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Sustainability of school-located influenza vaccination programs in Florida

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Abstract

Background—School-located influenza vaccination (SLIV) programs are a promising strategy for increasing vaccination coverage among schoolchildren. However, questions of economic sustainability have dampened enthusiasm for this approach in the United States. We evaluated SLIV sustainability of a health department led, county-wide SLIV program in Alachua County, Florida. Based on Alachua's outcome data, we modeled the sustainability of SLIV programs statewide using two different implementation costs and at different vaccination rates, reimbursement amount, and Vaccines for Children (VFC) coverage.

Methods—Mass vaccination clinics were conducted at 69 Alachua County schools in 2013 using VFC (for Medicaid and uninsured children) and non-VFC vaccines. Claims were processed after each clinic and submitted to insurance providers for reimbursement (\$5 Medicaid and \$47.04 from private insurers). We collected programmatic expenditures and volunteer hours to calculate fixed and variable costs for two different implementation costs (with or without in-kind costs included). We project program sustainability for Florida using publicly available county-specific student populations and health insurance enrollment data.

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Results—Approximately 42% ($n = 12,853$) of pre-kindergarten – 12th grade students participated in the SLIV program in Alachua. Of the 13,815 doses provided, 58% (8042) were non-VFC vaccine. Total implementation cost was \$14.95/dose or \$7.93/dose if “in-kind” costs were not included. The program generated a net surplus of \$24,221, despite losing \$4.68 on every VFC dose provided to Medicaid and uninsured children. With volunteers, 99% of Florida counties would be sustainable at a 50% vaccination rate and average reimbursement amount of \$3.25 VFC and \$37 non-VFC. Without volunteers, 69% of counties would be sustainable at 50% vaccination rate if all VFC recipients were on Medicaid and its reimbursement increased from \$5 to \$10 (amount private practices receive).

Conclusions and relevance—Key factors that contributed to the sustainability and success of an SLIV program are: targeting privately insured children and reducing administration cost through volunteers. Counties with a high proportion of VFC eligible children may not be sustainable without subsidies at \$5 Medicaid reimbursement.

Keywords

Influenza vaccination; Immunization; Insurance; Cost; School health services; School-aged population

1. Introduction

Unvaccinated children comprise 90% of all influenza-associated pediatric deaths that occur each year in the United States [1]. Despite these high profile deaths [2,3], and six years after the Advisory Committee for Immunization Practice started recommending annual vaccination for children [4], vaccination rates remain suboptimal [5,6]. School-located influenza vaccination (SLIV) programs provide one mechanism to achieve Healthy People 2020 goals for 80% vaccination coverage rates among school-age children [7]. These programs complement provider-based vaccination by increasing the opportunity for parents to have their child vaccinated at school [8]. Several SLIV programs have achieved high vaccination rates [8–10], and have also documented a reduction in absenteeism [11,12] and influenza transmission [9,13–21].

Although support for SLIV programs is strong [22,23], limited data exists regarding their financial sustainability in the United States [23–25]. Programs heavily dependent on reimbursement from insurers can encounter staggering start-up costs, and must navigate through a complex two payer reimbursement system (private health insurance and Medicaid) and 6% of children being uninsured [26]. Although the Affordable Care Act (ACA) mandates that all new private health insurance plans must cover routine vaccination at no cost to the enrollee, some do not recognize health departments as an in network provider [23,24]. Further, it has been reported that Medicaid reimbursement is inadequate to sustain SLIV programs [24,25].

The main objective of this study was to examine the economic sustainability of a health department led, county-wide SLIV program that encompassed pre-kindergarten – 12th grade students in public, private, and charter schools in Alachua County, Florida for the 2013–2014 school year. Based upon the program’s outcome data, we explored the sustainability of

SLIV programs statewide using two different implementation costs (with or without volunteers), and under different parameters: vaccination rates, Medicaid reimbursement amount, and Vaccine for Children (VFC) coverage. We defined sustainability as the program cost being less than or equal to net revenue.

