in children on the morbidity of the unvaccinated elderly. *Epidemiology and Infection*, 134, 71–78.
- Jordan, R., Connock, M., Albon, E., Fry-Smith, A., Olowokure, B., Hawker, J., et al. (2006). Universal vaccination of children against influenza: Are there indirect benefits to the community? A Systematic Review of the Evidence. *Vaccine*, 24, 1047–1062.
- King, J Jr., Cummings, G., Stoddard, J., Readmond, B., Magder, L., Stong, et al. (2005). A pilot study of the effectiveness of a school-based influenza vaccination program. *Pediatrics*, 116, 868–873.
- King, J Jr., Stoddard, J., Gaglani, M., Moore, K., Magder, L., McClure, E., et al. (2006). Effectiveness of school-based influenza vaccination. *The New England Journal of Medicine*, 355(24), 2523–2532.
- Longini, I. M. Jr., & Halloran, M. E. (2005). Strategy for distribution of influenza vaccine to high-risk groups and children. *American Journal of Epidemiology*, 161(4), 303–306.
- Pezzino, G. (2008). *How to achieve and sustain high vaccination rates among Kansas children: An action plan*. Immunize Kansas Kids. Retrieved December 1, 2008, from <http://www.khi.org/s/index.cfm?aid=1473>
- Principi, N., Esposito, S., Marchisio, P., Gasparini, R., & Crovari, P. (2003). Socioeconomic impact of influenza on healthy children and their families. *The Pediatric Infectious Disease Journal*, 22(10), S207–S210.
- Reichert, T., Sugaya, N., Fedson, D., Glezen, P., Simonsen, L., & Tashiro, M. (2001). The Japanese experience with vaccinating school children against influenza. *The New England Journal of Medicine*, 344(12), 889–896.

Schmier J., Li S., King J. C., et al. (2008). Benefits and costs of immunizing children against influenza at school: An economic analysis based on a large-cluster controlled clinical trial. *Health Affairs*. 27: w96–w104.

Sugaya, N., & Takeuchi, Y. (2005). Mass vaccination of school children against influenza and its impact on the influenza-associated mortality rate among children in Japan. *Clinical Infectious Diseases*, 41, 939–947.

APPENDIX A: LIST OF KEY INFORMANTS INTERVIEWED

1. Mary “Midge” Ransom, Ph.D: Administrator, Franklin County Health Department
2. Karen Haug, R.N., B.S.N.: Administrator, Hodgeman County Health Department
3. Laura Bottom, R.N.: Immunization Coordinator, Pottawatomie County Health Department
4. Claudia Blackburn, R.C.N., M.P.H., C.P.M: Administrator, Sedgwick County Health Department
5. JVonnah Maryman, M.P.H.: Project Manager for Immunizations and Health Services, Sedgwick County Health Department
6. Allison Alejos, R.N., B.S.N.: Deputy Director of Local Public Health Services, Shawnee County Health Agency
7. Sue Bowden, R.N., B.S.: Immunization Program Director, Kansas Department of Health and Environment
8. Beverly Rogers, R.N.: School nurse, Washburn Rural High School, Topeka
9. Jane Handlos, R.N.: School nurse, Milford Elementary
10. Chris Tuck, R.N., M.S.: Health Services Director, Seaman Unified School District 345, Topeka
11. Lynn Anderson, R.N., B.S.N.: Kansas Immunization Program Nurse Consultant, Kansas Department of Health and Environment
12. Fred Patrick, M.D.: Pediatrician, Pediatric Care, Topeka
13. Dennis Cooley, M.D.: Pediatrician, Pediatric Associates of Topeka P.A.
14. Tom Simpson, M.D.: Family Practice, Sterling Medical Center
15. Robin Haag: Parent
16. Diana Goliff: Parent
17. Stephanie Johnston: Parent

APPENDIX B: LOCAL HEALTH DEPARTMENT INTERVIEW

1. Are you aware of any efforts to provide flu vaccinations at schools?
2. Where do you think is the best place for children to receive flu vaccinations?
3. Do you think that school nurses and other school-based health center professionals should be considered a priority group to give the flu vaccine?
4. How do you feel about school-based flu vaccination programs?
5. Have you ever been involved in the school-based vaccination program?

[PROMPT: If the answer to Q. 5 is “yes”, please answer Q. 6]

[PROMPT: If the answer to Q.5 is “no”, please answer Q.14 – Q.16]

6. What were the main challenges that you faced during the flu vaccination program?

[PROMPTS: Communication, management, storage, location, resources?]

7. What are specific issues that came up during the program?
8. What went well, and are past successes sufficiently institutionalized?
9. What might have been done differently?
10. What should be done differently in the future?
11. Would you consider participating in the school-based program again?
12. Would you like to serve as the central point of leadership for school-based immunization for influenza?
13. Do you have any other comments or questions?

[PROMPT: If the answer to Q.5 is “no”, please answer Q.14 – Q.16]

14. What were the reasons that you haven’t participated in the school-based flu program?
15. Would you consider participating in the school-based program in the future?
16. How do you feel about becoming the central point of leadership for school-based immunization for influenza?

END OF INTERVIEW

APPENDIX C: SCHOOL INTERVIEW

1. Has your school ever participated in a flu vaccination program?

[PROMPT: If the answer to Q. 1 is “yes”, please answer the following questions]

2. How would you rate your overall experience with the flu vaccination program?
3. What were the main challenges that you faced during the flu vaccination program?