2. Methods

2.1. Alachua's SLIV program

For the 2009–10 to 2012–13 school years, the Alachua County program provided Live Attenuated Influenza Vaccine (LAIV) to all participating schoolchildren. The Florida Department of Health (FDOH) provided the vaccine and did not impose restrictions on its use (e.g. eligibility requirements such as income). Volunteers and community grants offset the infrastructure cost of the program. Schoolchildren ineligible for the LAIV were identified and encouraged to receive an inactivated influenza vaccine (IIV) at their medical home [8,9]. To track vaccination coverage among schoolchildren, the Alachua County Health Department (ACHD) and community pediatricians agreed to enter all influenza vaccinations into the vaccine registry. Overall, this community-based initiative has consistently achieved a pre-kindergarten – 12th grade vaccination rate 42% during that time period.

For the 2013–14 school year, the FDOH restricted the use of vaccine because of ACA guidelines. The FDOH vaccine could only be given to schoolchildren eligible for the Vaccines for Children (VFC) program (schoolchildren with consent form notating they are uninsured, underinsured, Medicaid eligible, or American Indian or Alaska Native). This required the SLIV program to segregate all participating schoolchildren into two categories: VFC and non-VFC. Further, the ACHD had to purchase vaccine for non-VFC participants (schoolchildren with consent forms reporting to have private insurance). The number of non-VFC doses needed was projected from previous years. To recoup the cost of purchasing non-VFC vaccine, the SLIV program explored the option of billing private insurers for vaccine and its administration.

2.2. Alachua's billing and reimbursement

After each vaccine clinic, claims were processed and submitted to insurance providers for reimbursement. The ACHD absorbed the economic loss of insufficient, partial, and denied claims (two billing attempts were made for each denied claim). To ensure that the program remained at no cost to participants, parents/guardians were not directly billed if claims were denied or if the private insurer required a co-pay (grandfathered insurance policies that still required co-pays post ACA [27]). [27]).

2.2.1. Non-VFC vaccine—The ACHD negotiated contracts with the two large private insurance plans to gain recognition as an in-network provider at \$47.04 per dose (\$25 for vaccine and \$22.04 for its administration). Further, the ACHD attempted to bill all other private insurers to recover costs. All participants receiving a non-VFC vaccine were categorized into this group. This group included schoolchildren: with no insurance (retrospectively identified), with an in-network private insurance company, or with an out-

of-network insurance. Due to this admixture of reimbursement amounts from different insurers, reimbursement could range from a net loss (from purchased vaccine and its administration) to a net gain (greater than \$0). The purchasing cost of non-VFC vaccine was \$17.50/dose for the ACHD.

2.2.2. VFC vaccine—All participants receiving a VFC vaccine were categorized into this group. This group included schoolchildren with Medicaid or meeting requirements for a VFC vaccine. The ACHD billed Medicaid for the administration of VFC vaccines among those insured. In Florida, health departments are reimbursed at \$5 per dose for all vaccine administration (vaccine is donated and therefore cannot be billed). Due to this admixture of schoolchildren with and without Medicaid, reimbursement for VFC vaccine could range from a net loss (from vaccine administration) to a net gain (if a full reimbursement of \$5 was obtained from Medicaid, and the reimbursement is higher than the program's administration costs).

2.3. Alachua's programmatic cost

To account for counties that may need to hire additional personnel to implement the SLIV program, we calculated two types of infrastructure costs: with and without in-kind costs (Table 1). To give our costs a unit value, all costs were either divided by the total number of students enrolled in Alachua (fixed cost) or the number of doses provided (variable cost).

2.3.1. Direct costs—Expenses relating to the SLIV program were obtained from ACHD's accounting of all costs relating to the program: print materials (consent forms and promotional materials), supplies (office and medical), transportation costs, and personnel costs. The transportation costs only included trips to schools using the ACHD vehicles (the farthest school is 40 miles from the main health department). Employees' salaries and times sheets of permanent (program coordinator) and temporary employees (clerks, registered nurses, and program assistants) were used to calculate personnel costs/hour spent working directly on the program. Further, we asked staff to estimate the percentage of time spent working on the following activities: program promotion, reviewing/pursuing consent forms, implementing the vaccine clinics, and billing of claims. A full time ACHD employee was assigned to serve as the program coordinator for 5 months with an annual salary of ~\$49,000 per year. Among our temporary employees, we hired three different types of staff: clerks, program assistants, and registered nurses (RNs). Clerks were paid at \$15.60/hour to check forms prior to the vaccine clinic, enter vaccination data into Florida's vaccine registry, and process claims for billing. Program assistants were hired at \$10/hour to oversee the coordination of volunteers at their assigned schools, to promote the SLIV program, and to review/pursue consent forms in weeks leading up to their schools' scheduled vaccine clinic. RNs were hired at \$25/hour to vaccinate at clinics when volunteer vaccinators were not available. We estimated personnel cost by multiplying the assigned wage of each personnel type to the total number of hours spent on specific activities (travel time, program promotion, reviewing/pursuing consent forms, vaccinating children, clinic set up/break down, entering data into the registry, processing billing claims, and coordinating program with school administrators). The program did not reimburse for travel, so we only included paid travel time of one hour to each school site (an overestimate).

2.3.2. In-kind costs—Volunteers (vaccinators and program promoters) and permanent employees (school nurses assigned to coordinate program as part of their additional duties) were asked to report the numbers of hours worked on SLIV related activities. To calculate the dollar value of our volunteers, we decided that vaccinators (mostly senior nursing students) would be paid \$25/hour, the same rate as our temporary RNs. Program promoters (mostly undergraduates students) were calculated to be paid \$8/hour. Permanent employees (mostly licensed practical nurses, LPNs) were paid at \$20/hour. Similar personnel calculations were performed to monetize work being done by volunteers and permanent employees.

2.4. Fixed and variable costs

In order to estimate both types of infrastructure cost for each county in Florida, we calculated fixed and variable costs based on the direct and indirect costs outlined earlier. We defined fixed costs as the expenditures needed to implement the program (regardless of the number of doses administered) divided by the number of students enrolled in participating schools. On the other hand, variable costs were dependent on the number of doses administered by the SLIV program. This includes extra medical supplies and staff time spent on promoting the program, vaccinating students, entering data into the state vaccine registry, and processing the claims for billing. Variable cost per dose was calculated by the total cost divided by the number of doses provided. Further, variable cost per dose was treated as a linear function, which assumes that the cost remained the same for every additional child vaccinated as opposed to the cost being incrementally lower for every additional child vaccinated (economies of scale).

2.5. SLIV sustainability analysis for Florida Counties

The sustainability projections were reported with the assumptions that the vaccination rate among non-VFC and VFC groups are equal; however, the number of public and private children immunized will vary by county, based on their insurance profile. County-specific health insurance data and enrollment were used to calculate the percentage of children in the non-VFC group and VFC group (Medicaid and uninsured). The adjusted parameters were: overall vaccination rates (30–70%), Medicaid reimbursement amounts (\$5 to \$10), Medicaid coverage (65–100%). The model held the non-VFC reimbursement amount (\$47.04) and the reimbursement percentage (80.35%) constant.

We investigated sustainability at different implementation costs (with and without in-kind costs) and under three different VFC reimbursement scenarios: (1) a \$5 Medicaid reimbursement for 60% of VFC claims (average reimbursement from VFC doses are \$3.25). This is Alachua's observed outcome; (2) a \$5 Medicaid reimbursement for all VFC claims (assumption that VFC recipients are covered by Medicaid); (3) a \$10 Medicaid reimbursement for 60% of VFC claims (assumption that Medicaid increase reimbursement); and (4) \$10 Medicaid reimbursement for 100% of VFC claims (assumption that all VFC recipients are covered by Medicaid, and reimbursement amount was increased to \$10, the Medicaid reimbursement amount for private medical providers).

Fixed and variable costs for both implementation costs (with and without in-kind costs included) were used to predict infrastructure cost for other counties in Florida. Each county's fixed costs were adjusted by multiplying Alachua's fixed cost per-student to the number of students enrolled in each county. Fixed cost was a function of the number of students enrolled in that county, and independent of the number of doses provided. The per-dose variable cost for each county was dependent on the number of doses provided and the implementation costs (with or without in-kind costs included).

Public and charter school enrollment data for each county were obtained from the Florida Department of Education [28]. The same data were not available for private schools; therefore, this population was not included in the sustainability models. We obtained county-level data of uninsured and Medicaid eligible children from the US Census [26] and the Agency for Health Care Administration [29], and identified that 83% of Medicaid eligible children in Florida were covered [30].