[PROMPTS: communication, management, storage, location, resources]

4. What are specific issues that came up during the program?
5. What went well, and are past successes sufficiently institutionalized?
6. What might have been done differently?
7. What should be done differently in the future?
8. Do you think that school nurses and other school-based health center professionals should be considered a priority group to give the flu vaccine?
9. Did you receive any feedback from students or/and parents about the school-based vaccination program?

[PROMPT: If the answer to Q.9 is “yes”, please answer Q.10 – Q.14]

10. How did children and parents feel about the school-based flu vaccination program?
11. What was the effect of the vaccination program on the student absenteeism rates during the flu season?
12. How do you feel about receiving support from health department nurses?
13. Would you participate in a flu program again?
14. Do you have any other comments or questions?

END OF INTERVIEW

APPENDIX D: PRIVATE PROVIDER INTERVIEW

1. Are you aware of any efforts to provide flu vaccinations at schools?
2. Where do you think is the best place for children to receive flu vaccinations?
3. Do you think that school nurses and other school-based health center professionals should be considered a priority group to give the flu vaccine?
4. How do you feel about school-based flu vaccination programs?
5. Have you ever been involved in the school-based vaccination program?
6. Do you have any additional questions or comments?

END OF INTERVIEW

APPENDIX E: PARENT INTERVIEW

1. Are you aware of any efforts to provide flu vaccinations at schools?
2. Did your child receive a flu vaccine last year?

[PROMPT: If the answer to Q. 2 is “yes”, please answer Q.3]

[PROMPT: If the answer to Q. 2 is “no”, please answer Q.11 – Q.13]

3. At what kind of place did your child get the last flu shot?
 - a. A doctor’s office
 - b. A health department
 - c. A store

[PROMPTS: supermarkets, drug store]

- d. School

[PROMPT: If the answer to Q. 3 is “School,” please answer Q. 4 – Q.10]

[PROMPT: If the answer to Q. 3 is not” school,” please answer Q. 11 – Q.13]

4. How would you rate your child’s overall experience with the school-based flu vaccination program?
5. Did you or your child experience any challenges or problems?
6. What might have been done differently?
7. What should be done differently in the future?
8. Do you think that school nurses and other school-based health center professionals should be considered a priority group to give the flu vaccine?
9. If flu vaccine is offered at your school, would you give permission for your child to receive flu vaccine at school?

[PROMPT: If the answer to Q. 9 is “no”, please explain]

10. Do you have any other comments or questions?

[PROMPT: If the answer to Q. 3 is “Not school”, please answer Q. 11 – Q.13]

11. Do you think that school nurses and other school-based health center professionals should be considered a priority group to give the flu vaccine?

12. If flu vaccine is offered at your school, would you give permission for your child to receive flu vaccine at school?

[PROMPT: If the answer to Q. 12 is “no”, please explain]

13. Do you have any other comments or questions?

END OF INTERVIEW

APPENDIX F: LIST OF ASSUMPTIONS USED TO DEVELOP THE CAMPAIGN COST PROJECTION

- The LHD will organize the campaign; provide templates for letters to parents and providers and for consent forms; conduct limited advertisement activities about the campaign to mass media and health professionals; purchase, store, transport and administer vaccine; provide nurses as needed and 1 clerical staff for each vaccination site.

- School districts will facilitate the planning and implementation of the campaign; identify a suitable space for the vaccination activities; make copies of letters and consent forms, distribute them to the parents and collect them back; advertise the campaign to parents and students; provide 1 nurse and support staff for each site as needed.

- KDHE will provide vaccine for VFC eligible children.

- The proportion of VFC eligible children in the state is assumed to be 28 percent, which is the state average. In localities with a higher proportion of VFC-eligible children some of the cost for the vaccine will shift from the LHD to KDHE.⁶

- The projected costs for each campaign includes some fixed costs (which do not change with the size of the campaign) and some variable costs that take into account how many school districts, schools and students are involved in the campaign. The cost is divided as follows:

Table F1. Projected Costs for Each Campaign

	Paid by LHD	Paid by school district
Fixed costs	\$20,750	\$232
Additional cost per each school district	\$1,152	—
Additional costs per each school	\$145	\$168
Additional cost per each student immunized (not including the vaccine)	\$3	—

⁶ The cost for VFC vaccine is allocated to KDHE, but the vaccine is purchased by KDHE using federal funds.

- The cost for the vaccine cost is assumed at \$12/dose for private vaccine and \$10/dose for VFC vaccine. The private vaccine is available to non-VFC eligible children and is purchased by the LHD. The VFC vaccine is available to VFC-eligible children and is purchased by KDHE using federal funds. It is assumed that standard, thimerosal-containing vaccine will be used in the campaign. The use of thimerosal-free vaccine would cost about 50 percent more. The use of live, attenuated vaccine would cost about twice as much as the standard injectable vaccine.
- The LHD will collect a reimbursement for each dose of private vaccine administered. For children receiving VFC vaccine the reimbursement is assumed at \$14 to cover administrative fee, and is provided by the state Medicaid and SCHIP programs. It is assumed that every VFC child is enrolled in Medicaid or SCHIP, allowing the LHD to collect the administration fee.⁷ For non-VFC eligible children the reimbursement is assumed at \$25 to cover both the cost of the vaccine and the administrative fee and can be collected from the parents or from the child's insurance plan. It is assumed that an insurance or direct payment will be collected for every non-VFC student.
- For children younger than 8 years who need two doses of vaccine, it is assumed that only the first does is provided during the school campaign.

⁷ Some VFC eligible children are not enrolled in Medicaid or SCHIP but in Kansas this number is small.