Vaccination rates, demographic data, costs, reimbursements, and sustainability projects were calculated using the R statistical software [31]. We conducted a one-way sensitivity analysis by varying Medicaid reimbursement amounts to examine the impact on the sustainability model.

3. Results

3.1. Characteristics of participating schools and program participants

In 2013–14, approximately 30,816 students were enrolled in the 69 schools that participated in the SLIV program (Table 2). Roughly 42% (12,853) of students received at least one dose of LAIV through the SLIV program. Of these, 78% of children 9 and under received their second dose with the program. Of the three school types, private schools had the highest vaccination rate at 43%, while charter schools had the lowest coverage at 38%.

3.2. Outcomes of Alachua's SLIV program

3.2.1. Insurance claims—When possible, the ACHD attempted to submit a claim for each of the 13,815 doses administered by the program (Fig. 1). Among the 8042 non-VFC doses administered, 80.35% ($n = 6462$) of claims were reimbursed by private health insurers at $> \$0$ for the vaccine and its administration. The remaining non-VFC claims ($n = 1580$) contained incorrect insurance information or were rejected from insurers because the participant was no longer covered.

Among the 5773 VFC doses, 31.56% ($n = 1822$) were administered to participants meeting the “uninsured” VFC eligibility criteria, therefore unbillable. Claims for the remaining 3951 VFC doses (68.44%) were submitted to Medicaid. Approximately 94.86% ($n = 3748$) were reimbursed at exactly \$5 (the standard Medicaid rate for Florida health departments). The remaining Medicaid claims ($n = 203$) contained incorrect information or were rejected because the participants were no longer covered.

3.2.2. Implementation costs—When in-kind costs were excluded, the total cost per dose administered was \$7.93 (Table 1). The majority of the cost, roughly 89%, was attributed to

personnel hours. Approximately 43% of the cost was fixed, translating to \$3.41 for every dose administered or \$1.54 for every student enrolled in a participating school. The variable cost was \$4.52 per dose administered.

When in-kind costs were included, the total cost per dose administered increased to \$14.95, with personnel cost accounting for 94% of the total cost. Almost 49% of the total cost was fixed, accounting for \$7.29 per dose administered or \$3.28 per student enrolled in a participating school. The variable cost increased to \$7.66 per dose administered.

3.2.3. Expenditures—The Alachua program (in-kind costs excluded) spent \$250,288 in 2013 (Table 3). At \$17.50 per dose, non-VFC vaccine accounted for 65.30% (\$140,735) of the total expenditure. Program implementation accounted for the remainder (\$109,553) of the costs at \$7.93 for every VFC and non-VFC administered. If in-kind costs were included, the program would have spent \$347,269 in 2013 (Program implementation accounted for 59.47% (\$206,534) of the costs at \$14.95 for every dose administered.

3.2.4. Reimbursement and net revenue—Among claims for non-VFC vaccine, the average reimbursement from private insurers was \$37.14 (\$0.77 to \$50.83). The total amount reimbursed was \$255,769 (Table 3). When in-kind costs were excluded, the net revenue from non-VFC vaccines was \$51,261 (at \$6.37 for every non-VFC dose administered). In total, the unbillable non-VFC doses cost the program \$40,185. When in-kind costs were included, the net revenue from non-VFC vaccines was −\$5194 (at −\$.65 for every non-VFC dose administered). In total, the unbillable non-VFC doses had cost the program \$51,279.

Among claims for VFC vaccine, the total reimbursement from Medicaid was \$18,740 at \$5 (When in-kind costs were excluded, the net revenue from VFC vaccines was −\$27,040 (at −\$4.68 for every VFC dose administered). In total, the unbillable VFC doses had cost the program \$9156. When in-kind costs were included, the net revenue from non-VFC vaccines was −\$67,566 (at −\$11.70 for every VFC dose administered). In total, the unbillable non-VFC doses cost the program \$17,261.

In total, the program generated a net revenue of \$24,221 when in-kind costs were excluded (Table 3). Further, the program lost \$4.68 for every VFC vaccine given. If in-kind costs were included, the program would generate a net loss of \$72,760. The program would lose \$.65 and \$11.70 for every non-VFC administered and VFC vaccine administered.

3.3. SLIV sustainability for Florida Counties

3.3.1. Average VFC reimbursement at \$3.25—When in-kind costs were excluded 51% (35 out of 67) counties in Florida could be sustainable at a 30% vaccination rate. At a 40% vaccination rate, 91% (63 out of 67) of counties could be sustainable. Only one county (highest Medicaid population in Florida) remained unsustainable until reaching a 70% vaccination rate (Fig. 2, Panel A1–A5). However, with in-kind costs included, it would be very difficult for any county to achieve sustainability until 40% vaccination rate (Fig. 2, Panel B1–B5). At a 70% vaccination rate, about 22% (15) of Florida's most affluent counties would be sustainable.

3.3.2. Average VFC reimbursement at \$5, \$6.50, and \$10—If 100% students receiving VFC were on Medicaid (\$5 reimbursement amount), 22% of counties would be sustainable at a 70% vaccination rate (Fig. 2, Panel C1–C5). If VFC reimbursement increased to \$10 (similar to private medical provider), but only 65% of VFC recipients were covered with Medicaid, 46 (69%) of counties would be sustainable at 70% (Fig. 2, Panel D1–D5). However, if all VFC recipients were covered by Medicaid at \$10, all but one county would be sustainable (Fig. 2, Panel E1–E5).

4. Discussion

Only a handful of studies have addressed economic sustainability of SLIV programs [25,32,33]. In contrast to earlier published reports [24], we found that these programs can be financially sustainable. Key factors that contributed to the sustainability and success of the Alachua County SLIV program and potentially other programs are: targeting adequate numbers of privately insured children and reducing implementation cost through volunteers and mass vaccination (opposed to the clinic/individual-based approach).

Our study highlights that the current Medicaid reimbursement structure promotes vaccination inequity and negatively impacts local control efforts against all vaccine preventable diseases, especially for health departments. Consistent with our findings, similar observations were documented in Denver, Colorado. Denver's program recouped only a quarter the implementation and vaccine costs, because of the low reimbursement obtained from their target population (89% of their participants were on Medicaid, a low income children's insurance plan, or uninsured)[24]. Without approaches like SLIV programs, VFC dependent populations are less likely to receive vaccine [24], which may result in higher burden of disease and healthcare associated costs for Medicaid [34,35]. If Medicaid reimbursement for health departments were the same as private providers (at \$10/dose), more SLIV programs would be sustainable in Florida. Further, this inequity in reimbursement translates to all vaccines, not just for influenza. Implementation costs are another key aspect of SLIV sustainability. We show that recruiting volunteers during mass vaccination clinics is an effective way to reduce cost and support long-term sustainability. Similar to other programs [36,37], we believe that communities could partner with their local colleges or universities especially with nursing programs or medical civic groups such as the Medical Reserve Corps. If utilizing volunteers is not a possible option, temporary staff can handle the administrative tasks and vaccination (as done in Alachua for private schools). Both approaches facilitate mass vaccinations clinics, which can substantially reduce implementation costs [33].

Increasing the reimbursement amount and improving the proportion of successfully reimbursed claims are also important factors for sustainability. Achieving this goal at a mass scale would require a lengthy and time consuming process at a local level. Programs may want to consider negotiating with providers collectively, at a state or national level for a greater bargaining position. Furthermore, determining insurance coverage by screening each consent form (prior to vaccination) is another possible option for sustainability. However, this type of strategy may be a time consuming process, and therefore may not be cost-effective.

There are several limitations to this analysis. The costs and reimbursements are based on one county's experience, and may not be directly generalizable. Published studies have reported lower participation from privately insured students [24], but they had targeted schools with high VFC populations. Our implementation costs (both with and without volunteers) are in the lower range of other SLIV programs [8,10,24,25,33,38–40]. Many of these programs had higher costs because some had to hire personnel to do duplicate work due to privacy issues [24,25], did not mass immunize [25], or were starting a program with limited infrastructure [40]. Our costs could also be lower due to underreporting of volunteer hours and cost assumptions, such as salary and cost for supplies. Lastly, the Alachua program is six years old. This experience may have an advantage in reducing costs due to efficiency and achieving higher vaccination rates than other SLIV programs. However, three SLIV programs have reported achieving 45% vaccination rates or greater among K-12 [11,41,42]. And some programs have achieved over 55% vaccination among elementary children [43].

5. Conclusions

Alachua has demonstrated that SLIV programs have the potential to improve community health and reduce inequality in an economically sustainable manner. Secondly, we found that parents were willing to have their insurance provider billed. More work is needed to assist health departments address billing and reimbursement issues for vaccinations. At an implementation level, having analytic tools for public health decision-makers to quickly assess the economics of implementing SLIV programs tailored to their specific community or state would be helpful. At a policy level, cost-savings analyses on the impact of SLIV programs on reducing influenza expenditures incurred by health insurers (both private and Medicaid) would be needed. These cost analyses may help build an even stronger case for increasing the current reimbursement amounts and make it easier for health departments to contract with private insurers for influenza vaccination.

In summary, wider implementation of SLIV programs can help achieve vaccination goals. We found that these programs can be sustainable through reimbursement from private insurers. In communities with a high proportion of VFC eligible children, SLIV programs are not sustainable unless they are subsidized or can obtain a higher Medicaid reimbursement amount. Our data raises the basic questions about funding for influenza vaccination for all children, and the overall approach to public health under current reimbursement strategies in the United States. We hope this will lead to a broader discussion among public health officials, policy makers, health insurers, researchers, and the vaccine manufacturers to finding a solution to this important issue.

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Abbreviations

SLIV	school-located influenza vaccination
VFC	Vaccines for Children
LAIV	Live Attenuated Influenza Vaccine
ACHD	Alachua County Health Department

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What is known on this subject

- School-located influenza vaccination (SLIV) programs are shown to increase vaccination rates and reduce community transmission. Traction for wider implementation has been slow moving due to funding barriers. Limited data exists regarding successful strategies for financial sustainability.

What this study adds

- This study found that SLIV programs can be sustainable by targeting privately insured children, reducing administration cost through volunteers, and obtaining high vaccination rates. Communities with a high proportion of VFC eligible children may not be sustainable without subsidies.

Non-VFC= participants with no insurance, with an in-network private insurance company, or with an out-of-network insurance. VFC Doses = participants with Medicaid or meeting requirements for a VFC vaccine.

^a Percentages obtained by dividing by the total doses administered.

^b Claims reimbursed at >\$0 (the average reimbursement from private insurers was \$37.14 (\$0.77 to \$50.83)).

^c Percentages obtained by dividing by the total Non-VFC doses administered.

^d Unbillable claims containing incorrect insurance policy information or were rejected from insurers because the participant was no longer covered.

^e Claims of participants meeting the “uninsured” VFC eligibility criteria, therefore unbillable.

^f Percentages obtained by dividing by the total VFC doses administered.

^g Claims reimbursed by Medicaid at \$5.

^h Medicaid claims containing incorrect information or were rejected because the participants were no longer covered.

Fig. 1.

Billing outcomes of Alachua’s school-located influenza vaccination programs. Non-VFC = participants with no insurance, with an in-network private insurance company, or with an out-of-network insurance, VFC Doses = participants with Medicaid or meeting requirements for a VFC vaccine. ^a Percentages obtained by dividing by the total doses administered. ^b Claims reimbursed at >\$0 (the average reimbursement from private insurers was \$37.14 (\$0.77 to \$50.83)). ^c Percentages obtained by dividing by the total Non-VFC doses administered. ^d Unbillable claims containing incorrect insurance policy information or were rejected from insurers because the participant was no longer covered. ^e Claims of participants meeting the “uninsured” VFC eligibility criteria, therefore unbillable. ^f Percentages obtained by dividing by the total VFC doses administered. ^g Claims reimbursed by Medicaid at \$5. ^h Medicaid claims containing incorrect information or were rejected because the participants were no longer covered.

The vaccination rate among non-VFC and VFC groups are equal, however, the number of public and private kids immunized varied by county, based their insurance profile.

County-specific health insurance data and enrollment were used to calculate the percentage of children in the non-VFC group (percentage of privately insured children multiplied by student enrollment) and VFC group (percentage of Medicaid insured children by student enrollment plus the percentage of uninsured children multiplied by student enrollment).

Private school enrollment data for each county were excluded because data was unavailable.

Fixed costs per student are: \$1.54 (in-kind costs included) and \$3.28 (all-inclusive aka in-kind costs not included)

Variable costs per dose are: \$3.41 (in-kind costs included) and \$7.29 (in-kind costs not included)

^a \$5 Medicaid reimbursement for 65% of VFC recipients (average reimbursement from VFC doses are \$3.25). This is Alachua's observed outcome with in-kind costs excluded.

^b \$5 Medicaid reimbursement for 65% of VFC recipients (average reimbursement from VFC doses are \$3.25). This is Alachua's observed outcome with in-kind costs included.

^c \$5 Medicaid reimbursement for 100% VFC recipients (assumption that all VFC recipients are covered by Medicaid).

^d \$10 Medicaid reimbursement for 65% of VFC recipients.

^e \$10 Medicaid reimbursement for 100% of VFC recipients (assumption that all VFC recipients are covered by Medicaid, and reimbursement amount was increased to \$10, the Medicaid reimbursement amount for private medical providers).

Fig. 2.

Sustainability of school-located influenza vaccination programs with and without community support at varying vaccination rates. The vaccination rate among non-VFC and VFC groups are equal, however, the number of public and private kids immunized varied by county, based their insurance profile. County-specific health insurance data and enrollment were used to calculate the percentage of children in the non-VFC group (percentage of privately insured children multiplied by student enrollment) and VFC group (percentage of Medicaid insured children by student enrollment plus the percentage of uninsured children multiplied by student enrollment). Private school enrollment data for each county were excluded because data was unavailable. Fixed costs per student are: \$1.54 (in-kind costs included) and \$3.28 (all-inclusive aka in-kind costs not included). Variable costs per dose are: \$3.41 (in-kind costs included) and \$7.29 (in-kind costs not included). ^a \$5 Medicaid reimbursement for 65% of VFC recipients (average reimbursement from VFC doses are \$3.25). This is Alachua's observed outcome with in-kind costs excluded. ^b \$5 Medicaid

reimbursement for 65% of VFC recipients (average reimbursement from VFC doses are \$3.25). This is Alachua's observed outcome with in-kind costs included. ^c \$5 Medicaid reimbursement for 100% VFC recipients (assumption that all VFC recipients are covered by Medicaid). ^d \$10 Medicaid reimbursement for 65% of VFC recipients. ^e \$10 Medicaid reimbursement for 100% of VFC recipients (assumption that all VFC recipients are covered by Medicaid, and reimbursement amount was increased to \$10, the Medicaid reimbursement amount for private medical providers).

Table 1

Infrastructure cost of Alachua County's SLIV in 2013–2014.

Cost category	Description	In-kind costs ^a	
		Excluded	Included
Fixed costs^b			
Program materials	Consent forms, office supplies and start-up medical supplies for emergency kits and clinics.	\$0.27	\$0.27
Transportation	Four round trips to each school for consent form drop off, clerks to review consent forms, and first and second dose vaccine clinic.	\$0.03	\$0.03
Hired personnel	Salary for program coordinator salary (5 months), clerks, program assistants, and RNs to perform duties independent of the number of doses provided (e.g. travel time, clinic set up/break down, and training.)	\$1.24	\$1.24
Permanent Employees	Salary for school nurses assigned to coordinate program as part of their normal duties.	\$0	\$1.06
Program Promotion Volunteers	Salary for volunteers to perform duties independent of the number of doses provided.	\$0	\$0.27
RN Volunteers	Salary for RNs to perform duties independent of the number of doses provided.	\$0	\$0.41
Fixed costs per student		\$1.54	\$3.28
Fixed costs per dose		\$3.41	\$7.29
Variable costs^c			
Program materials	Additional medical supplies for emergency kits and clinics.	\$0.22	\$0.22
Hired personnel	Salary for duties dependent of the number of doses provided (e.g. review consent forms, bill third-party payers, and administering vaccine).	\$4.30	\$4.30
Program Promotion Volunteers	Salary for duties dependent of the number of doses provided.	\$0	\$2.08
RN Volunteers	Salary for duties dependent of the number of doses provided.	\$0	\$1.06
Variable cost per dose		\$4.52	\$7.66
Total cost per dose		\$7.93	\$14.95

SLIV = school-located influenza vaccination; RN = registered nurse.

^aIn-kind cost = donated time from volunteers and school nurses.^bFixed costs are expenditures needed to implement the program, regardless of the number of doses administered.^cVariable costs are dependent on the number of doses administered by the SLIV program. This includes extra medical supplies and staff time spent on promoting the program, vaccinating students, entering data into the state vaccine registry, and processing the claims for billing.

Table 2

Immunization rates and characteristics of Alachua County school types in the SLIV program in 2013–2014.

Characteristics	All	Public schools ^d	Charter schools ^{a,b}	Private schools ^b
First dose vaccination, %	42 (5–75)	42 (5–65)	38 (13–59)	43 (14–75)
VFC doses, %	40 (3–95)	43 (20–95)	52 (15–89)	14 (3–14)
Student population	30,816	26,255	1185	3376
Schools	69	42	10	17
School size ^c	447 (20–2052)	625 (20–2052)	119 (62–239)	199 (62–820)
Free or reduced lunch eligibility, % ^d	–	–	–	–
Race/ethnicity, %				
Black or African American	–	–	32 (0–96)	–
Hispanic/Latino	–	–	5 (0–17)	–
Other ^e	–	–	3 (0–9)	–

SLIV = school-located influenza vaccination; VFC = Vaccines for Children.

^aData obtained from the Florida Department of Education, Fall 2013 membership.

^bData reported to the Alachua County Health Department, Fall 2013. Free or reduced lunch eligibility and race/ethnicity was unavailable for all private and charter schools.

^cMean value.

^d–, “” denotes data not available.

^e“Other” includes Asian, Pacific Islander, American Indian, Alaska Native, and two or more races. Data was rounded up, and missing data was interpreted as 0.

Table 3

Expenditures and reimbursements by vaccination group and implementation costs.

Group ^d	Non-VFC		VFC		Total	
	Excluded	Included	Excluded	Included	Excluded	Included
Expenditures						
Vaccine ^c	\$140,735	\$140,735	\$0	\$0	\$140,735	\$140,735
Implementation ^d	\$63,773	\$120,228	\$45,780	\$86,306	\$109,553	\$206,534
Total	\$204,508	\$260,963	\$45,780	\$86,306	\$250,288	\$347,269
Reimbursement						
Total	\$255,769	\$255,769	\$18,740	\$18,740	\$274,509	\$274,509
Average per dose ^e	\$37.14 (\$0–50.53)	\$37.14 (\$0–50.53)	\$3.25 (\$0–5)	\$3.25 (\$0–5)	\$19.87 (\$0–0.53)	\$19.87 (\$0–50.53)
Net revenue						
Total	\$51,261	–\$5194	–\$27,040	–\$67,566	\$24,221	–\$72,760
Per dose ^f	\$6.37	–\$0.65	–\$4.68	–\$11.70	\$1.75	–\$5.27

VFC = Vaccines for Children program.

^aNon-VFC group = schoolchildren with no insurance (but stated they did have insurance on the consent form), with an in-network private insurance company, or with an out-of-network insurance. VFC group = schoolchildren with Medicaid or meeting requirements for a VFC vaccine (Medicaid eligible, American Indian or Alaska Native, or uninsured).

^bIn-kind cost = donated time from volunteers and school nurses.

^cNon-VFC vaccines = \$17.50/dose. VFC vaccines = no cost to the program.

^dIn-kind costs excluded = \$14.95/dose administered. In-kind costs included = \$7.93/dose administered.

^eAverage per dose = total reimbursement amount divided by number of vaccines type administered. Reimbursement range provided. Medicaid was billed \$5 per dose, and would be reimbursed at \$5 if student was covered. (\$5 is the standard health department reimbursement amount for all vaccines). All private insurers were billed \$47.04 per dose (for the vaccine and its administration). A few claims submitted to private insurers were reimbursed greater than the billed amount.

^fNet revenue per dose = total net revenue divided by number of doses administered.